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Barber Orchard  
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## COMMUNITY RELATIONS PLAN

# BARBER ORCHARD SITE

Waynesville, Haywood County, North Carolina



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**U.S. Environmental Protection Agency**  
**Region IV**  
**North Site Management Branch**  
**61 Forsyth Street, SW**  
**Atlanta, Georgia 30303**

**March 2001**

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**PREFACE**

This Community Relations Plan for the Barber Orchard Site, Waynesville, Haywood County, North Carolina is a working document which serves as a guide for communicating with the affected community. The activities and schedules presented in this Plan will be revised as circumstances, community interests and concerns change. The Plan outlines the United States Environmental Protection Agency's (EPA) strategy for informing and involving local officials and citizens in clean up decisions for this Site and will be used throughout the project's Remedial Investigation/Feasibility Study (RI/FS) phase, the remedy selection process, Remedial Design and Remedial Action phases.

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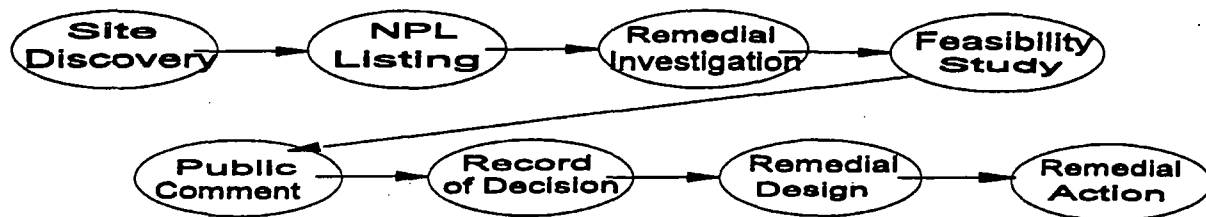
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## SECTION 1

## INTRODUCTION TO SUPERFUND

This section provides the public with a better understanding of how Superfund works. The flow chart featured below indicates the sequence of major steps in the Superfund process. A brief history of the Superfund program also appears in this section.



**What is Superfund?** In 1980 Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, more commonly known as Superfund). This Act authorizes EPA to investigate and respond to releases or potential releases of hazardous substances that may endanger public health, welfare, and the environment. The 1980 law set up a trust fund of \$1.6 billion to pay for the investigations and cleanup of sites where parties responsible for the problems are unable or unwilling to clean up the site. In October 1986, Congress amended and reauthorized the Superfund law and increased the size of the fund to approximately \$8.5 billion. This amendment is known as the Superfund Amendments and Reauthorization Act (SARA). Superfund dollars are normally utilized at sites which have been abandoned, are bankrupt, or which have no parties able to finance the cleanup. For those sites where the responsible party(ies) are able and willing to pay for and conduct the steps to clean up the site, EPA is involved in the Superfund process in an enforcement capacity to ensure the responsible party(ies) conduct the cleanup as agreed. As of the writing of this document, the Superfund program is undergoing reauthorization by Congress to determine if the program will continue in force, increase or decrease funding and personnel, relinquish some of the authority of the program over to the States, decide whether to continue using the current ranking system for sites or change the format, etc.

After a site is initially discovered it is usually inspected by the State. The State or EPA then scores the site using a numerical ranking system known as the Hazard Ranking System (HRS). The HRS is the principal mechanism used to place contaminated sites on the National Priorities List (NPL). It is a numerically based scoring system that uses information from initial, limited investigations to assess the relative potential of sites to pose a threat to human health or the

environment. HRS scores do not determine the priority of funding EPA remedial response actions, because the information collected so far is not sufficient to determine either the extent of contamination or the appropriate response for a particular site. Sites with the highest scores do not necessarily come to the EPA's attention first. EPA relies on more detailed studies in the remedial investigation/feasibility study. The HRS score is based upon risk factors related to conditions at the site. The factors are: 1) likelihood that a site has released or has the potential to release hazardous substances into the environment; 2) characteristics of waste (e.g., toxicity and waste quantity; and 3) people or sensitive environments affected by the release. The four pathways that are used to score a site are groundwater migration (drinking water); surface water migration (drinking water, human food chain, sensitive environments); soil exposure (resident population, nearby population, sensitive environments); and air migration (population, sensitive environments).

The State or EPA may develop the ranking criteria for a site, and request that the site be placed on the National Priorities List if the HRS score is 28.5 or greater. The NPL is a roster of hazardous waste sites in the Nation posing a threat to human health or the environment that require investigation/ action. Every site on the NPL qualifies for federal Superfund money to pay for cleaning up the contamination. As of the writing of this document, the Barber Orchard Site was proposed on January 11, 2001, for placement on the NPL with a score of 70.71 based primarily on pesticide contamination in groundwater which is the sole source of drinking water for residents in this community. High levels of arsenic and lead in soil also attributed to the Site's scoring. There are currently 25 sites in North Carolina on the NPL.

Because of the numerous agricultural properties (i.e., apple, peach and grapefruit orchards, orange groves, strawberries, grapes, nuts, lettuce, tomatoes, tobacco, grain crops, to name a few) throughout the United States that have and continue to use pesticides to protect the various crops, EPA established a policy on December 21, 1988, which outlines when these types of properties can be listed on the NPL. An agricultural property can be placed on the NPL only if pesticide contamination can be attributed to leaks, spills, or improper disposal. Ways of showing these releases are:

1. Documentation that the pesticide was used in a manner inconsistent with labeling.
2. Pesticides are found in locations that they would not typically be found in if used properly.
3. Evidence of spills where pesticides are found at levels that far exceed those representing normal application levels.
4. Pesticide carriers (volatile organic compounds (VOCs)) found without accompanying pesticides.

If a site or any portion of a site poses an imminent threat to public health or the environment at any time, EPA may conduct an emergency response action. **Emergency responses** usually involve short-term, immediate actions to remove and or treat the substances creating the threat, i.e., response to "classical emergencies" resulting from oil and hazardous substance spills and life threatening and environmental emergencies such as fire and explosion at hazardous waste sites. EPA has categorized removal actions in three ways: emergency, time-critical and non-time-critical, based on the type of situation, the urgency and threat of the release or potential release, and the subsequent time frame in which the action must be initiated. Emergency and time-critical removal actions respond to releases requiring action within six months; non-time-critical removal actions respond to releases requiring action that can start later than six months after the release. These type of removal actions are taken by the Superfund Emergency Response and Removal Branch, and in many cases precede the long-term remedial actions which are taken by the Superfund Remedial Branch such as is the case in Barber Orchard.

One of the first community relations activities EPA undertakes after a site has been proposed or placed on the National Priorities List is to interview citizens in and around the site, city and county officials, any concerned citizen groups, news media, and any other interested parties to determine the level of concern felt by the public. Through this effort a mailing list is developed enabling us to keep citizens informed. An Information Repository is established either in a nearby public library, town or city hall, or a facility that is accessible to the general public. The information repository houses all of the site-related documents developed during the Superfund process which the Agency uses to select a remedy for treating/cleaning up site contamination. A Community Relations Plan is developed presenting a brief history of the site, community and surrounding area; a list of concerns expressed by the public regarding the site; an outline featuring the schedule for keeping the public informed and involved during the Superfund process focusing on two-way communication between EPA and interested parties; and being responsive to citizens needs. The Agency conducts a "kick-off" public meeting to explain the Superfund process, provide an overview of the remedial investigation and feasibility study, outline upcoming investigation activities, give citizens an opportunity to meet EPA representatives, and respond to questions and concerns expressed by the public.

Next, EPA will negotiate with the potentially responsible party(ies), where viable, concerning who will pay for and conduct the **Remedial Investigation (RI) and Feasibility Study (FS)** portion of the process. The **RI/FS** is conducted by either the Potentially Responsible Party or EPA. Since there is no known viable potentially responsible parties at this time for the Barber Orchard Site, EPA will conduct the investigation. EPA will develop a work plan for conducting the **RI**. The **RI** is an extensive, detailed and in-depth sampling/analysis of surface and subsurface

soil, surface water and sediment, groundwater, air and any other media that might be contaminated. The **RI** initially identifies types of contaminants present, estimated quantity of contamination present in the various media, and the potential risks to human health and the environment. After all sampling data has been received a **Risk Assessment** is prepared to determine what are the current risks to humans, animals, and the environment from exposure to contaminants at the levels found based upon the samples taken from the site. The **Feasibility Study (FS)** is conducted based upon the information developed from the **RI** and the **Risk Assessment**. Various treatment alternatives are evaluated based upon nine criteria to determine which alternatives are feasible for treating contamination at the site. After these steps have been completed, a **Proposed Plan** of action is prepared briefly outlining the results of the **RI**, **Risk Assessment** and possible clean up actions that can be taken at the site. A public meeting and a 30-day public comment period are held to present results of the **RI/FS**, respond to questions and receive public input concerning the Agency's proposed actions. After EPA considers public comments and all technical data, a final remedy is selected and documented in a **Record of Decision (ROD)**. The **ROD** becomes an official document which presents the Agency's reasons and documentation for selecting the clean up method which is defensible in court.

Again, EPA negotiates with the **Potentially Responsible Party(ies) PRPs**, where viable, to determine who will pay for and conduct the remaining phases of the Superfund process consisting of the **Remedial Design, Remedial Action, Operation & Maintenance, and Site Deletion**. Since there are no viable **PRPs**, EPA will prepare a work plan blueprinting how to construct and implement the selected treatment system, then the treatment system is designed. After the design has been finalized and approved, construction of the treatment system begins the **Remedial Action** phase of the process.

In general, negotiations with responsible parties, development of a work plan for conducting the investigation, and implementation of the **RI/FS** and **Risk Assessment** can take from one to two years to complete depending upon the site's complexity; the selection process of a remedy can take three to four months; negotiations can take four to six months; development of the remedial design can take six months to a year, again depending upon how technical and intricate the treatment system is; physical construction of the treatment system and beginning operations can take one to twelve months; completion of cleaning/treating contaminated soil can take from one to two years (depending upon the contaminants and quantity of soil to be treated). Treatment of contaminated groundwater may take decades to complete. The "Operation and Maintenance" phase will continue throughout the process until completion. Once the contaminant levels have been reduced to the required levels as stated in the **Record of Decision**, the "Deletion" process is implemented in order to remove the site from the National Priorities List. The actual length of time it takes to clean up hazardous wastes at a site depends upon many, many factors. An average

clean up for soils takes between five to seven years; an average for cleaning up contaminated groundwater is 30 or more years.

Community relations activities during the lengthy process include interviews, public meetings, availability sessions, informal gatherings, frequent updating of fact sheets, updating the Site's mailing list, newspaper notices, and other activities intended to keep citizens and officials informed and involved, and to encourage public input. These activities are scheduled throughout the course of the remedial cleanup process. Specific activities vary from site to site depending upon the level and nature of concern. The range of community relations activities that can occur is described in this document. For easy access to this office we have set up the **1-800-435-9233 telephone number** to enable citizens to contact the office any time there is a question, concern or an incident or some questionable action that needs to be reported.



## SECTION 2.0

### OVERVIEW OF THE COMMUNITY RELATIONS PLAN

This **Community Relations Plan (CRP)** was prepared in March 2001 by the U. S. Environmental Protection Agency (EPA) Region IV, Customer Service Branch, Community Involvement Coordinator for North Carolina. It provides a brief history of the Waynesville area, Site background information, and it describes specific issues of community interest and concerns related to the Barber Orchard Site in Haywood County, North Carolina. It also outlines the community relations activities that will be conducted by EPA throughout the Superfund remedial process .

Preparation of a Community Relations Plan is a required activity under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The federal program developed to carry out these laws is usually referred to as the Superfund program. A part of the Superfund program known as the community relations/ public participation activities is outlined in this plan as it is applicable to the Barber Orchard Site. The program focuses on activities designed to keep citizens and officials informed of Site activities and developments.

This document describes community relations activities to be conducted by EPA throughout the Remedial Investigation/Feasibility Study (RI/FS), the remedy selection process, and up to the Remedial Design phase at the Site. (Refer to the Superfund flowchart on page 4) This Plan is divided into the following sections:

1. Overview of the Superfund Program
2. Overview of the Community Relations Plan
3. Site Background
4. Community Background
5. Public Issues and Concerns
6. Community Relations Objectives
7. Community Relations Techniques
8. Schedule of Activities

Appendix A contains a list of Federal, State, county and city government contacts, environmental groups, news media, and interested parties within the community. Appendix B lists the location for the Administrative Record and Information Repository and suggested public meeting locations. Appendix C provides an explanation of the Technical Assistance Grant (TAG)

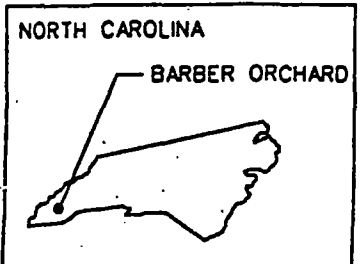
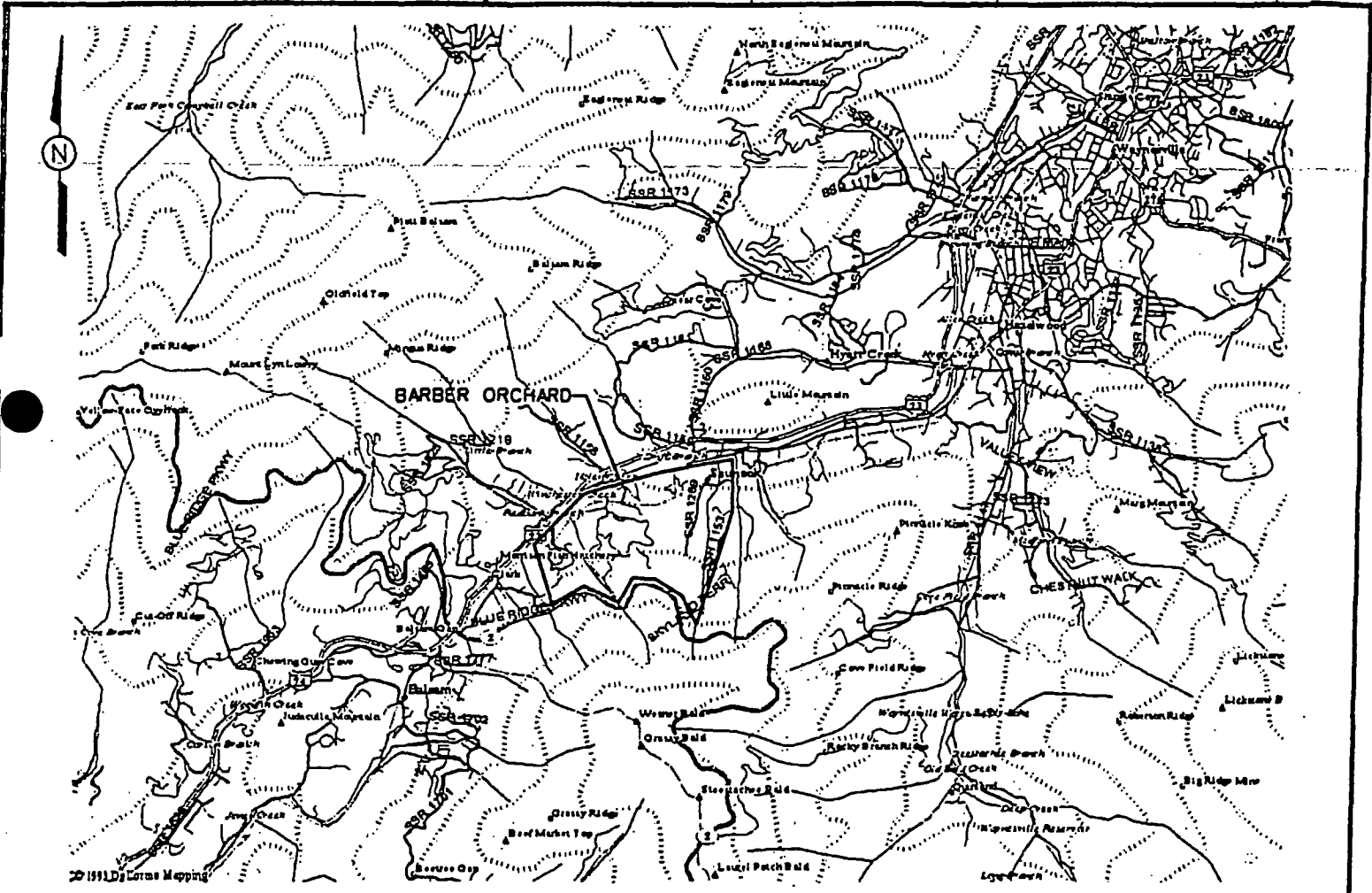
Program (available for citizens at a National Priorities List site) and Community Working Group (applicable at any site). Appendix D is a glossary of terms/explanations used in this Plan.

Information contained in this document was obtained from files maintained by EPA; the North Carolina Department of Environment, Health and Natural Resources; the North Carolina Department of Environmental Management; the North Carolina Division of Water Quality; Haywood County and Waynesville city officials, local Chamber of Commerce and residents. Interviews were conducted beginning on January 29 through February 13, 2001 with city and county public officials, area residents, businesses, news media, and other citizens interested in or effected by the Site. Their concerns/ comments are presented in Section 4.4. This Plan will be updated and revised/amended as necessary as the remedial activities at the Site move toward completion and community concerns are reassessed.

# SECTION 3 SITE BACKGROUND

## 3.1 Site Description and Location

The Barber Orchard Site is a former apple orchard which was developed into a residential community. It is located off Highway 74/23 approximately 3 miles west of the Waynesville city limits in western Haywood County, North Carolina. The Site is approximately 438± acres in size located on the northern slope of a mountain. The former orchard includes residential, undeveloped and wooded properties.



SITE LOCATION MAP

BARBER ORCHARD  
NORTH CAROLINA

NOT TO SCALE



### 3.2 Site History:

(The following information was compiled from verbal recount, historical information and documented records from various sources.)

An apple orchard was Mr. Richard N. Barber, Sr.'s dream. Mr. Barber, Sr. was a factory representative for International Harvester and others in the 1890's selling tillage/spraying/harvesting equipment. During those years he traveled extensively visiting many dairies, orchards and other agricultural properties. He became fascinated with apple orchards and visited the Geneva, New York agricultural experiment station a number of times to learn as much as he could about the various apples and how to grow them. He learned that it is best to plant an apple orchard on the north slope of a mountain which retains moisture, trees would not bud prematurely and where the trees will grow larger quicker. In 1903 his dream began to become a reality when he purchased from the Robert Love family approximately 100-acres of virgin, fertile land on the north side of the mountain to establish an apple orchard. [The Love family was given over 1,000 acres resulting from the Revolutionary War.] Over time he and his son, Richard Barber, Jr., purchased additional tracts of land in the Saunook area increasing the size of the orchard.

The land was cleared by hand labor, mule, and dynamite, and trees planted by hand on the lower portion of the slope to begin with. Spray machines set on wagons drawn by mules were used to apply pesticides to the apple trees. In the beginning Paris Green, lead-arsenate and several other chemicals were applied on the trees to protect them from disease, insects that would infest the roots, bark, center of trees, leaves and apples, as well as rodents that would eat the fruit. Mr. Barber learned from various federal and state agricultural experiment stations and agricultural extension services (i.e., Beltsville in Maryland) what were the standard pesticides and insecticides to use on the varieties of apple trees; at what times of the year these chemicals should be applied; which chemicals should be used on specific ages of trees; which are used to kill insects at different stages of growth/development; which chemicals to use to hold apples on trees to keep them from dropping prematurely; etc. Also, different chemicals had to be used at different stages of growth/development. A number of other factors had to also be considered in the production of apples such as not more than 50 mature trees per acre, elevation, size and variety of trees, root stock and grafting, bees and pollination, pruning and harvesting times of the year.

Housing was provided for the laborers as well as land for raising food and grazing of cattle. The houses also had running water which was supplied by the springs on the property.

Mr. Richard Barber, Jr. started working with his father in the orchard in 1929. In 1932 they installed below ground piping to distribute pesticides throughout the orchard just as a number of other orchards were doing in the Country, such as Washington State, West Virginia, Virginia,

New York and Pennsylvania. There were no laws governing the use of pesticide/insecticide products in the early years, only directions for application provided by the manufacturer and used as suggested by the federal agricultural extension services. In the mid 1950's orchard owners began to use new organochlorine pesticide/insecticide products such as DDT, DDD, and DDE and Lindane because they were less expensive and more effective.

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) came into effect on June 25, 1947. However, the Federal Environmental Pesticide Control Act of 1972 forms the basis for most current pesticide legislation, and banned the use of DDT, DDD, and DDE in the United States in 1972. However, today Lindane may only be purchased and used by certified pesticide applicators, and most agricultural and dairy uses have been eliminated by the EPA because of concerns about the compound's potential to cause cancer. Originally, pesticide/insecticide chemicals were potent enough to kill insects, fungus, rodents, however, now the emphasis is upon protecting the consumer from the chemicals.

Throughout the orchards operational history, various pesticide mixtures containing DDT, hexachlorocyclohexane (BHC), endrin, and/or dieldrin, as well as arsenic, lead, copper acetoarsenite and other hazardous substances, were applied to the orchard to control insects, rodents, disease, and apple development. [These pesticides were purchased from manufacturers such as PPG, Dow Chemical, DuPont, and California Spray Chemical.]

Pesticides and related metals from spills, leaks, and improper disposal of pesticide-contaminated containers, as well as from product application have been detected in soils and groundwater throughout the Site. The mixing of pesticides reportedly occurred in one central mixing area. The mixing area consisted of two 500-gallon concrete tanks. Occasional spills of the pesticide mixture allegedly occurred in this area. Diluted pesticides were transported from the mixing area to locations throughout the orchard via an underground pipeline system that was buried to a depth of about one foot below land surface. The pipeline system was pressurized at 800 pounds per square inch, and was about 2 to 2.5 inches in diameter. At various locations, the orchard employees would connect a flexible hose and nozzle to the pipeline to apply pesticides to the apple trees. During the winter months, the pipes reportedly would freeze, causing them to rupture and leak. The pipes were routinely flushed to prevent clogging, and any pesticide mixture present in the pipes was allowed to flow onto the ground. All pesticides were reportedly stored in a packing house.

Mr. Barber had one of the State's oldest and most successful commercial apple orchards consisting of approximately 475 acres. He worked diligently over the years providing some of the most delicious apples for consumers from the 20-25 different varieties of trees in the orchard.

*William Tell* apples, the Barber brand name, were in demand by buyers because of their taste, texture, quality and desirability. North Carolina's apple production was approximately seventh in the Nation with Washington State being the largest apple producer at that time.

Between 1978-79 Mr. Barber sold the commercially operating orchard to Earl D. Stewart (father and his two sons, Glenn and Jerry) and Wilbur Brown, Jr. They limited the varieties of apple trees being grown to concentrate on specific types of apple production. Operation of the orchard continued until they filed bankruptcy due to a number of factors. The Mountain Federal Land Bank Association/ Farm Credit Bank of Columbia, who secured the loans for Stewart/Brown to purchase the property, foreclosed against the owners in 1988. In order to recoup some of their money, Mountain Federal Land Bank Association/Farm Credit Bank of Columbia conducted an auction selling this commercial apple orchard as residential property. The acreage was divided into parcels for purchase by the general public at auction on June 6, 1988. [Tract "A", 21 acres; Tract "B", 13 acres; Tract "C", 15 acres; Tract "D", 67 acres; Tract "E", 300 acres; Tract "F", 21.6 acres; and Tract "G", 2 acres for a total of 438.6 acres. All parcels are a part of the Federal Land Bank Deed of Trust in Book 253, page 117.] Not all property was sold during the June 6<sup>th</sup> auction, therefore, Walnut Grove Auction Sales was hired to conduct an auction on October 28, 1988, in order to assist the Mountain Federal Land Bank Association/Farm Credit Bank of Columbia to recoup more of the money financed to purchase the orchard. According to historical records, Farm Credit Bank of Columbia conducted another auction on March 12, 1991. According to the written notice for the auctions, purchasers were instructed to conduct a personal on-site inspection, that there were no warranties of title or condition of property, express or implied and all property was sold "as is". There are no state laws that specifically require developers to disclose condition of property or run a pesticide analysis on agricultural property. Standard tests offered by the county health department only check water for fecal coliform bacteria and inorganic matter - not pesticides.

[NOTE: The Federal Land Bank of Columbia, the Farm Credit Bank of Columbia, Mountain Federal Land Bank Association, and South Atlantic Production Credit Association were the entities involved with the foreclosure and auction of the orchard property. Due to reorganization of the federal land bank system, none of those entities exist today - Carolina Farm Credit performs many of the activities formerly performed by these lending institutions. These entities were a part of the farm credit system created by the federal government obtaining funding from the open market via farm credit bonds, etc., and are a cooperative owned by the farmers. Today, Carolina Farm Credit is the direct lender for Mountain Federal Land Bank.]

The mountain-side, orchard property now became the dream of others - a very attractive, affordable and desirable place to build a house and raise a family, build a retirement house or a

summer house, and for others it became a source of future income. The first house was built in 1990 with the majority of construction of residences occurred between 1993 and 1994.

### **3.3 Description of Contamination and Actions Taken To-Date**

Various pesticides and pesticide mixtures containing DDT, hexachlorocyclohexane (BHC), endrin, and/or dieldrin, as well as arsenic, lead, copper acetoarsenite, and other hazardous substances, were applied to the orchard from the early 1900's until 1984 to control insects, rodents, disease, and apple development. Application of pesticides, insecticides, fungicides, and fertilizers to commercial and individually owned agricultural crops/orchards continues as common practice today to control various diseases, insects, rodents, fungus and to assist in development of products.

The contamination of this Site became known in 1999 after a resident in Barber Orchard requested their drinking water be sampled because of their concern that they were living in a former commercial apple orchard. Sampling revealed the presence of pesticides in their water. As a result, the North Carolina Department of Environment and Natural Resources, Division of Water Quality conducted more extensive groundwater sampling. This prompted sampling of the 88 residential wells in the orchard. Of the 88 wells, 34 contained contaminants above the State's drinking water/groundwater standards. The State of North Carolina Department of Agriculture collected soil samples from 16 properties in the former apple orchard, 10 of those contained levels of pesticides and lead above the State's soil remediation goals.

In June 1999, the EPA Region 4 Science & Ecosystem Support Division (SESD) collected soil samples from 55 locations (53 were residential properties). Of the soil samples collected, 35 locations contained arsenic above 20 parts per million (ppm), and 25 of those were above 40 ppm. SESD also collected 55 well samples, 21 contained concentrations of various pesticides above health-based benchmarks. The various water samples contained varying concentrations of Dieldrin, Endrin, DDT, DDE, DDD, and Lindane. Because of this finding, Dr. Ken Rudo with the Division of Public Health, NC Department of Health and Human Services, and Mr. Bob Wood, Director of Haywood County Health Department recommended that residents not consume their water and limit showers and bathing times to less than 10 minutes. They were also encouraged to place carbon filters on their wells to remove the pesticides. EPA provided one resident bottled water due to elevated levels of lindane in their well water. During the June 1999 sampling and subsequent sampling activities, pipes from the underground pipeline system were observed on a number of residential properties. In many areas, the pipes were protruding from the ground, and liquid was observed leaking from one of the pipes. A sample collected from sediment in one of the pipes contained arsenic levels of 2,460,000 ppb and lead at 6,970,000. As

a result of all of this sampling, the EPA Emergency Response & Removal Branch conducted a "time-critical" soil removal action of residential properties with arsenic levels over 40 ppm beginning in September 1999 and ending in August 2000. All properties, developed and undeveloped, were sampled to determine what contaminants were present and at what levels. During the sampling actions, pesticide residue in powder form was noted in the former central mixing area, along with discarded pesticide containers. The major contaminants found in soil were arsenic and lead.

The top foot of soil contaminated with arsenic levels over 40 parts per million was excavated from 28 residential properties. Clean soil was then placed in the excavated areas the area was graded and seeded, and plants replaced. Streets in the community were also repaved after the removal activities were completed. Over 31,500 tons of contaminated soil were excavated and transported to an EPA approved landfill in Buford, Georgia. Excavating the top foot of soil from the maintained areas on each residential property and replacing those areas with clean soil eliminated direct contact with contamination and any health risk to residents. The removal action total project costs are estimated at 4 million dollars.

Groundwater was not addressed during the removal activities. Residents with elevated levels of pesticides in their well water were encouraged to place granular activated carbon filters on their wells heads to remove the pesticides. Congressman Charles Taylor was able to set aside \$475,000 as a grant to be administered by the County to address the water situation in Barber Orchard. The County government is in the process of obtaining additional funding to put with the \$475,000 to install a water line to the Barber Orchard area. To extend the water line to connect all residents in the Barber Orchard community is estimated to cost several million dollars.

The Barber Orchard site was proposed for placement on the National Priorities List in January 2001. In anticipation of beginning the Remedial Investigation, the EPA Project Manager and Community Involvement Coordinators conducted community interviews beginning January 29<sup>th</sup> through February 14, 2001. EPA also met with residents and property owners who attended the January 29<sup>th</sup> evening meeting to discuss upcoming events and respond to questions. The information gathered from these sessions has been placed in this document in the appropriate sections. The Remedial Investigation and Feasibility Study will address both soil and groundwater contamination.

Because this is the first former commercial apple orchard proposed for placement on the NPL, EPA will be very meticulous in its investigation to determine exactly what actions can be taken to remove risks of exposure to contaminants by humans and animals.





## SECTION 4.0 COMMUNITY BACKGROUND

### 4.1 City and County Profile

#### Town of Waynesville

In May 1776, members of the militia ventured through this part of the country. Following the American Revolution many of these men returned with their families to settle in the area. Descendants of these and other early settlers names are found throughout Haywood County today. One of the soldiers who settled here following the war was Colonel Robert Love, who founded and named the town Waynesville in 1809 in honor of General "Mad Anthony" Wayne, Colonel Love's commander during the American Revolution. He also donated land for the court house, jail and public square.

Agriculture has always played a large part in the area's economy, but after World War II, industry moved to the forefront. Today, tourism also plays a major role. Downtown merchants and property owners voluntarily submitted to additional property tax in order to revitalize the municipal service district surrounding Main Street and to provide for general improvements to the area to enhance the appeal of the downtown area.

For a number of years, the Town of Hazelwood was surrounded within the city limits of Waynesville. In July 1995, the towns of Hazelwood and Waynesville merged into one community consisting of approximately seven square miles, with an estimated population of 9,750 citizens. As of January 2001 the estimated population is 9,863. The Town of Waynesville provides water and sewer maintenance, sanitation services, and street maintenance to all city residents. The waste water treatment plant has a capacity of 3.5 million gallons per day with an average flow of 3.5 million gallons per day. The drinking water treatment plant includes an 8,400 acre watershed with a WS-1 restricted classification and a 50 acre lake. The plant has a capacity of 8 million gallons per day and serves 17,000 customers.

The Town of Waynesville has a council-manager form of municipal government. The Board of Aldermen is comprised of five members including the Mayor. This Board appoints the Town Manager who in turn appoints the Department Heads. The Board meets every 2<sup>nd</sup> and 4<sup>th</sup> Tuesday at 7:00 PM in the Town Hall, and all meetings are open to the public. Municipal elections are held every four years to elect the Mayor and Board of Aldermen. There are eight voting precincts in Waynesville. Elections are non-partisan and handled by the Haywood County Board of Elections.

## Haywood County

Haywood County, consisting of 544 square miles, established in 1808 was formed out of a portion of Buncombe County. The county was named in honor of John Haywood who served as state treasurer from 1878 to 1927. The county encompasses the cities of Canton, Clyde, Maggie Valley and Waynesville. The Haywood County seat is located in Waynesville. Approximately 40 percent of the county is within the Great Smoky Mountains National Park, the Pisgah National Forest, and the Blue Ridge Parkway.

In the early years of Haywood County, Maggie Valley was mostly a farming community. Over the years more and more people have moved into this beautiful valley and the area has become a mecca for people wanting to get out of the "big" cities and enjoy the beauty of nature. Named for one of the daughters of the community's first postmasters, Maggie Valley has since developed as a national and international destination for tourists.

Clyde was once an important holding area and loading point for shipping livestock to more populous areas of the country. Today the town has evolved into a "bedroom" community for people who work outside the area. Other small townships and communities in Haywood County include Balsam, Beaverdam, Bethel, Cataloochee, Cecil Crabtree, Cruso, East Fork, Fines Creek, Iron Duff, Ivy Hill, Jonathan Creek, Piegion, and White Oak.

Haywood County government is under the direction of four county commissioners and a chairman, with the chairman begin elected from the board. They in turn appoint the county manager who performs the administrative functions of county government. Members of the board of county commissioners are elected every 4 years in November and take office December 1st. The board meets the second Tuesday of each month at 7:00 pm.

The latest census report estimates the Haywood County population at 52,000. Twenty-one percent of the county's population is under 18, while nearly 20 percent is over 65.

Property values in the county continue to increase. In 1995 over \$62,015,106 was exchanged in the sale of 733 properties as reported through the Multiple Listing Service (MLS). In 2000 there were 887 sales recorded through the MLS totaling \$98,556,856 with an average sale of \$111,112. These figures do not include other sales by individuals and realtors not listed in the MLS.

Manufacturing and tourism are Haywood County's major industries, followed by agriculture and the service industry. Blue Ridge Paper Products, Inc. (formerly Champion International) in Canton provides employment for over 1,500 people in the county. Other industries in the county include Lea Industries/Ladd Furniture produces bedroom furniture, and Wellco Enterprises

produces boots. While the number of people working farms has declined, agriculture still is a strong part of the county's overall economy. Beef and dairy cattle, sheep, swine, and the growing of tomatoes and apples are the major agricultural crops.

Haywood County and its four incorporated communities operate on a fiscal year beginning July 1. Property taxes are 74 cents per \$100 valuation in the county. Town tax rates are 67 cents per \$100 valuation in Canton, 48 cents in Clyde, 43 cents in Waynesville, and 45 cents in Maggie Valley. Sales tax in Haywood County is six percent.

Haywood County has one of the lowest crime rates in North Carolina making it a more desirable area to live. The 911 emergency response system covers the county. Volunteer fire departments are located throughout the county's rural areas. Haywood County has two high schools, three middle schools, and ten elementary schools, as well as several private schools. Haywood Community College is a fully accredited college offering 30 curriculum programs. Haywood County is a popular area for retirees, and there are many programs, facilities, and services available for these citizens. There are numerous points of interest, regional attractions, and events in the area to keep tourists and residents active and busy.

#### **4.2 Community Profile**

The Barber Orchard Site is mainly a residential development located in a former commercial apple orchard. Individuals living in this community are either housewives and children, retired or working people. The average age for residents is between 40 to 60 years of age. The income per family in this community ranges from approximately \$35,000/year to \$150,000/year. Residents are predominantly white Caucasians. Several property owners continued growing apples on the property for their personal consumption, a few use the land for grazing goats, cattle or horses and gardening, while the majority utilize the land for residential purposes only, or the land remains undeveloped.

#### **4.3 Chronology of Community Involvement**

- A resident asked the NC State Water Quality officials in Asheville to sample their well water because of their concern that the area they were living in had been a commercial apple orchard. Based upon those results indicating the presence of pesticides, all other wells in the orchard were sampled by the State and Haywood County. Soil sampling was also conducted.
- Residents wrote U.S. Senator Jesse Helms, U.S. Senator John Edwards, U.S. Representative Robert Carpenter, U.S. Representative Charles Taylor, and many other officials concerning Barber Orchard requesting their help.

- Residents held meetings to discuss the situation and what course of action they should take.
- The Haywood County Health Department and the NC Department of Health & Human Services held a community meeting on March 16, 1999 to discuss the presence of pesticides found in Barber Orchard residents wells. Dr. Ken Rudo with the State advised residents not to drink their water and limit shower/bathing times.
- Monthly meetings of the Barber Orchard Homeowners Association and newsletters kept residents and property owners updated on the investigation and clean up activities in the orchard.
- Several residents contacted attorneys requesting legal advise.
- A number of residents participated in medical screening of blood and urine to determine if they contained lead or arsenic. The blood screening was conducted by the Agency of Toxic Substances & Disease Registry (ATSDR), and urine screening conducted by the Haywood County Health Department.
- Residents attended a number of public meetings held by either the Haywood County Health Department, NC Department of Health & Human Services, and EPA where they received information concerning the contamination in the soil and groundwater.
- One property owner has allowed the Western Carolina University to conduct research on his undeveloped lot to determine whether the root systems of plants such as corn, peas, and Indian mustard will draw significant amounts of lead and arsenic from the soil.

#### 4.4 Key Community/Public Concerns/Issues

EPA conducted interviews with a number of residents and property owners in Barber Orchard, as well as local government officials, the news media and former owner of the orchard. These interviews enabled EPA and community members the opportunity to exchange information and concerns about the Site. The following comments/concerns were expressed during the community interviews:

- ▶ Drinking water is the major issue, first priority.
- ▶ Feels mislead at auction. Something needs to be done by the State, County or Federal government to have laws governing disclosure on future sale of agricultural properties to protect the public.
- ▶ Can't afford to have a carbon filter and keep it maintained.
- ▶ Build reservoir at top of mountain to provide water to residents.
- ▶ Residents mental health has been impacted.
- ▶ Property values have plummeted, loss of property values, can't sell or build now.
- ▶ Banks and mortgage lenders are afraid to finance construction of homes or finance purchase of land in the orchard. They weren't afraid to sell the land at auction though.
- ▶ No one warned them about the pesticide contamination in soil and well water.

- ▶ Wants someone told they did wrong in not being forthright about the property.
- ▶ Farm bureau that sold the orchard as residential property should carry the blame for the problem.
- ▶ Very disappointed because they had been told the property had been sampled and it was OK.
- ▶ Are contaminants still in soil beneath properties that have only had one foot of soil removed?
- ▶ Recently saw water in creek below the mixing area was running milk white and there are more bottles appearing in the creek.
- ▶ The continual publicity in the news media has caused much frustration and annoyance.
- ▶ No one has monitored the water filters on the wells as they had been told.
- ▶ The appearance of the orchard is not as beautiful as it was because so many trees have been removed.
- ▶ Current homeowners association does not truly represent them.
- ▶ Why did their property have low levels when all around them everyone had high levels of lead and arsenic.
- ▶ Concerned about the stigma of living in the orchard.
- ▶ Has living here affected our health?
- ▶ Has drinking the water affected our children?
- ▶ Is concerned about the soil because they have a garden and eat the food they raise.
- ▶ Where will we get good, clean, rich top soil to replace top soil that would be excavated?
- ▶ Piping still in the ground, is it continuing to cause the problem?
- ▶ Right before getting ready to sell house and move, learned of situation in orchard and could not sell house.
- ▶ What restrictions are there on excavating dirt from the orchard property?
- ▶ Copper is high in the area, is there a reason for this?
- ▶ Will undeveloped property and pasture land be cleaned up?
- ▶ Shocked because they were told there was no problem with the property.
- ▶ Media has overplayed the whole situation.
- ▶ Major concern is if there is a risk to residents' health.
- ▶ Definitely wants well sampled because of young children. Living on outer fringe of orchard, they feel left out and don't want to be overlooked during upcoming investigation.
- ▶ Property being contaminated has kept them from building.
- ▶ People wanting to sell/buy land at a cheap price as a "good deal" - now have problems.
- ▶ Cannot understand why people have been so ugly to him, he operated a commercial apple orchard, applying pesticides as was common practice, he did not sell the orchard as residential property.
- ▶ Could not understand how a commercial apple orchard could be sold as residential property.
- ▶ Why hasn't the farm credit bank been held accountable?

Some of the words used to describe their feelings were: "disappointed, frustrated, mislead, deceived, shocked, concerned, very upset, horrified, devastated, stressed out emotionally, frightened, hoodwinked, dismayed, stigmatized, mad, depressed, and sick of the whole mess."

## SECTION 5.0 COMMUNITY RELATIONS OBJECTIVES

The primary goal of the community relations program at the Barber Orchard Site is designed to encourage public participation in all aspects of the environmental decision-making process. To be effective, the program should ensure that communication between residents in the community and government agencies is kept open and informative. Special attention should be directed at keeping the community informed and involved during remedial process activities. EPA can maintain this relationship by encouraging community interest and involvement in the following ways:

- Identify people within EPA, the North Carolina Department of Environment & Natural Resources, and the Haywood County Health Department as contact points for the public;
- Establish and maintain open lines of communication with the public and establish credibility in the affected community by being responsive to concerns and requests;
- Address community concerns regarding the contamination of groundwater and soil and site-related health concerns;
- Educate area residents about the Superfund program procedures, policies, and requirements in general, and about specific Site issues in non-technical terms where possible; conduct a Superfund Workshop teaching the Superfund program and how it works to the public;
- Inform area residents, local officials, and the news media of all proposed Site activities; utilize the news media as a tool for keeping citizens informed;
- Solicit citizen input on remedial activities providing opportunities for public participation;
- Encourage and facilitate positive interaction among government agencies, public officials, and concerned citizens by coordinating all activities with state, county, and local officials;
- Anticipate future information needs and potential shifts in levels of concern periodically reassessing the community's concerns and update this Community Relations Plan, as necessary.



## SECTION 6.0 COMMUNITY RELATIONS TECHNIQUES

The community relations activities included in this section are proposed as appropriate and effective ways to meet the objectives described in the preceding section. These techniques will ensure that statutory and regulatory requirements for community relations are met, and will provide opportunities for the community to participate in decisions related to how any contamination found at the Site will be cleaned up.

Since the community did have concerns about the Site and expressed interest in EPA's involvement and activities, EPA will implement a community relations program designed to involve local officials, residents, the media, and environmental groups during the Superfund process. A detailed discussion of EPA's approach to strategy and the specific techniques to be used in the community relations program for the Barber Orchard Site follows:

1. Establish an information repository near the Site in the City of Waynesville which will house the **Administrative Record** and the **Information Repository** to ensure that accurate, understandable information is available to interested citizens. The Administrative Record serves as the official file documenting EPA's remedy selection and includes all data, reports, correspondence, and documents relevant to the clean up decision. The Administrative Record will be compiled at the initiation of the Remedial Investigation and will contain work plans, the Feasibility Study, Risk Assessment, Record of Decision and other pertinent documents which are crucial to the selected remedy and are legally required by law. The Administrative Record will be updated as information becomes available to ensure that documents are available to the public throughout the entire Superfund process. The **Information Repository** will contain information that is not crucial to the selection of a remedy for the Site. The materials in this file will consist of fact sheets, press releases, news articles, literature on various contaminants of concern, literature on the Superfund process, and any other literature that will assist the public in a better understanding of the Superfund program. The Haywood County Public Library located at 402 South Haywood Street has agreed to house these materials. Both of these files will be placed in the reference section of the library to allow for public reading.
  
2. Meet with local officials (city and county), the Haywood County Health Department and State of North Carolina officials and involve them in the process at appropriate points in the study and remedy selection process. Maintain phone contact as needed to ensure that they are kept informed and that EPA is kept current on activities relevant to the Site or interest in the Site. Appropriate timing for contacts would be the completion of the Remedial Investigation and

Feasibility Study work plan, at the end of the first phase of sampling and analysis, completion of the Remedial Investigation report, completion of the draft Feasibility Study and/or development of the proposed plan, when the remedy has been selected, completion of the remedial design/action work plan, and upon completion of the remedial design and initiation of the remedial action itself. EPA should brief local officials prior to any public meetings.

3. Establish Agency contacts to provide accurate and timely response to questions from citizens, local officials, the news media, and to provide a mechanism for monitoring changes in the level of community interest and concern. These contact people can provide information to residents during the Remedial Investigation, Feasibility Study and Proposed Plan activities ensuring that contacts are always responsive to public concerns. The Remedial Project Manager and Community Involvement Coordinator for the Site should be visible in the community as often as necessary.
4. Conduct open, informal meetings or availability sessions with the public prior to the initiation of field work for the Remedial Investigation and at the completion of the investigation. In addition, EPA should afford frequent opportunities for the community to ask questions and have issues explained or clarified for them. EPA should involve state, local and county officials in meetings and appropriate agency officials in addition to the Remedial Project Manager and the Community Involvement Coordinator. Conduct a Superfund workshop for citizens if public interest is supportive of this training.
5. Prepare periodic fact sheets to inform the community of findings, progress, and future activities at critical points in the process, including, but not limited to, initiation of the Remedial Investigation/Feasibility Study, completion of the Remedial Investigation/Feasibility Study report, announcement of EPA's preferred alternative (the Proposed Plan) for clean up at the Site, after the Record of Decision, completion of the remedial design and initiation of the remedial action, and any other time new information becomes available. These fact sheets should be designed to ensure that the public is provided with clear, easy-to-understand information on all activities at the Barber Orchard Site. Fact sheets should reiterate opportunities for the community to participate in the remedy selection process, including the availability of Technical Assistance Grants (TAGs), if applicable, and Community Working Groups which are discussed in Appendix C of this Plan.
6. Maintain a mailing list to ensure that all interested parties have an opportunity to obtain information and be kept informed of all on-going activities regarding the Site.

7. Place public notices in local newspapers and provide public service announcements to local media to ensure that all interested parties have an opportunity to learn about EPA activities at the Site. Appropriate items or events for public notification include public meetings, availability sessions, work shops, announcement of EPA's proposed action, selection of a remedy, and any explanations of significant differences after a Record of Decision has been issued. All notices should reference repository locations and opportunities for public involvement.
8. Provide news releases to local media, through newspapers, television, and major radio stations in the area, to ensure that information is disseminated to the public.
9. Hold a public meeting to explain the findings from the Remedial Investigation/Feasibility Study and the preferred cleanup alternative as well as EPA's rationale for the choice, to answer concerns and clarify issues, and to accept oral or written comments on the Proposed Plan.
10. Assist in the preparation of the Responsiveness Summary to accompany the Record of Decision which thoroughly addresses each significant public comment and community concern and explains how EPA considered the comments/concerns in its remedy selection. The summary will be made available to the public in the information repository.
11. Review the Community Relations Plan periodically, particularly at the beginning of the remedial design stage of the clean up process, to determine if revision is necessary and to ensure the continued effectiveness of the community relations program in addressing community concerns and EPA public relations activities.
12. Provide the opportunity and assist one community group, representing residents on and near the Site, to receive a **Technical Assistance Grant (TAG)** [See Appendix C for an explanation of the grant program and a copy of the Federal Register October 1, 1992 Final Rule]. The site must be either proposed or listed on the National Priorities List to be eligible to receive a TAG. A grant of up to \$50,000 is available with the community providing a 20% match of funding and/or donated or in-kind services. The grant would enable the group to hire a technical advisor or consultant with expertise to review EPA data and documents and interpret them for the community and assist the community in providing meaningful input to EPA on the Remedial Investigation/ Feasibility Study and the Proposed Plan. EPA will include information on Technical Assistance Grants in Site materials prepared for the public, will include information in the repositories, and will discuss the grants at public meetings. In addition, EPA staff will be available to provide pre-application assistance to the community group both in person and by phone. EPA will provide TAG manuals to interested groups.

During the interview process, a number of residents stated they would be interested in participating on a group to obtain a TAG.

Community Advisory Groups (CAGs) are another mechanism designed to enhance community involvement in the Superfund process. EPA will not establish or control CAGs; however, the Agency will assist interested communities in CAG activities. Further, EPA anticipates that the CAGs will serve primarily as a means to foster interaction among interested members of an affected community, to exchange facts and information, and to express individual views of CAG participants while attempting to provide, if possible, consensus recommendations from the CAG to EPA.

A CAG should serve as a public forum for representatives of diverse community interests to present and discuss their needs and concerns related to the Superfund decision-making process with appropriate Federal and State/Tribal/local governments. The CAG is designed as a mechanism for all affected and interested parties in a community to have a voice and actively participate in the Superfund process. Information on CAG formation is in Appendix C.

13. Conduct periodic public surveys to determine how successful the community involvement program has been and where improvements need to be made. Monitor the community's concerns and information needs, especially following the selection of the remedy for the Site.

## SECTION 7.0 SCHEDULE OF ACTIVITIES

Specific, recommended community relations activities discussed in the preceding Section are presented in Table 1 as they correspond to technical milestones achieved during the Superfund process. The community relations program tailored to this Site will revolve around getting information to all interested parties as quickly as possible and presenting ample opportunity for those parties to meet and talk with EPA contacts to have their concerns addressed and to provide input to EPA as it considers future action at the Site. Dates for implementing various community relations tasks will depend on the Remedial Investigation/Feasibility Study task schedules. As indicated, many of the tasks are ongoing which will continue throughout the process and will be tailored to any shift in community concern during the Superfund process. Citizen concerns will be addressed, and their input will be taken into consideration when determining future EPA actions.

**Table 1  
Community Relations Schedule**

Community Relations Techniques	Remedial Investigation	Feasibility Study	Completion of RI/FS	Proposed Plan	Record of Decision	Remedial Design Activities
Information Repository	X					
Develop/Maintain Mailing List	X					
Establish Agency Contact	X					
Hold Availability Session	X (as needed)					
Provide Fact Sheets	X (as needed)					
Provide Public Notices	X (as needed)					
Provide Press Release	X (as needed)					
Conduct Public Meetings	X (as needed)					
Responsiveness Summary						
CRP Reviewed/Revised (if necessary)					X	
TAG or CAC Notice	X					
Public Surveys				X		

**APPENDIX A**  
**LIST OF CONTACTS AND**  
**INTERESTED PARTIES**

**APPENDIX A  
LIST OF INTERESTED PARTIES**

**FEDERAL ELECTED OFFICIALS**

U.S. Senator Jesse Helms  
403 Senate Dirkson Building  
1st & Constitution Avenues, NE  
Washington, D.C. 20510-3301  
(202) 224-6343

District Office Address:  
310 New Bern Avenue #122  
Raleigh, North Carolina 27601-1441  
(919) 856-4630

Congressman Charles Taylor  
231 Cannon House Office Building  
Washington, D. C. 20515-3309  
(202) 225-6401

District 11 Address:  
22 South Pack Square, Suite 330  
Asheville, North Carolina 28001  
(828) 251-1988

U.S. Senator John Edwards  
823 Hart Senate Building  
2<sup>nd</sup> St. & Constitution Avenues, NE  
Washington, D.C. 20510-3304  
(202) 224-3154

District Office Address:  
314 Century Post Office Bldg.  
Raleigh, NC 27602  
(919) 856-4245

**STATE ELECTED OFFICIALS**

Governor Michael F. Easley  
North Carolina State Capitol  
One E. Edenton Street  
Raleigh, North Carolina 27611  
(919) 733-4994

Lt. Governor Beverly Perdue  
North Carolina State Capitol  
16 West Jones Street  
Raleigh, North Carolina 27603  
(919) 733-7350

N.C. State Senator Robert C. Carpenter  
Legislative Office Building, Room 517  
Raleigh, North Carolina 27601-2808  
(919) 733-5875

District 42 Address:  
29 Admiral Drive  
Franklin, North Carolina 28734  
(828) 524-5009

N. C. Senator Dan Robinson  
Legislative Building, Room 2113B  
Raleigh, North Carolina 27601-2808  
(919) 733-5880

District 29 Address:  
P. O. Box 115  
Cullowhee, North Carolina 28723  
(828) 203-0427

N.C. Representative Phillip R. Haire  
Legislative Office Building, Room 419B  
Raleigh, North Carolina 27601-2808  
(919) 715-3005

District 52 Address:  
718 Avondale Road  
Gastonia, North Carolina 28054  
(704) 861-1231

N.C. Representative Marge Carpenter  
State Legislative Building, Room 1015  
Raleigh, North Carolina 27602-1096  
(919) 733-5886

District 52 Address:

P. O. Box 893  
Waynesville, North Carolina 28786  
(828) 452-6857

**FEDERAL OFFICIALS**

U.S. Environmental Protection Agency  
Waste Management Division  
61 Forsyth Street, SW  
Atlanta, Georgia 30303  
Toll Free # 1-800-435-9233

Mr. Jon Bornholm, Remedial Project Manager  
North Site Management Branch  
(404) 562-8820

Dr. Elmer Akin, Health Assessment Officer  
Office of Health Assessments  
(404) 562-8634

Ms. Diane Barrett, Community Involvement  
Coordinator  
Customer Service Branch  
(404) 562-8489

Ms. Rosemary Patton, Regional TAG  
Coordinator  
(404) 562-8866

Mr. Phillip Vorsatz, N.C. Section Chief  
North Site Management Branch  
(404) 5620-8789

Mr. Bob Safay, Regional Representatives  
Agency of Toxic Substances & Disease  
Registry (ATSDR)  
c/o U.S. Environmental Protection Agency  
(404) 561-1782

Mr. Kevin Beswick, EPA Site Attorney  
Environmental Assessment Division  
(404) 562-9580



**N.C. STATE OFFICIALS**

N.C. Dept. of Environment & Natural Resources  
401 Oberlin Road, Suite 150  
Raleigh, North Carolina 27611  
(919) 733-2801

Mr. William G. Ross, Jr., Secretary  
NC Dept. of Environment & Natural Resources

Mr. Grover Nicholson, Branch Head  
Superfund Federal Remediation Branch

Mr. Dempsey Benton, Chief Deputy Secretary  
NC Dept. of Environment & Natural Resources

Mr. Nile Testerman, Project Manager  
Division of Waste Management

Mr. Don Reuter, Director  
Office of Public Affairs

Mr. Kerr Stevens, Director  
Division of Water Quality

Ms. Chrystal Bartlett  
Public Information Officer

Mr. John Morris, Director  
Division of Water Resources

Mr. William L. Meyer, Director  
Division of Waste Management

Ms. Linda Sewall, Director  
Division of Environmental Health

Mr. Dexter Matthews, Acting Deputy Director  
Division of Waste Management

Asheville Regional Office  
59 Woodfin Place  
Asheville, North Carolina 28801-2482  
(828) 251-6208

Mr. Jack Butler, Chief, Superfund Section  
Division of Waste Management

**HAYWOOD COUNTY OFFICIALS**

Haywood County Government  
215 North Main Street  
Waynesville, NC 28786  
(828) 452-6625

Mr. Jack Horton, County Manager  
Mr. Rick Hunnicutt, Asst. County Manager  
Mr. Jim Stevens, Commissioner  
Mr. Wade Francis, Commissioner  
Ms. Mary Ann Enloe, Commissioner  
Mr. Carlyle Ferguson, Commissioner  
Mr. Bill Noland, Commissioner  
Mr. Leon Killian, County Attorney

Mr. Bob Wood, Director  
Haywood County Health Department  
2177 Asheville Road, Waynesville  
(828) 452-6675

**WAYNESVILLE CITY OFFICIALS**

Town of Waynesville  
Waynesville Town Hall  
16 South Main Street, P. O. Box 100  
Waynesville, NC 28786  
(828) 452-2491

Mr. Henry Foy, Mayor  
Mr. Lee Galloway, Town Manager  
Mr. John Swift, Town Planner  
Ms. Libba Feichter, Alderwoman  
Mr. Gavin Brown, Alderman  
Mr. Kenneth Moore, Alderman  
Mr. Gary Caldwell, Alderman  
Mr. Michael L. Bonfoey, City Attorney

**MEDIA CONTACTS****A. Newspapers**

*The Enterprise Mountaineer*  
 P. O. Box 129  
 413 N. Main Street  
 Waynesville, NC 28786  
 Phone: (828) 452-6601  
 Fax # (828) 452-0665

*Asheville Citizen Times*  
 56 Montgomery Street  
 Waynesville, NC 28786  
 Phone: (828) 452-1467  
 Fax # (828) 452-1470

*Smoky Mountain News*  
 P. O. Box 629  
 Waynesville, NC 28786  
 Phone: (828) 452-4251  
 Fax # (828) 452-3585

**B. Radio**

WHCC-AM 1400 & WQNS-FM 104.9  
 P. O. Box 659  
 Waynesville, NC 28786  
 Phone: (828) 456-8661  
 Fax # (828) 456-4316

WRGC-AM 680  
 Old Waynesville Road, Box 1044  
 Sylva, NC 28779  
 Phone: (828) 586-2221  
 Fax # (828) 586-6834

WKSF-FM 99.9  
 Summerlin Road  
 Asheville, NC 28806  
 Phone: (828) 257-2700  
 Fax # (828) 255-7850

**C. Television**

WLOS-TV Channel 13  
 288 Macon Avenue  
 Asheville, NC 28804  
 Phone: (828)255-0013  
 Fax # (828) 255-4612

**ENVIRONMENTAL GROUPS AND OTHER INTERESTED PERSONS**

Residents/property owners in Barber Orchard

Clean Water Fund of North Carolina  
P. O. Box 1008  
Raleigh, North Carolina 27602  
Contact: Hope Taylor

Realtors and Mortgage Lenders

Haywood County Commissioners

Town of Waynesville

Congressmen Charles Taylor

Congressman John Edwards

News Media

## **APPENDIX B**

# **INFORMATION REPOSITORY AND POSSIBLE MEETING LOCATIONS**

## APPENDIX B

### INFORMATION REPOSITORY LOCATIONS

Haywood County Public Library (828) 452-5169  
 402 Haywood Street  
 Waynesville, North Carolina 28786  
 Business Hours: Monday - Thursday 9:00 am - 9:00 pm

U.S. Environmental Protection Agency (404) 562-8946  
 Atlanta Record Center  
 61 Forsyth Street, SW  
 Atlanta, Georgia 30303  
 Business Hours: Monday - Friday 8:00 am - 5:00 pm

### SUGGESTED MEETING LOCATIONS

Saunook Fire Station (704) 866-6618  
 Old Balsam Road  
 Waynesville, North Carolina 28786  
 Contact: Fire Chief

Fire station can seat approximately 40-50 people, room will have to be set up for number of anticipated attendees, handicapped accessible, A/V equipment needs to be rented, no fees. Must contact the Fire Chief at least two weeks prior to proposed meeting.

Pleasant Balsam Missionary Baptist Church (828)  
 2404 Old Balsam Road  
 Waynesville, North Carolina 28786

Church auditorium or recreation room, can seat approximately 200 people, order A/V equipment from local source, handicapped accessible, no fees. Must contact Bob Phillips at least two weeks prior to proposed meeting date.

Thad Woods Auction Hall  
25 Muse Business Park, Hwy. 23/74  
Waynesville, North Carolina 28786  
Contact: Mr. Thad Wood

(828)456-3298

Auction hall will hold approximately 200 people, is handicapped accessible, will need to rent A/V equipment, no fee required, must contact Mr. Wood at least two weeks prior to meeting date.

# **APPENDIX C**

**TECHNICAL ASSISTANCE GRANT (TAGs)**

**and**

**COMMUNITY ADVISORY GROUPS (CAGs)**

## APPENDIX C

# TECHNICAL ASSISTANCE GRANTS PROGRAM

An important aspect of the Superfund program is citizen involvement at the local level in decision-making that relates to site-specific cleanup actions. For this reason, community outreach activities are underway at each of the 1,200 sites that are presently on, or proposed for listing on the National Priorities List (NPL). The NPL is EPA's published list of the most serious abandoned or otherwise uncontrolled hazardous waste sites nationwide, which have been identified for possible remedial cleanup under Superfund.

Recognizing the importance of community involvement and the need for citizens living near NPL sites to be well-informed, Congress included provisions in the Superfund Amendments & Reauthorization Act (SARA, 1986) to establish a Technical Assistance Grant Program intended to foster informed public involvement in decisions relating to site-specific cleanup strategies under Superfund.

In addition to regulatory and legal requirements, decisions concerning cleanup initiatives at NPL sites must take into account a range of technical considerations. These include:

- analytical profiles of conditions at the site;
- the nature of the wastes involved; and
- the kinds of technology available for performing the necessary cleanup actions.

The TAG Program provides funds for qualified citizens' groups to hire independent technical advisors to help them understand and comment on such technical factors in cleanup decision affecting them. Listed below are the basic provisions of the TAG Program:

- Grants of up to \$50,000 are available to community groups for the purpose of hiring technical advisors to help individuals understand and interpret site-related technical information.
- The group must cover 20 percent of the total costs of the project to be supported by TAG funds. That means the group can provide in-kind services or raise funds to cover their portion of the grant.
- The group must budget the expenditure of grant funds to cover the entire cleanup period (which averages six years).
- There may be only one TAG award per NPL site at any one time; however, the grant may be renewed.



Acceptable uses of these grant funds include payments to technical advisors for services such as:

- reviewing site-related documents, whether produced by EPA or others;
- meeting with the recipient group to explain technical information;
- providing assistance to the grant recipient in communicating the group's site-related concerns;
- disseminating interpretations of technical information to the community; and
- participating in site visits, when possible, to gain a better understanding of cleanup activities.

A copy of the *Technical Assistance Grants Final Rule* (40 CFR Part 35) published in the Federal Register on Thursday, October 1, 1992, follows this section. This document contains all recent revisions to the Rule and provides details concerning those changes. However, you will need to contact the Region IV office for literature.

For further information on Technical Assistance Grants and to receive more information or an application package, please contact:

Ms. Rosemary Patton, Regional TAG Coordinator  
CERCLA State Programs, Waste Management Division  
U.S. Environmental Protection Agency, Region IV  
61 Forsyth Street, SW  
Atlanta, Georgia 30303  
Phone: (404) 562-8866 or 1-800-435-9233

## COMMUNITY ADVISORY GROUP (CAG)

A CAG should serve as a public forum for representatives of diverse community interests to present and discuss their needs and concerns related to the Superfund decision-making process with appropriate Federal and State/Tribal/local governments. The CAG is designed as a mechanism for all affected and interested parties in a community to have a voice and actively participate in the Superfund process. However, it is important to remember that the CAG is not the only mechanism for community involvement at a site; as the lead Agency, EPA continues to have the obligation to inform and involve the entire community through regular as well as innovative community involvement activities.

A CAG allows the Agency to exchange information with members of the affected community and encourages CAG members to discuss site issues and activities among themselves. The CAG also can provide a public service to the rest of the affected community by representing the community in discussions regarding the site and by relaying information from these discussions back to the rest of the community.

A community with a high level of interest and concern about site activities should be a strong candidate for a CAG. In addition, a site in the early stages of a long-term cleanup without an existing community group may be a strong candidate site for an effective CAG. If a group already exists which is representative of the local community, a CAG may not be appropriate - if the existing group can fulfill the role of a CAG. A CAG can be formed at any point in the cleanup process but may be most effective early in the cleanup process.

The program does not obtain funds from the government, but is based on voluntary participation on a regular basis. The average number of citizens that are recommended for a CAG is 20.

Responsibilities of each CAG member are:

1. Serve as a direct and reliable conduit for information flow to and from the community. CAG members have a responsibility to share information with other members of the affected community - the people they represent.
2. Fairly and honestly represent the views of other community members as well as their own at CAG meetings.
3. Review information concerning site cleanup plans, including technical documents, proposed and final plans, status reports and consultants reports and provide comments and other input at CAG meetings and other special-focus meetings.
4. Play an important role at key points in the cleanup decision-making process by expressing individual and community preferences on site issues.
5. Attempt, whenever possible, to achieve consensus with their fellow members before providing official comments or stating positions on relevant issues and key documents.
6. Assist the Chairperson in disseminating information on key issues to the community.
7. Attend all CAG meetings.
8. Be committed to the CAG and willing to serve for an extended period of time (at least two years).
9. Serve voluntarily and without compensation.

*[Booklet entitled Guidance for Community Advisory Groups at Superfund Sites is attached for information.]*

United States  
Environmental Protection  
Agency

Office of  
Solid Waste and  
Emergency Response

EPA 540-K-93-001  
PB93-963301  
September 1993



# Superfund Technical Assistance Grants

Office of Emergency and Remedial Response  
Hazardous Site Control Division (5203G)

Quick Reference Fact Sheet  
Publication 9230.1-05/FSA

## WHAT IS THE TECHNICAL ASSISTANCE GRANT PROGRAM?



**Background of the Program:** In 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—otherwise known as “Superfund”—established a trust fund for the cleanup of hazardous waste sites in the United States. CERCLA was modified and extended when Congress passed the Superfund Amendments and Reauthorization Act of 1986 (SARA). The Environmental Protection Agency (EPA) is responsible for administering the Superfund Program.

An important aspect of the Superfund program is citizen involvement at the local level in decision-making that relates to site-specific cleanup actions. For this reason, community outreach activities are underway at each of the approximately 1,200 sites that are presently on the National Priorities List (NPL). The NPL is EPA’s published list of the most serious hazardous waste sites nationwide that have been identified as potential threats to the environment.

Recognizing the importance of community involvement and the need for citizens living near NPL sites to be well-informed, Congress included provisions in SARA to establish a Technical Assistance Grant (TAG) Program, intended to promote public involvement in decisions on site-specific cleanup strategies under Superfund.

Decisions concerning cleanup activities at NPL sites should be based on a range of technical considerations. These might include:

- Studies of site conditions.
- The nature of the wastes involved.
- The technologies available for performing the necessary cleanup actions.

The TAG Program provides funds for qualified citizens’ groups affected by a Superfund site to hire independent technical advisors to help them understand and comment on site-related information, and thus participate in cleanup decisions.

*Since the first TAG was awarded in 1988, more than \$6 million has been awarded directly to grassroots groups.*

### Basic Provisions of the TAG Program:

- Grants of up to \$50,000 are available to community groups for the purpose of hiring a technical advisor to interpret site-related technical information. Additional funding may be available for unusually large or complex sites.



# Guidance for Community Advisory Groups at Superfund Sites

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### **Acknowledgments**

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The Community Advisory Group guidance is the product of the efforts of many people; individuals from the following groups have participated in its review and development: EPA Regional Offices, EPA OSWER Offices, OERR Environmental Justice Task Force, National Environmental Justice Advisory Committee, Association of State and Territorial Solid Waste Management Officials and EPA's Office of General Counsel. In particular, the Community Involvement Team (OERR), Linda Garczynski (OSWER), Hale Hawbecker (OGC), Jane Lemke (WI), Verne McFarland (R6), Marilu Martin (R5), Marcia Murphy (CA), Murray Newton (OERR), Charles Openchowski (OGC), Sonya Pennock (R8), and Suzanne Wells (OERR) each have made valuable contributions to the development and quality of this guidance.

— Diana Hammer (OERR), Project Manager

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### **Notice**

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The policies set out in this memorandum are intended solely as guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this memorandum, or to act at variance with the guidance, based on an analysis of specific site circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

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### **For More Information on CAGs**

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Contact your Regional Community Involvement Manager or a staff member of the Community Involvement and Outreach Center at EPA Headquarters. (See the list of contacts in Appendix E.)

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## 1. Background

- > **Environmental Justice Task Force**
  - > **Purpose of this Guidance**
  - > **Selecting Sites**
- 

The United States Environmental Protection Agency (EPA) is committed to involving the public in the Superfund cleanup process. In fact, there are many examples throughout the Superfund program where community involvement has enhanced, rather than impeded the Superfund cleanup decision-making process. While recognizing that providing additional opportunities for community involvement may require additional time and slow the cleanup process down initially, EPA believes this is time well spent, and that early and effective community involvement will actually save time in the long run.

EPA is committed to early, direct, and meaningful public involvement and provides numerous opportunities for the public to participate in site cleanup decisions. One of these opportunities for community involvement, is the EPA's Technical Assistance Grants (TAGs) program. EPA awards TAGs to eligible community groups so they can hire their own, independent Technical Advisor, enabling community members to participate more effectively in the decision-making process at Superfund sites. For more information on the TAG program, see the "Superfund Technical Assistance Grants" quick reference fact sheet (EPA 540-K-93-001; PB93-963301).

Community Advisory Groups (CAGs) are another mechanism designed to enhance community involvement in the Superfund process. CAGs respond to a growing awareness within EPA and throughout the Federal government that particular populations who are at special

risk from environmental threats—such as minority and low-income populations—may have been overlooked in past efforts to encourage public participation. CAGs are an effective mechanism to facilitate the participation of community members, particularly those from low-income and minority groups, in the decision-making process at Superfund sites.

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### 1.1 Environmental Justice Task Force

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The Office of Solid Waste and Emergency Response (OSWER) Environmental Justice (EJ) Task Force was established in 1993 to analyze environmental justice issues specific to waste programs and develop recommendations to address these issues. The EJ Task Force advised that the creation of Community Advisory Groups would enhance public involvement in the Superfund cleanup process. Specifically in its April 1994 report, titled OSWER Environmental Justice Task Force Draft Final Report (EPA 540-R-94-004), the Task Force recommended implementing a program involving CAGs at a minimum of ten sites nationwide by the end of FY94 and providing guidance to support the CAG activities.

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### 1.2 Purpose of this Guidance

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As lead Agency at a Superfund site, EPA has an important role to play in encouraging the use of Community Advisory Groups (see Section 10.3, under "Roles and Responsibilities"). This guidance document is designed to assist EPA staff [primarily Community Involvement Coordinators (CICs) and Site Managers, such as Remedial Project Managers, On-Scene Coordinators, and Site Assessment Managers] in working with CAGs at Superfund sites (this includes remedial and appropriate removal sites).

This guidance addresses the objectives, functions, membership, and scope of authority for CAGs. It emphasizes practical approaches and activities, and is designed to be flexible enough to meet the unique needs of individual local communities. The guidance is based on the Agency's experience in carrying out community involvement activities pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and policy documents issued by EPA and other Federal agencies. It also draws on concepts articulated in the President's Executive Order on Environmental Justice 12898, EPA/OSWER's Environmental Justice Task Force report, the "Restoration Advisory Board Implementation Guidelines" developed by the EPA and the Department of Defense (9/94), and the "Interim Guidance for Implementing Restoration Advisory Boards" drafted by the California Environmental Protection Agency (11/93).

This guidance provides a number of considerations to assist Community Involvement Coordinators (CICs) and Site Managers in working with a successful CAG. **CAGs need not conform to all aspects of this guidance.** Consequently, this guidance is intended to provide a starting point or frame of reference to help groups organize and begin meeting. A CAG's structure and operation, however, should reflect the unique needs of its community.

EPA will not establish or control CAGs; however, the Agency will assist interested communities in CAG activities. Further, EPA anticipates that the CAGs will serve primarily as a means to foster interaction among interested members of an affected community, to exchange facts and information, and to express individual views of CAG participants while attempting to

provide, if possible, consensus recommendations from the CAG to EPA.

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### **1.3 Selecting Sites**

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While EPA is initially focusing the CAG concept and guidance on Superfund sites with environmental justice concerns, the methods and principles are intended to be applied broadly and to include other Superfund sites as well. In some cases, the sites selected for a CAG may already have some form of community advisory group and EPA could help formalize the group, recognizing it as being representative of the community. In other cases, sites may be selected where a community advisory group doesn't yet exist, but where a CAG would be useful to encourage full community participation in site cleanup activities. See Section 2.2, "Determining the Need for a CAG" for more information on appropriate sites for a CAG.

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## **2. Community Advisory Group (CAG) Development**

- > **CAG Scope of Authority**
  - > **Determining the Need for a CAG**
  - > **Preparation for the CAG Information Meeting**
  - > **CAG Information Meeting**
- 

Community Advisory Groups are important tools for enhancing community involvement in the Superfund process. Through CAGs, EPA seeks to achieve direct, regular, and meaningful consultation with all interested parties throughout all stages of a response action.



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## 2.1 CAG Scope of Authority

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A CAG should serve as a public forum for representatives of diverse community interests to present and discuss their needs and concerns related to the Superfund decision-making process with appropriate Federal and State/Tribal/local governments. The CAG is designed as a mechanism for all affected and interested parties in a community to have a voice and actively participate in the Superfund process. However, it is important to remember that the CAG is not the only mechanism for community involvement at a site; as the lead Agency, EPA continues to have the obligation to inform and involve the entire community through regular as well as innovative community involvement activities.

EPA cannot, by law, give up its responsibility to make the final decisions at a site; however, by providing the perspective of the local community, the CAG can assist EPA in making better decisions. A CAG that is broadly representative of the affected community offers EPA a unique opportunity to hear—and seriously consider—community preferences for site cleanup and remediation. It is particularly important that in instances where an EPA decision and/or response differs from a stated CAG preference regarding site cleanup, EPA accepts the responsibility of explaining its decision and/or response to CAG members.

A CAG allows the Agency to exchange information with members of the affected community and encourages CAG members to discuss site issues and activities among themselves. The CAG also can provide a public service to the rest of the affected community by representing the community in discussions regarding the site and by relaying information from these discussions back to the rest of the

community. CAGs thus can be a valuable tool for both the Agency and communities throughout the cleanup process.

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## 2.2 Determining the Need for a CAG

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The CIC should consult with other site team members (for example, the Site Manager and Attorney) in selecting an appropriate site for a CAG. The team may consider a number of factors during the selection process, including: Generally, what is the level of community interest and concern about the site?

- Might that level of community interest and concern warrant a CAG?
- Has the community expressed an interest in forming a CAG?
- Does a group similar to a CAG exist?
- Do groups with competing agendas exist at the site?
- Are there any environmental justice issues or concerns regarding the site?
- What is the history of community involvement at the site?
- What is the likelihood of long-term cleanup activity at the site?

Depending on the status of the cleanup process at the site, substantial information may exist about the community. For example, if the site is in the RI/FS phase, the Community Relations Plan, developed based on interviews with community members, is a good information source.

A community with a high level of interest and concern about site activities should be a strong candidate for a CAG. In addition, a site in the

early stages of a long-term cleanup without an existing community group may be a strong candidate site for an effective CAG. Communities at removal sites, particularly non-time critical removal sites, also may benefit from a CAG (keeping in mind, however, the time necessary to begin CAG operations when considering a CAG for removal sites).

If a group exists which is representative of the local community (for example, a local environmental group that has been active at the site or a TAG recipient group), a CAG may not be appropriate—if the existing group can fulfill the role of a CAG. If competing groups exist at a site; however, their disparate interests and agendas can undermine even the best efforts of agencies, elected officials, and concerned citizens to forge a CAG. This situation should be given serious consideration in making the decision to promote CAGs at such sites.

A CAG can be formed at any point in the cleanup process but may be most effective early in the cleanup process. Generally, the earlier a CAG is formed, the more CAG members can participate in and impact site activities and cleanup decisions.

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### **2.3 Preparation for the CAG Information Meeting**

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The CAG Information Meeting is the setting for introducing the CAG concept to the community. Before the CAG Information Meeting, the CIC may begin the process of informing and educating the community about the purposes of the CAG and opportunities for membership and participation. This is especially important at Superfund sites where the community may have had relatively limited participation in the Superfund process. This section offers suggestions,

concerns, and methods that EPA (in conjunction with others such as State/Tribal/local governments) may use to notify a community about the formation of a CAG. These are not the only options—techniques will necessarily vary from site to site and from community to community. In many instances, it may be useful to target multiple newspapers as well as alternative media (for example, public service announcements on the radio, public access channels on cable television, free circulation newspapers) to more effectively reach out to communities. Other outreach options include flyers, announcements in local churches, etc. Remember also, that another important and effective method to "spread the word" about the CAG is through the personal relationships that Agency representatives have established in the community. No matter what method or media is used, EPA (in conjunction with others such as State/Tribal/local governments) must provide the information in a manner readily understandable to community members.

#### **2.3.1 Fact Sheet**

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EPA (in conjunction with others such as State/Tribal/local governments) may prepare and distribute a brief fact sheet describing the CAG prior to the CAG Information Meeting. A sample CAG fact sheet is included as Appendix A. In preparing the fact sheet, EPA may consult with the State/Tribal/local government. EPA may wish to expand existing networks used in distributing information about public involvement activities for the distribution of CAG-related fact sheets and other materials.

Community interviews conducted prior to development of the Community Relations Plan for the site, as well as the plan itself, are potential sources of information to identify effective methods for distributing the CAG fact sheet.

Depending on the status of the response action, the interviews and plan may not have been completed for all sites. If this is the case, EPA staff may conduct limited community interviews with local officials and community leaders, making special effort to contact those leaders with ties to the environmental justice and other site-related concerns of the community. For example, these sources could include churches and community organizations in minority and low-income neighborhoods. This will ensure that credible information sources identified by members of the community are used to supplement and reinforce direct mailing of the fact sheet. In addition, copies of the fact sheet should be available in the information repositories and at the CAG Information Meeting.

The fact sheet is designed to describe the purpose of the CAG and membership opportunities and delineate the role of CAG members. If a significant segment of the community is non-English speaking or visually impaired, EPA (in conjunction with others such as State/Tribal/local governments) should translate the fact sheet for distribution to these members of the community.

### **2.3.2 Public Notice**

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EPA (in conjunction with others such as State/Tribal/local governments) may prepare a public notice or display ad to advertise the CAG Information Meeting in general circulation newspapers serving the affected communities around the site. To ensure that all segments of the affected population are notified, notices in newspapers that serve low-income, minority, and non-English speaking audiences in the community also should be considered.

The notice should be published approximately two weeks in advance of the CAG Information

Meeting and should include the following information:

- Time and location of the meeting;
- CAG purpose and membership opportunities;
- The roles and responsibilities of CAG members;
- A statement that the meeting is open for public attendance and participation;
- Topics for consideration at the CAG Information Meeting; and
- Name and phone number of contact person(s) to obtain more information.

The public notice should appear in a prominent section of the newspapers, where it is likely to be read by the majority of community members. A sample CAG public notice is included as Appendix B.

### **2.3.3 News Release**

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EPA personnel (in conjunction with others such as State/Tribal/local governments) may prepare and distribute to the local media a news release to explain the purpose of the CAG and announce the time and location of the initial information meeting. Depending on local media coverage of Superfund and other environmental issues related to the site, it may be appropriate to prepare a more extensive media packet of information to update the local media on public involvement activities and overall response plans and progress.

### **2.3.4 Agenda**

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EPA, in consultation with the State/Tribal/local governments and residents, may develop an initial agenda for the CAG Information Meeting. The agenda should reflect important

community concerns raised in relation to the Superfund response. Again, the results of community interviews conducted in the process of developing Community Relations Plans and other community involvement activities may provide a source of information and background on community concerns. Demonstrating an awareness of and sensitivity to concerns expressed by the community is an important element in maximizing the potential benefits of CAGs.

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#### **2.4 CAG Information Meeting**

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EPA may sponsor the CAG Information Meeting and may consult with the State/Tribal/local government in its preparation. EPA (in conjunction with others such as State/Tribal/local governments) should attempt to hold the CAG Information Meeting as early as possible in the cleanup process.

EPA personnel (and/or others such as State/Tribal/local governments) may facilitate the CAG Information Meeting; however, for this and subsequent meetings, it may be preferable to have someone from the community with facilitation experience or a professional meeting facilitator serve as facilitator. A neutral facilitator is particularly effective at sites where some controversy is anticipated. Facilitation may produce a better sense of fairness and independence, helping to ensure more productive discussions.

The Information Meeting should serve to introduce the CAG concept to the community. The following topics may be appropriate to discuss at the meeting:

- Purpose and overview of the CAG;
- Goal of representing diverse community interests;

- Interface between the CAG and other community involvement activities;
- Membership opportunities;
- Suggested member selection process and timetable;
- Examples of a CAG Mission Statement and operating procedures (including community leadership);
- Suggested member responsibilities;
- Overview of site cleanup plans and progress; and
- Open discussion/question and answer period.

The Information Meeting and subsequent CAG meetings should be held in a central location and at a convenient time for community members. In addition, EPA (and/or others such as State/Tribal/local governments) should consider requirements of the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1994 in choosing a location (for example, accessibility by wheelchairs and availability of signers and readers, as necessary, to assist hearing and visually impaired participants).

Resources permitting, EPA (and/or others such as the State/Tribal/local governments) may provide appropriate administrative and logistical support for arranging the meeting and documenting its proceedings. Preparation of a concise and easy-to-read summary of the meeting also should be considered. Such a summary will help facilitate effective communication with local community members. The summary should be translated for interested members of the community who are non-English speaking or visually impaired. The summary should be made available for public review in the information repositories and through other dissemination methods no later than one month

after the Information Meeting. Copies of the summary also may be mailed to all community members who attend the initial meeting and to those who are on mailing lists used for other community involvement activities related to the site.

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### 3. CAG Startup

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The time period between the CAG Information Meeting and the implementation of a fully functional CAG may vary from site to site. EPA should encourage CAGs to be in full operation within six months after the information meeting, in order to maximize their effectiveness in the Superfund cleanup decision-making process. There are several key activities that should be completed during this time period to ensure successful CAG operation. These activities are described in the following sections.

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## 4. CAG Membership

- > **Size of the CAG**
  - > **Membership Composition**
  - > **Roles and Responsibilities of CAG Members**
  - > **Membership Solicitation**
  - > **Membership Selection Models**
- 

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### 4.1 Size of the CAG

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The number of members in the CAG may vary from site to site depending on the composition and needs of the affected community. The

CAG should determine the size of its membership; when doing so, the CAG should consider the following factors:

- Diversity of the community;
- CAG workload; and
- Effective group discussion and decision-making (i.e., pros/cons of larger vs. smaller groups).

Federal Facility Environmental Restoration Advisory Boards, groups similar to CAGs, generally average around 20 members. While it often is difficult to ensure that everyone has an opportunity to participate and to achieve closure on discussions in larger groups, the CAG should be large enough to adequately reflect the diversity of community interests regarding site cleanup and reuse.

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### 4.2 Membership Composition

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To the extent possible, membership in the CAG should reflect the composition of the community near the site and the diversity of local interests, including the racial, ethnic, and economic diversity present in the community—the CAG should be as inclusive as possible. At least half of the members of the CAG should be local community members (sometimes referred to as "near neighbors").

CAG membership should be drawn from the following groups:

- Residents or owners of residential property near the site and those who may be affected directly by site releases;
- Those who potentially may be affected by releases from the site, even if they do not live or own property near the site;

- Local medical professionals practicing in the community;
- Native American tribes and communities;
- Representatives of minority and low-income groups;
- Citizens, environmental, or public interest group members living in the community;
- TAG recipients, if a TAG has been awarded at the site;
- Local government, including pertinent city or county governments, and governmental units that regulate land use in the vicinity of the site;
- Representatives of the local labor community;
- Facility owners and other significant PRPs;
- The local business community; and
- Other local, interested individuals.

Clearly, persons with an obvious conflict of interest at the site should not be members of the CAG, e.g., remedy vendors, lawyers involved in pending site litigation, non-local representatives of national groups, and others without a direct, personal interest in the site.

In order to prevent the PRP (or another interest group) from dominating CAG discussions, the community shall have the authority to limit the number of these representatives or designate them as ex-officio members.

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### **4.3 Roles and Responsibilities of CAG**

#### **Members**

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Generally, CAG members will be expected to participate in CAG meetings, provide data and information to EPA on-site issues, and share

information with their fellow community members. EPA (along with State/Tribal/local governments, as appropriate) should help the CAG clearly define and maintain these roles and responsibilities (see Section 10.2, under "Roles and Responsibilities").

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### **4.4 Membership Solicitation**

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*For the CAG concept to be successful, the membership of each CAG should reflect the diverse interests of the community in which the Superfund site is located. It is also important that each community have the lead role in determining the membership appropriate for its CAG. This will help encourage participation in and support for the CAG. EPA should not select or approve/disapprove individual CAG members but must certify that the CAG is representative of the diverse interests of the community.*

EPA, in coordination with the State/Tribal/local governments, should inform the community about the purposes of the CAG and opportunities for membership and participation. This public outreach effort needs to be tailored to the individual community in which the CAG is to be formed. This is especially important at sites which are in the early stages of the Superfund cleanup process, sites at which opportunities for community participation have been limited, and/or sites where there has been relatively little community or media interest.

EPA (in coordination with others such as the State/Tribal/local governments) should make every effort to ensure that all individuals and groups representing community interests are informed about the CAG and the potential for membership so that each has the opportunity to participate in the CAG. For example, EPA

may begin the public outreach effort regarding CAG membership before the CAG Information Meeting by distributing the CAG fact sheet and publishing public notices and news releases.

Depending on the results of community-wide efforts to solicit nominations for CAG membership, it may be necessary to refine and further focus efforts for specific groups. These efforts may be reinforced with a letter to individuals and groups representing diverse community interests. A sample letter regarding CAG membership is included as Appendix C. CAG information also can be mailed to those expressing interest generally in the site and/or specifically in the CAG. CAG information also should be made available through the local information repositories. The information also may be reformatted and posted in other visible locations such as information kiosks and community centers.

If there is not enough community interest to form a CAG after all solicitation efforts have been exhausted, EPA (in conjunction with others such as State/Tribal/local governments) may issue a public notice through all available outlets to announce that efforts to form a CAG have been unsuccessful. A sample of such a public notice is included as Appendix D.

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## **4.5 Membership Selection Models**

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The selection of CAG members should be accomplished in a fair and open manner in order to maintain the level of trust needed for successful CAG operation. The members of the CAG should reflect the composition of the community and represent the diversity of local interests. In designing the method for developing a CAG that is most appropriate for the

affected community, it may be useful for EPA (in conjunction with others such as State/Tribal/local governments) to offer some type of facilitation.

The following Membership Selection models are examples that may be used and adapted to best meet the particular needs of a community. Of course, each community is unique and no one model will work in all instances; in fact, it may be appropriate to develop an entirely different model for selecting CAG members. Similarly, formal membership selection models, such as those described in this section, may not always be necessary. For example, selecting a group may be as simple as widely advertising the opportunity to join the CAG and then recognizing the CAG as consisting of the respondents. The key is that the CAG represent the interests of the community and that the CAG be able to function as a group. The exact selection process is secondary, as long as the process is fair and open.

### **4.5.1 Screening Panel Model**

Under this model, EPA, consulting with and involving the State/Tribal/local government, could assist the community in organizing a short-term Screening Panel to review nominations for membership on the CAG prior to final member selection. After the opportunity to form a CAG has been announced, the local community should identify (using a fair and open manner) CAG members who represent the diverse interests of the community. The panel should, to the extent practical, reflect the diversity of interests in the community since the panel would be expected to choose CAG members who are equally representative. The panel may select a chairperson from among its members.

The Screening panel should consider establishing and publicizing the following:

- Procedures for nominating members for the CAG, including the way members of the community can nominate themselves to be CAG members (panel members also may nominate themselves to be CAG members);
- The process for screening nominations and making recommendations for membership;
- The criteria to be used in screening nominations and determining membership recommendations; and
- A list of any recommended nominees for membership on the CAG.

The Screening Panel Chairperson may forward the panel's recommended list of nominees to the appropriate EPA Regional Administrator for review and comment (not for approval/disapproval of individuals) with regard to its ability to represent the interests of the community.

#### **4.5.2 Existing Group Model**

Under this model, an existing group in the community—such as a group with a history of involvement at the Superfund site—may be selected as the CAG for that community, if, in fact, it does represent the diverse interests in the community. If the group does not appear representative of the community, EPA may ask the group to expand its membership to include any community interests not represented.

#### **4.5.3 Core Group Model**

Under this model, EPA, consulting with and involving the State/Tribal/local governments, could select a Core Group that represents the diverse interests of the community. EPA (in conjunction with others such as State/Tribal/local governments) may remind the community

that a person may nominate himself or herself through the application process. For example, members of the Core Group could include seven members representing the following interests: two local residents, local government, environmental, civic, labor, and business. The members of this Core Group then would select the remaining members of the CAG in a fair and open manner.

#### **4.5.4 Self-Selecting Group Model**

Under this model, after EPA (in conjunction with others such as State/Tribal/local governments) announces the opportunity to form a CAG, the local community identifies (in a fair and open manner) CAG members who they believe represent the diverse interests of their community. Realistically, it may take some communities a significant amount of time to fully select the CAG members.

#### **4.5.5 Local Government Group Model**

Under this model, the local government would select, in a fair and open manner, members of the community to serve on the CAG. This model may be appropriate at sites where a positive working relationship and established communication channels exist between the local government and the community.

## **5. CAG Member Training**

Many of those selected as members of the CAG may require some initial training to enable them to perform their duties. EPA may work with the State/Tribal agencies, the local government(s), local universities, the PRP(s), and others, to provide training and prepare



briefing materials for CAG members. EPA also may work with these organizations and appropriate local groups to develop a method for quickly informing and educating new CAG members about cleanup issues, plans, and progress. Every effort should be made to tailor the training to the specific needs of the CAG members. For example, some CAG members may require more extensive training than others; similarly, some may need training materials in alternative formats, such as in a language other than English. It is extremely important for the success of the CAG process that all members have an adequate opportunity to understand the Superfund process and the cleanup issues related to their respective sites. It also is important that the CAG function as a group, meaning some CAGs may need training on how to function effectively as a group.

Training may be accomplished at regular CAG meetings and/or through activities such as the following:

- Formal training sessions;
- Briefing books, fact sheets, and maps; and
- Site tours.

Every effort should be made to provide CAG members with appropriate and necessary training, subject to available resources.

Technical staff from local, State/Tribal, and Federal agencies involved in site cleanup may attend CAG meetings. They may serve as technical resources and provide information about their respective areas of expertise to CAG members.

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## 6. Administrative Support for the CAG

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EPA, together with State/Tribal governments, the local government(s), local universities, the PRP(s), and others may assist the CAG with administrative support on issues relevant to the Superfund site cleanup and decision-making process.

Resources permitting, EPA also may expand existing site contractor support work assignments, for example, to provide administrative support and translate documents with EPA staff oversight.

Administrative support for the CAG may include the following:

- Arranging for meeting space in a central location;
- Preparing and distributing meeting notices and agenda;
- Taking notes during meetings and preparing meeting summaries;
- Duplicating site-related documents for CAG review;
- Duplicating and distributing CAG review comments, fact sheets, and other materials;
- Providing mailing services and postage;
- Preparing and placing public notices in local newspapers;
- Maintaining CAG mailing lists;
- Translating or interpreting outreach materials and CAG meetings in cases where there is a

significant non-English speaking portion of the community; and

- Facilitating CAG meetings and special-focus sessions, if requested by the CAG.

After CAG members have been selected, EPA, in coordination with the State/Tribal agencies and the local government, may assist the CAG in developing a news release or fact sheet announcing the startup of the CAG and providing the names of CAG members. The news release or fact sheet also can be used as a vehicle for publicly thanking all members of the community who expressed an interest in CAG participation, encouraging their continued involvement through attendance at CAG meetings, and announcing the first CAG meeting.

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## 7. CAG Operations

- > **Chairperson**
  - > **Mission Statement and Operating Procedures**
  - > **Meetings**
- 

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### 7.1 Chairperson

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CAG members may select a Chairperson from within their ranks and determine an appropriate term of office. It may be useful to advise that the Chairperson be committed to the CAG and willing to serve for an extended period of time (e.g., two years) to ensure continuity. Members have the right and responsibility to replace the Chairperson as they believe necessary. The processes for selecting and dismissing a Chairperson should be detailed in the CAG's operating procedures.

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### 7.2 Mission Statement and Operating Procedures

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Each CAG should develop a Mission Statement describing the CAG's specific purpose, scope, goals, and objectives. The mission statement and subsequent CAG activities should focus on actions related to Superfund site issues consistent with the purpose of a CAG.

Each CAG should develop its own letterhead. Each CAG also should develop a set of procedures to guide day-to-day operations. Topics to be addressed in these operating procedures include the following:

- How to fill membership vacancies;
- How often to hold meetings;
- The process for reviewing and commenting on documents and other materials;
- How to notify the community of CAG meetings;
- How the public can participate in and pose questions during CAG meetings; and
- How to determine when the CAG has fulfilled its role and how it will disband.

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### 7.3 Meetings

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All CAG meetings should be open to the public. The meetings should be announced publicly (via display ads in newspapers, flyers, etc.) well enough in advance (e.g., two weeks) to encourage maximum participation of CAG and community members.

EPA personnel (and/or others such as State/Tribal/local governments) may facilitate CAG meetings, however, it may be preferable to use

someone from the community with facilitation experience or a professional meeting facilitator. A neutral facilitator is particularly effective at sites where some controversy is anticipated. Facilitation may produce a better sense of fairness and independence, helping to ensure more productive discussions. If a facilitator is regularly used during CAG meetings, it may be helpful to further clarify both the Chairperson's and facilitator's roles to avoid direct conflict between the facilitator and Chairperson.

The intent of the CAG is to ensure ongoing community involvement in Superfund response actions. As such, regular attendance at CAG meetings by all CAG members should be anticipated. Even though they are not CAG members, the EPA Site Manager and the CIC may attend meetings and encourage representatives of other pertinent Federal agencies and State/Tribal/local governments to attend meetings as well. Governmental attendees should not be so numerous, however, as to inhibit meeting discussions. Consistent attendance, however, can demonstrate commitment to meaningful public participation in the cleanup process.

### **7.3.1 Meeting Frequency**

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CAG meetings should be scheduled on a regular basis. CAG members should determine the frequency of CAG meetings based on the needs at their particular site. Meetings should be held often enough to allow the CAG to respond to site issues within specified timeframes and allow for timely communication of CAG actions and site activities to the rest of the community. Frequency of meetings should be covered in the CAG's operating procedures.

### **7.3.2 Location**

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The CAG meetings should be held in a location agreed upon by CAG members. It is useful to

consider a location convenient to CAG members, as well as central enough to encourage attendance by other interested members of the community. Meeting spaces such as local libraries, high schools, and senior centers may be acceptable locations. The location should meet requirements of the Americans with Disabilities Act and the Rehabilitation Act of 1994 (for example, accessibility for those in wheelchairs).

### **7.3.3 Meeting Format**

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The format for CAG meetings may vary depending on the needs of the CAG. A basic meeting format might include:

- Review of "old" business;
- Status update by the project technical staff and CAG member discussion;
- Discussion and question/answer session involving members of the public in attendance;
- Summary and discussion of "action items" for the CAG; and
- Discussion of the next meeting's agenda.

Prior to announcing each meeting, CAG members may wish to agree upon the meeting's purpose, agenda, and format. If necessary, arrangements should be made to provide a translator or interpreter and/or facilitator. EPA (in conjunction with others such as State/Tribal/local governments) may assist the CAG in making appropriate arrangements.

### **7.3.4 Special-Focus Sessions**

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The CAG also may consider holding special-focus sessions from time to time. These meetings would focus on a single topic and provide an opportunity for the CAG to solicit input, discuss, or gather information on a specific issue

requiring attention. If an expert cannot attend a special-focus session—travel and attendance in person may not always be possible—it may be useful for the CAG to schedule a conference call with that expert to discuss a particular issue. EPA (in conjunction with others such as State/Tribal/local governments) may provide support for special-focus sessions on issues relevant to the Superfund site cleanup and decision-making process.

### **7.3.5 Meeting Documentation**

The CAG should prepare a concise summary of each meeting, highlighting the topics discussed, agreements reached, and action items identified. EPA and others such as the State/Tribal/local governments may provide support for this effort. The CAG may want to consider preparing a summary, rather than a verbatim transcript, to facilitate effective communication with local communities. If a significant segment of the affected population is non-English-speaking or visually impaired, they also should translate the summary, as appropriate, for these members of the community.

The meeting summary should be available for public review in the information repositories and through other dissemination methods within one month of the meeting. Copies of the summary also may be mailed to all community members who attended the meeting and to those who are on the CAG mailing list. If the CAG mailing list is larger than EPA's site mailing list, EPA may expand its mailing list to include interested community members from the CAG list.

## **8. CAG Response to Requests for Comments**

EPA (in conjunction with others such as State/Tribal/local governments) should make every effort to involve the CAG during the early stages of developing documents—for example, during the scoping stage.

When EPA offers CAG members the opportunity to review and comment on documents, it may be helpful for EPA's technical staff (and from other appropriate agencies) to conduct a brief walk-through of each document prior to the CAG members' review. This overview may include explaining the goals and significance of each document in the cleanup process.

EPA should consider making all documents available to the CAG for the same length of time as to other groups—such as the State/Tribal and peer review groups. The duration of comment periods for some Superfund site-related documents, such as the Remedial Investigation/Feasibility Study (RI/FS) and the Proposed Plan and Records of Decision (RODs), are already established. CAG members, however, may be asked to review and comment on a variety of documents and other information for which comment period durations have not been established. EPA should explain to the CAG that, in some cases, time allotted for review of these materials may have to be less than 30 days. In those cases, the CAG should be ready to complete its review and provide comments in the shorter time period.

The CAG may determine the most efficient way to respond to requests for review and comment on key documents. The CAG

should choose, on a case-by-case basis, the most appropriate mechanism to ensure that comments are provided within specified time-frames. One option available for the CAG to gather input from its constituents is by holding a special-focus meeting. To assist in the process, EPA (in conjunction with others such as State/Tribal/local governments) should prepare executive summaries in plain language describing the document and its key points.

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## 9. EPA Response to Comments from the CAG

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Since EPA representatives may attend CAG meetings regularly, EPA may have the opportunity to respond to many CAG comments on key documents and other issues in the context of meeting discussions. These responses should be documented as part of the interchange during the CAG meeting and, unless otherwise stated, should not be considered part of the formal Agency "Response to Comments" (as required under Sections 113 and 117 of CERCLA and 40 CFR 300 of the National Contingency Plan). EPA should recognize the nature of the comments (whether statements of individual preferences or statements supported by all CAG members), and give the comments corresponding weight for consideration. In cases where there are numerous comments to address in a meeting context, EPA may respond to them in writing.

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## 10. Roles and Responsibilities

- > **CAG Chairperson**
  - > **CAG Members**
  - > **EPA (as Lead Agency)**
  - > **State/Tribal Regulatory Agency**
  - > **CAG - TAG Interface**
- 

EPA is committed to early, direct, and meaningful public involvement. Through CAGs, community members have a direct line of communication with EPA (as well as with the State/Tribal/local governments, depending on their level of involvement) and many opportunities for expressing their opinions. As a representative public forum, CAG members are able to voice their views on cleanup issues and play an important role in cleanup decisions. This is especially important before key points in the cleanup process. For example, CAG members may express preferences for the type of remedy, cleanup levels, future land use, and interaction with the regulatory agencies. Since the CAG, by definition, is intended to be representative of the affected community, the regulatory agencies will give substantial weight to the preferences expressed by CAG members. This is particularly important if the preferences reflect the position of most CAG members or represent a consensus from the CAG. EPA must not only listen to views expressed by CAG members but address their views when making site decisions.

EPA, the State/Tribal/local governments, the CAG Chairperson, and CAG members each have an important role to play in the development and operation of the CAG and in contributing to its effectiveness as a forum for meaningful public participation in Superfund response actions.

The following list, while not comprehensive, includes some of the key functions of each player.

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### **10.1 CAG Chairperson**

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1. Prepare and distribute an agenda prior to each CAG meeting.
2. Ensure that CAG meetings are conducted in a manner that encourages open and constructive participation by all members and invites participation by other interested parties in the community.
3. Ensure that all pertinent community issues and concerns related to the Superfund site response are raised for consideration and discussion.
4. Attempt, whenever possible, to reach consensus among CAG members by providing official comments or stating positions on relevant issues and key documents.
5. Facilitate dissemination of information on key issues to the community.

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### **10.2 CAG Members**

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1. Serve as a direct and reliable conduit for information flow to and from the community. CAG members have a responsibility to share information with other members of the affected community—the people they represent. Their names should be publicized widely within the local community to ensure that community members and interest groups have ready access to CAG members. If CAG members do not wish to have their phone numbers listed publicly, an alternative contact system should be explored to

ensure that the community has access to CAG members.

2. Represent not only their own personal views, but also the views of other community members while serving on the CAG. CAG members should honestly and fairly present information they receive from members of the community; tentative conclusions should be identified properly as such.
3. Review information concerning site cleanup plans, including technical documents, proposed and final plans, status reports, and consultants' reports and provide comments and other input at CAG meetings and other special-focus meetings.
4. Play an important role at key points in the cleanup decision-making process by expressing individual community preferences on site issues.
5. Attempt, whenever possible, to achieve consensus with their fellow members before providing official comments or stating positions on relevant issues and key documents.
6. Assist the Chairperson in disseminating information on key issues to the community.
7. Attend all CAG meetings.
8. Be committed to the CAG and willing to serve for an extended period of time (e.g., two years). Terms may be staggered for continuity.
9. Serve voluntarily and without compensation.

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### **10.3 EPA (as Lead Agency)**

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1. Provide information on the opportunity to form the CAG.

2. Attend CAG meetings to provide information and technical expertise on Superfund site cleanup.
3. Facilitate discussion of issues and concerns relative to Superfund actions.
4. Listen and respond to views expressed by CAG members, giving them substantial consideration when making site decisions, especially when views are those of most or all CAG members.
5. Work with others, as appropriate, to support and participate in training to be provided to CAG members.
6. Assist the CAG with administrative and logistical support and meeting facilities.

representative of the TAG group to be a member of the CAG. The Regions also should encourage the TAG and CAG to work together toward common goals with respect to site remediation.

If no TAG currently exists for this site, community members are still eligible and are encouraged to apply for a TAG. *Having a CAG at a site in no way precludes an eligible group at that same site from receiving a TAG.*

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#### **10.4 State/Tribal Regulatory Agency**

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1. Attend all CAG meetings.
2. Serve as an information referral and resource bank for the CAG on State- or Tribal-related issues.
3. Support training to be provided to CAG members.
4. If the lead agency, assume responsibilities under Section 10.3.

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#### **10.5 CAG - TAG Interface**

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TAG recipients can use their TAG funds to hire their own independent Technical Advisor to help them better understand and more effectively participate in the decision-making process at Superfund sites.

If a TAG has been awarded to a community group for work at this particular site (with the CAG), the Region should encourage a

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**Points to Keep in Mind Regarding Community Advisory Groups**

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- Consult with and involve appropriate State and Tribal Governments.
- Consult with and involve appropriate local governments.
- Involve communities EARLY in the Superfund process.
- Maintain open communication channels.
- Share information.
- Be sincere.



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## **11. Appendices**

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## APPENDIX A: Fact Sheet

# COMMUNITY ADVISORY GROUP (CAG)

## *(Name and Location of Site)*

The U.S. Environmental Protection Agency (EPA) believes it may be useful for the community (*communities*) of (*name of community or communities affected*) to establish a Community Advisory Group (CAG) to ensure that all segments of the community have an opportunity to participate in the decision-making process at (*name of the site*).

**The Superfund program** under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) covers the cleanup of sites involving the improper disposal of hazardous substances throughout the country. Community involvement is an important element of the Superfund process, and EPA encourages it. EPA's comprehensive Community Involvement Program for (*name of the site*) began in (*date*). (*Provide a brief description of accomplishments of the Community Involvement Program at this site, if possible.*)

EPA, in cooperation with (*name of the State/Tribal Regulatory Agency and any other parties to the cleanup agreement*), has begun work to cleanup (*name of the site*).

*(Provide a brief description of the site and the cleanup-related activities to date.)*

**A Community Advisory Group (CAG)** provides a setting in which representatives of the local community can get up-to-date information about the status of cleanup activities, as well as discuss community views and concerns about the cleanup process with EPA, the State/Tribal regulatory agency, and other parties involved in cleanup of the Superfund site. **The CAG is a public forum in which all affected and interested parties in a community can have a voice and actively participate in the Superfund process.**

**Getting Involved.** CAGs are made up of members of the community. CAG membership is voluntary and members should be willing to serve two-year terms. CAG members will meet regularly and review and comment on technical documents and plans related to the environmental studies and cleanup activities at (*name of site*). Members will help EPA and the community exchange information about site activities and community concerns. CAG members will meet with individuals and groups in the community to obtain their views and hear their concerns related to site cleanup. **All CAG meetings will be open to the public.** CAG members will be chosen from among nominations submitted by individuals and groups in the community. (*May provide more details about the specific membership selection model here.*) **The deadline for membership application is (*date*).**

**For More Information Contact:** (*local contact name, address, and telephone number*).

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**APPENDIX B: Public Notice #1**

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*(Name and Location of Site)*

## Formation of Community Advisory Group

**The U.S. Environmental Protection Agency (EPA)** believes it may be useful for the community (*communities*) of (*name of community or communities affected*) to establish a Community Advisory Group (CAG) to ensure that all segments of the community have an opportunity to participate in the decision-making process at (*name of the site*).

**The Superfund program** involves cleaning up hazardous waste sites throughout the country. EPA encourages community involvement and considers it to be an important element of the Superfund process.

The CAG will provide a setting in which representatives of the local community can get up-to-date information about the status of cleanup activities, as well as discuss community views and concerns about the cleanup process with EPA, the State regulatory agency, and other parties involved in cleanup of the site. **The CAG will be a public forum in which all affected and interested parties in a community can have a voice and actively participate in the Superfund process.**

**EPA will sponsor a meeting on (*date*) at (*time*)** to discuss the purpose of the CAG, provide information on how CAG members should be chosen, and answer questions concerning cleanup plans and activities at the site. (*Provide a brief description of specific site-related issues to be discussed.*) The meeting will be held at (*meeting location address*).

**The CAG will be made up of members of the community.** CAG membership is voluntary and members serve without compensation. Members should be willing to serve two-year terms. The CAG will meet regularly to review and comment on technical documents and plans related to the environmental studies and cleanup activities at (*name of site*) and to relay community views and concerns related to the site. **All CAG meetings will be open to the public, and all members of the community are encouraged to participate.**

**For more information about the CAG, contact:** (*local contact name, address, and telephone number*).

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**APPENDIX C: Sample CAG Letter**

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Dear *(name of Community Member/Organization)*:

The community *(communities)* of *(name of community or communities affected)* is establishing a Community Advisory Group (CAG) to ensure that all segments of the community have an opportunity to participate in the decision-making process at *(name of the site)*.

The Superfund program involves cleaning up hazardous waste sites throughout the country. EPA encourages community involvement—an important element of the Superfund process.

The CAG will provide a setting in which representatives of the local community can get up-to-date information about the status of cleanup activities, as well as discuss community views and concerns about the cleanup process with EPA, the State/Tribal regulatory agency, and other parties involved in cleanup of the site.

The CAG will be made up of members of the community, and members should reflect the diverse interests in the community. CAG membership is voluntary and members serve without compensation. Members should be willing to serve two-year terms. The CAG will meet regularly to review and comment on technical documents and plans related to the environmental studies and cleanup activities at *(name of site)* and to relay information between EPA and the community about the ongoing activities at the site. They will be expected to meet often with individuals and groups in the community to obtain their views and hear their concerns related to site cleanup issues.

CAG membership offers an outstanding opportunity to represent the community and help ensure the most effective remediation of the *(name of site)*.

If you have any questions about CAGs, please call \_\_\_\_\_ at \_\_\_\_\_.

Sincerely,

*(name of EPA Regional CIC  
and, if possible, a local community leader)*

Enclosure

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**APPENDIX D: Public Notice #2**

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*(Name and Location of Site)*  
**Insufficient Community Interest for  
Community Advisory Board (CAG)**

**The U.S. Environmental Protection Agency (EPA)** believed it would be useful for the community (or communities) of *(name of community or communities affected)* to establish a Community Advisory Group (CAG) to ensure that all segments of the community have an opportunity to participate in the decision-making process at *(name of the site)*.

The CAG would provide a setting in which representatives of the local community could get up-to-date information about the status of cleanup activities, as well as discuss community views and concerns about the cleanup process with EPA, the State/Tribal regulatory agency, and other parties involved in cleanup of the site. **The CAG would be a public forum in which all affected and interested parties in a community would have a voice and could participate actively in the Superfund process.**

Efforts to encourage members of the community to serve as CAG members began on *(date)*. These efforts included direct communication with individuals and organizations in the community *(be specific in terms of the outreach effort)* as well as a public meeting in which the purpose of the CAG and the roles and responsibilities of CAG members were discussed.

Despite these efforts, members of the community have not expressed enough interest so far to ensure full participation by all segments of the community. Since these efforts to stimulate interest in a CAG in *(name of community)*, have not been successful, EPA will not continue to encourage a CAG to form at *(name of site)*. If in the future, community members express an interest in forming a CAG, EPA may reconsider this decision.

**If You Have Any Questions Contact:** *(local contact name, address, and telephone number)*.

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**APPENDIX E: List of Community Involvement Managers Nationwide**


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Region 1

US EPA  
 John F. Kennedy Federal Bldg. Rm. RPS-74  
 Boston, MA 02203  
 Johanna Hunter  
 617-565-3425

Region 2

US EPA (26-OEP)  
 290 Broadway  
 26th Floor  
 New York, NY 10007  
 Lillian Johnson  
 212-637-3675

Region 3

US EPA (3HW43)  
 841 Chestnut Street  
 Philadelphia, PA 19107  
 Hal Yates  
 215-566-5530

Region 4

US EPA  
 Waste Management Division  
 100 Alabama Street, SW  
 Atlanta, GA 30303

## South Remedial Branch:

Betty Winter (AL, GA, MS)

404-562-8934

1-800-435-9234

Rose Jackson (South FL)

404-562-8940

Carleen Wakefield (North FL)

404-562-8915

## North Remedial Branch:

Cynthia Peurifoy (SC)

404-562-8798

1-800-435-9233

Diane Barrett (NC)

404-562-8830

Cindy Gibson (SC, KY)

404-562-8808

## Emergency Response Branch:

Michael Henderson (All Region 4 States)

404-562-8724

1-800-564-7577

Region 5

US EPA (PS19-J)  
 Metcalfe Federal Bldg.- 19th floor  
 77 W. Jackson Blvd.  
 Chicago, IL 60604  
 Toni Lesser  
 312-886-6685

Region 6

US EPA (6 SF-P)  
 First International Bank Tower & Fountain Place  
 1445 Ross Ave., 12th Floor  
 Dallas, TX 75270-2733  
 Verne McFarland  
 214-665-6617

Region 7

US EPA  
 726 Minnesota Ave.  
 Kansas City, KS 66101  
 Rowena Michaels  
 913-551-7003

# **APPENDIX D**

# **GLOSSARY**

## APPENDIX D - GLOSSARY

This glossary defines terms often used by the U.S. Environmental Protection Agency (EPA) when describing activities occurring in the Superfund process though not necessarily used in this document. These definitions apply specifically to the Superfund program and may have other meanings when used in different circumstances. Underlined words included in various definitions are defined separately in the glossary.

**Administrative Order on Consent (AOC):** A legal agreement between EPA and potentially responsible parties (PRPs) whereby PRPs agree to perform or pay the cost of a site cleanup. The agreement describes actions to be taken at a site and may be subject to a public comment period. Unlike a consent decree, an administrative order on consent does not have to be approved by a judge.

**Administrative Record:** A file which is maintained and contains all information used by the lead agency to make its decision on the selection of a response action under CERCLA. This file is to be available for public review and a copy is to be established at or near the site, usually at one of the information repositories. Also, a duplicate file is held in a central location, such as a Regional or State office.

**Air Stripping:** A treatment system that removes, or "strips," volatile organic compounds from contaminated ground water or surface water by forcing an airstream through the water and causing the compounds to evaporate.

**Applicable or Relevant and Appropriate Requirements (ARARs):** The Federal and State requirements that a selected remedy will attain. These requirements may vary among sites and alternatives.

**Aquifer:** An underground rock formation composed of materials such as sand, soil, or gravel that can store and supply ground water to wells and springs. Most aquifers used in the United States are within a thousand feet of the earth's surface.

**Baseline Risk Assessment:** A means of estimating the amount of damage a Superfund site could cause to human health and the environment. Objectives of a risk assessment are to: 1) help determine the need for action; 2) help determine the levels of chemicals that can remain on the site and still protect health and the environment; and 3) provide a basis for comparing different cleanup methods.

**Bioaccumulative:** Substances that increase in concentration in living organisms (that are very slowly metabolized or excreted) as they breathe contaminated air, drink contaminated water, or eat contaminated food.



**Biodegradable:** The ability to break down or decompose rapidly under natural conditions and processes.

**Carbon Adsorption:** A treatment system where contaminants are removed from ground water or surface water when the water is forced through tanks containing activated carbon, a specially treated material that attracts the contaminants.

**Carcinogen:** Any substance that can cause or contribute to the production of cancer.

**Chronic Toxicity:** The capacity of a substance to cause long-term poisonous human health effects.

**Cleanup:** Actions taken to deal with a release or threatened release of hazardous substances that could affect public health and/or the environment. The term "cleanup" is often used broadly to describe various response actions or phases of remedial responses such as the remedial investigation/feasibility study.

**Comment Period:** A time period during which the public can review and comment on various documents and EPA actions. For example, a comment period is provided when EPA proposes to add sites to the National Priorities List (NPL). Also, a minimum 30-day comment period is held to allow community members to review and comment on a draft RI/FS and proposed plan. This comment period must be extended an additional 30 days upon timely request. A comment period is also required to amend the Record of Decision (ROD). Similarly, a 30 day comment period is provided when EPA proposes to delete a site from the NPL.

**Community Relations (CR):** EPA's program to establish two-way communication with the public to create understanding of EPA programs and related actions, to assure public input into decision-making processes related to affected communities, and to make certain that the Agency hears, listens to and is responsive to public concerns. Specific community relations activities are required in relations to Superfund remedial actions.

**Community Relations Plan (CRP):** Formal plan for EPA community relations activities at a Superfund site. The CRP is designed to ensure citizen opportunities for public involvement at the site, determine those activities which will provide for such involvement, and allow citizens the opportunity to learn about the site.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** A federal law passed by Congress in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, EPA can either:

- Pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work; or

Take legal action to force parties responsible for site contamination to clean up the site or pay back the Federal government for the cost of the cleanup.

**Consent Decree (CD):** A legal document, approved and issued by a judge, that formalizes an agreement reached between EPA and potentially responsible parties (PRPs) where PRPs will perform all or part of a Superfund site cleanup. The consent decree describes actions that PRPs are required to perform and is subject to a public comment period.

**Contaminant:** Any physical, chemical, biological, or radiological substance or matter that has an adverse affect on air, water or soil.

**Cost-Effective Alternative:** The cleanup alternative selected for a site on the National Priorities List based on technical feasibility, permanence, reliability, and cost. The selected alternative does not require EPA to choose the least expensive alternative. It requires that if there are several cleanup alternatives available that deal effectively with the problems at a site, EPA must choose the remedy on the basis of permanence, reliability, and cost

**Cost Recovery:** A legal process where potentially responsible parties can be required to pay back the Federal government for money it spends on any cleanup actions.

**Criteria:** Descriptive factors taken into account by EPA in setting standards for various pollutants. These factors are used to determine limits on allowable concentration levels, and to limit the number of violations per year. When issued by EPA, the criteria provide guidance to the states on how to establish their standards.

**Downgradient:** The direction that groundwater flows, similar in concept to 'downstream' for surface water, such as a river.

**Effluent:** Treated or untreated waste-water which flows from a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

**Emergency:** Those releases or threats of releases requiring initiation of on-site activity within hours of the lead agency's determination that a removal action is appropriate.

**Enforcement:** EPA's efforts, through legal action if necessary, to force potentially responsible parties to perform or pay for a Superfund site cleanup.

**Environmental Response Team (ERT):** EPA hazardous waste experts who provide 24-hour technical assistance to EPA Regional Offices and States during all types of emergencies involving releases at hazardous waste sites and spills of hazardous substances.

**Explanation of Differences:** After adoption of a final remedial action plan, if any remedial action is taken, or any enforcement action under Section 106 is taken, or if any settlement or consent

decree under Sections 106 or 122 is entered into, and if such action, settlement, or decree differs in any significant respects from the final plan, the lead agency is required to publish an explanation of the significant differences and the reasons the changes were made.

**Feasibility Study (FS):** See Remedial Investigation/Feasibility Study

**Ground Water:** The supply of fresh water found beneath the earth's surface that fills pores between materials such as sand, soil, or gravel. In aquifers, ground water occurs in sufficient quantities that it can be used for drinking water, irrigation and other purposes.

**Hazard Ranking System (HRS):** A scoring system used to evaluate potential relative risks to public health and the environment from releases or threatened releases of hazardous substances. EPA and States use the HRS to calculate a site score, from 0 to 100, based on the actual or potential release of hazardous substances from a site through air, surface water, or ground water. This score (28.5 or higher) is the primary factor used to decide if a hazardous waste site should be placed on the National Priorities List.

**Hazardous Substance:** Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

**Hydrology:** The science dealing with the properties, movement, and effects of water found on the earth's surface, in the soil and rocks below, and in the atmosphere.

**Incineration:** Burning of certain types of solid, liquid, or gaseous materials under controlled conditions to destroy hazardous waste.

**Information Repository:** A file containing current information, technical reports, reference documents, and TAG application information regarding a Superfund site. The information repository is usually located in a public building that is convenient for local residents -- such as a public school, city hall, or library.

**Inorganic Chemicals:** Chemical substances of mineral origin, not of basically carbon structure.

**In-situ:** Means to keep in place, treatment conducted in its original place; ex-situ is removal from place of origin.

**Leachate:** A contaminated liquid resulting when water percolates, or trickles, through waste materials and collects components of those wastes. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or ground water.

**Maximum Contaminant Level (MCLs):** The maximum permissible level of a contaminant for human consumption in water delivered to any user of a public water system..

**Monitoring Wells:** Special wells drilled at specific locations on or off a hazardous waste site where ground water can be sampled at selected depths and studied to determine such things as the direction in which ground water flows and the types and amounts of contaminants are present.

**National Oil and Hazardous Substances Pollution Contingency Plan (NCP):** The Federal regulation that guides determination of the sites to be corrected under the Superfund program and the program to prevent or control spills into surface waters or other portions of the environment. The NCP was revised in February 1990.

**National Pollutant Discharge Elimination System (NPDES):** A provision of the Clean Water Act which prohibits the discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state or (where delegated) a tribal government on an Indian reservation allowing a controlled discharge of liquid after it has undergone treatment.

**National Priorities List (NPL):** EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from the Trust Fund. The list is based primarily on the score a site receives on the Hazard Ranking System (HRS). EPA is required to update the NPL at least once a year.

**National Response Center (NRC):** The center operated by the U.S. Coast Guard that receives and evaluates reports of oil and hazardous substance releases into the environment and notifies the appropriate agency(ies). The NRC can be contacted 24-hours a day, toll-free at (800) 424-8802.

**Operable Unit:** An action taken as one part of an overall site cleanup. For example, a carbon absorption system could be installed to halt rapidly spreading groundwater contaminants while a more comprehensive and long-term remedial investigation/feasibility study is underway. A number of operable units can be used in the course of a site cleanup.

**Operation and Maintenance (O&M):** Activities conducted at a site after a response action occurs, to ensure that the cleanup or containment system is functioning properly.

**Parts Per Billion (ppb)/Parts per Million (ppm):** Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene (TCE) in 1 million ounces of water is 1 ppm; 1 ounce of TCE in 1 billion ounces of water is 1 ppb. If one drop of TCE is mixed in a competition-size swimming pool, the water will contain about 1 ppb of TCE.

**Permeability:** The capacity of rock or soil to transmit a fluid, usually water in specified directions.

**Plume:** A visible or measurable discharge of a contaminant from a given point of origin; can be visible or thermal in water, or visible in the air as, for example, a plume of smoke. A three dimensional zone within the groundwater that contains contaminants and generally moves in the direction of, and with groundwater flow.

**Potentially Responsible Party (PRP):** An individual(s) or company(ies) (such as owners, operators, transporters, or generators of hazardous waste) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

**Preliminary Assessment:** The process of collecting and reviewing available information about a known or suspected hazardous waste site or release. EPA or States use this information to determine if the site requires further study. If further study is needed, a site inspection is undertaken.

**Presumptive Remedy:** Preferred treatment technologies for common categories of sites, based on historical patterns of remedy(ies) selected and EPA's scientific and engineering evaluation of performance data on technology implementation, and has determined that a particular remedy, or set of remedies, is presumptively the most appropriate for addressing site-specific circumstances.

**Proposed Plan:** A public participation requirement of SARA in which EPA summarizes for the public the preferred cleanup strategy, the rationale for the preference, reviews the alternatives presented in the detailed analysis of the remedial investigation/feasibility study, and presents any waivers to cleanup standards of §121(d)(4) which may be proposed. This may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under Agency consideration.

**Quality Assurance/Quality Control (QA/QC):** A system of procedures, checks, audits, and corrective actions used to ensure that field work and laboratory analysis during the investigation and cleanup of Superfund sites meet established standards.

**Reasonable Maximum Exposure:** Calculation of the highest exposure to all contaminants at a site that an individual would be expected to receive under current and future land-use conditions.

**Recharge:** The processes by which water is absorbed and is added to the zone of saturation in soil/sediment, either directly into a formation, or indirectly by way of another formation.

**Record of Decision (ROD):** A public document that explains which cleanup alternative(s) will be used at National Priorities List sites. The Record of Decision is based on information and technical analysis generated during the remedial investigation/feasibility study and consideration of public comments and community concerns.

**Remedial Design (RD):** An engineering phase that follows the Record of Decision when technical drawings and specifications are developed for the subsequent remedial action at a site on the National Priorities List.

**Remedial Action (RA):** The actual construction or implementation phase that follows the remedial design of the selected cleanup alternative at a site on the National Priorities List.

**Remedial Investigation/Feasibility Study:** Extensive, in-depth, investigative and analytical studies usually performed at the same time in an interactive, iterative process, and together referred to as the "RI/FS." This document contains an assessment of actual and potential risks posed by the site. They are intended to:

- . Gather the data necessary to determine the type and extent of contamination at a Superfund site;
- . Establish criteria for cleaning up the site;
- . Identify and screen cleanup alternatives for remedial action; and
- . Analyze in detail the technology and costs of the alternatives.

**Remedial Project Manager (RPM):** The EPA or State official responsible for overseeing the long-term remedial response activities.

**Remedial Response:** A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious, but does not pose an immediate threat to public health and/or the environment.

**Removal Action:** An immediate action taken over the short-term to address a release or threatened release of hazardous substances.

**Resource Conservation and Recovery Act (RCRA):** A Federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent new, uncontrolled hazardous waste sites.

**Response Action:** A CERCLA-authorized action at a Superfund site involving either a short-term removal action or a long-term remedial response that may include, but is not limited to, the following activities:

- . Removing hazardous materials from a site to an EPA-approved, licensed hazardous waste facility for treatment, containment, or destruction.
- . Containing the waste safely on-site to eliminate further problems.
- . Destroying or treating the waste on-site using incineration or other technologies.
- . Identifying and removing the source of ground water contamination and halting further movement of the contaminants.

**Responsiveness Summary:** A summary of oral and/or written public comments received by EPA during a comment period on key EPA documents, and EPA's responses to those comments. The responsiveness summary is a key part of the Record of Decision, highlighting community concerns for EPA decision-makers.

**Risk Assessment:** Estimating the degree of harm people will face if exposed to a particular level or quantity of a substance.

**Sediment:** The sand or mud found at the bottom and sides of bodies of water, such as creeks, rivers, streams, ponds, lakes and swamps. Sediments typically consist of soil, clay, silt, plant matter, and sometimes gravel.

**Site Inspection (SI):** The collection of information from a Superfund site to determine the extent and severity of hazards posed by the site. It follows and is more extensive than a preliminary assessment. The information is used to score the site with the Hazard Ranking System to determine whether response action is needed.

**Solvents:** Liquids capable of dissolving other liquids or solids to form a solution. The chief uses of industrial solvents are as cleaners and degreasers. Many solvents are flammable and toxic to varying degrees.

**Superfund:** The program operated under the legislative authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also referred to as the Trust Fund, to carry out the EPA solid waste emergency removal and long-term remedial activities.

**Superfund Amendments and Reauthorization Act (SARA):** Modifications to CERCLA enacted on October 17, 1986.

**Surface Water:** Bodies of water that are above ground, such as rivers, lakes, and streams.

**Technical Assistance Grant (TAG) Program:** A grant program that provides funds for qualified citizens' groups to hire independent technical advisors to help them understand and comment on technical documents and provide the Agency with input on decisions relating to Superfund cleanup actions at the site.

**Treatment, Storage, and Disposal Facility (TSD Facility):** Any building, structure, or installation where a hazardous substance has been treated, stored, or disposed. TSD facilities are regulated by EPA and States under the Resource Conservation and Recovery Act.

**Volatile Organic Compound:** A group of chemical compounds composed primarily of carbon and hydrogen that are characterized by their tendency to evaporate (or volatilize) into the air from water or soil. VOCs are substances that are contained in common solvents and cleaning fluids. Some VOCs are known to cause cancer.

**Water Quality Criteria:** Specific levels of water quality which, if reached, are expected to render a body of water suitable for its designated use. The criteria are based on specific levels of pollutants that would make water harmful if used for drinking, swimming, farming, fish production or industrial processes.

**Water Table:** The level below which the soil or rock is saturated with water, sometimes referred to as the upper surface of the saturated zone.



## **APPENDIX E**

# **TOXICOLOGICAL PROFILES OF CONTAMINANTS OF CONCERN**



# EPA Facts About Arsenic

June 1992

## What is arsenic?

Arsenic is a naturally occurring element. Pure arsenic is a gray-colored metal, but this form is not common. It is usually found in combination with one or more other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is referred to as inorganic arsenic, whereas arsenic combined with carbon and hydrogen is referred to as organic arsenic. Organic forms of arsenic are usually less toxic than the inorganic forms.

Arsenic is produced primarily as a by-product from the operation of nonferrous smelters, glass manufacturing, pesticide production and application, and burning of fossil fuels. Arsenic is also produced as a result of natural forces, that is, volcanos and weathering of arsenic-containing rocks. The major uses of arsenic are as wood preservatives and agricultural pesticides.

## How might exposure to arsenic occur?

Arsenic is very widely distributed in the environment, and everyone is exposed to low levels. For most people, food constitutes the largest source of arsenic intake, with lower amounts coming from air and drinking water. Some edible fish and shellfish contain elevated levels of arsenic, but this is predominantly in an organic form known as "fish arsenic" that has a low toxicity. Above-average levels of exposure are usually associated with one or more of the following circumstances: (1) Natural mineral deposits containing large quantities of arsenic (may result in elevated inorganic arsenic levels in drinking water); (2) Chemical waste disposal sites, which contain large quantities of improperly-contained arsenic, (may allow the chemical to escape into the groundwater); (3) Elevated levels of arsenic in soil (may lead to exposure from ingesting soil); (4) Manufacturing (smelting) of copper and other metals (often releases inorganic arsenic into the air); (5) Burning of fossil fuels (results in low levels of inorganic arsenic emissions into the air); and, (6) Widespread application of pesticides (may lead to water or soil contamination).

## How does arsenic enter the body?

Arsenic enters the body principally through ingestion of food or water. Most ingested arsenic is quickly absorbed through the stomach and intestines and enters the blood stream. Arsenic which is inhaled (low levels of arsenic are present in cigarette smoke) is also well-absorbed into the blood stream through the lungs. Small amounts of arsenic may enter the body through the skin.

Most arsenic absorbed into the body is converted by the liver to a less-toxic form that is efficiently excreted in the urine. Consequently, arsenic does not have a strong tendency to accumulate in the body except at high exposure levels.

## How can arsenic exposure affect human health?

Large doses of inorganic arsenic can be fatal. Lower levels of exposure may injure a number of different body tissues or systems, producing *systemic effects*. When taken orally, a common effect is irritation of the digestive tract, leading to pain, nausea, vomiting, and diarrhea. Other effects include decreased production of red and white blood cells, abnormal heart function, blood vessel damage, liver and/or kidney injury, and impaired nerve function causing a "pins and needles" feeling in the feet and hands.

Perhaps the systemic effect most characteristic of oral exposure to inorganic arsenic is a pattern of skin abnormalities including the appearance of dark and light spots on the skin, and small "corns" on the palms, soles, and trunk. Some of these corns may ultimately progress to skin cancer. Arsenic ingestion has also been reported to increase the risk of internal cancer, especially in the liver, bladder, kidneys, and lungs.

Inhalation exposure to inorganic arsenic dusts or fumes sometimes produces the same types of systemic health effects produced by oral exposure. However, this is not common, and the effects are usually mild. Of much greater concern is the ability of inhaled arsenic to increase the risk of lung cancer. Direct skin contact with arsenic compounds, frequently from inorganic arsenic dusts in air, may result in mild to severe irritation of the skin, eyes and throat.

## Is there a medical test to identify arsenic exposure?

Measuring the levels of arsenic in urine is the best way to identify recent exposures. However, some common tests do not distinguish nontoxic forms such as fish arsenic from other forms. Consequently, a high concentration of arsenic in urine may not necessarily indicate a health problem. Measurement of arsenic in hair or fingernails is sometimes used to detect chronic exposures; however, this method is not very reliable for detecting low levels of arsenic exposure.

## What levels of exposure have resulted in harmful health effects?

Generally, inorganic forms of arsenic are more toxic than organic forms, and forms that dissolve easily in water tend to be more toxic than those that dissolve poorly in water. Studies indicate considerable variation among different individuals, and it is difficult to identify with certainty the range of exposures which are of concern. The levels of arsenic that most people ingest in food or water are not usually considered to be a health concern. In fact, arsenic in trace amounts may be essential to good health.

For inhalation exposure, air concentrations of around 0.2 parts per billion (ppb) are associated with irritation to the nose, throat and exposed skin. The term "parts per billion" is a way of expressing the concentration of a contaminant in a liquid or air. One part per billion is equal to one inch in a distance of about sixteen thousand miles (or a penny in ten million dollars), a very small amount. Higher levels may occasionally lead to mild signs of systemic toxicity similar to that seen with oral exposure.

## What currently happens to arsenic wastes?

The principal waste product of arsenic is slag, a by-product of ore smelting. Arsenic production is a dry operation (no water is used); only small quantities are discharged in wastewater. There is no recycling of arsenic from its principal use in wood preservatives and agricultural chemicals.

## What recommendations has the federal government made to protect human health?

The U.S. Environmental Protection Agency (EPA) has established limits on the amount of arsenic released to the environment. EPA has also restricted or prohibited many of the uses of arsenic in pesticides and is considering further restrictions. EPA has established a *Maximum Contamination Level (MCL)* of 50 ppb for arsenic in drinking water.

### GLOSSARY

*Maximum Contaminant Level:* EPA evaluates the health risks associated with various contaminant levels to ensure that public health is adequately protected. The MCL, as it is commonly known, is the maximum allowable concentration of a specific contaminant in public drinking water.

*Systemic Effect:* Impacts of contamination which affect the entire organism or bodily system.

*Toxic:* Acting as a poisonous or hazardous substance; having poisonous or harmful qualities.

For more information about Arsenic, please contact EPA at the following address:

*U.S. Environmental Protection Agency  
Superfund Program  
Community Relations Coordinator  
345 Courtland Street, N.E.  
Atlanta, GA 30365*



# EPA Facts About *Lead*

June 1992

## What is lead?

Lead is a bluish-gray metal which occurs naturally throughout the environment. Lead and its compounds are found in plants and animals used for food, and in air, drinking water, surface waters, and soil.

Lead is mined from ore deposits or salvaged from recycled scrap metal. It is used in a wide range of products; the main use is in the manufacture of storage batteries. Other uses are the production of chemicals, including paint, gasoline additives, ammunition and various metal products (for example, sheet lead, solder, and pipe).

## How can lead and its compounds affect human health?

Lead exposure is especially dangerous for unborn children because their bodies can be harmed while they are being formed. Exposure of the mother during pregnancy can cause premature birth, low birth weight, or even miscarriage. Young children are also at an increased risk because more of the lead ingested into their bodies is absorbed and they are more sensitive than adults to its effects. Lead exposure in infants and young children has been shown to decrease IQ scores, retard physical growth, and cause hearing problems. These health effects can occur at exposure levels once thought to be safe.

A link between lead exposure and cancer in humans has not been demonstrated. However, because laboratory animals fed lead throughout their lives have developed tumors, lead should be considered a possible cancer-causing substance in humans.

Exposure to high levels of lead can cause severe brain and kidney damage. Lead exposure may increase blood pressure in middle-aged men; high levels may also affect the male reproductive system.

## Is there a medical test to identify lead exposure?

Lead exposure can be identified by measuring the amount of a substance called erythrocyte protoporphyrin (EP) present in red blood cells. The amount of EP is high when the amount of lead in the blood is high. However, there are problems associated with this technique. Unless the lead levels are extremely high, EP levels may be within what are considered normal limits. In addition, other diseases which affect the red blood cells, such as some types of anemia, can cause high EP levels. Exposure can also be identified by using x-ray techniques to measure the amount of lead present in bone and teeth. However, this test is not commonly used.

## How does lead enter the body?

Lead exposure stems primarily from contact with contaminated dust or water. Lead present in the air attaches to dust. Dust contaminated with lead is removed from the air by rain. Lead can remain in the soils where it is deposited for many years, however, heavy rainfall can cause lead contaminated soil to move into both groundwater and surface waters. Lead and lead compounds have been found at 853 of approximately 1,300 sites on the National Priorities List of hazardous waste sites in the U.S.

Lead can enter the body through inhalation of air contaminated with lead particles or dust which contains lead. Nearly all lead entering the lungs moves to the blood and then to other parts of the body. In adults, very little of the amount of lead ingested in food, beverages, water, and dust enters the blood from the intestinal tract. However, when children swallow food or soil containing lead, much more of the lead enters their blood and moves to other parts of the body. Relatively small amounts of lead enter the body through the skin.

Regardless of the route by which lead enters the body, most is stored in bone. Since additional lead is stored with each new exposure, the level in bones and teeth increases with age. Lead that is not stored in the body is removed in bodily wastes.

### What recommendations has the federal government made to protect human health?

The Centers for Disease Control (CDC) recommends that screening for lead poisoning be included in health care programs for children, especially those between the ages of 6 months and 9 years.

The CDC recommends immediate medical treatment for children found to have blood lead levels of 250 parts per billion (ppb) or greater. The term "parts per billion" is a way of expressing the concentration of a contaminant in a liquid or air. One part per billion is equal to one inch in a distance of about sixteen thousand miles (or a penny in ten million dollars), a very small amount. There is now concern that levels as low as 100 to 150 ppb might be harmful to children, and because of this, the CDC is reviewing current screening criteria.

The Consumer Product Safety Commission (CPSC) does not permit lead content in most paints to be above 0.06%. The CPSC suggests that all painted surfaces in homes be tested for lead. Paint which is found to contain high levels of lead should be removed.

The Environmental Protection Agency (EPA) prohibits lead levels in drinking water above 15 ppb of lead in water. EPA suggests that public water systems treat their water to decrease contamination from plumbing (pipes, solder, etc.) if the level of lead in tap water that has been standing overnight exceeds 15 ppb. Drinking water in schools must be tested for lead and provision made for its removal if lead levels exceed allowable limits.

### How might exposure to lead occur?

Lead exposure can result from inhaling air, drinking water, or ingesting foods or soil that contain lead. Inhaling air containing lead-contaminated dust or ingesting lead-contaminated soil, both of which may be found at hazardous waste sites or near areas with heavy automobile traffic, are also exposure sources. Children may be exposed to lead by swallowing such non-food items as chips of paint which contain lead.

Until recently, the largest single source of lead in air vehicle exhaust. Other sources of release to the air include emissions from iron and steel production, smelting operations, municipal waste incinerators, and lead-acid battery manufacturers. Cigarette smoke is also a source of lead.

The major sources of lead released to water are lead plumbing and solder in houses, schools, and public buildings; lead-contaminated dust and soil carried into water by rain and wind; and wastewater from industries that use lead.

Lead can be released to the soil from lead-contaminated wastes in municipal and hazardous waste landfills, and from fertilizers that contain sewerage sludge. Plants can absorb lead from contaminated soil, and as a result, food and beverages may contain lead.

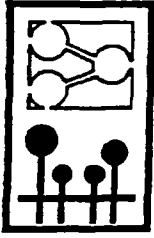
### What is the method of treatment and disposal of lead?

The primary method of disposing of lead is recycling; an estimated 70-75 percent of the lead produced in the U.S. is considered recyclable. Certain uses of lead pre recycling, for example, lead used in gasoline. Over percent of the lead used in manufacturing lead-acid storage batteries is recycled; 50 percent of the lead requirements are met by recycled lead, mostly from lead batteries.

A substantial amount of lead is disposed of in municipal and hazardous waste landfills. Lead is commonly disposed of as lead-containing waste products such as storage batteries, ammunition waste, sheet lead, solder, pipes, lead-based paints, and solid waste from lead mining and mineral ore processing.

For more information about Lead, please contact EPA at the following address:

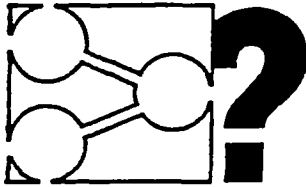
*U.S. Environmental Protection Agency  
Superfund Program  
Community Relations Coordinator  
345 Courtland Street, N.E.  
Atlanta, GA 30365*



# ATSDR Public Health Statement

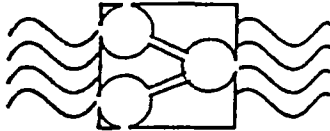
## Aldrin and Dieldrin

### *What are aldrin and dieldrin?*



Aldrin and dieldrin are the common names of two insecticides that are closely related chemically. The technical compounds are light tan to brown solids or powders. Aldrin is readily converted to dieldrin in the environment, so these two closely related compounds are considered together by regulatory bodies. Their toxicities do not differ significantly.

### *How might I be exposed to aldrin and dieldrin?*



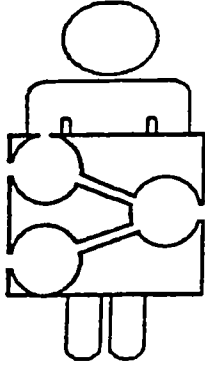
Aldrin and dieldrin were widely used from the 1950s to the early 1970s. Aldrin has been used as a soil insecticide to control root worms, beetles, and termites. Dieldrin has been used in agriculture for soil and seed treatment and in public health to control disease vectors such as mosquitoes and tsetse flies. Dieldrin has also had veterinary use as a sheep dip and has been used in treatment of wood and mothproofing of woolen products. Persons could be occupationally exposed to aldrin and dieldrin from inhalation and by absorption through the skin. Most uses for aldrin and dieldrin were banned in 1975; at present these compounds are no longer produced in or imported into the United States.

Although dieldrin is persistent in soil, environmental background levels are known to be decreasing slowly. Residual contamination may be present at waste sites from the disposal of used stocks. Where this is appreciable, a potential exists for exposure to cleanup workers. Air and water appear to be sources of minor importance to the general population with regard to aldrin and dieldrin exposure. In the past, food products grown in soil treated with aldrin or dieldrin have probably been the primary source of dieldrin residues in fatty tissues of the general population; however, since 1970, dietary intake has shown a significant decrease.

Because neither aldrin nor dieldrin are currently produced in or imported into the United States, their use is believed to be minimal. Possible new releases may come from the use of individually owned stockpiles of aldrin for the underground control of termites; although because importation of aldrin ceased more than 3 years ago, it is believed that there is very little, if any, termiticide stock left in this country. Higher exposure rates can be expected

for persons residing in homes treated with aldrin for termite control. Improper application practices by applicators may result in unnecessarily high exposure to occupants of treated structures.

### *How do aldrin and dieldrin get into my body?*

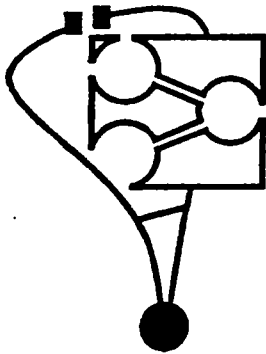


The most likely way that aldrin and dieldrin have entered the human body in the past is by eating food grown in treated soil, by eating products from animals previously exposed to these insecticides (fish, poultry, or beef), or by drinking water or milk containing the compounds. Since aldrin and dieldrin cannot be used on farm crops at this time, the risk of exposure through these routes has been reduced. Exposure to indoor air in aldrin-treated structures may presently be the most likely source of exposure.

It is possible to breathe air containing aldrin or dieldrin in homes that have been treated with these compounds for termite control. There is also potential for exposure to the applicators and nearby residents if improper procedures are used.

Occupationally, aldrin and dieldrin may enter the body by penetrating the skin. However, since these compounds are no longer available to any extent, this route of exposure is no longer likely except as a potential threat to cleanup workers at hazardous waste sites.

### *How can aldrin and dieldrin affect my health?*



Aldrin and dieldrin are clearly toxic. How they affect your health would depend on the concentration to which one is exposed and the length of time of the exposure.

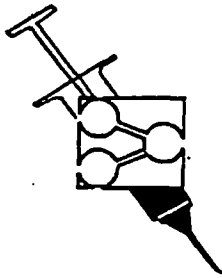
**Brief exposures at high levels**—The main effects from short-term exposure to high levels or doses of aldrin and dieldrin are headache, dizziness, irritability, loss of appetite, nausea, muscle twitching, convulsions, and loss of consciousness; death may occur at extremely high exposures or doses. All symptoms disappear with time after removal from a nonlethal exposure. The use of protective clothing and respirators is necessary under conditions when high exposures may occur.

**Long-term exposures at varying levels**—Long-term occupational exposure to fairly low levels of aldrin and dieldrin has not been documented as resulting in any demonstrable adverse effects. Studies with animals fed dieldrin have shown that the liver can be damaged and the ability of the immune system to protect against infections can be suppressed. Oral doses of aldrin and dieldrin have caused liver cancer in mice but not in rats. Although there is inadequate evidence to judge whether aldrin/dieldrin are

carcinogenic in humans, the Environmental Protection Agency (EPA) considers aldrin and dieldrin probable carcinogens based on sufficient evidence in animals.

There is inconclusive evidence in humans, but more evidence in animals, that exposure of a pregnant female to aldrin and dieldrin may be associated with harm to the fetus.

***Is there a medical test to determine if I have been exposed to aldrin and dieldrin?***



Aldrin and dieldrin exposure can be estimated by monitoring the level of dieldrin in the blood. Aldrin is rapidly converted to dieldrin in the human body. Adverse effects have been related to the concentration of dieldrin in the blood. A range of blood levels that are not associated with effects have been determined in workers. In the past, levels of dieldrin in fat biopsies have been used to monitor exposure. Levels of excretion products of dieldrin in the urine have not been found to be a precise method of monitoring exposure.

***What levels of exposure have resulted in harmful health effects?***

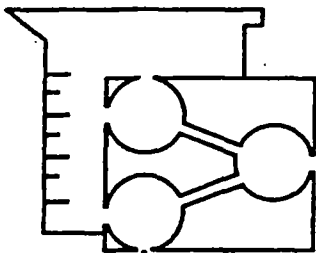
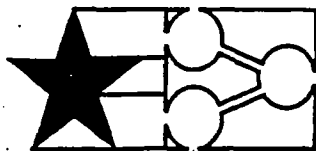


Figure 1.1 describes health effects from eating foods or drinking liquids containing aldrin or dieldrin. The scale represents exposure measured in milligrams of aldrin or dieldrin per kilogram of body weight per day. There is insufficient information to provide a similar graph for the effects of breathing air containing aldrin or dieldrin or having skin contaminated with either material. It has been estimated that continuous exposure to 10 micrograms per cubic meter dieldrin in air causes no effects in humans.

The first column, called short-term, represents health effects from exposure to aldrin or dieldrin lasting for 14 days or less. The second column, long-term, represents health effects for exposure lasting more than 14 days.

***What recommendations has the federal government made to protect human health?***

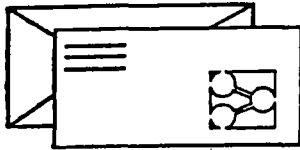


In 1974, EPA suspended nearly all uses of aldrin and dieldrin on the basis of cancer risks for both compounds. Ultimately, all uses on food crops were banned. Use of aldrin as a subterranean termiticide continued after 1974, but the sole importer ceased importation in 1985 and cancelled its registration in 1987, and all other termiticide registrations of aldrin have been either cancelled or suspended. Two minor uses that were still allowed, mothproofing in manufacturing processes and dipping roots and tops of nonfood plants, have been voluntarily cancelled by industry. In 1981, a labeling improvement program (LIP) was initiated by EPA to attempt to avoid errors of misapplication to buildings for termite control. In accordance with an



agreement with the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA), the EPA is currently reevaluating recommended tolerances for unavoidable residue levels of aldrin or dieldrin in food products. The basis for this action is that residues in food crops and, hence, in the human body have decreased markedly since the regulatory actions of 1974 and 1975. The Occupational Safety and Health Administration (OSHA) has promulgated standards for aldrin or dieldrin in air of 0.25 milligram per cubic meter of air to limit exposure of occupational workers.

***Where can I get more information?***



If you have more questions or concerns, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, E-29  
Atlanta, Georgia 30333

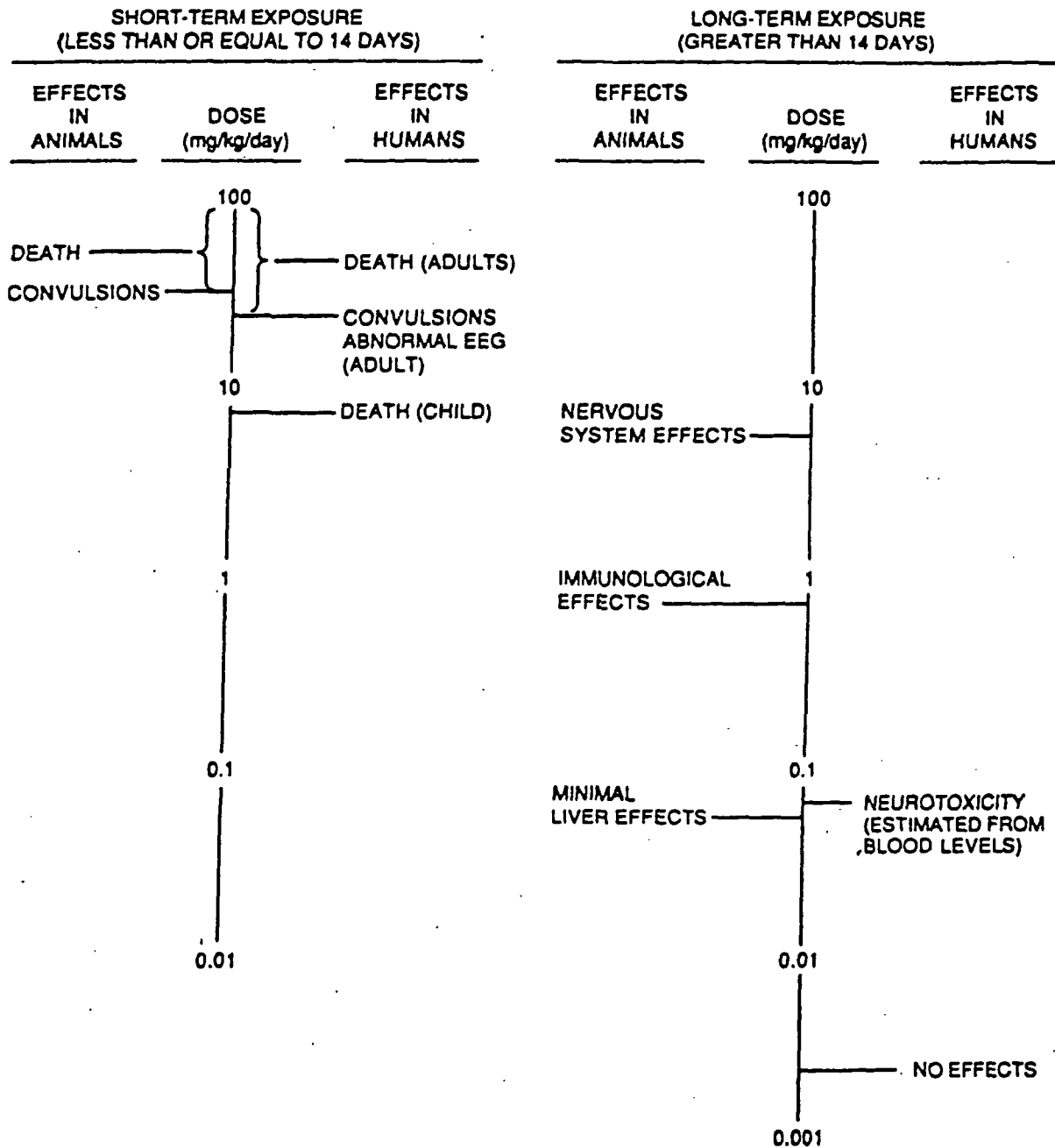
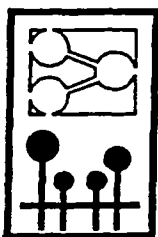


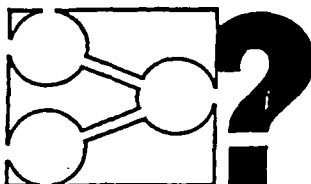
Fig. 1.1. Health effects from ingesting aldrin or dieldrin.



# ATSDR Public Health Statement

## DDT, DDE, and DDD

### *What are DDT, DDE, and DDD?*

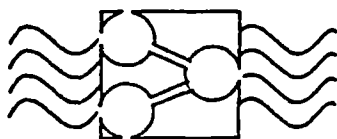


DDT, 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane, was one of the most widely used chemicals for controlling insect pests on agricultural crops and controlling insects that carry such diseases as malaria and typhus. Technical DDT is primarily a mixture of three forms (p,p'-DDT, o,p'-DDT, and o,o'-DDT), all of which are white, crystalline, tasteless, and almost odorless solids. In addition, DDE, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene, and DDD, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, are found in small amounts as contaminants in technical DDT. DDD was also used to kill pests, and one form of DDD was used medically to treat cancer of the adrenal gland.

DDT does not occur naturally in the environment. The presence of DDT in the environment is generally a result of contamination due to past production and use and subsequent movement from sites of application to land, water, and air. Several waste sites, including Superfund sites [National Priorities List (NPL) sites], contain these compounds and might act as additional sources of environmental contamination. Some DDT may be degraded in air, but the compound may persist for a long time bound to certain soils.

DDT can no longer be used as a pesticide in the United States except in cases of public health emergency. It is, however, still used in several other areas of the world. In addition, the use of DDD to kill pests has also been banned.

### *How might I be exposed to DDT, DDE, and DDD?*



Humans can be exposed to DDT, DDE, and DDD primarily by eating food that contains small amounts of these compounds. Even though DDT has not been used in this country since 1972, small amounts of DDT and DDE are found in soil and, under certain conditions, may be transferred to crops grown on this soil. In addition, imported foods may have been directly exposed to DDT. The amount of DDT in crops has been decreasing and is expected to continue to decrease with time. In the United States, the average amount of DDT and DDE eaten daily in food in 1981 was 2.24 micrograms per day ( $\mu\text{g}/\text{day}$ ) (0.000032 mg/kg/day), with root and leafy

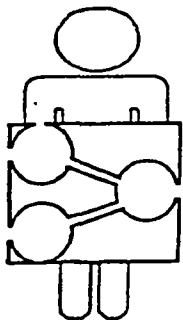
vegetables containing the highest amount. Meat, fish, and poultry also contain very low levels of these compounds.

DDT or its breakdown products are still found in air, water, and soil samples. Levels in most air and water samples are low, however, and exposure by these pathways is of little concern. Air samples in the United States have shown levels of DDT ranging from 0.00001 to 1.56 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ), depending on the location and year of sampling. Most reported samples were collected in the mid 1970s, and present levels are expected to be much lower. DDT and DDE have been reported in surface waters at levels of 0.001 micrograms per liter ( $\mu\text{g}/\text{L}$ ), while DDD generally is not found in surface water.

National soil testing programs in the early 1970s have reported levels in soil ranging from 0.18 to 5.86 parts per million (ppm).

DDT has been found at 66, DDE at 33, and DDD at 28 out of 1177 hazardous waste sites.

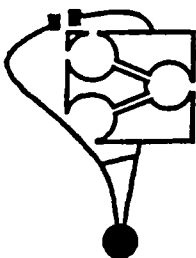
### *How can DDT, DDE, and DDD enter and leave my body?*



DDT, DDE, or DDD enter the body mainly when a person eats foods contaminated with these compounds. Small amounts of DDT, DDE, and DDD may also be inhaled and pass through the lungs into the body. Because inhaled DDT, DDE, or DDD particles are generally too large to pass through the lungs into the body, they are more likely coughed-up and ingested. These compounds are very poorly absorbed through the skin. Persons who take part in activities at NPL sites would most likely be exposed by accidentally taking in soil through the mouth.

Once inside the body, these compounds are stored most readily in fatty tissue. Stored amounts leave the body very slowly. Levels in fatty tissues may either remain relatively constant over time or even increase with continued exposure over time. However, amounts of DDT in the body will decrease with decreasing exposure. They leave the body primarily in urine, but breast milk is another way they may leave the body.

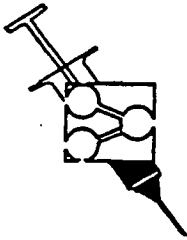
### *How can DDT, DDE, and DDD affect my health?*



Short-term exposure to high doses of DDT affects primarily the nervous system. People who either voluntarily or accidentally swallowed very high amounts of DDT experienced excitability, tremors, and seizures. These effects on the nervous system appeared to be reversible once exposure stopped. Some people who came in contact with DDT complained of rashes or irritation of the eyes, nose, and throat. People exposed for a long-term

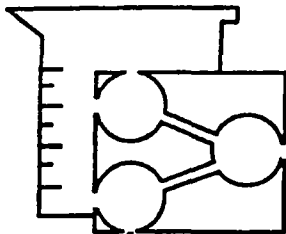
at low doses, such as people who made DDT, had some changes in the levels of liver enzymes, but there was no indication that DDT caused irreversible harmful (noncancer) effects. Tests in laboratory animals confirm the effect of DDT on the nervous system. However, tests in animals suggest that exposure to DDT may have a harmful effect on reproduction, and long-term exposure may affect the liver. Studies in animals have shown that oral exposure to DDT can result in an increased occurrence of liver tumors. In the five studies of DDT-exposed workers, results did not indicate increases in the number of deaths or cancers. However, these studies had limitations so that possible increases in cancer may not have been detected. Because DDT caused cancer in laboratory animals, it is assumed that DDT could have this effect in humans. Therefore, EPA lists DDT, DDE, and DDD as probable human carcinogens. The U.S. Department of Health and Human Services has determined that DDT may reasonably be anticipated to be a carcinogen.

***Is there a medical test to determine whether I have been exposed to DDT, DDE, or DDD?***



Specific analytical tests have been developed to detect DDT, DDE, and DDD in the fat, blood, urine, semen, and breast milk of exposed individuals. Samples of blood and urine are easy to obtain, and levels in these samples may help determine the relative amount of exposure of an individual. Although testing may indicate that an individual has had low, normal, or excessive exposure to DDT, DDE, or DDD, such tests cannot indicate the exact amount of exposure or the environmental levels to which a person was exposed.

***What levels of exposure have resulted in harmful health effects?***

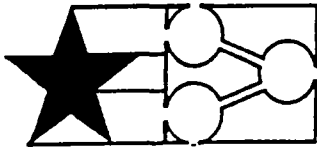


In several studies, volunteers have eaten measured amounts of DDT and DDE. A single dose of 6 to 10 milligrams DDT per kilogram of body weight (mg DDT/kg body weight) may result in sweating, headache, and nausea, while a dose of 16 mg DDT/kg body weight may lead to convulsions. Persons who have eaten DDT in these amounts usually recover within 24 hours. Volunteers ate 0.31 to 0.61 mg DDT/kg/day for up to 21 months without any noticeable effects. These doses may be compared with the estimated dietary intake in 1981 of 0.000032 mg DDT/kg/day. A summary of the information on health effects in humans is presented in Tables 1-1 and 1-3. Minimal Risk Levels (MRLs) are also included in Table 1-3. These MRLs were derived from animal data for both short-term and longer-term exposure. The MRLs provide a basis for comparison to levels which people might encounter either in the air or in food or drinking water. If a person is exposed to DDT at an amount below the MRL, it is not expected that harmful (noncancer) effects will occur. Since these levels are based only on information that is currently available, there is always some uncertainty

associated with them. Also, since the method for deriving MRLs does not use any information about cancer, a MRL does not imply anything about the presence, absence, or level of risk of cancer.

Studies done with laboratory animals have tried to associate health effects with exposure to DDT. A summary of this information is presented in Tables 1-2 and 1-4. In general, relatively high doses of these compounds are required to produce serious health effects in animals.

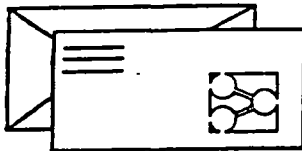
### *What recommendations has the federal government made to protect human health?*



EPA banned all uses of DDT, except for public health emergency, in 1972 primarily because amounts were building up in the environment and because some cancer tests in laboratory animals showed positive results. Although DDT is no longer used in this country, there are still federal regulations concerning the amounts of DDT that are allowed in food (40 CFR 180.147) and water (EPA 440/5-80-038).

The Occupational Safety and Health Administration (OSHA) states that workers may not be exposed to quantities of DDT greater than 1 milligram per cubic meter ( $\text{mg}/\text{m}^3$ ) of air for an 8-hour workday. EPA estimates that at an ambient criteria level of 0.024 nanogram per liter ( $\text{ng}/\text{L}$ ), consuming 2 liters of drinking water and eating 6.5 grams (g) of fish and shellfish per day would be associated with an increased lifetime cancer risk of one extra cancer case for every one million persons exposed. In addition, there are tolerance levels set for virtually all foods.

### *Where can I get more information?*



If you have further questions or concerns, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, E-29  
Atlanta, Georgia 30333

TABLE 1-1. Human Health Effects from Inhalation of DDT, DDE, or DDD

Short-term Exposure (less than or equal to 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from short-term human exposure to air containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from long-term human exposure to air containing specific levels of DDT, DDE, or DDD are not known.

TABLE 1-2. Animal Health Effects from Inhalation of DDT, DDE, or DDD

Short-term Exposure (less than or equal to 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from short-term animal exposure to air containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from long-term animal exposure to air containing specific levels of DDT, DDE, or DDD are not known.

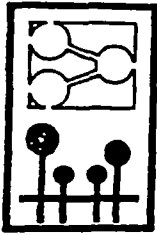


TABLE 1-3. Human Health Effects from Eating or Drinking DDT, DDE, or DDD.

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
214	Single dose	Headache, nausea
357	Single dose	Headache, nausea, vomiting
560	Single dose	Heart, increased rate
571	Single dose	Vomiting, convulsions
0.0178	Single dose	Minimal Risk Level
<u>Levels in Water (ppm)</u>		The health effects resulting from short-term human exposure to water containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
22	18 months	No effects
0.0125	60 days	Minimal Risk Level
<u>Levels in Water (ppm)</u>		The health effects resulting from long-term human exposure to water containing specific levels of DDT, DDE, or DDD are not known.

TABLE 1-4. Animal Health Effects from Eating or Drinking DDT, DDE, or DDD

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
20	4 days	Developmental effects in rabbits (decreased fetal body weight)
200	1 week	Increases in enzymatic activity
510	3 days	Developmental effects in rabbits (increased resorptions)
2000	Single dose	Death in rats
<u>Levels in Water (ppm)</u>		The health effects resulting from short-term animal exposure to water containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
3.67	8 weeks	Immunological effects in rabbits
75	36 months	Liver necrosis in rats
200	27 months	Renal necrosis in rats
210	78 weeks	Neurological effects in rats (tremors)
<u>Levels in Water (ppm)</u>		The health effects resulting from long-term exposure to water containing specific levels of DDT, DDE, or DDD are not known.



# ATSDR Public Health Statement

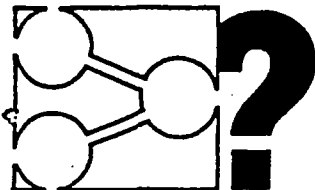
## Endrin/Endrin Aldehyde

- This Statement was prepared to give you information about endrin and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,177 sites on its National Priorities List (NPL). Endrin has been found at 23 of these sites. Endrin aldehyde has not been found at any of these NPL sites. However, we do not know how many of the 1,177 NPL sites have been evaluated for endrin/endrin aldehyde. As EPA evaluates more sites, the number of sites at which endrin is found may change. The information is important for you because endrin may cause harmful health effects and because these sites are potential or actual sources of human exposure to endrin.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous substance such as endrin/endrin aldehyde, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

### *What are endrin and endrin aldehyde?*



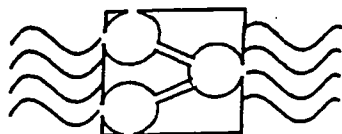
Endrin is a solid white substance that has been used as a pesticide to control insects and rodents. It is no longer produced or sold for general use in the United States.

Endrin is not very soluble in water. It has been found in groundwater or surface water, but only at very low levels. It is more likely to cling to the bottom sediments of bodies of water. Endrin was generally not found in the air except at locations where it was being applied to fields.

Endrin breaks down slowly in the environment. At high temperatures (about 392°F), it begins to break down into other substances which are more harmful than endrin.

Little information is known about the properties of endrin aldehyde. It is not commercially used but is found as an impurity and breakdown product of endrin. It is not known what happens to this substance once it is released to the environment.

### ***How might I be exposed to endrin or endrin aldehyde?***

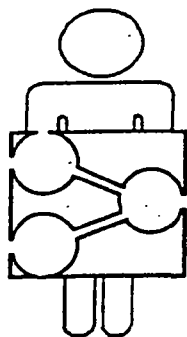


You may be exposed to endrin in air, water or soil if you live near a hazardous waste site. Endrin has been detected at 23 such sites. In other surveys, endrin was found in groundwater and surface water at less than 1% of the locations that were tested. The average level in these waters was about one part endrin per one billion parts water (1 ppb). Endrin has not been detected in drinking water at levels below 0.1 ppb. In surveys of soil and sediment, it was found at a frequency of about 2% and at an average level of 9 ppb. In other soil studies, endrin was detected in cropland soil samples at 10 ppb.

Endrin aldehyde has not been found in air or drinking water; however, it has been detected in surface water (0.2 ppb), groundwater (1.5 ppb) and in soil/sediments (10 ppb) at less than 1% of locations tested.

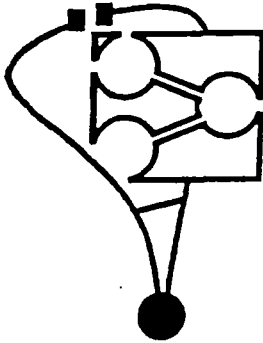
You may also be exposed to endrin by eating foods containing endrin. It has been detected at levels of 0.05 to 0.50 parts per million (ppm) in beans, fruits, and vegetables. The levels of endrin aldehyde in foods are not known.

### ***How can endrin and endrin aldehyde enter and leave my body?***



Endrin and endrin aldehyde can enter your body when you eat foods or drink beverages that contain this substance, breathe air that contains it, or get it on your skin. When endrin enters your body by any of these pathways, it is rapidly changed into other substances. Endrin and its breakdown products are rapidly removed from the body, usually within a few days, through the urine and feces. There is some evidence that small amounts of endrin may remain in the fatty tissue of your body when you are exposed to high levels of endrin above 0.20 milligrams (mg) endrin/kilogram (kg) body weight. No information is known about how endrin aldehyde leaves the body.

## *How can endrin and endrin aldehyde affect my health?*



Endrin can cause death and a wide variety of other harmful health effects. If you swallow large amounts of endrin, convulsions and death may occur in a few hours.

Less severe symptoms which may result from endrin are headache, convulsions, dizziness, nausea, vomiting, nervousness and confusion. Some of these symptoms continue for weeks.

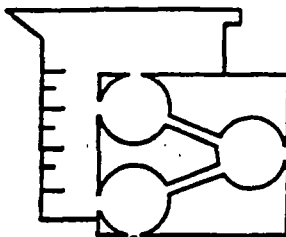
No long-term health effects have been noted in workers exposed to endrin by breathing it or by skin contact with it, either in factories or during field applications.

Studies in animals confirm that endrin's main target is the nervous system. Birth defects, especially abnormal bone formation, have been seen in some animal studies. While there are no human data on birth defects, animal evidence suggests that endrin exposure during pregnancy could pose a health risk to the developing fetus at relatively high doses.

In studies using rats, mice and dogs, endrin did not produce cancer. However, these studies were not suitable for accurately evaluating the ability of endrin to cause cancer. It is not known if endrin can cause cancer in exposed humans. Though endrin has been detected in exposed factory workers, no increased incidence of cancers has been found.

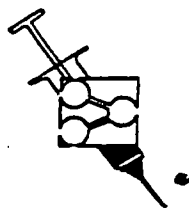
No studies were found on how endrin aldehyde can affect your health or modify the health effects of endrin.

## *What levels of exposure have resulted in harmful health effects?*



There is no information on the levels of endrin in air that affect humans (Table 1-1). Tables 1-2 through 1-4 show the relationship between exposure to endrin and known health effects. Minimal Risk Levels (MRLs) are also included in Table 1-3. These MRLs were derived from animal data for both short-term and long-term exposure. The MRLs provide a basis for comparison with levels that people might encounter either in the air or in food or drinking water. If a person is exposed to endrin at an amount below the MRL, it is not expected that harmful (noncancer) health effects will occur. Because these levels are based only on information currently available, some uncertainty is always associated with them. Also, because the method for deriving MRLs does not use any information about cancer, an MRL does not imply anything about the presence, absence, or level of risk for cancer.

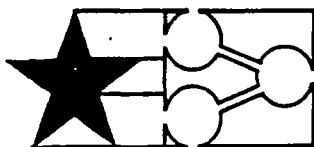
***Is there a medical test to determine whether I have been exposed to endrin or endrin aldehyde?***



If you are exposed to endrin, the chemical can be detected in your blood and fatty tissue. There are tests that can measure the presence of endrin in the blood or fat of exposed persons. Since special equipment is needed, these tests are not routinely performed in doctors' offices. Although these tests can be used to confirm that a person has been exposed to endrin, it is not yet possible to use those tests to predict the type or severity of any health effects that might occur. Concentrations of the endrin metabolites (12-ketoendrin and anti-12-hydroxyendrin glucuronide) have been found in urine and feces of workers exposed to endrin.

No information is available on tests for exposure to endrin aldehyde.

***What recommendations has the federal government made to protect human health?***

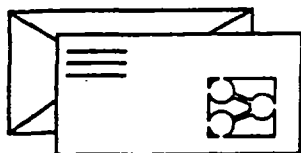


In order to protect individuals from the potential health effects of endrin, the Environmental Protection Agency (EPA) has banned the production and use of endrin in the United States. The Food and Drug Administration (FDA) has established a limit of 0.2  $\mu\text{g}/\text{L}$  (micrograms per liter) in bottled water. The National Institute for Occupational Safety and Health (NIOSH) considers exposure to endrin to be dangerous to human health if exposure levels exceed 0.1  $\text{mg}/\text{m}^3$  (milligrams per cubic meter).

The Occupational Safety and Health Administration (OSHA) has established a limit of 0.1  $\text{mg}/\text{m}^3$  endrin in workplace air for an 8-hour workshift exposure in a 40-hour workweek.

No information can be found on government regulations for endrin aldehyde.

***Where can I get more information?***



If you have any more questions or concerns not covered here, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, E-29  
Atlanta, Georgia 30333

This agency can also give you information on the location of the nearest occupational and environmental health clinics. Such clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

TABLE 1-1. Human Health Effects from Breathing Endrin

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term exposure of humans to air containing specific levels of endrin are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term exposure of humans to air containing specific levels of endrin are not known.

TABLE 1-2. Animal Health Effects from Breathing Endrin

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term exposure of animals to air containing specific levels of endrin are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
0.36	185 days	Liver damage, kidney damage, and death in rabbits and mice.

\*These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.



TABLE 1-3. Human Health Effects from Eating or Drinking Endrin

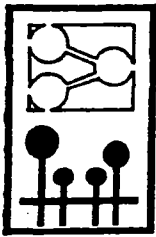
Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
0.07		Minimal Risk Level based on animal studies
6,000 <u>Levels in Water</u>	1 day	Convulsions and death.  The health effects resulting from short-term exposure of humans to water containing specific levels of endrin are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
0.01		Minimal Risk Level based on animal studies
<u>Levels in Water</u>		The health effects resulting from long-term exposure of humans to water containing specific levels of endrin are not known.

\*These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.

TABLE 1-4. Animal Health Effects from Eating or Drinking Endrin

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
4	11 days	Increased liver weight in mice.
6	14 days	Reduced weight gain in rats.
25	1 day	Death of monkeys.
70	7 days	Convulsions in rats.
100	1 day	Death in rats.
<u>Levels in Water</u>		The health effects resulting from short-term exposure of animals to water containing specific levels of endrin are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
3	2 years	Enlarged heart and kidneys in dogs.
4	80 weeks	Hyperexcitability in mice.
4	80 weeks	Death in mice.
13	2 years	Liver and kidney effects in rats.
15	2 years	Death in rats.
<u>Levels in Water</u>		The health effects resulting from long-term exposure of animals to water containing specific levels of endrin are not known.

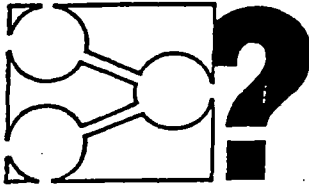
\*These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.



# ATSDR Public Health Statement

## DDT, DDE, and DDD

### *What are DDT, DDE, and DDD?*

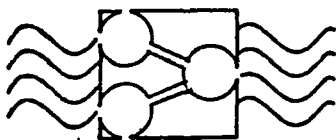


DDT, 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane, was one of the most widely used chemicals for controlling insect pests on agricultural crops and controlling insects that carry such diseases as malaria and typhus. Technical DDT is primarily a mixture of three forms (p,p'-DDT, o,p'-DDT, and o,o'-DDT), all of which are white, crystalline, tasteless, and almost odorless solids. In addition, DDE, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene, and DDD, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, are found in small amounts as contaminants in technical DDT. DDD was also used to kill pests, and one form of DDD was used medically to treat cancer of the adrenal gland.

DDT does not occur naturally in the environment. The presence of DDT in the environment is generally a result of contamination due to past production and use and subsequent movement from sites of application to land, water, and air. Several waste sites, including Superfund sites [National Priorities List (NPL) sites], contain these compounds and might act as additional sources of environmental contamination. Some DDT may be degraded in air, but the compound may persist for a long time bound to certain soils.

DDT can no longer be used as a pesticide in the United States except in cases of public health emergency. It is, however, still used in several other areas of the world. In addition, the use of DDD to kill pests has also been banned.

### *How might I be exposed to DDT, DDE, and DDD?*



Humans can be exposed to DDT, DDE, and DDD primarily by eating food that contains small amounts of these compounds. Even though DDT has not been used in this country since 1972, small amounts of DDT and DDE are found in soil and, under certain conditions, may be transferred to crops grown on this soil. In addition, imported foods may have been directly exposed to DDT. The amount of DDT in crops has been decreasing and is expected to continue to decrease with time. In the United States, the average amount of DDT and DDE eaten daily in food in 1981 was 2.24 micrograms per day ( $\mu\text{g/day}$ ) (0.000032 mg/kg/day), with root and leafy

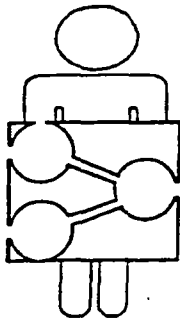
vegetables containing the highest amount. Meat, fish, and poultry also contain very low levels of these compounds.

DDT or its breakdown products are still found in air, water, and soil samples. Levels in most air and water samples are low, however, and exposure by these pathways is of little concern. Air samples in the United States have shown levels of DDT ranging from 0.00001 to 1.56 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ), depending on the location and year of sampling. Most reported samples were collected in the mid 1970s, and present levels are expected to be much lower. DDT and DDE have been reported in surface waters at levels of 0.001 micrograms per liter ( $\mu\text{g}/\text{L}$ ), while DDD generally is not found in surface water.

National soil testing programs in the early 1970s have reported levels in soil ranging from 0.18 to 5.86 parts per million (ppm).

DDT has been found at 66, DDE at 33, and DDD at 28 out of 1177 hazardous waste sites.

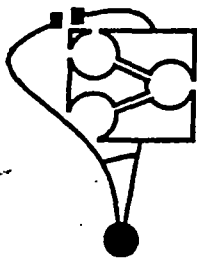
### *How can DDT, DDE, and DDD enter and leave my body?*



DDT, DDE, or DDD enter the body mainly when a person eats foods contaminated with these compounds. Small amounts of DDT, DDE, and DDD may also be inhaled and pass through the lungs into the body. Because inhaled DDT, DDE, or DDD particles are generally too large to pass through the lungs into the body, they are more likely coughed-up and ingested. These compounds are very poorly absorbed through the skin. Persons who take part in activities at NPL sites would most likely be exposed by accidentally taking in soil through the mouth.

Once inside the body, these compounds are stored most readily in fatty tissue. Stored amounts leave the body very slowly. Levels in fatty tissues may either remain relatively constant over time or even increase with continued exposure over time. However, amounts of DDT in the body will decrease with decreasing exposure. They leave the body primarily in urine, but breast milk is another way they may leave the body.

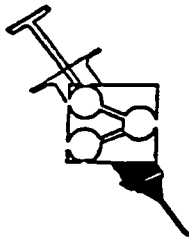
### *How can DDT, DDE, and DDD affect my health?*



Short-term exposure to high doses of DDT affects primarily the nervous system. People who either voluntarily or accidentally swallowed very high amounts of DDT experienced excitability, tremors, and seizures. These effects on the nervous system appeared to be reversible once exposure stopped. Some people who came in contact with DDT complained of rashes or irritation of the eyes, nose, and throat. People exposed for a long-term

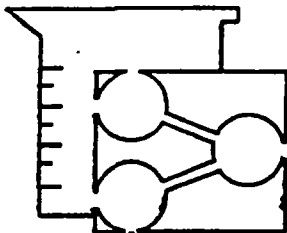
at low doses, such as people who made DDT, had some changes in the levels of liver enzymes, but there was no indication that DDT caused irreversible harmful (noncancer) effects. Tests in laboratory animals confirm the effect of DDT on the nervous system. However, tests in animals suggest that exposure to DDT may have a harmful effect on reproduction, and long-term exposure may affect the liver. Studies in animals have shown that oral exposure to DDT can result in an increased occurrence of liver tumors. In the five studies of DDT-exposed workers, results did not indicate increases in the number of deaths or cancers. However, these studies had limitations so that possible increases in cancer may not have been detected. Because DDT caused cancer in laboratory animals, it is assumed that DDT could have this effect in humans. Therefore, EPA lists DDT, DDE, and DDD as probable human carcinogens. The U.S. Department of Health and Human Services has determined that DDT may reasonably be anticipated to be a carcinogen.

***Is there a medical test to determine whether I have been exposed to DDT, DDE, or DDD?***



Specific analytical tests have been developed to detect DDT, DDE, and DDD in the fat, blood, urine, semen, and breast milk of exposed individuals. Samples of blood and urine are easy to obtain, and levels in these samples may help determine the relative amount of exposure of an individual. Although testing may indicate that an individual has had low, normal, or excessive exposure to DDT, DDE, or DDD, such tests cannot indicate the exact amount of exposure or the environmental levels to which a person was exposed.

***What levels of exposure have resulted in harmful health effects?***

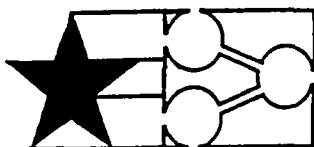


In several studies, volunteers have eaten measured amounts of DDT and DDE. A single dose of 6 to 10 milligrams DDT per kilogram of body weight (mg DDT/kg body weight) may result in sweating, headache, and nausea, while a dose of 16 mg DDT/kg body weight may lead to convulsions. Persons who have eaten DDT in these amounts usually recover within 24 hours. Volunteers ate 0.31 to 0.61 mg DDT/kg/day for up to 21 months without any noticeable effects. These doses may be compared with the estimated dietary intake in 1981 of 0.000032 mg DDT/kg/day. A summary of the information on health effects in humans is presented in Tables 1-1 and 1-3. Minimal Risk Levels (MRLs) are also included in Table 1-3. These MRLs were derived from animal data for both short-term and longer-term exposure. The MRLs provide a basis for comparison to levels which people might encounter either in the air or in food or drinking water. If a person is exposed to DDT at an amount below the MRL, it is not expected that harmful (noncancer) effects will occur. Since these levels are based only on information that is currently available, there is always some uncertainty

associated with them. Also, since the method for deriving MRLs does not use any information about cancer, a MRL does not imply anything about the presence, absence, or level of risk of cancer.

Studies done with laboratory animals have tried to associate health effects with exposure to DDT. A summary of this information is presented in Tables 1-2 and 1-4. In general, relatively high doses of these compounds are required to produce serious health effects in animals.

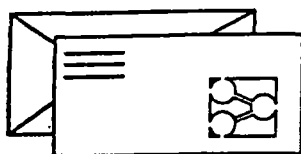
***What recommendations has the federal government made to protect human health?***



EPA banned all uses of DDT, except for public health emergency, in 1972 primarily because amounts were building up in the environment and because some cancer tests in laboratory animals showed positive results. Although DDT is no longer used in this country, there are still federal regulations concerning the amounts of DDT that are allowed in food (40 CFR 180.147) and water (EPA 440/5-80-038).

The Occupational Safety and Health Administration (OSHA) states that workers may not be exposed to quantities of DDT greater than 1 milligram per cubic meter ( $\text{mg}/\text{m}^3$ ) of air for an 8-hour workday. EPA estimates that at an ambient criteria level of 0.024 nanogram per liter ( $\text{ng}/\text{L}$ ), consuming 2 liters of drinking water and eating 6.5 grams (g) of fish and shellfish per day would be associated with an increased lifetime cancer risk of one extra cancer case for every one million persons exposed. In addition, there are tolerance levels set for virtually all foods.

***Where can I get more information?***



If you have further questions or concerns, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, E-29  
Atlanta, Georgia 30333

TABLE 1-1. Human Health Effects from Inhalation of DDT, DDE, or DDD

Short-term Exposure (less than or equal to 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from short-term human exposure to air containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from long-term human exposure to air containing specific levels of DDT, DDE, or DDD are not known.

TABLE 1-2. Animal Health Effects from Inhalation of DDT, DDE, or DDD

Short-term Exposure (less than or equal to 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from short-term animal exposure to air containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)	
<u>Levels in Air (ppm)</u>	<u>Description of Effects</u> The health effects resulting from long-term animal exposure to air containing specific levels of DDT, DDE, or DDD are not known.



TABLE 1-3. Human Health Effects from Eating or Drinking DDT, DDE, or DDD.

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
214	Single dose	Headache, nausea
357	Single dose	Headache, nausea, vomiting
560	Single dose	Heart, increased rate
571	Single dose	Vomiting, convulsions
0.0178	Single dose	Minimal Risk Level
<u>Levels in Water (ppm)</u>		The health effects resulting from short-term human exposure to water containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
22	18 months	No effects
0.0125	60 days	Minimal Risk Level
<u>Levels in Water (ppm)</u>		The health effects resulting from long-term human exposure to water containing specific levels of DDT, DDE, or DDD are not known.

TABLE 1-4. Animal Health Effects from Eating or Drinking DDT, DDE, or DDD

Short-term Exposure • (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
20	4 days	Developmental effects in rabbits (decreased fetal body weight)
200	1 week	Increases in enzymatic activity
510	3 days	Developmental effects in rabbits (increased resorptions)
2000	Single dose	Death in rats
<u>Levels in Water (ppm)</u>		The health effects resulting from short-term animal exposure to water containing specific levels of DDT, DDE, or DDD are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Duration of Exposure</u>	<u>Description of Effects</u>
3.67	8 weeks	Immunological effects in rabbits
75	36 months	Liver necrosis in rats
200	27 months	Renal necrosis in rats
210	78 weeks	Neurological effects in rats (tremors)
<u>Levels in Water (ppm)</u>		The health effects resulting from long-term exposure to water containing specific levels of DDT, DDE, or DDD are not known.

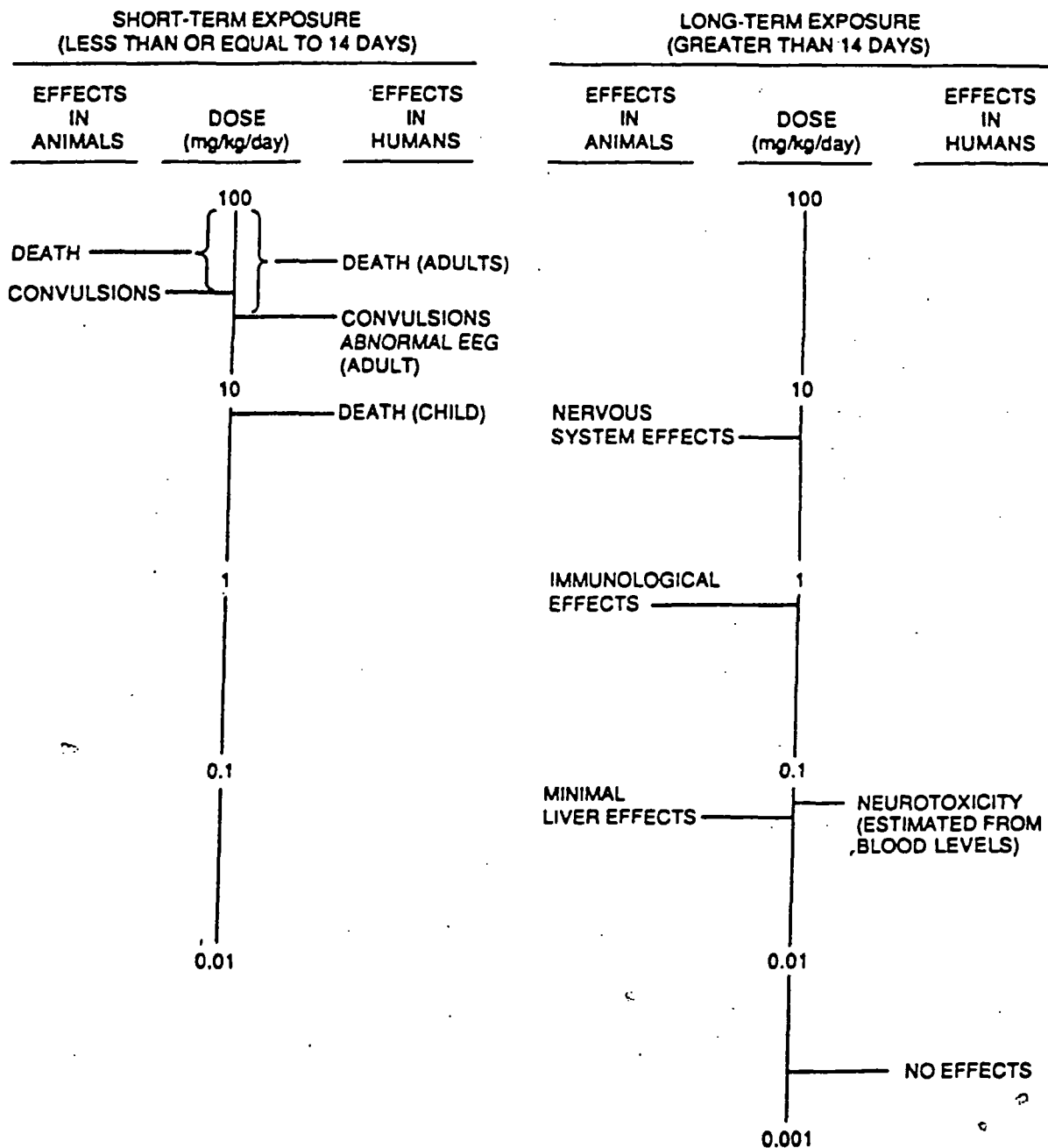
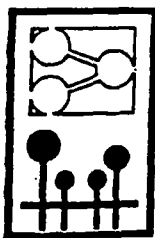


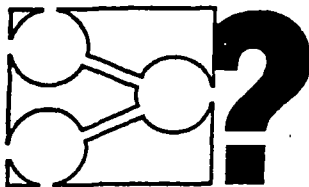
Fig. 1.1. Health effects from ingesting aldrin or dieldrin.



# ATSDR Public Health Statement

## Hexachlorocyclohexane

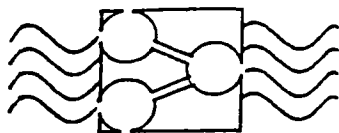
### *What is hexachlorocyclohexane?*



Hexachlorocyclohexane (HCH), formerly known as benzene hexachloride (BHC) and other common names, is a man-made chemical that exists in eight chemical forms (called isomers). All HCH isomers are solids at room temperature. Gamma ( $\gamma$ )-HCH, commonly called lindane, has been used as an insecticide on fruit, vegetable, and forest crops and as a human medicine to treat head and body lice and scabies, a contagious skin disease caused by mites. It is a white solid that may evaporate into the air. The vapor is colorless and almost odorless. Lindane has not been produced in the United States since 1977. Imported lindane is available in the United States for insecticide use as dusts, powders, liquids, or concentrates and it is available as a lotion, cream, or shampoo to control scabies. Lindane is found in household products like dog dips, house sprays, and shelf paper. Technical-grade HCH, a mixture of several chemical forms of HCH, was once used as an insecticide in the United States and typically contained about 40% lindane as well as the alpha- ( $\alpha$ ), beta- ( $\beta$ ), and delta- ( $\delta$ ) forms of HCH. Technical-grade HCH is no longer available in the United States for insecticide use.

Lindane is often sold combined with fertilizers and other insecticides. Although technical-grade HCH is no longer used as an insecticide in the United States,  $\alpha$ -,  $\beta$ -,  $\delta$ -, and  $\gamma$ -HCH have been found in the soil and surface water at hazardous waste sites. Lindane and  $\alpha$ -,  $\beta$ -, and  $\delta$ -HCH can be found in the air as a vapor or attached to small particles such as soil and dust; it is removed from the air by rain. Lindane can remain in the air for as long as 17 weeks. In soil and water, it is broken down by algae, fungi, and bacteria to less toxic substances. In general, HCH isomers are broken down quickly in water; in natural water samples, lindane did not remain for much more than 30 days. The length of time that HCH isomers will remain in soil is not known.

## *How might I be exposed to hexachlorocyclohexane?*



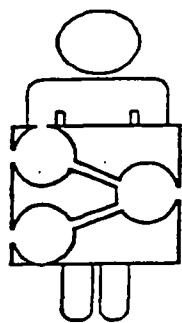
Humans can be exposed to lindane and the  $\alpha$ -,  $\beta$ -, and  $\delta$ -forms of HCH in workplace air, in the air surrounding manufacturing plants or agricultural fields, or by eating plants, meat, milk, or water that contain forms of HCH. At spill and dump sites, HCH isomers can enter the air from contaminated soil and from plants grown in contaminated soil, and they can be washed from the soil and plants into surface water.

Typically, people are not exposed to the  $\alpha$ -,  $\beta$ -, and  $\delta$ -forms of HCH separately but rather to lindane or to technical-grade HCH that contains lindane and the other isomers of HCH. In addition, people may be exposed to lindane when it is applied to the skin as a lotion to control lice and scabies.

The average amount of lindane in air in the United States in 1970-1972 was 0.9 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ), and the average amount of  $\alpha$ -HCH was 1.2  $\text{ng}/\text{m}^3$ ; information on the other isomers was not available. Lindane was found in drinking water from various rural and urban areas in amounts of 0.05-0.1 parts per billion (ppb). These levels are all considered to be low. The most likely way that humans can be exposed to HCH is by eating food or drinking water that contains the chemical. Most food samples do not contain measureable amounts of HCH isomers. The average daily amount that an adult gets from food has been reported to be 0.14 micrograms ( $\mu\text{g}$ ) of lindane, 0.56  $\mu\text{g}$  of  $\alpha$ -HCH, and less than 0.07  $\mu\text{g}$  of  $\beta$ - and  $\delta$ -HCH.

Lindane has been found at 37 of 1177 sites listed on the National Priorities List (NPL). Alpha-HCH has been found at 8 sites;  $\beta$ -HCH at 12 sites; and  $\delta$ -HCH at 6 sites. At these sites, lindane was found in surface water at a level of approximately 0.5 ppb and in soil at a level of 11 ppb. Alpha-HCH was found in surface water at a level of 8.14 ppb and in soil at a level of 97 ppb. Beta-HCH was found in surface water at a level of 3 ppb and in soil at a level of 150 ppb. Delta-HCH was found in surface water at a level of 31 ppb and in soil at a level of 7 ppb.

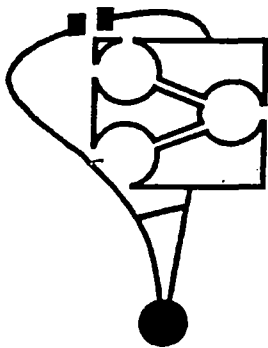
## *How can hexachlorocyclohexane enter and leave my body?*



Lindane and the other isomers of HCH can enter the body when people eat contaminated food or drink contaminated water. Inhaling air contaminated with lindane or other isomers of HCH can also lead to entry of these chemicals through the lungs. Lindane can be passed through the skin when it is used as a lotion to control scabies or body lice. In general, HCH isomers and the products formed from them in the body can be temporarily stored in fat. The total amount of lindane in the body depends on how much the person has recently been exposed to, but the total amount of  $\beta$ -HCH in the body depends on how much the person is exposed to and for how long.

Beta-HCH leaves the body very slowly. Lindane, the  $\alpha$ - and  $\delta$ -isomers of HCH, and the products formed from them in the body are promptly excreted in the urine; small amounts leave in the feces and expired air.

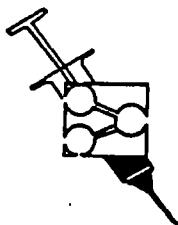
### *How can hexachlorocyclohexane affect my health?*



The effects of lindane and/or the  $\alpha$ -,  $\beta$ -, and  $\delta$ -isomers of HCH seen in humans are lung irritation, heart disorders, blood disorders, headache, convulsions, and changes in the levels of sex hormones. These effects have occurred in workers exposed to HCH vapors during pesticide manufacture and/or in individuals exposed accidentally or intentionally to large amounts of HCH. Exposure to large amounts of HCH can also cause death in humans and animals. Convulsions and kidney disease have been reported in animals fed lindane or  $\gamma$ -HCH. Liver disease has been reported in animals fed lindane or  $\alpha$ -,  $\beta$ -, or technical-grade HCH. Long-term administration of lindane or  $\alpha$ -,  $\beta$ -, or technical-grade HCH to laboratory rodents has been reported to result in liver cancer. The U.S. Department of Health and Human Services has determined that technical-grade HCH, lindane, and  $\alpha$ - and  $\beta$ -HCH may reasonably be anticipated to be carcinogenic.

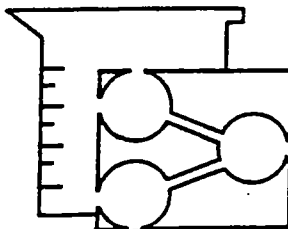
Reduced ability to fight infection was reported in animals fed lindane, and injury to the ovaries and testes was reported in animals given lindane or  $\beta$ -HCH. In animals, exposure by mouth to lindane during pregnancy may cause an increased number of fetuses with extra ribs. HCH isomers are changed by the body into other chemical products, some of which may be responsible for the harmful effects.

### *Is there a medical test to determine if I have been exposed to hexachlorocyclohexane?*



HCH isomers can be measured in the blood, urine, and semen of exposed individuals. Samples of these fluids can be collected in a doctor's office and sent to a laboratory that has the special equipment needed to measure the forms of HCH. Although the amount of HCH isomers in blood, urine, or semen can be measured, it is usually not possible to determine from this test the environmental levels to which the person was exposed or the health effects that are likely to occur from specific concentrations. Measurement of the products of HCH that are formed in the body and found in the urine has been used to find out whether a person was exposed to HCH, but this method cannot now be used to determine exposure to HCH alone, because other environmental chemicals yield the same end-products.

## *What levels of exposure have resulted in harmful health effects?*

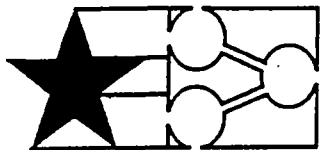


Workers exposed to HCH at pesticide manufacturing companies have reported headaches and irritation of the nose, mouth, and skin. Slight changes in the number of blood cells and increased reproductive hormone levels have been found in some workers. It is not possible, however, to decide what exposures were linked with these effects or whether the effects were the result of exposure to HCH alone (Table 1-1). No studies have been done to find out the health effects of HCH in animals that breathed HCH (Table 1-2).

Tables 1-3 and 1-4 show the relationship between eating and drinking HCH and known health effects. Humans who have accidentally or intentionally swallowed large amounts of lindane had upset stomachs, muscle weakness, and seizures, and some people have died. It was not possible, however, to find out the actual amount of lindane that these people swallowed (Table 1-3). Minimal risk levels (MRLs) are also included in Table 1-3. These MRLs were derived from animal data for short-term or for long-term exposure. The MRLs provide a basis for comparison with levels that people might encounter either in the air or in food or drinking water. If a person is exposed to an HCH isomer at an amount below the MRL, it is not expected that harmful (noncancer) health effects will occur. Because these levels are based only on information that is currently available, some uncertainty is always associated with them. Also, because the method for deriving MRLs does not use any information about cancer, a MRL does not imply anything about the presence, absence, or level of risk of cancer.

The only information available about the health effects that can occur from eating or drinking specific amounts of HCH isomers is available from animal studies. This information is presented in Table 1-4.

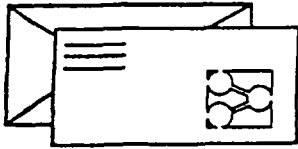
## *What recommendations has the federal government made to protect human health?*



The federal government has developed regulations and guidelines to protect individuals from the possible health effects of HCH isomers in the environment. The Food and Drug Administration (FDA 1986a) set the maximum level of lindane in bottled water at 0.004 mg per liter (L) of water. The Environmental Protection Agency (EPA 1975) has decided that the maximum level of lindane in drinking water should not be above 0.004 mg/L of water and has estimated that exposure of an average-weight adult to 0.004 mg lindane/L of water each day for a lifetime is unlikely to result in noncancer health effects. The Occupational Safety and Health Administration (OSHA 1984) has set a legally enforceable limit of 0.5 milligram lindane per cubic meter of air ( $\text{mg}/\text{m}^3$ ) in the workplace.

EPA regulations about the reportable quantities of chemicals require that a spill of one pound or more of lindane or  $\alpha$ -HCH and 10 pounds or more of  $\beta$ -HCH be reported to the Federal Government National Response Center.

*Where can I get more information?*



If you have any further questions or concerns, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, E-29  
Atlanta, Georgia 30333



TABLE 1-1. Human Health Effects From Breathing Hexachlorocyclohexane

Short-term Exposure (less than or equal to 14 days)		
Levels in Air (mg/m <sup>3</sup> )	Duration Of Exposure	Description of Effects
		The health effects resulting from short-term exposure of humans to air containing specific levels of hexachlorocyclohexane are not known.
Long-term Exposure (greater than 14 days)		
Levels in Air (mg/m <sup>3</sup> )	Duration of Exposure	Description of Effects
		The health effects resulting from long-term exposure of humans to air containing specific levels of hexachlorocyclohexane are not known.

TABLE 1-2. Animal Health Effects From Breathing Hexachlorocyclohexane

Short-term Exposure (less than or equal to 14 days)		
Levels in Air (mg/m <sup>3</sup> )	Duration Of Exposure	Description of Effects
		The health effects resulting from short-term exposure of animals to air containing specific levels of hexachlorocyclohexane are not known.
Long-term Exposure (greater than 14 days)		
Levels in Air (mg/m <sup>3</sup> )	Duration Of Exposure	Description of Effects
		The health effects resulting from long-term exposure of animals to air containing specific levels of hexachlorocyclohexane are not known.

TABLE 1-3. Human Health Effects From Eating Or Drinking Hexachlorocyclohexane

Short-term Exposure (less than or equal to 14 days)		
Levels in Food (ppm)	Duration Of Exposure	Description of Effects
0.3		Minimal risk level (based on studies with $\gamma$ -HCH in animals).
Levels in Water (ppm)		The health effects resulting from short-term exposure of humans to water containing specific levels of hexachlorocyclohexane are not known.
Long-term Exposure (greater than 14 days)		
Levels in Food (ppm)	Duration Of Exposure	Description of Effects
0.02	2-52 weeks	Minimal risk level (based on studies with $\beta$ -HCH in animals).
Levels in Water (ppm)		The health effects resulting from long-term exposure of humans to water containing specific levels of hexachlorocyclohexane are not known.

TABLE 1-4. Animal Health Effects From Eating Or Drinking Hexachlorocyclohexane

Short-term Exposure (less than or equal to 14 days)		
Levels in Food (ppm)	Duration Of Exposure	Description of Effects*
300	1 day	Learning problems in rats ( $\gamma$ -HCH).
800	6 days	Seizures in rats ( $\gamma$ -HCH).
1,200	1 day	Seizures in rats ( $\gamma$ -HCH).
Levels in Water (ppm)		
The health effects resulting from short-term exposure of animals to water containing specific levels of hexachlorocyclohexane are not known.		
Long-term Exposure (greater than 14 days)		
Levels in Food (ppm)	Duration Of Exposure	Description of Effects*
10	4-13 weeks	Injury to liver in rats ( $\beta$ -HCH).
	13 weeks	Increase in ovary weight in rats ( $\beta$ -HCH).
30	5-6 weeks	Suppressed immune function in rabbits ( $\gamma$ -HCH).
50	6 weeks	Learning problems in rats ( $\gamma$ -HCH).
	13 weeks	Increased kidney weight in rats ( $\beta$ -HCH).
100	39 weeks	Injury to kidney in rats ( $\gamma$ -HCH).
250	13 weeks	Reduced number of red blood cells; injury to ovary; and coma in rats ( $\beta$ -HCH).
800	36 weeks	Injury to kidney in rats ( $\alpha$ -HCH)
Levels in Water (ppm)		
The health effects resulting from long-term exposure of animals to water containing specific levels of hexachlorocyclohexane are not known.		

\* These effects are listed at the level at which they were first observed. They may also be seen at higher levels.