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Environmental Protection
Agency

Solid Waste And
Emergency Response
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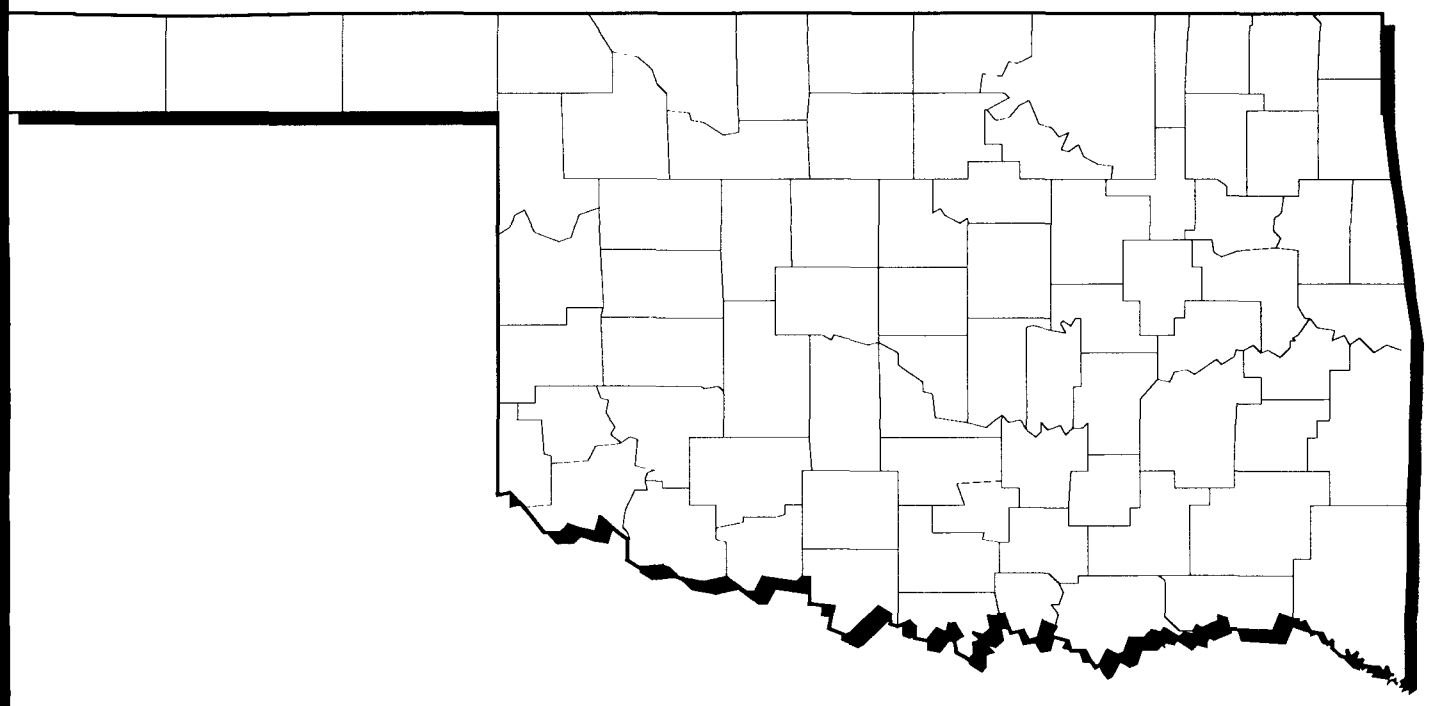
December 1992
PB93-963235

SUPERFUND: Progress at National Priority List Sites



OKLAHOMA 1992 UPDATE

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NATIONAL PRIORITIES LIST SITES:

Oklahoma

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Emergency & Remedial Response
Office of Program Management
Washington, DC 20460

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INTRODUCTION

A BRIEF OVERVIEW OF SUPERFUND

During the second half of the Twentieth Century, the environmental consequences of more than 100 years of industrialization in the United States became increasingly clear. Authors such as Rachel Carson wrote passionately about the often-hidden environmental effects of our modern society's widespread use of chemicals and other hazardous materials. Their audience was small at first, but gradually their message spread. Growing concern turned to action, as people learned more about the environment and began to act on their knowledge

The 1970s saw environmental issues burst onto the national scene and take hold in the national consciousness. The first Earth Day was observed in 1970, the year that the U.S. Environmental Protection Agency (EPA) was founded. By the end of the 1970s, Love Canal in New York and the Valley of the Drums in

Kentucky had entered the popular lexicon as synonyms for pollution and environmental degradation.

Superfund Is Established

The industrialization that gave Americans the world's highest standard of living also created problems that only a national program could address. By 1980, the U.S. Congress had passed numerous environmental laws, implemented by the EPA, but many serious hazardous waste problems were slipping through the cracks.

Responding to growing concern about public health and environmental threats from uncontrolled releases of hazardous materials, the U.S. Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Popularly known as Superfund, CERCLA had one seemingly simple job—to uncover and clean up hazardous materials spills and contaminated sites.

A Big Job

Few in Congress, the EPA, the environmental community, or the general public knew in 1980 just how big the nation's hazardous materials problem is. Almost everyone thought that Superfund would be a short-lived program requiring relatively few resources to clean up at most a few hundred sites. They were quite mistaken.

As the EPA set to work finding sites and gauging their potential to harm people and the environment, the number of sites grew. Each discovery seemed to lead to another, and today almost 36,000 hazardous waste sites have been investigated as potential hazardous waste sites. They are catalogued in the EPA's computerized database, CERCLIS (for the Comprehensive Environmental Re-

sponse, Compensation, and Liability Information System).

The damage to public health and the environment that each site in CERCLIS might cause is evaluated; many sites have been referred to State and local governments for cleanup. The EPA lists the nation's most serious hazardous waste sites on the National Priorities List, or NPL. (These Superfund sites are eligible for federally-funded cleanup, but whenever possible the EPA makes polluters pay for the contamination they helped create.) The NPL now numbers 1,275 sites, with 50 to 100 added each year. By the end of the century, the NPL may reach as many as 2,100 sites.

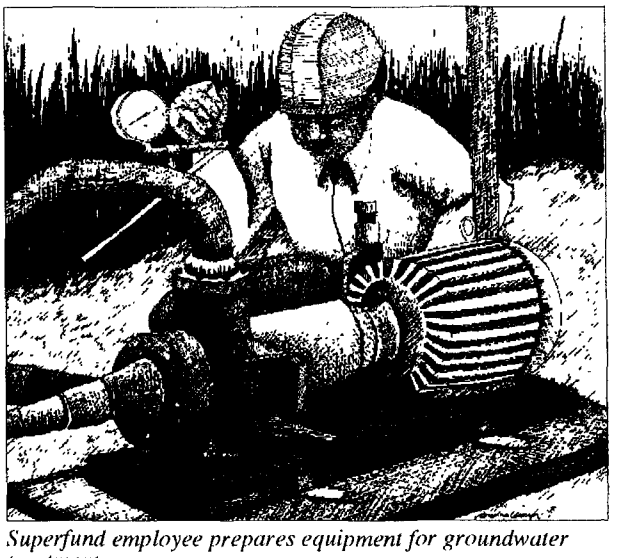
Superfund faces some of the most complex pollution problems ever encountered by an environmental program. Improperly stored or disposed chemicals and the soil they contaminate are one concern. More difficult to correct are the wetlands and bays, and the groundwater, lakes, and rivers often used for drinking water that are contaminated by chemicals spreading through the soil or mixing with storm water runoff. Toxic vapors contaminate the air at some sites, threatening the health of people living and working near by.

Superfund aims to control immediate public health and environmental threats by tackling the worst problems at the worst sites first. Wherever possible, Superfund officials use innovative treatment techniques—many developed or refined by the EPA—to correct hazardous materials problems once and for all. Many of the treatment techniques they use did not exist when the program was created.

The EPA Administrator had challenged Superfund to complete construction necessary for cleanup work at 130 NPL sites by the end of the 1992 federal fiscal year. By September 30, 1992, the end of fiscal year 1992, construction had been completed at a total of 149 NPL sites. Superfund is well on its way of meeting the Administrator's goal of completing construction at 200 NPL sites by the end of fiscal year 1993, and 650 sites by the end of fiscal year 2000.

Quick Cleanup at Non-NPL Sites

Long-standing hazardous waste sites are not Superfund's only concern. The EPA also responds to hazardous spills and other emergencies, hauling away chemicals for proper treatment or disposal. Superfund teams perform or supervise responses at rail and motor vehicle accidents, fires, and other emergencies involving hazardous substances. They also evacuate people living and working near by, if necessary, and provide clean drinking water to people whose own water is contaminated. Removal crews also post warning signs and take other precautions to keep people and animals away from hazardous substances.



Superfund employee prepares equipment for groundwater treatment.

Quick Cleanups, or Removals, are not limited to emergencies. When cleanup crews at contaminated sites find hazardous substances that immediately threaten people or the environment, they act right away to reduce the threat or to remove the chemicals outright. As the EPA implements the Superfund Accelerated Cleanup Model (SACM), more and more sites will undergo quick cleanups, and many of these will be cleaned up completely without ever being included on the NPL. (See "Streamlining Superfund: The Superfund Accelerated Cleanup Model.")

Some of Superfund's most significant gains in public health and environmental protection have been won by the removal program. As of March 31, 1992, the Emergency Response Program had logged more than 2,300 removal completions since Superfund was established.

Superfund employee removing drums from a Superfund site.

The Public's Role

Superfund is unique among federal programs in its commitment to citizen participation. Although the EPA is responsible for determining how dangerous a site is and how best to clean it up, the Agency relies on citizen input as it makes these decisions.

Community residents are often invaluable sources of information about a hazardous waste site, its current and previous owners, and the activities that took place there. Such information can be crucial to experts evaluating a site and its potential dangers.

Residents also comment on EPA cleanup plans by stating their concerns and preferences at public meetings and other forums and in formal, written comments to Agency proposals. The EPA takes these comments and concerns seriously, and has modified many proposals in response to local concerns. For, ultimately, it is the community and its citizens that will live with the results of the EPA's decisions and actions; it is only fair that citizens participate in the process.

A Commitment to Communication

The Superfund program is very serious about public outreach and communication. Community relations coordinators are assigned to each NPL site to help the public understand the potential hazards present, as well as the cleanup alternatives. Local information repositories, such as libraries or other public buildings, have been established near each NPL site to ensure that the public has an opportunity to review all relevant information and the proposed cleanup plans.

The individual State volumes contain summary fact sheets on NPL sites in each State and territory. Together, the fact sheets provide a concise report on site conditions and the progress made toward site cleanups as of March 1992. The EPA revises these volumes periodically to provide an up-to-date record of program activities. A glossary of key terms relating to hazardous waste management and Superfund site cleanup is provided at the back of this book.

INTRODUCTION

Superfund is, of course, a public program, and as such it belongs to everyone of us. This volume, along with other State volumes, comprises the EPA's report on Superfund progress to the program's owners for the year 1992.

STREAMLINING SUPERFUND: THE SUPERFUND ACCELERATED CLEANUP MODEL

Historically, critics and supporters alike have measured Superfund's progress by the number of hazardous waste sites deleted from the NPL. Although easy enough to tally, this approach is too narrow. It misses the major gains Superfund makes by reducing major risks at the nation's worst hazardous sites long before all clean-up work is done and the site deleted. It also ignores the Removal Program's contributions to meeting Superfund's twin mandates of maximizing public health and environmental protection.

Renewing Superfund's commitment to rapid protection from hazardous materials, the EPA is streamlining the program. The Superfund Accelerated Cleanup Model, or SACM, will take Early Actions, such as removing hazardous wastes or contaminated materials, while experts study the site. SACM also will combine similar site studies to reduce the time required to evaluate a site and its threats to people and the environment. This way, immediate public health and environmental threats will be addressed while long-term cleanups are being planned.

Emergencies such as train derailments and motor vehicle accidents will continue to be handled expeditiously. Teams of highly trained technicians will swing into action right away, coordinating the cleanup and removal of hazardous substances to ensure public safety as quickly as possible.

Breaking With Tradition

The traditional Superfund process begins with a lengthy phase of study and site assessment, but SACM will save time by combining separate, yet similar, activities. Each EPA Region will form a Decision Team of site managers, risk assessors, community relations coordinators, lawyers, and other experts to monitor the studies and quickly determine whether a site requires Early Action (taking less than five years), Long-term Action, or both.

While the site studies continue, the Decision Team will begin the short-term work required to correct immediate public health or environmental threats from the site. Besides removing hazardous materials, Early Actions include taking precautions to keep contaminants from moving off the site and restricting access to the site. Early Actions could eliminate most human risk from these sites, and Superfund will further focus its public participation and public information activities on site assessment and Early Action.

Long-Term Solutions

While Early Actions can correct many hazardous waste problems—and provide the bulk of public health and environmental protection—some contamination will take longer to correct. Cleanups of mining sites, wetlands, estuaries, and projects involving incineration of contaminants or restoration of groundwater can take far longer than the three to five years envisioned for Early Actions. Under SACM, these sites will be handled much as they are now.

Also under SACM, the EPA will continue its pursuit of potentially responsible parties who may have caused or contributed to site contamination. Expedited enforcement and procedures for negotiating potentially responsible party settlements will secure their participation. Superfund personnel will continue to oversee clean-up work performed by potentially responsible parties.

HOW SUPERFUND WORKS

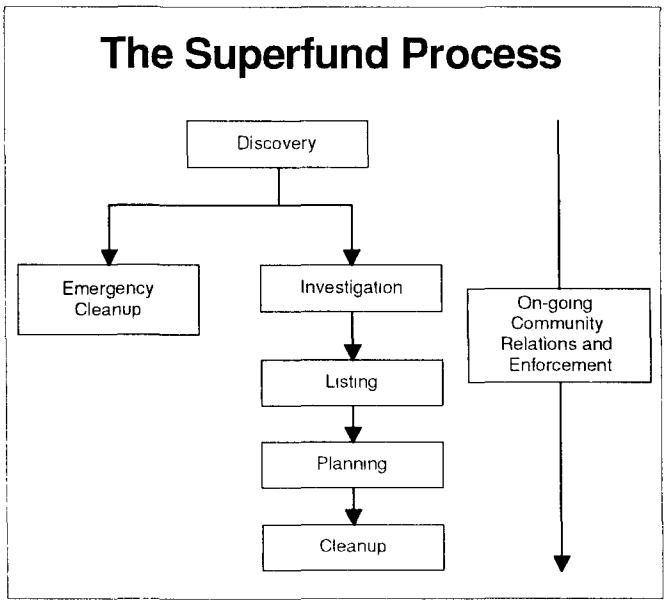
Each Superfund site presents a different set of complex problems. The same hazardous materials and chemicals often contaminate many sites, but the details of each site are different. Almost always, soil is contaminated with one or more chemicals. Their vapors may taint the air over and around the site. Contaminants may travel through the soil and reach underground aquifers which may be used for drinking water, or they may spread over the site to contaminate streams, ponds, and wetlands. The contaminating chemicals may interact with each other, presenting even more complicated cleanup problems.

Superfund's cleanup process is arduous and exacting. It requires the best efforts of hundreds of experts in science and engineering, public health, administration and management, law, and many other fields.

The average NPL site takes from seven to ten years to work its way through the system, from discovery to the start of long-term cleanup. Actual cleanup work can take years, decades if contaminated groundwater must be treated. Of course, imminent threats to public health or the environment are corrected right away.

The diagram to the right presents a simplified view of the cleanup process. The major steps in the Superfund process are:

- Site discovery and investigation to identify contaminants and determine whether emergency action is required;
- Emergency site work such as removing contaminants for proper treatment or disposal, and securing the site to keep people and animals away, if warranted by conditions at the site;
- Site evaluation to determine how people living and working nearby, and the environment, may be exposed to site contaminants;
- Detailed studies to determine whether conditions are serious enough to add the site to the National Priorities List of sites eligible for federally funded cleanup under Superfund;
- Selection, design, and implementation of a cleanup plan, after a thorough review of the most effective cleanup options, given site conditions, contaminants present, and their potential threat to public health or the environment.
- Follow-up to ensure that the cleanup work done at the site continues to be effective over the long term.



From the earliest stages, EPA investigators work hard to identify those responsible for the contamination. As their responsibility is established, the EPA negotiates with these "responsible parties" to pay for cleaning up the problem they helped create. This "enforcement first" policy saves Superfund Trust Fund monies for use in cleanups where the responsible parties cannot be identified, or where they are unable to fund cleanup work.

THE VOLUME

How to Use the State Book

The site fact sheets presented in this book are comprehensive summaries that cover a broad range of information. The fact sheets describe hazardous waste sites on the NPL and their locations, as well as the conditions leading to their listing ("Site Description"). The summaries list the types of contaminants that have been discovered and related threats to public and ecological health ("Threats and Contaminants"). "Cleanup Approach" presents an overview of the cleanup activities completed, underway, or planned. The fact sheets conclude with a brief synopsis of how much progress has been made in protecting public health and the environment. The summaries also pinpoint other actions, such as legal efforts to involve polluters responsible for site contamination and community concerns.

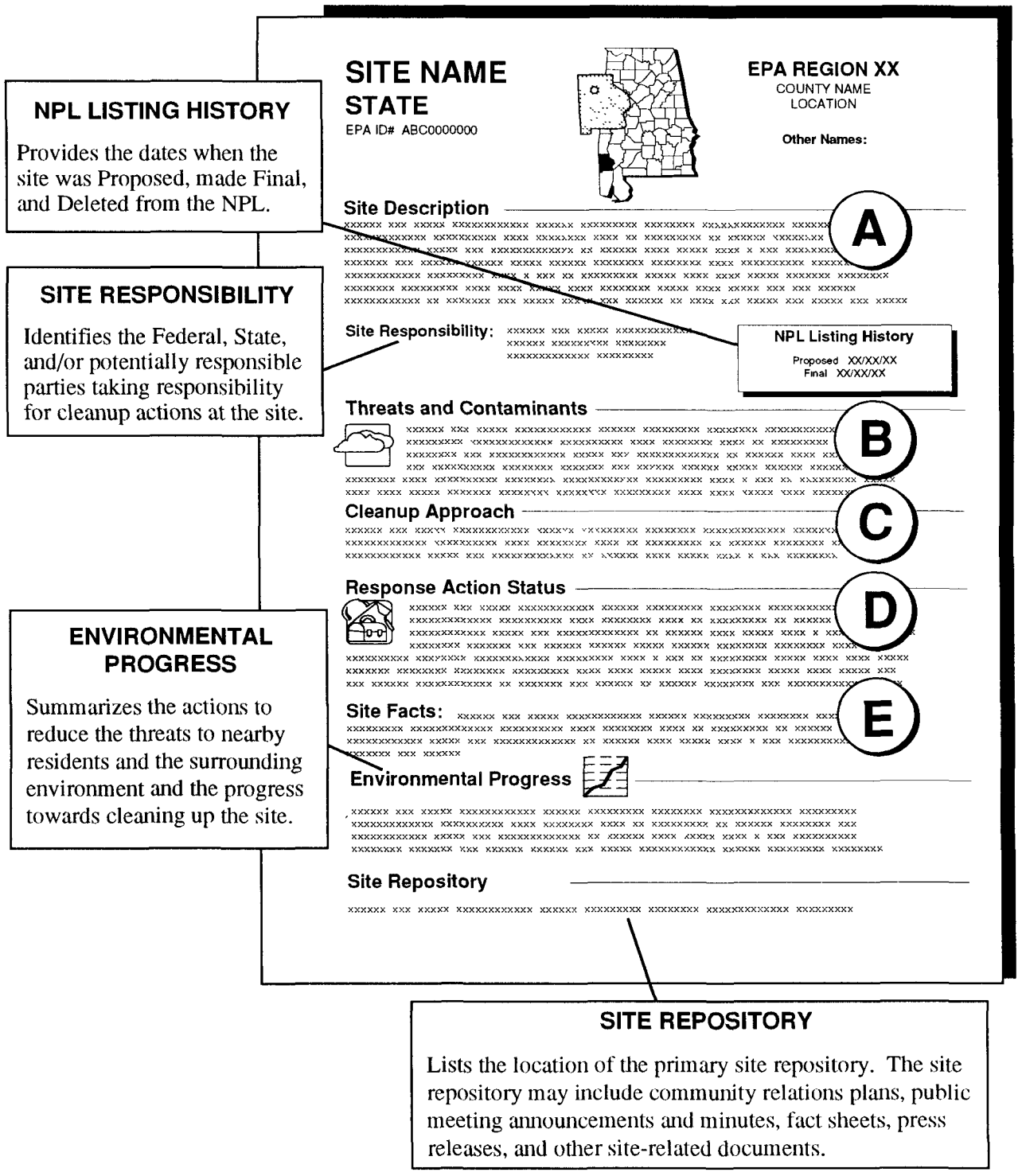
The fact sheets are arranged in alphabetical order by site name. Because site cleanup is a dynamic and gradual process, all site information is accurate as of the date shown on the bottom of each page. Progress always is being made at NPL sites, and the EPA periodically will update the site fact sheets to reflect recent actions and will publish updated State volumes. The following two pages show a generic fact sheet and briefly describe the information under each section.

How Can You Use This State Book?

You can use this book to keep informed about the sites that concern you, particularly ones close to home. The EPA is committed to involving the public in the decision making process associated with hazardous waste cleanup. The Agency solicits input from area residents in communities affected by Superfund sites. Citizens are likely to be affected not only by hazardous site conditions, but also by the remedies that combat them. Site cleanups take many forms and can affect communities in different ways. Local traffic may be rerouted, residents may be relocated, temporary water supplies may be necessary.

Definitive information on a site can help citizens sift through alternatives and make decisions. To make good choices, you must know what the threats are and how the EPA intends to clean up the site. You must understand the cleanup alternatives being proposed for site cleanup and how residents may be affected by each one. You also need to have some idea of how your community intends to use the site in the future, and you need to know what the community can realistically expect once the cleanup is complete.

The EPA wants to develop cleanup methods that meet community needs, but the Agency only can take local concerns into account if it understands what they are. Information must travel both ways in order for cleanups to be effective and satisfactory. Please take this opportunity to learn more, become involved, and assure that hazardous waste cleanup at "your" site considers your community's concerns.



NPL LISTING HISTORY

Provides the dates when the site was Proposed, made Final, and Deleted from the NPL.

SITE RESPONSIBILITY

Identifies the Federal, State, and/or potentially responsible parties taking responsibility for cleanup actions at the site.

ENVIRONMENTAL PROGRESS

Summarizes the actions to reduce the threats to nearby residents and the surrounding environment and the progress towards cleaning up the site.

SITE REPOSITORY

Lists the location of the primary site repository. The site repository may include community relations plans, public meeting announcements and minutes, fact sheets, press releases, and other site-related documents.

A

SITE DESCRIPTION

This section describes the location and history of the site. It includes descriptions of the most recent activities and past actions at the site that have contributed to the contamination. Population estimates, land usages, and nearby resources give readers background on the local setting surrounding the site.

B

THREATS AND CONTAMINANTS

The major chemical categories of site contamination are noted, as well as which environmental resources are affected. Icons representing each of the affected resources (may include air, groundwater, surface water, soil, and contamination to environmentally sensitive areas) are included in the margins of this section. Potential threats to residents and the surrounding environments arising from the site contamination also are described.

C

CLEANUP APPROACH

This section contains a brief overview of how the site is being cleaned up.

D

RESPONSE ACTION STATUS

Specific actions that have been accomplished or will be undertaken to clean up the site are described here. Cleanup activities at NPL sites are divided into separate phases, depending on the complexity and required actions at the site. Two major types of cleanup activities often are described: initial, immediate, or emergency actions to quickly remove or reduce imminent threats to the community and surrounding areas; and long-term remedial phases directed at final cleanup at the site. Each stage of the cleanup strategy is presented in this section of the summary. Icons representing the stage of the cleanup process (initial actions, site investigations, EPA selection of the cleanup remedy, engineering design phase, cleanup activities underway, and completed cleanup) are located in the margin next to each activity description.

E

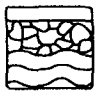
SITE FACTS

Additional information on activities and events at the site are included in this section. Often details on legal or administrative actions taken by the EPA to achieve site cleanup or other facts pertaining to community involvement with the site cleanup process are reported here.

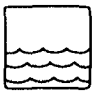
THE VOLUME

The "icons," or symbols, accompanying the text allow the reader to see at a glance which environmental resources are affected and the status of cleanup activities at the site.

Icons in the Threats and Contaminants Section



Contaminated *Groundwater* resources in the vicinity or underlying the site. (Groundwater is often used as a drinking water source.)



Contaminated *Surface Water and Sediments* on or near the site. (These include lakes, ponds, streams, and rivers.)

Contaminated *Air* in the vicinity of the site. (Air pollution usually is periodic and involves contaminated dust particles or hazardous gas emissions.)

Contaminated *Soil and Sludges* on or near the site. (This contamination category may include bulk or other surface hazardous wastes found on the site.)

Threatened or contaminated *Environmentally Sensitive Areas* in the vicinity of the site. (Examples include wetlands and coastal areas or critical habitats.)

Icons in the Response Action Status Section

Initial, Immediate, or Emergency Actions have been taken or are underway to eliminate immediate threats at the site.

Site Studies at the site to determine the nature and extent of contamination are planned or underway.

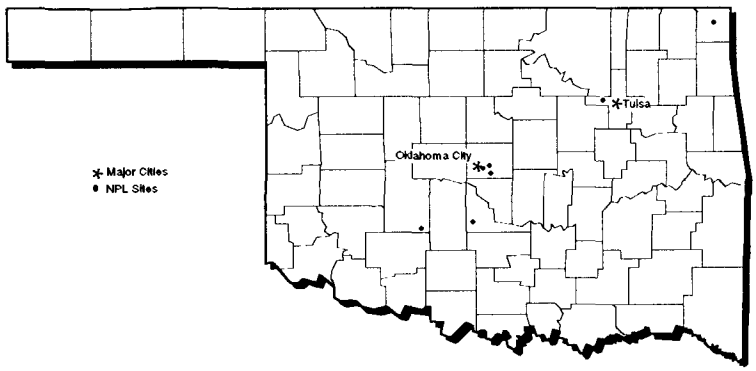
Remedy Selected indicates that site investigations have been concluded, and the EPA has selected a final cleanup remedy for the site or part of the site.

Remedy Design means that engineers are preparing specifications and drawings for the selected cleanup technologies.

Cleanup Ongoing indicates that the selected cleanup remedies for the contaminated site, or part of the site, currently are underway.

Cleanup Complete shows that all cleanup goals have been achieved for the contaminated site or part of the site.

A SUMMARY OF THE STATE PROGRAM



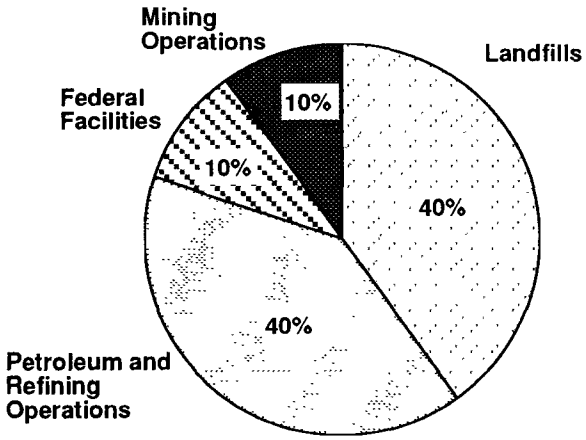
Superfund Activities in Oklahoma

The State of Oklahoma is located within EPA Region 6, which includes the five south central States. The State covers 69,919 square miles. According to the 1990 Census, Oklahoma experienced a 4 percent increase in population between 1980 and 1990, and is ranked twenty-eighth in U.S. population with approximately 3,146,000 residents.

The Controlled Industrial Waste Disposal Act provides the State with the authority to implement the Superfund program at the State level. General authority to implement the program has been granted to the Department of Health. This authority includes the right to access the site and the option to impose civil and criminal penalties on polluters. In practice, the State orders polluters to conduct or pay for cleanup activities by invoking its enforcement authorities. The State may conduct emergency response actions and removals at abandoned sites; however, the cost of cleanup cannot be recovered from polluters except under the Federal Superfund program. Permit fees and funds transferred from the Public Health Special Fund are placed in the Controlled Industrial Waste Fund that finances, in addition to cleanup activities, the 10 percent contribution from the State required by the Federal Superfund program. Currently, 10 sites in the State of Oklahoma have been listed as final on the NPL. No new sites have been proposed for listing in 1992.

The Department of Health
implements the Superfund Program in the State of Oklahoma

Activities responsible for hazardous waste contamination in the State of Oklahoma include:



Facts about the 10 NPL sites in Oklahoma:

Immediate Actions (such as removing hazardous substances or restricting site access) were performed at nine sites.

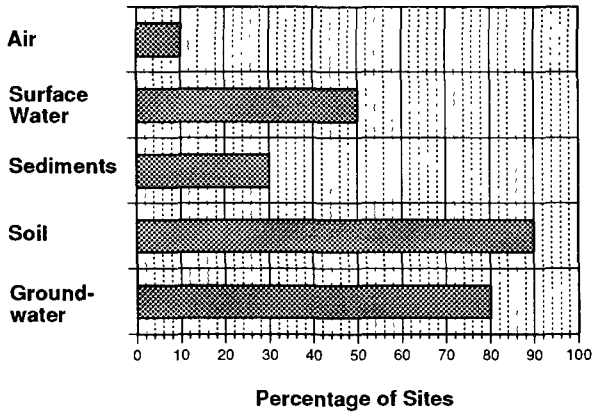
Three sites endanger sensitive environments.

Eight sites are located near residential areas.

OKLAHOMA

Most Sites Have Multiple Contaminants and Contaminated Media:

Media Contaminated at Sites



Contaminants Found at Sites

	Percentage of Sites
Heavy Metals	80%
VOCs	60%
PCBs	30%
Pesticides/Herbicides	30%
Petrochemicals/Explosives	30%
Acids	20%
Creosotes	10%

The Potentially Responsible Party Pays...

In the State of Oklahoma, potentially responsible parties are paying for or conducting cleanup activities at five sites.

For Further Information on NPL Sites and Hazardous Waste Programs in the State of Oklahoma Please Contact:

☎ EPA Region 6 Office of External Affairs, Community Relations	For information concerning community involvement	(214) 655-2200
☎ National Response Center	To report a hazardous waste emergency	(800) 424-8802
☎ The Department of Health: Solid Waste Service	For information about the State's responsibility in the Superfund Program	(404) 271-7159
☎ EPA Region 6 Hazardous Waste Management Division	For information about the Regional Superfund Program	(214) 655-6740
☎ EPA Superfund Hotline	For information about the Federal Superfund Program	(800) 424-9068

THE NPL REPORT

PROGRESS TO DATE

The following Progress Report lists all sites currently on, or deleted from, the NPL and briefly summarizes the status of activities for each site at the time this report was prepared. The steps in the Superfund cleanup process are arrayed across the top of the chart, and each site's progress through these steps is represented by an arrow (⇨) indicating the current stage of cleanup.

Large and complex sites often are organized into several cleanup stages. For example, separate cleanup efforts may be required to address the source of the contamination, hazardous substances in the groundwater, and surface water pollution, or to clean up different areas of a large site. In such cases, the chart portrays cleanup progress at the site's *most advanced* stage, reflecting the status of site activities rather than administrative accomplishments.

⇨ An arrow in the "Initial Response" category indicates that an emergency cleanup, immediate action, or initial action has been completed or currently is underway. Emergency or initial actions are taken as an interim measure to provide immediate relief from exposure to hazardous site conditions or to stabilize a site to prevent further contamination.

⇨ A final arrow in the "Site Studies" category indicates that an investigation to determine the nature and extent of the contamination at the site currently is ongoing or planned.

⇨ A final arrow in the "Remedy Selection" category means that the EPA has selected the final cleanup strategy for the site. At the few sites where the EPA has determined that initial response actions have eliminated site contamination, or that any remaining contamination will be naturally dispersed without further cleanup activities, a "No Action" remedy has been selected. In these cases, the arrows are discontinued at the "Remedy Selection" step and resume in the "Construction Complete" category.

⇨ A final arrow at the "Remedial Design" stage indicates that engineers currently are designing the technical specifications for the selected cleanup remedies and technologies.

⇨ A final arrow in the "Cleanup Ongoing" column means that final cleanup actions have been started at the site and currently are underway.

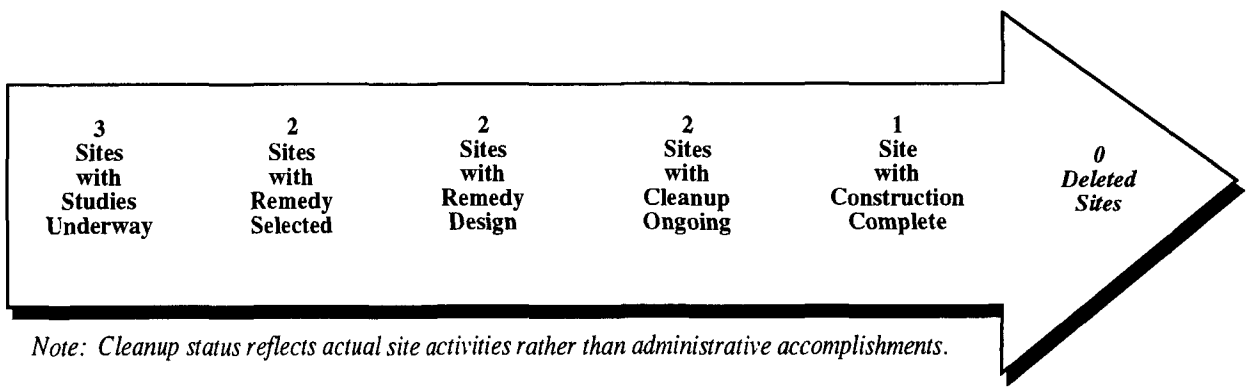
⇨ A final arrow in the "Construction Complete" category is used only when all phases of the site cleanup plan have been performed, and the EPA has determined that no additional construction actions are required at the site. Some sites in this category currently may be undergoing long-term operation and maintenance or monitoring to ensure that the cleanup actions continue to protect human health and the environment.

✓ A check in the "Deleted" category indicates that the site cleanup has met all human health and environmental goals and that the EPA has deleted the site from the NPL.

Further information on the activities and progress at each site is given in the site "Fact Sheets" published in this volume.

Progress Toward Cleanup at NPL Sites in the State of Oklahoma

Site Name	County	NPL	Date	Initial Response	Site Studies	Remedy Selected	Remedy Design	Cleanup Ongoing	Construction Complete	Deleted
COMPASS INDUSTRIES (AVERY DRIVE)	TULSA	Final	09/21/84	⇨	⇨	⇨	⇨	⇨	⇨	
DOUBLE EAGLE REFINERY COMPANY	OKLAHOMA	Final	03/31/89	⇨	⇨					
FOURTH ST. ABANDONED REFINERY	OKLAHOMA	Final	03/31/89	⇨	⇨					
HARDAGE/CRINER	MCCLAIN	Final	09/08/83	⇨	⇨	⇨	⇨			
MOSLEY ROAD SANITARY LANDFILL	OKLAHOMA	Final	02/21/90		⇨					
OKLAHOMA REFINING COMPANY	CADDO	Final	02/21/90	⇨	⇨	⇨				
SAND SPRINGS PETROCHEMICAL CO.	TULSA	Final	06/10/86	⇨	⇨	⇨				
TAR CREEK (OTTAWA COUNTY)	OTTAWA	Final	09/08/83	⇨	⇨	⇨	⇨	⇨		
TENTH STREET DUMP/JUNKYARD	OKLAHOMA	Final	07/22/87	⇨	⇨	⇨	⇨			
TINKER AIR FORCE BASE (SOLDIER CREEK/BUILDING 3001)	OKLAHOMA	Final	07/01/87	⇨	⇨	⇨	⇨	⇨		

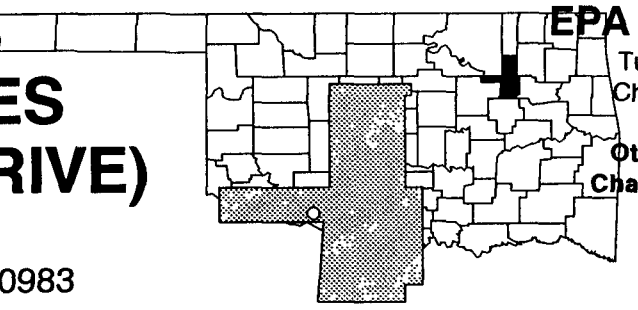


Note: Cleanup status reflects actual site activities rather than administrative accomplishments.

COMPASS INDUSTRIES (AVERY DRIVE)

OKLAHOMA

EPA ID# OKD980620983



EPA REGION 6

Tulsa County
Chandler Park

Other Names:
Chandler Landfill

Site Description

Compass Industries (Avery Drive) is a 30-acre abandoned landfill situated on a bluff overlooking the Arkansas River to the west of Tulsa. Operating from 1972 to 1976, it served as one of the major municipal landfills in the Tulsa area. Unknown wastes have been dumped at the site since the mid-1950s. The limited records available indicate that several types of hazardous wastes were dumped there, including toxic chemicals, metals, and carcinogenic materials. Prior to that, the site was used for limestone quarrying. During the 1970s, poor operating practices and open burning resulted in several fires at the landfill. The most recent fire burned underground for several years, occasionally breaking out into the open. The waste is piled approximately 20 feet deep. The State Health Department began to study air and water quality in 1983, when residents complained about odors at the site. The site is in a rural area, but is immediately west of Chandler Park, a recreational area. The nearest residence is 1/4 mile from the site, and the nearest drinking water well is 1/2 mile away, although it is upgradient from the site and currently is not in use.

Site Responsibility: The site is being addressed through Federal, State, and potentially responsible parties' actions.

NPL Listing History
Proposed Date: 09/08/83
Final Date: 09/21/84

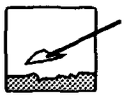
Threats and Contaminants

The soil is contaminated with toxic metals and organic compounds. Contaminants include oily sludges, jet fuel, solvents, acids, caustics, bleaches, benzene, polychlorinated biphenyls (PCBs), and pesticides. However, soil no longer poses a threat due to the installation of a clay cap over the contaminated area. The low concentrations of contaminants in the groundwater are within Federal standards. In the past, the site was troubled by recurrent fires. Toxic air emissions from burning material threatened nearby residences. In addition, trespassers from the nearby recreational area were at risk of coming in contact with contaminated materials, as people have used the site for target practice; however, the site is fenced now making trespassing unlikely. The area near the site is a habitat for the endangered bald eagle.

Cleanup Approach

The site is being addressed in two stages: immediate actions to limit access to the site and a long-term remedial phase to control the source of contamination.

Response Action Status



Immediate Actions: The EPA installed a fence around the site and put warning signs around its perimeter in mid-1988.

Source Control: In 1987, the EPA selected the following remedies: installing an EPA-approved cap over the landfill area to isolate contaminated materials and reduce the amount of water seeping into and through the landfill; diverting surface water to reduce overland flows and infiltration; grading the site to encourage site runoff and prevent erosion; and collecting and treating contaminated shallow groundwater before discharge to the Arkansas River. The construction phase began in 1989. The clay cap was completed in 1990 and final seeding of the site took place in 1991. Further sampling of the groundwater showed that the low levels of contaminant concentrations do not pose a threat to people or the environment. Therefore, the remedy for groundwater cleanup was canceled. A final site inspection, conducted in 1991, verified that the cleanup has been effective. Samples taken in early 1992, as part of the operations and maintenance program, verified that the cleanup continues to protect public health and the environment.

Site Facts: The parties potentially responsible for the site contamination performed the cleanup, pursuant to an Administrative Order.

Environmental Progress

The construction of a fence to limit access to the site has reduced the exposure potential of the Compass Industries (Avery Drive) site. Completion of the clay cap has contained material on site and surface water diversion techniques will help keep pollutants from migrating off site. The site is currently in a five-year operations and maintenance phase to ensure that the site cleanup remedy continues to protect public health and the environment.

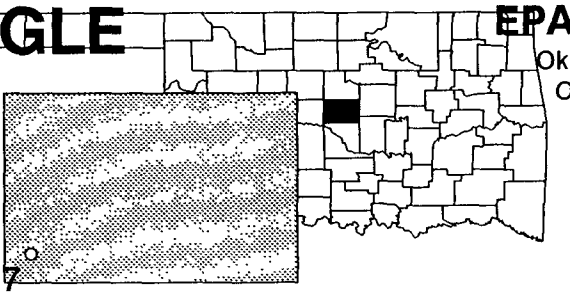
Site Repository

Page Memorial Library, 6 East Broadway, Sand Springs, OK 74063

DOUBLE EAGLE REFINERY COMPANY

OKLAHOMA

EPA ID# OKD007188717



EPA REGION 6
Oklahoma County
Oklahoma City

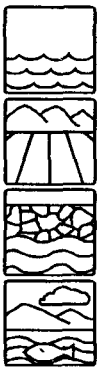
Site Description

The Double Eagle Refinery Company, located southeast of the intersection of 4th Street NE and Martin Luther King Avenue, has been in operation since 1929. Until around 1980, this 7-acre facility refined used motor oils by acidulation, distillation, and filtration. Areas of concern include: a sludge lagoon, six smaller earthen impoundments, and numerous structures and pieces of abandoned refinery equipment. An inventory done by the site owner in 1990 showed 13 steel buildings, a fire tube boiler, two heat exchanges, five vacuum precoat/scrapper filters, two concrete settling cells, and approximately 100 steel tanks of varying dimensions. Although the equipment appears to be contaminated to various degrees, the tanks are empty. Since the inventory, the owner has removed some of the equipment from the site. About 36,000 cubic yards of waste oils contaminated with heavy metals are in surface impoundments on site. According to the company, the oils come from truck fleets, garages, automobile dealers, industries, and City, State, and Federal agencies throughout the State. In addition, waste solvents and other products were collected from major industrial companies in Oklahoma. Approximately 6,100 cubic yards of nearby land have been contaminated. The land use in the area is mixed industrial-residential. About 28,500 people in Del City and Smith Village obtain drinking water from public and private wells within 3 miles of the site. The site is located 1/2 mile from a school and 1/4 mile from a residential area. Surface waters within 3 miles of the site are used for recreational activities. The North Canadian river is located approximately 1/2 mile south of the site. Wetlands are located adjacent to the site and wildlife in the area includes migratory fowl and small mammals. The Fourth Street Superfund site is about 500 feet northeast of the Double Eagle Refinery Company site. Cleanup at both sites may be interrelated as proves necessary.

Site Responsibility: This site is being addressed through Federal and potentially responsible parties' actions.

NPL LISTING HISTORY
Proposed Date: 06/24/88
Final Date: 03/31/89

Threats and Contaminants

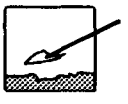


Sediments from the ponds and drainage areas, the surrounding soil areas, groundwater, and surface water are contaminated with barium, lead, zinc, acid base-neutral compounds, and volatile organic compounds (VOCs). Groundwater in the area is shallow (10 to 25 feet in some cases) and soils are permeable, conditions that help contaminants move into groundwater. There is a health risk from direct contact with the materials, but this has been lessened since the area was fenced. Wetlands are located adjacent to the site.

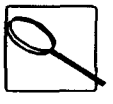
Cleanup Approach

This site is being addressed in two stages: immediate actions and two long-term remedial phases focusing on source control and the cleanup of groundwater.

Response Action Status



Immediate Actions: In 1988, the EPA ordered the site owner to fence the northern side of the site, so that people and animals could not come in direct contact with hazardous substances. The fence was erected in 1989.



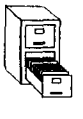
Source Control: The EPA began conducting an investigation of the sources of contamination at the site in 1989. The study is expected to conclude in 1992, at which point the EPA will select the technologies to control the sources.

Groundwater: Investigations to determine the nature and extent of groundwater contamination and to identify cleanup alternatives began in mid-1992 and are expected to be completed in late 1993.

Environmental Progress

Fencing the Double Eagle Refinery Company site has reduced the potential of exposure to hazardous substances, making the area safer while investigations are taking place.

Site Repository

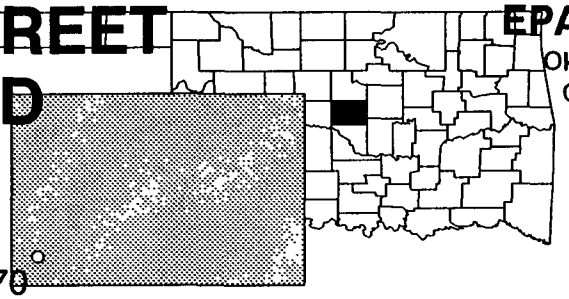


Ralph Ellison Library, 2000 Northeast 23, Oklahoma City, OK 73111

FOURTH STREET ABANDONED REFINERY

OKLAHOMA

EPA ID# OKD980696470



EPA REGION 6
Oklahoma County
Oklahoma City

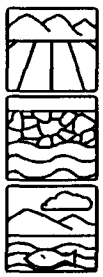
Site Description

The Fourth Street Abandoned Refinery is an abandoned 28-acre facility that operated from 1940 to 1968, and was comprised of numerous oil and sludge disposal pits. More recent dumping has occurred in the form of old concrete and building materials and government surplus supplies. An inactive oil well and a gas well are on site. Elevated levels of semi-volatile and volatile organic compounds (VOCs) have been identified in soil, sediment, and sludge. Approximately 32,500 people live within 3 miles of the abandoned refinery. The nearest surface water body is the North Canadian River, which is approximately 1/2 mile south of the site. Wetlands are located adjacent to the site. The Double Eagle Refinery Company site, also on the NPL, is about 500 feet southwest of the Fourth Street Abandoned Refinery site.

Site Responsibility: The site is being addressed through Federal and State actions.

NPL LISTING HISTORY
Proposed Date: 06/24/88
Final Date: 03/31/89

Threats and Contaminants



Soil samples contain barium, lead, chlordane, and crude oil constituents. Groundwater and sludge from the site are contaminated with nickel, benzene, and numerous VOCs. Given the hydrogeology of the site, there is significant potential for groundwater contamination in the two aquifers. The land drains to the south and east, thus threatening the North Canadian River. Also, the site was not completely fenced, making it possible for people and animals to come in direct contact with hazardous substances.

Cleanup Approach

This site is being addressed in three stages: initial actions and two long-term remedial phases focusing on source control and cleanup of the groundwater.

Response Action Status

Initial Actions: In 1985, the State decontaminated junk autos, stored two drums of benzene, and capped and seeded the area. The EPA fenced the site and posted warning signs in 1989.

Source Control: Between 1985 and 1987, the EPA performed surveys and field sampling at the site. The EPA currently is conducting an investigation to determine the extent of contamination to surface water, sediment, soil, sludge, and tar areas, as well as to track the movement of contaminants through the air. The investigation, scheduled to be completed in 1992, will recommend alternatives for cleanup. Further studies of specific aspects of the site may be proposed in the future.

Groundwater: Investigations to determine the nature and extent of groundwater contamination and to identify cleanup alternatives began in mid-1992 and are expected to be completed in late 1993.

Environmental Progress

Decontamination of junk autos, confinement of benzene, and capping of the area have reduced the potential of exposure to contamination at the Fourth Street Abandoned Refinery site, making it safer while awaiting further cleanup activities.

Site Repository

Ralph Ellison Library, 2000 Northeast 23, Oklahoma City, OK 73111

HARDAGE/CRINER
OKLAHOMA
EPA ID# OKD000400093

EPA REGION 6
McClain County
3/4 mile west of Criner on Hwy. 122

Other Names:
Hardage Landfill
Criner Landfill
Criner/Hardage Waste Disposal

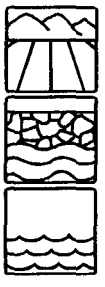
Site Description

The 60-acre Hardage/Criner site was licensed by the State of Oklahoma from 1972 to 1980 to accept industrial and hazardous wastes such as asbestos, cyanides, and flammable sludges. Pits excavated to receive wastes filled rapidly; wastes were then transferred to two temporary ponds. In the west pond, liquid wastes were slurried with soil and transferred to the south pond. When the south pond filled, wastes were stacked 15 to 20 feet above the ground, becoming a sludge mound. In the mid-1970s, drums were no longer emptied but were piled at the northern end of the main pit, called the drum mound. These practices resulted in pesticides, solvents, acids, and metal sludges contaminating surface water, groundwater, and surface soil. The nearest residence in this rural area is at the southwestern site boundary. Adjacent to the North Criner Creek flood plain, the site is surrounded by cattle grazing land. Shallow groundwater from the site has moved into the North Criner Creek alluvium.

Site Responsibility: This site is being addressed through Federal, State, and potentially responsible parties' actions.

NPL LISTING HISTORY
Proposed Date: 10/23/81
Final Date: 09/08/83

Threats and Contaminants

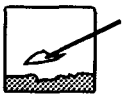


Solvents, paint sludge, and inks have contributed to the contamination of soil, groundwater, and surface waters. Contamination found in each area includes: heavy metals, pesticides, polychlorinated biphenyls (PCBs), oils, and methylene chloride. Inhalation of dusts and vapors generated from the soils on site poses a potential risk for workers and trespassers. Fugitive dusts and vapors from on-site soil disruption could be inhaled off site. There is no known current use of the groundwater, but any use of contaminated groundwater would be hazardous.

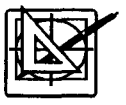
Cleanup Approach

The site is being addressed in three stages: initial actions and two long-term remedial phases focusing on cleanup of the source area and the groundwater.

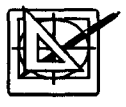
Response Action Status



Initial Actions: In 1982, the potentially responsible parties started decontaminating the site by mixing pit fluids with soil, excavating visibly contaminated soils from mixing areas and temporary ponds, capping the source areas with a soil cover, and consolidating wastes in source areas. The parties potentially responsible for contamination fenced the site in 1987. In 1988, heavy rains caused slope damage to the western face of the barrel mound. The potentially responsible parties performed the repair, restored the other eroded mound areas, and provided a new water supply for 12 residences.



Source Area: In 1986, the EPA chose the following remedies, to be carried out by the potentially responsible parties, for cleaning up the source of contamination: excavation of approximately 180,000 cubic yards from the principal source areas (the drum mound, main pit, and sludge mound) to the bedrock; separation of wastes; treatment and disposal of solids in an on-site approved landfill; incineration of organic liquids; and treatment and disposal of inorganic liquids. A public comment period was held in 1989 to explore options other than those listed. In 1989, the EPA revised the 1986 remedy selection. The revised cleanup remedy calls for soil vapor extraction of the source areas, consolidation of contaminated soils, and removal of contaminated liquids followed by off-site incineration and capping of the source areas. To date, interceptor wells have been installed in the southwest area of the site and liquid extraction wells have been installed in the drum mound and Drum Pit areas. Extracted contaminants will be taken off-site for incineration. All cleanup activities are expected to be completed in mid-1993.



Groundwater: The EPA's selected remedy, which was reviewed by the public in 1989, is to build a V-shaped trench to intercept contaminated groundwater over most of the site. Another interceptor trench will catch groundwater that is moving into the alluvium located under North Criner Creek. The captured groundwater will be pumped to an on-site treatment unit, and then the treated water will be discharged to North Criner Creek. The groundwater and surface water will be monitored, surface drainage controlled, and the use of contaminated groundwater prevented through institutional controls.

Site Facts: In 1978, the State of Oklahoma filed complaints against the facility for suspected lead poisoning of the air around the site. A ruling in 1982 found that the potentially responsible parties were liable for all costs of removal or remedial actions. A complaint was filed against 36 generators and transporters in 1986. A partial Consent Decree was signed by the potentially responsible parties in 1987 for the groundwater cleanup. In August 1990, the Federal District Court selected the cleanup remedy proposed by the potentially responsible parties.

Environmental Progress

The initial actions taken by the potentially responsible parties to decontaminate the soil, excavate contaminated soils, and cap the source areas as described above have reduced the potential exposure of nearby residents to the waste at the Hardage/Criner site, making it safer while it awaits further remedial activities.

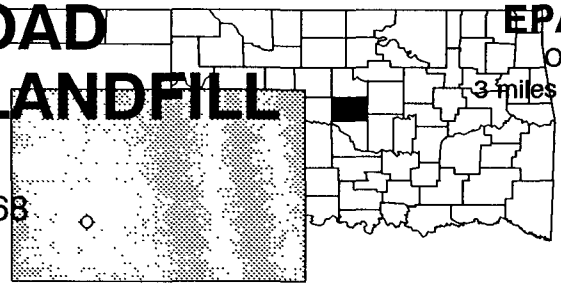
Site Repository

Purcell City Library, 919 North 9th Street, Purcell, OK 73080

MOSLEY ROAD SANITARY LANDFILL

OKLAHOMA

EPA ID# OKD980620868



EPA REGION 6
Oklahoma County
3 miles east of Oklahoma City

Site Description

The Mosley Road Sanitary Landfill covers 72 acres and was used from 1975 to 1987 as a commercial, residential, and industrial landfill. In 1976, the landfill accepted approximately 2 million gallons of hazardous substances under a Temporary Emergency Waiver for Hazardous Waste Disposal issued by the Oklahoma State Department of Health. According to the permit application, pesticides, industrial solvents, sludges, waste chemicals, and emulsions were deposited into two unlined pits. Since then, the pits have been buried under as much as 20 feet of solid refuse and fill. Concerns about groundwater contamination brought the site to the EPA's attention. Hazardous wastes were disposed of near the base of the landfill; a long-term risk could exist if wastes leak into the groundwater. The landfill lies above the Garber-Wellington Formation, an aquifer that serves as a high-quality drinking water source for many Oklahoma City residents. The surrounding area is both residential and commercial. An estimated 57,000 people obtain drinking water from public and private wells within a 3-mile radius of the site. Six homes are located within 1/2 mile from the site and obtain drinking water from private wells.

Site Responsibility: This site is being addressed through Federal and potentially responsible parties' actions.

NPL LISTING HISTORY
Proposed Date: 06/24/88
Final Date: 02/21/90

Threats and Contaminants

The soil is contaminated with pesticides, industrial solvents, sludges, waste chemicals, emulsions, and other substances disposed of in the landfills. Potential contamination of groundwater connected to the public drinking water system may pose a threat to public health.

Cleanup Approach

The site is being addressed in a single long-term remedial phase focusing on cleanup of the entire site.

Response Action Status

Entire Site: Under an agreement with the EPA, Waste Management of Oklahoma, Inc. and Mobile Waste Controls, Inc. are performing a study that will determine the nature and extent of site contamination and will identify and evaluate potential remedies for site problems. The investigation was completed in 1991. Cleanup decisions will be finalized in 1992 and actual site cleanup is planned for 1993.

Site Facts: Waste Management of Oklahoma, Inc. signed an Administrative Order with the EPA in 1989 to conduct an investigation into the nature and extent of site contaminants.

Environmental Progress

The investigation into a permanent solution is being carried out, and the EPA will decide on a final remedy soon. Meanwhile, the EPA assessed conditions at the Mosley Road Sanitary Landfill site and determined that the site does not warrant immediate cleanup actions.

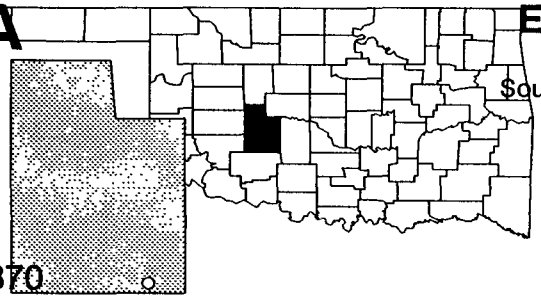
Site Repository

Crutcho Elementary School, 2401 North Air Depot, Oklahoma City, OK 73141

OKLAHOMA REFINING COMPANY

OKLAHOMA

EPA ID# OKD091598870



EPA REGION 6

Caddo County
South Baskett Street in Cyril

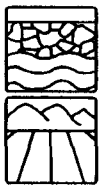
Site Description

The 160-acre Oklahoma Refining Company site is an abandoned oil refinery that was active from 1908 to 1984. The operator at the site placed process wastes, some reactive or flammable, into approximately 50 impoundments, many of which were unlined. Other wastes were tilled into the soil or placed in a waste pile. In 1981, the EPA observed leachate coming from the site, threatening nearby Gladys and Chetonia Creeks, which are used for recreational activities. In 1984, the owner declared bankruptcy and abandoned the facility. In 1986, the EPA found an on-site monitoring well to be contaminated with heavy metals. The Rush Springs Sandstone aquifer, which lies beneath the site, is considered to be a potential source of drinking water; however, no one is currently drinking water from the contaminated portion of the aquifer. Approximately 1,600 people obtain drinking water from public and private wells within 3 miles of the site. One private well is located within 1,000 feet of the site.

Site Responsibility: This site is being addressed through Federal and State actions.

NPL LISTING HISTORY
Proposed Date: 06/24/88
Final Date: 02/21/90

Threats and Contaminants

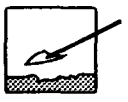


The groundwater is contaminated with heavy metals, including arsenic and lead. Process wastes from oil refining were tilled into the soil through a landfarming operation, but the soil contaminants are unspecified. While surface water is not contaminated, it will be addressed by cleanup activities since often it mixes in with drinking water supplies. Many of the wastes remaining on site are flammable or reactive and pose the threat of fire or explosion. The site is unfenced, making it accessible to people and animals. Gladys Creek, which is adjacent to the site, has been shown to be affected by contamination from the site.

Cleanup Approach

This site is being addressed in two stages: initial actions and a long-term remedial phase focusing on cleanup of the entire site.

Response Action Status



Initial Actions: In 1989, the EPA surveyed the site to determine the nature of emergency actions required. As a result of the survey, a fence was erected to limit access to the site in 1990. Netting was placed over the impoundments, further reducing the risk of direct contact with the hazardous waste. Additionally, the drums on the site were disposed of in late 1991.

Entire Site: In 1989, the Oklahoma State Department of Health began an investigation to assess the extent of contamination in soil, groundwater, and surface waters and to identify appropriate cleanup strategies. The cleanup remedy was selected in mid-1992 and includes: biological treatment of surface waters, recycling, neutralization of acidic and caustic waste deposits, and interception and treatment of groundwater. The design of these cleanup activities is expected to begin in early 1993.

Site Facts: The EPA issued an Administrative Order in 1980, requiring the potentially responsible parties to reduce site discharge to Gladys Creek.

Environmental Progress

Initial cleanup actions to control contamination and to fence the Oklahoma Refining Company site have reduced the potential for direct exposure to hazardous substances, making the area safer while cleanup activities are being planned.

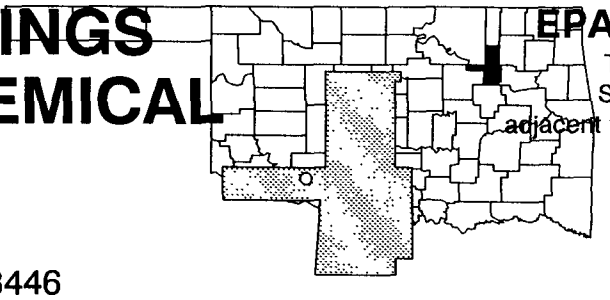
Site Repository

Cyril City Hall, 202 West Main Street, Cyril, OK 73029

SAND SPRINGS PETROCHEMICAL COMPLEX

OKLAHOMA

EPA ID# OKD980748446



EPA REGION 6

Tulsa County
Sand Springs,
adjacent to the Arkansas River

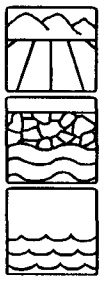
Site Description

The 235-acre Sand Springs Petrochemical Complex site, approximately 3 miles west of the Tulsa city limits, operated as a refinery from the turn of the century through the late 1940s. It was later developed as an industrial area consisting of chemical manufacturers, solvent and waste oil recovery operations, transformer salvaging and recycling, and various other industries. The site contains acid sludge pits, a surface impoundment, spray ponds, and solvent and waste oil lagoons. The refinery left two unlined pits about 10 feet deep, containing sulfuric acid sludge and heavy metals. Over the years, sludge seeped into the Arkansas River levee, releasing contaminants into the river. Other industries stored or disposed of hazardous substances in drums, tanks, and unlined pits, or simply buried them on the site. These substances included volatile organic compounds (VOCs), acids, caustics, chlorinated solvents, and sludges containing heavy metals. The nearest residence is located on site. Drinking water wells are in use within 1/2 mile, although they are upgradient of the contaminated site.

Site Responsibility: This site is being addressed by Federal, State, and potentially responsible parties' actions.

NPL LISTING HISTORY
Proposed Date: 09/08/83
Final Date: 06/10/86

Threats and Contaminants

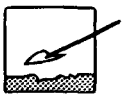


The primary contaminants of concern affecting the soil, shallow groundwater, sediments and sludge are VOCs and heavy metals such as lead and chromium. The Arkansas River has been shown to be contaminated by past seepage of sulfuric acid sludges and heavy metals through the levee. Individuals are at risk from direct contact with or accidental ingestion of contaminated soil, groundwater, or sludges.

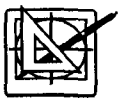
Cleanup Approach

The site is being addressed in three stages: immediate actions and two long-term remedial phases focusing on control of the sources of contamination and cleanup of the groundwater.

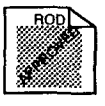
Response Action Status



Immediate Actions: Under orders from the EPA, some of the parties potentially responsible for the contamination removed drums and tanks from the site. The EPA also removed 400 drums of hazardous material, repaired the fence, and sampled and analyzed the pits, on-site soil, and the on-site monitoring wells.



Source Control: In September 1987, the EPA determined that incineration of the contaminated soil and sludges is the most efficient remedy for this site. However, the remedy of solidification or stabilization of wastes that was proposed during the public comment period will be allowed if the responsible parties can demonstrate that these techniques provide comparable protection of public health and environment in the given time period. ARCO started the engineering design for the remedy in 1988, including a bench-scale pilot test to determine the most appropriate solidification technique. In 1991, ARCO performed further testing for solidification/stabilization techniques. Design of a wastewater treatment plant was completed in 1991 and construction has begun. Cleanup activities are scheduled to be completed in 1994.



Groundwater: In 1988, following a study by the State, the EPA selected a "no action" cleanup remedy for the groundwater phase. This approach features monitoring groundwater and Arkansas River water for 30 years. The EPA believes that once the sources of contamination are removed, groundwater pollution will dissipate naturally over time, via the natural flushing action of the aquifer. In addition to monitoring, signs will be posted, warning residents of the dangers of coming in direct contact with site contamination. Groundwater monitoring began in 1990. To date, contamination levels have not been significantly reduced.

Site Facts: In 1984, the EPA issued two Administrative Orders for drum and tank removal. In 1987, an Administrative Order was issued to the parties potentially responsible for site contamination, who conducted on-site incineration and solidification treatability studies. A Consent Decree was signed in 1990 by ARCO, the State, and the EPA for design and cleanup of site contaminants.

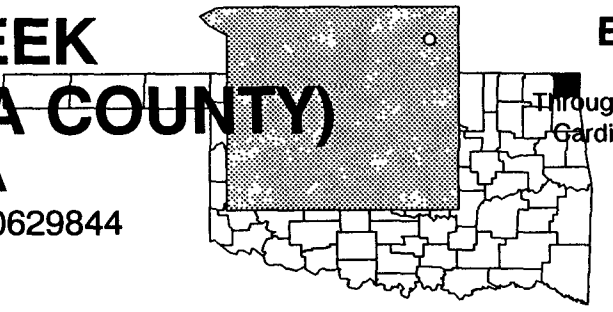
Environmental Progress

The immediate actions undertaken to remove contaminated drums and tanks and to repair the fence surrounding the site have reduced the exposure potential at the Sand Springs Petrochemical Complex site while cleanup activities are taking place.

Site Repository 

Page Memorial Library, 6 East Broadway, Sand Springs, OK 74063

TAR CREEK (OTTAWA COUNTY)
OKLAHOMA
EPA ID# OKD980629844



EPA REGION 6
Ottawa County
Through the towns of Miami, Picher, Cardin, Quapaw, and Commerce

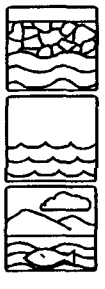
Site Description

The Tar Creek (Ottawa County) site covers a 40-square mile portion of the Tri-State Mining District (Picher Mine Field), which covers 100 square miles. The area produced significant quantities of lead and zinc in the 1920s and 1930s. When major mining operations ceased in the early 1970s, groundwater accumulated in the mines. The acid water reacted with the surrounding rock, causing many of the metals present to dissolve and resulting in high concentrations of zinc, lead, and cadmium in the water. In 1979, acid mine water with high concentrations of heavy metals began to discharge to the surface from boreholes and the abandoned mine shafts, contaminating the surface water in Tar Creek. This problem, along with the potential for contaminating the drinking water source under the mining area, prompted the U.S. Geological Survey and the State to investigate the site. In 1981, the State declared the site its number one pollution problem. The towns of Miami, Picher, Cardin, Quapaw, and Commerce are located within the site area boundary. The nearby population of approximately 21,000 receives its drinking water from the Robidoux Aquifer.

Site Responsibility: This site is being addressed through Federal and State actions.

NPL LISTING HISTORY
Proposed Date: 10/23/81
Final Date: 09/08/83

Threats and Contaminants

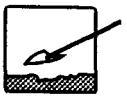


The groundwater, sediments, and surface water were contaminated with heavy metals including lead, zinc, and cadmium. The upper aquifer was contaminated with heavy metals. Several people use the upper aquifer as a source of drinking water. The lower aquifer was threatened due to several boreholes and leaking abandoned wells connecting the aquifers. The lower aquifer serves several towns and rural communities including the towns of Miami and Picher. Because the Picher town water well passes through a highly mineralized rock formation, the high levels of heavy metal contaminants indicated major casing failure in the well. Runoff of surface waters had degraded Tar Creek. Wetlands are found on the site and also were subject to contamination.

Cleanup Approach

The site is being addressed in two stages: an initial action and a long-term remedial phase focusing on contamination at the entire site.

Response Action Status



Initial Action: In 1985, an emergency water supply was put in place by the National Guard. The EPA plugged the contaminated well using sand and corrosion-resistant concrete. Backup wells were used to flush the city lines. Subsequently, water quality in these two wells returned to normal and the National Guard discontinued water delivery. The EPA drilled the new well, connected it to the water system, and re-tested the water.

Entire Site: The selected remedies included diverting and diking the two major inflow areas in Kansas and a third in Oklahoma, plugging aquifer wells, and developing a monitoring plan. A total of 83 wells were plugged. These cleanup activities were completed in 1986. The State currently is monitoring the effectiveness of the remedy. A report is being prepared by the State to assess the effectiveness of the remedy and will be reviewed by the EPA in 1993. The first 5 year review period will immediately follow.

Site Facts: In 1982, the EPA awarded a Cooperative Agreement to the State for a site investigation and a study of alternative cleanup strategies.

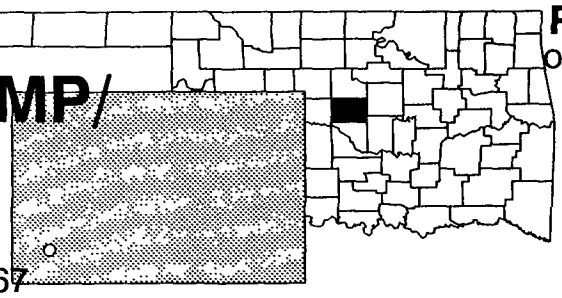
Environmental Progress

Actions by the State of Oklahoma and the EPA have reduced the potential for contaminants in the shallow groundwater to migrate to deeper drinking water aquifers and have achieved the groundwater cleanup standards established for the site. The State also has completed cleanup activities at the Tar Creek (Ottawa County) site for surface water improvement.

Site Repository

Miami Public Library, 200 North Main Street, Miami, OK 74354

TENTH STREET DUMP/ JUNKYARD
OKLAHOMA
EPA ID# OKD980620967



REGION 6
Oklahoma County
Oklahoma City

Other Names:
Frazier Pit

Site Description

The 3 1/2-acre Tenth Street Dump/Junkyard site in Oklahoma City was used as a municipal landfill before 1959. It housed a private salvage yard from 1959 to 1979, after which it became a private automobile junkyard. During the salvage of electrical equipment, large amounts of polychlorinated biphenyl (PCB) oil was spilled on the ground. A fire at the site destroyed 1,000 old tires, which may have contributed to a black tar-like substance on the ruined soil. Workers indiscriminately bulldozed drums of benzene and methylene chloride onto sections of the site along with other debris. About 30,000 people draw drinking water from public and private wells within 3 miles of the site; the nearest is within 1/4 mile. Residential property is adjacent to the site.

Site Responsibility: The site is being addressed through Federal actions.

NPL LISTING HISTORY
Proposed Date: 01/22/87
Final Date: 07/22/87

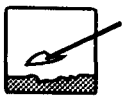
Threats and Contaminants

The soils have high levels of PCBs. Residents, trespassers, and children are potentially threatened by direct exposure to contaminated soils and waste left on the site. The North Canadian River is threatened by contaminated runoff from the site. Contaminants from the soil also may threaten nearby groundwater.

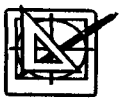
Cleanup Approach

This site is being addressed in two stages: initial actions and a long-term remedial phase focusing cleanup of the entire site.

Response Action Status



Initial Actions: The first phase of the initial action started in 1985 and included decontamination of the automobiles, spare parts, office building, and tire repair machine shop. After decontamination, workers backfilled the wash pit. Because contamination was widespread, the entire site was capped to prevent rainfall and erosion from spreading pollutants. In a second cleanup phase, an 18-inch clay layer was placed on the site. The entire area was fenced and posted. The cap was seeded in 1986. Workers moved the hazardous waste drums and left them on site, pending disposal arrangements.



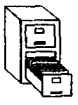
Entire Site: In 1990, the EPA selected a remedy for cleanup of the site, which includes excavation, on-site chemical dechlorination, and on-site disposal of contaminated soils. Engineering designs for the cleanup activities began in 1991 and are expected to be completed in 1994.

Site Facts: In 1985, the EPA issued an Administrative Order to the potentially responsible parties to decontaminate and remove junked cars, remove and properly dispose of electrical equipment and drums containing hazardous substances, install a fence, and build a synthetic liner and clay cap to prevent runoff from spreading contaminants.

Environmental Progress

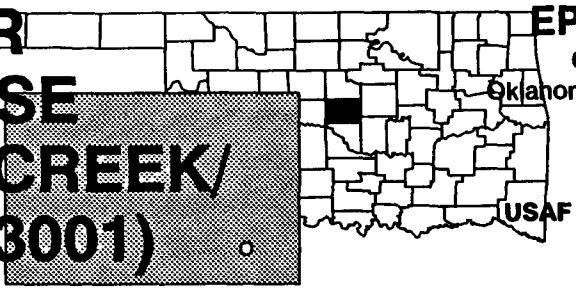
The EPA has completed many cleanup activities at the Tenth Street Dump/Junkyard site, including decontamination of hazardous items and fencing and capping the site, making the site safer as cleanup activities are being designed.

Site Repository



Ralph Ellison Library, 2000 Northeast 23, Oklahoma City, OK 73111

TINKER AIR FORCE BASE (SOLDIER CREEK/ BUILDING 3001)



EPA REGION 6
Oklahoma County
Oklahoma City metropolitan area

Other Names:
USAF Tinker Air Force Base

OKLAHOMA

EPA ID# OK1571724391

Site Description

The Tinker Air Force Base (Soldier Creek/Building 3001) site is located in the northeastern portion of the 220-acre base, east of the North-South runway. It encompasses Building 3001, the two adjacent underground storage tank areas, adjacent Soldier Creek, and the contaminated groundwater under the base. Tinker Air Force Base (AFB) was activated in 1942. Its primary mission was to serve as a worldwide repair depot for aircraft and associated equipment and weaponry. The Building 3001 complex used large quantities of industrial solvents in its business of maintaining aircraft and rebuilding jet engines. In the past, waste oils, solvents, paint sludges, and plating waste generated from maintenance activities were disposed of in two industrial waste pits, 1 mile south of Soldier Creek and Building 3001. Since 1979, industrial wastes have been disposed of off site. Four landfills and the groundwater are contaminated with chromium and trichloroethylene (TCE). As of 1988, four drinking water wells at the base were polluted. The closest municipal well, 1/2 mile to the northwest, serves approximately 55,400 people. The nearest residences and drinking wells are 300 feet from the site. The base has 19,500 workers and 2,700 residents.

Site Responsibility: This site is being addressed through Federal actions.

NPL LISTING HISTORY
Proposed Date: 04/01/85
Final Date: 07/01/87

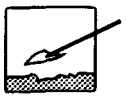
Threats and Contaminants

Four potable groundwater wells are contaminated with high concentrations of TCE and cadmium. Soil and sediments are contaminated with TCE and chromium. Surface water is contaminated with nickel and cadmium. Drinking contaminated groundwater poses a threat to residents and workers. Municipal wells for Midwest City are at least 500 feet deep, and therefore are not at great risk of becoming contaminated.

Cleanup Approach

This site is being addressed in three stages: emergency actions and two long-term remedial phases focusing on cleanup of contaminants at the Building 3001 Complex and Soldier Creek.

Response Action Status



Emergency Actions: In 1985, the Air Force removed tanks in Building 3001, contaminated soil from on-base streams, and contaminants from the groundwater under one of the site's facility. In addition, a cap was installed at one of the landfills, with additional capping on its Southeastern corner. Two wells were plugged in 1986. In 1990, contaminated liquids were removed from the waste pit. The pit has since been cleaned, backfilled, and capped.

Building 3001 Complex: In 1987, the Air Force contracted with the U.S. Army Corps of Engineers to do an 18-month study that is the equivalent of the Superfund investigation into site contaminants and remedies. In 1990, a remedy was selected for the site, which includes the extraction of contaminated groundwater and treatment by air or steam stripping, metals precipitation, and fine filtration. Engineering designs began in 1990 and are expected to be fully completed in 1993. The removal of fuel products above the water table began in mid-1991.

Soldier Creek: Investigations into the nature and extent of the contamination at Soldier Creek began in 1990. These studies are expected to be completed and remedy selection is anticipated in 1993.

Site Facts: Tinker AFB is participating in the Installation Restoration Program, a specially funded program established by the Department of Defense (DOD) in 1978 to identify, investigate, and control the migration of hazardous contaminants at military and other DOD facilities.

Environmental Progress

The removal of contaminated materials and the capping of a landfill by the Air Force has greatly reduced the chances of hazardous exposure at the Tinker AFB (Soldier Creek/Building 3001) site, making it safer while the Air Force completes final investigations and begins cleanup activities.

Site Repository

Midwest City Public Library, 8143 West Reno Avenue, Midwest City, OK 73110

GLOSSARY

Terms Used in the NPL Book

This glossary defines terms used throughout the NPL Volumes. The terms and abbreviations contained in this glossary apply specifically to work performed under the Superfund program in the context of hazardous waste management. These terms may have other meanings when used in a different context. A table of common toxic chemicals found at NPL sites, their sources, and their potential threats is located on page G-15

Acids: Substances, characterized by low pH (less than 7.0), that are used in chemical manufacturing. Acids in high concentration can be very corrosive and react with many inorganic and organic substances. These reactions possibly may create toxic compounds or release heavy metal contaminants that remain in the environment long after the acid is neutralized.

Administrative Order On Consent: A legal and enforceable agreement between the EPA and the parties potentially responsible for site contamination. Under the terms of the Order, the potentially responsible parties (PRPs) agree to perform or pay for site studies or cleanups. It also describes the oversight rules, responsibilities, and enforcement options that the government may exercise in the event of non-compliance by potentially responsible parties. This Order is signed by PRPs and the government; it does not require approval by a judge.

Administrative Order [Unilateral]: A legally binding document issued by the EPA, directing the parties potentially responsible to perform site cleanups or studies (generally, the EPA does not issue Unilateral Orders for site studies). This type of Order is not signed by the PRPs and does not require approval by a judge.

Aeration: A process that promotes breakdown of contaminants in soil or water by exposing them to air.

Agency for Toxic Substances and Disease Registry (ATSDR): The Federal agency within the U.S. Public Health Service charged with carrying out the health-related responsibilities of CERCLA.

Air Stripping: A process whereby volatile organic chemicals (VOCs) are removed from contaminated material by forcing a stream of air through the contaminated material in a pressurized vessel. The contaminants are evaporated into the air stream. The air may be further treated before it is released into the atmosphere.

Ambient Air: Any unconfined part of the atmosphere. Refers to the air that may be inhaled by workers or residents in the vicinity of contaminated air sources.

Applicable or Relevant and Appropriate Requirements (ARARs): Federal, State, or local laws which apply to Superfund activities at NPL sites. Both emergency and long-term actions must comply with these laws or provide sound reasons for allowing a waiver. ARARs must be identified for each site relative to the characteristics of the site, the substances found at the site, or the cleanup alternatives being considered for the site.

GLOSSARY

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called groundwater. A "sole source aquifer" supplies 50 percent or more of the drinking water of an area.

Artesian (Well): A well made by drilling into the earth until water is reached, which, due to internal pressure, flows up like a fountain.

Asbestos: A mineral fiber that can pollute air or water and is known to cause cancer or asbestosis when inhaled.

Attenuation: The naturally occurring process by which a compound is reduced in concentration over time through adsorption, degradation, dilution, or transformation.

Background Level: The amount of a substance typically found in the air, water, or soil from natural, as opposed to human, sources.

Baghouse Dust: Dust accumulated in removing particulates from the air by passing it through cloth bags in an enclosure.

Bases: Substances characterized by high pH (greater than 7.0), which tend to be corrosive in chemical reactions. When bases are mixed with acids, they neutralize each other, forming salts.

Berm: A ledge, wall, or a mound of earth used to prevent the migration of contaminants.

Bioaccumulate: The process by which some contaminants or toxic chemicals gradually collect and increase in concentration in living tissue, such as in plants, fish, or people, as they breathe contaminated air, drink contaminated water, or eat contaminated food.

Biological Treatment: The use of bacteria or other microbial organisms to break down toxic organic materials into carbon dioxide and water.

Bioremediation: A cleanup process using naturally occurring or specially cultivated microorganisms to digest contaminants and break them down into non-hazardous components.

Bog: A type of wetland that is covered with peat moss deposits. Bogs depend primarily on moisture from the air for their water source, are usually acidic, and are rich in plant residue [see Wetland].

Boom: A floating device used to contain oil floating on a body of water or to restrict the potential overflow of waste liquids from containment structures.

Borehole: A hole that is drilled into the ground and used to sample soil or ground-water.

Borrow Pit: An excavated area where soil, sand, or gravel has been dug up for use elsewhere.

Cap: A layer of material, such as clay or a synthetic material, used to prevent rainwater from penetrating and spreading contaminated materials. The surface of the cap generally is mounded or sloped so water will drain off.

Carbon Adsorption: A treatment system in which contaminants are removed from groundwater and surface water by forcing water through tanks containing activated carbon, a specially treated material that attracts and holds or retains contaminants.

Carbon Disulfide: A degreasing agent formerly used extensively for parts washing. This compound has both inorganic and organic

properties, which increase cleaning efficiency. However, these properties also cause chemical reactions that increase the hazard to human health and the environment.

Carbon Treatment: [see Carbon Adsorption].

Cell: In solid waste disposal, one of a series of holes in a landfill where waste is dumped, compacted, and covered with layers of dirt.

CERCLA: [see Comprehensive Environmental Response, Compensation, and Liability Act].

Characterization: The sampling, monitoring, and analysis of a site to determine the extent and nature of toxic releases. Characterization provides the basis for acquiring the necessary technical information to develop, screen, analyze, and select appropriate cleanup techniques.

Chemical Fixation: The use of chemicals to bind contaminants, thereby reducing the potential for leaching or other movement.

Chromated Copper Arsenate: An insecticide/herbicide formed from salts of three toxic metals: copper, chromium, and arsenic. This salt is used extensively as a wood preservative in pressure-treating operations. It is highly toxic and water-soluble, making it a relatively mobile contaminant in the environment.

Cleanup: Actions taken to eliminate a release or threat of release of a hazardous substance. The term "cleanup" sometimes is used interchangeably with the terms remedial action, removal action, response action, or corrective action.

Closure: The process by which a landfill stops accepting wastes and is shut down under Federal guidelines that ensure the protection of the public and the environment.

Comment Period: A specific interval during which the public can review and comment on various documents and EPA actions related to site cleanup. For example, a comment period is provided when the EPA proposes to add sites to the NPL. Also, there is minimum 3-week comment period for community members to review and comment on the remedy proposed to clean up a site.

Community Relations: The EPA effort to establish and maintain two-way communication with the public. The goals of community relations programs include creating an understanding of EPA programs and related actions, assuring public input into decision-making processes related to affected communities, and making certain that the Agency is aware of, and responsive to, public concerns. Specific community relations activities are required in relation to Superfund cleanup actions [see Comment Period].

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): Congress enacted the CERCLA, known as Superfund, in 1980 to respond directly to hazardous waste problems that may pose a threat to the public health and the environment. The EPA administers the Superfund program.

Confluence: The place where two bodies of water, such as streams or rivers, come together.

Confined Aquifer: An aquifer in which groundwater is confined under pressure that is significantly greater than atmospheric pressure.

Consent Decree: A legal document, approved and issued by a judge, formalizing an agreement between the EPA and the parties potentially responsible for site contamination. The decree describes cleanup actions that the potentially responsible parties are required to perform, or the costs incurred by the government that the parties will reimburse, and the roles, responsibilities, and enforcement options that the government may exercise in the event of non-compliance by potentially responsible parties. If a settlement between the EPA and a potentially responsible party includes cleanup actions, it must be in the form of a Consent Decree. A Consent Decree is subject to a public comment period.

Consent Order: [see Administrative Order on Consent].

Containment: The process of enclosing or containing hazardous substances in a structure, typically in a pond or a lagoon, to prevent the migration of contaminants into the environment.

Contaminant: Any physical, chemical, biological, or radiological material or substance whose quantity, location, or nature produces undesirable health or environmental effects.

Contingency Plan: A document setting out an organized, planned, and coordinated course of action to be followed in case of a fire, explosion, or other accident that releases toxic chemicals, hazardous wastes, or radioactive materials into the environment.

Cooperative Agreement: A contract between the EPA and the States, wherein a State agrees to manage or monitor certain site cleanup responsibilities and other activities on a cost-sharing basis.

Cost Recovery: A legal process by which potentially responsible parties can be required to pay back the Superfund program for money it spends on any cleanup actions [see Potentially Responsible Parties].

Cover: Vegetation or other material placed over a landfill or other waste material. It can be designed to reduce movement of water into the waste and to prevent erosion that could cause the movement of contaminants.

Creosotes: Chemicals used in wood preserving operations and produced by distillation of tar, including polycyclic aromatic hydrocarbons and polynuclear aromatic hydrocarbons [see PAHs and PNAs]. Contaminating sediments, soils, and surface water, creosotes may cause skin ulcerations and cancer through prolonged exposure.

Culvert: A pipe used for drainage under a road, railroad track, path, or through an embankment.

Decommission: To revoke a license to operate and take out of service.

Degradation: The process by which a chemical is reduced to a less complex form.

Degrease: To remove grease from wastes, soils, or chemicals, usually using solvents.

Deletion: A site is eligible for deletion from the NPL when Superfund response actions at the site are complete. A site is deleted from the NPL when a notice is published in the Federal Register.

De minimis: This legal phrase pertains to settlements with parties who contributed small amounts of hazardous waste to a site. This process allows the EPA to settle with small, or *de minimis* contributors, as a single group rather than as individuals, saving time, money, and effort.

Dewater: To remove water from wastes, soils, or chemicals.

Dike: A low wall that can act as a barrier to prevent a spill from spreading.

Dioxin: An organic chemical by-product of pesticide manufacture which is known to be one of the most toxic man-made chemicals.

Disposal: Final placement or destruction of toxic, radioactive, or other wastes; surplus or banned pesticides or other chemicals; polluted soils; and drums containing hazardous materials. Disposal may be accomplished through the use of approved secure landfills, surface impoundments, land farming, deep well injection, or incineration.

Downgradient: A downward hydrologic slope that causes groundwater to move toward lower elevations. Therefore, wells *downgradient* of a contaminated groundwater source are prone to receiving pollutants.

Ecological Assessment: A study of the impact of man-made or natural activity on living creatures and their environment.

Effluent: Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Emission: Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities.

Emulsifiers: Substances that help in mixing materials that do not normally mix; e.g., oil and water.

Endangerment Assessment: A study conducted to determine the risks posed to public health or the environment by contamination at NPL sites. The EPA or the State conducts the study when a legal action is to be taken to direct the potentially responsible parties to clean up a site or pay for the cleanup. An endangerment assessment supplements an investigation of the site hazards.

Enforcement: EPA, State, or local legal actions taken against parties to facilitate settlements; to compel compliance with laws, rules, regulations, or agreements; or to obtain penalties or criminal sanctions for violations. Enforcement procedures may vary, depending on the specific requirements of different environmental laws and related regulatory requirements. Under CERCLA, for example, the EPA will seek to require potentially responsible parties to clean up a Superfund site or pay for the cleanup [see Cost Recovery].

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or surface runoff, but can be intensified by such land-related practices as farming, residential or industrial development, road building, or timber-cutting. Erosion may spread surface contamination to off-site locations.

Estuary (estuarine): Areas where fresh water from rivers and salt water from nearshore ocean waters are mixed. These areas may include bays, mouths of rivers, salt marshes, and lagoons. These water ecosystems shelter and feed marine life, birds, and wildlife.

Evaporation Ponds: Areas where sewage sludge or other watery wastes are dumped and allowed to dry out.

Feasibility Study: The analysis of the potential cleanup alternatives for a site. The feasibility study usually starts as soon as the remedial investigation is underway. In this volume, the feasibility study is referred to as a site study [see also Remedial Investigation].

Filtration: A treatment process for removing solid (particulate) matter from water by passing the water through sand, activated carbon, or a man-made filter. The process is often used to remove particles that contain contaminants.

Flood Plain: An area along a river, formed from sediment deposited by floods. Flood plains periodically are innundated by natural floods, which can spread contamination.

Flue Gas: The air that is emitted from a chimney after combustion in the burner occurs. The gas can include nitrogen oxides, carbon oxides, water vapor, sulfur oxides, particles, and many chemical pollutants.

Fly Ash: Non-combustible residue that results from the combustion of flue gases. It can include nitrogen oxides, carbon oxides, water vapor, sulfur oxides, as well as many other chemical pollutants.

French Drain System: A crushed rock drain system constructed of perforated pipes, which is used to drain and disperse wastewater.

Gasification (coal): The conversion of soft coal into gas for use as a fuel.

General Notice Letter: [See Notice Letter].

Generator: A facility that emits pollutants into the air or releases hazardous wastes into water or soil.

Good Faith Offer: A voluntary offer, generally in response to a Special Notice letter, made by a potentially responsible party, consisting of a written proposal demonstrating a potentially responsible party's qualifications and willingness to perform a site study or cleanup.

Groundwater: Water that fills pores in soils or openings in rocks to the point of saturation. In aquifers, groundwater occurs in sufficient quantities for use as drinking and irrigation water and other purposes.

Groundwater Quality Assessment: The process of analyzing the chemical characteristics of groundwater to determine whether any hazardous materials exist.

Halogens: Reactive non-metals, such as chlorine and bromine. Halogens are very good oxidizing agents and, therefore, have many industrial uses. They are rarely found by themselves; however, many chemicals such as polychlorinated biphenyls (PCBs), some volatile organic compounds (VOCs), and dioxin are reactive because of the presence of halogens.

Hazard Ranking System (HRS): The principal screening tool used by the EPA to evaluate relative risks to public health and the environment associated with abandoned or uncontrolled hazardous waste sites. The HRS calculates a score based on the potential of hazardous substances spreading from the site through the air, surface water, or groundwater and on other factors such as nearby population. The HRS score is the primary factor in deciding if the site should be on the NPL.

Hazardous Waste: By-products of society that can pose a substantial present or potential hazard to human health and the environment when improperly managed. Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Heavy Metals: Metallic elements with high atomic weights, such as arsenic, lead, mercury, and cadmium. Heavy metals are very hazardous even at low concentrations and tend to accumulate in the food chain.

Herbicide: A chemical pesticide designed to control or destroy plants, weeds, or grasses.

Hot Spot: An area or vicinity of a site containing exceptionally high levels of contamination.

Hydrocarbons: Chemical compounds that consist entirely of hydrogen and carbon.

Hydrology: The properties, distribution, and circulation of water.

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Impoundment: A body of water or sludge confined by a dam, dike, floodgate, or other barrier.

Incineration: A group of treatment technologies involving destruction of waste by controlled burning at high temperatures, e.g., burning sludge to reduce the remaining residues to a non-burnable ash that can be disposed of safely on land, in some waters, or in underground locations.

Infiltration: The movement of water or other liquid down through soil from precipitation (rain or snow) or from application of wastewater to the land surface.

Influent: Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

Injection Well: A well into which waste fluids are placed, under pressure, for purposes of disposal.

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

Installation Restoration Program: The specially funded program established in 1978 under which the Department of Defense has been identifying and evaluating its hazardous waste sites and controlling the migration of hazardous contaminants from those sites.

Intake: The source from where a water supply is drawn, such as from a river or water body.

Interagency Agreement: A written agreement between the EPA and a Federal agency that has the lead for site cleanup activities, setting forth the roles and responsibilities of the agencies for performing and overseeing the activities. States often are parties to interagency agreements.

Interim (Permit) Status: Conditions under which hazardous waste treatment, storage, and disposal facilities, that were operating when regulations under the RCRA became final in 1980, are temporarily allowed by the EPA to continue to operate while awaiting denial or issuance of a permanent permit. The facility must comply with certain regulations to maintain interim status.

Lagoon: A shallow pond or liquid waste containment structure. Lagoons typically are used for the storage of wastewaters, sludges, liquid wastes, or spent nuclear fuel.

Landfarm: To apply waste to land or incorporate waste into the surface soil, such as fertilizer or soil conditioner. This practice commonly is used for disposal of composted wastes and sludges.

Landfill: A disposal facility where waste is placed in or on land. *Sanitary* landfills are disposal sites for non-hazardous solid wastes. The waste is spread in layers, compacted to the smallest practical volume, and covered with soil at the end of each operating day. Secure *chemical* landfills are disposal sites for hazardous waste. They are designed to minimize the chance of release of hazardous substances into the environment [see Resource Conservation and Recovery Act].

Leach, Leaching [v.t.]: The process by which soluble chemical components are dissolved and carried through soil by water or some other percolating liquid.

Leachate [n]: The liquid that trickles through or drains from waste, carrying soluble components from the waste.

Leachate Collection System: A system that gathers liquid that has leaked into a landfill or other waste disposal area and pumps it to the surface for treatment.

Liner: A relatively impermeable barrier designed to prevent leachate (waste residue) from leaking from a landfill. Liner materials include plastic and dense clay.

Long-term Remedial Phase: Distinct, often incremental, steps that are taken to solve site pollution problems. Depending on the complexity, site cleanup activities can be separated into several of these phases.

Long-term Response Action: An action which requires a continuous period of on-site activity before cleanup goals are achieved. These actions typically include the extraction and treatment of groundwater and monitoring actions.

Marsh: A type of wetland that does not contain peat moss deposits and is dominated by vegetation. Marshes may be either fresh or saltwater and tidal or non-tidal [see Wetland].

Migration: The movement of oil, gas, contaminants, water, or other liquids through porous and permeable soils or rock.

Mill Tailings: [See Mine Tailings].

Mine Tailings: A fine, sandy residue left from mining operations. Tailings often contain high concentrations of lead, uranium, and arsenic or other heavy metals.

Mitigation: Actions taken to improve site conditions by limiting, reducing, or controlling toxicity and contamination sources.

Modeling: A technique using a mathematical or physical representation of a system or theory that tests the effects that changes on system components have on the overall performance of the system.

Monitoring Wells: Special wells drilled at specific locations within, or surrounding, a hazardous waste site where groundwater can be sampled at selected depths and studied to obtain such information as the direction in which groundwater flows and the types and amounts of contaminates present.

National Priorities List (NPL): The EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term cleanup under Superfund. The EPA is required to update the NPL at least once a year.

Natural Attenuation: [See Attenuation].

Neutrals: Organic compounds that have a relatively neutral pH, complex structure and, due to their organic bases, are easily absorbed into the environment. Water is the most commonly known neutral, however, naphthalene, pyrene, and trichlorobenzene also are examples of neutrals.

Nitroaromatics: Common components of explosive materials, which will explode if activated by very high temperatures or pressures; 2,4,6-Trinitrotoluene (TNT) is a nitroaromatic.

Notice Letter: A General Notice Letter notifies the parties potentially responsible for site contamination of their possible liability. A Special Notice Letter begins a 60-day formal period of negotiation during which the EPA is not allowed to start work at a site or initiate enforcement actions against potentially responsible parties, although the EPA may undertake certain investigatory and planning activities.

The 60-day period may be extended if the EPA receives a good faith offer from the PRPs within that period. [See also Good Faith Offer].

On-Scene Coordinator (OSC): The predesignated EPA, Coast Guard, or Department of Defense official who coordinates and directs Superfund removal actions or Clean Water Act oil- or hazardous-spill corrective actions.

Operation and Maintenance: Activities conducted at a site after a cleanup action is completed to ensure that the cleanup or containment system is functioning properly.

Organic Chemicals/Compounds: Chemical substances containing mainly carbon, hydrogen, and oxygen.

Outfall: The place where wastewater is discharged into receiving waters.

Overpacking: Process used for isolating large volumes of waste by jacketing or encapsulating waste to prevent further spread or leakage of contaminating materials. Leaking drums may be contained within oversized barrels as an interim measure prior to removal and final disposal.

Pentachlorophenol (PCP): A synthetic, modified petrochemical that may be used as a wood preservative because of its toxicity to termites and fungi. It is a common component of creosotes and can cause cancer.

Perched (groundwater): Groundwater separated from another underlying body of groundwater by a confining layer, often clay or rock.

Percolation: The downward flow or filtering of water or other liquids through subsurface rock or soil layers, usually continuing downward to groundwater.

Pesticide: A substance or mixture of substances intended to prevent, destroy, or repel any pest. If misused, pesticides can accumulate in the foodchain and contaminate the environment.

Petrochemicals: Chemical substances produced from petroleum in refinery operations and as fuel oil residues. These include fluoranthene, chrysene, mineral spirits, and refined oils. Petrochemicals are the bases from which volatile organic compounds (VOCs), plastics, and many pesticides are made. These chemical substances often are toxic to humans and the environment.

Phenols: Organic compounds that are used in plastics manufacturing and are by-products of petroleum refining, tanning, textile, dye, and resin manufacturing. Phenols are highly poisonous.

Physical Chemical Separation: The treatment process of adding a chemical to a substance to separate the compounds for further treatment or disposal.

Pilot Testing: A small-scale test of a proposed treatment system in the field to determine its ability to clean up specific contaminants.

Plugging: The process of stopping the flow of water, oil, or gas into or out of the ground through a borehole or well penetrating the ground.

Plume: A body of contaminated groundwater flowing from a specific source. The movement of the groundwater is influenced by such factors as local groundwater flow patterns, the character of the aquifer in which groundwater is contained, and the density of contaminants [see Migration].

Pollution: Generally, the presence of matter or energy whose nature, location, or quantity produces undesired health or environmental effects.

Polycyclic Aromatic Hydrocarbons or Polyaromatic Hydrocarbons (PAHs): PAHs, such as pyrene, are a group of highly reactive organic compounds found in motor oil. They are a common component of creosotes and can cause cancer.

Polychlorinated Biphenyls (PCBs): A group of toxic chemicals used for a variety of purposes including electrical applications, carbonless copy paper, adhesives, hydraulic fluids, microscope immersion oils, and caulking compounds. PCBs also are produced in certain combustion processes. PCBs are extremely persistent in the environment because they are very stable, non-reactive, and highly heat resistant. Chronic exposure to PCBs is believed to cause liver damage. It also is known to bioaccumulate in fatty tissues. PCB use and sale was banned in 1979 with the passage of the Toxic Substances Control Act.

Polynuclear Aromatic Hydrocarbons (PNAs): PNAs, such as naphthalene, and biphenyls, are a group of highly reactive organic compounds that are a common component of creosotes, which can be carcinogenic.

Polyvinyl Chloride (PVC): A plastic made from the gaseous substance vinyl chloride. PVC is used to make pipes, records, raincoats, and floor tiles. Health risks from high concentrations of vinyl chloride include liver cancer and lung cancer, as well as cancer of the lymphatic and nervous systems.

Potable Water: Water that is safe for drinking and cooking.

Potentially Responsible Parties (PRPs): Parties associated with a Superfund site who may be liable for the cost of remedying the release of hazardous substances. This may include owners or operators of the site or transporters who disposed of materials at the site. PRPs may admit liability, or liability may be determined by a court of law. PRPs may sign a Consent Decree or Administrative Order on Consent to participate in the site cleanup without admitting liability.

Precipitation: The removal of solids from liquid waste so that the solid and liquid portions can be disposed of safely; the removal of particles from airborne emissions. Electrochemical precipitation is the use of an anode or cathode to remove the hazardous chemicals. Chemical precipitation involves the addition of some substance to cause the solid portion to separate.

Preliminary Assessment: The process of collecting and reviewing available information about a known or suspected waste site or release to determine if a threat or potential threat exists.

Pump and Treat: A groundwater cleanup technique involving the extracting of contaminated groundwater from the subsurface and the removal of contaminants, using one of several treatment technologies.

Radionuclides: Elements, including radium and uranium-235 and -238, which break down and produce radioactive substances due to their unstable atomic structure. Some are man-made, and others are naturally occurring in the environment. Radon, the gaseous form of radium, decays to form alpha particle radiation, which cannot be absorbed through skin. However, it can be inhaled, which allows alpha particles to affect unprotected tissues directly and thus cause cancer. Radiation also occurs naturally through the breakdown of granite.

RCRA: [See Resource Conservation and Recovery Act].

Recharge Area: A land area where rainwater saturates the ground and soaks through the earth to reach an aquifer.

Record of Decision (ROD): A public document that explains which cleanup alternative(s) will be used to clean up sites listed on the NPL. It is based on information generated during the remedial investigation and feasibility study and consideration of public comments and community concerns.

Recovery Wells: Wells used to withdraw contaminants or contaminated groundwater.

Recycle: The process of minimizing waste generation by recovering usable products that might otherwise become waste.

Remedial Action (RA): The actual construction or implementation phase of a Superfund site cleanup following the remedial design [see Cleanup].

Remedial Design: A phase of site cleanup where engineers design the technical specifications for cleanup remedies and technologies.

Remedial Investigation: An in-depth study designed to gather the data necessary to determine the nature and extent of contamination at a Superfund site, establish the criteria for cleaning up the site, identify the preliminary alternatives for cleanup actions, and support the technical and cost analyses of the alternatives. The remedial investigation is usually done with the feasibility study. In this volume, the remedial investigation is referred to as a site study [see also Feasibility Study].

Remedial Project Manager (RPM): The EPA or State official responsible for overseeing cleanup actions at the site.

Remedy Selection: The selection of the final cleanup strategy for the site. At the few sites where the EPA has determined that initial response actions have eliminated site contamination, or that any remaining contamination will be naturally dispersed without further cleanup activities, a "No Action" remedy is selected [see Record of Decision].

Removal Action: Short-term immediate actions taken to address releases of hazardous substances [see Cleanup].

Residual: The amount of a pollutant remaining in the environment after a natural or technological process has taken place, e.g., the sludge remaining after initial wastewater treatment, or the particulates remaining in air after the air passes through a scrubber.

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.

Retention Pond: A small body of liquid used for disposing of wastes and containing overflow from production facilities. Sometimes retention ponds are used to expand the capacity of such structures as lagoons the store waste.

Runoff: The discharge of water over land into surface water. It can carry pollutants from the air and land and spread contaminants from its source.

Scrubber: An air pollution control device that uses a spray of water or reactant or a dry process to trap pollutants in emissions.

Sediment: The layer of soil, sand, and minerals at the bottom of surface waters such as streams, lakes, and rivers, that absorbs contaminants.

Seeps: Specific points where releases of liquid, usually leachate, form from waste disposal areas, particularly along the lower edges of landfills.

Seepage Pits: A hole, shaft, or cavity in the ground used for the storage of liquids, usually in the form of leachate, from waste disposal areas. The liquid gradually leaves the pit by moving through the surrounding soil.

Septage: Residue remaining in a septic tank after the treatment process.

Sinkhole: A hollow depression in the land surface in which drainage collects; associated with underground caves and passages that facilitate the movement of liquids.

Site Characterization: The technical process used to evaluate the nature and extent of environmental contamination, which is necessary for choosing and designing cleanup measures and monitoring their effectiveness.

Site Inspection: The collection of information from a hazardous waste site to determine the extent and severity of hazards posed by the site. It follows, and is more extensive than, a preliminary assessment. The purpose is to gather information necessary to score the site, using the Hazard Ranking System, and to determine if the site presents an immediate threat that requires a prompt removal action.

Slag: The fused refuse or dross separated from a metal in the process of smelting.

Sludge: Semi-solid residues from industrial or water treatment processes that may be contaminated with hazardous materials.

Slurry Wall: Barriers used to contain the flow of contaminated groundwater or subsurface liquids. Slurry walls are constructed by digging a trench around a contaminated area and filling the trench with an impermeable material that prevents water from passing through it. The groundwater or contaminated liquids trapped within the area surrounded by the slurry wall can be extracted and treated.

Smelter: A facility that melts or fuses ore, often with an accompanying chemical change, to separate the metal. Emissions from smelters are known to cause pollution.

Soil Gas: Gaseous elements and compounds that occur in the small spaces between particles of soil. Such gases can move through or leave the soil or rock, depending on changes in pressure.

Soil Vapor Extraction: A treatment process that uses vacuum wells to remove hazardous gases from soil.

Soil Washing: A water-based process for mechanically scrubbing soils in-place to remove undesirable materials. There are two approaches: dissolving or suspending them in the wash solution for later treatment by conventional methods, and concentrating them into a smaller volume of soil through simple particle size separation techniques [see Solvent Extraction].

Stabilization: The process of changing an active substance into inert, harmless material, or physical activities at a site that act to limit the further spread of contamination without actual reduction of toxicity.

Solidification/Stabilization: A chemical or physical reduction of the mobility of hazardous constituents. Mobility is reduced through the binding of hazardous constituents into a solid mass with low permeability and resistance to leaching.

Solvent: A substance capable of dissolving another substance to form a solution. The primary uses of industrial solvents are as cleaners for degreasing, in paints, and in pharmaceuticals. Many solvents are flammable and toxic to varying degrees.

Solvent Extraction: A means of separating hazardous contaminants from soils, sludges, and sediment, thereby reducing the volume of the hazardous waste that must be treated. It generally is used as one in a series of unit operations. An organic chemical is used to dissolve contaminants as opposed to water-based compounds, which usually are used in soil washing.

Sorption: The action of soaking up or attracting substances. It is used in many pollution control systems.

Special Notice Letter: [See Notice Letter].

Stillbottom: Residues left over from the process of recovering spent solvents.

Stripping: A process used to remove volatile contaminants from a substance [see Air Stripping].

Sumps: A pit or tank that catches liquid runoff for drainage or disposal.

Superfund: The program operated under the legislative authority of the CERCLA and Superfund Amendments and Reauthorization Act (SARA) to update and improve environmental laws. The program has the authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health, welfare, or the environment. The "Superfund" is a trust fund that finances cleanup actions at hazardous waste sites.

Surge Tanks: A holding structure used to absorb irregularities in flow of liquids, including liquid waste materials.

Swamp: A type of wetland that is dominated by woody vegetation and does not accumulate peat moss deposits. Swamps may be fresh or saltwater and tidal or non-tidal [see Wetlands].

Thermal Treatment: The use of heat to remove or destroy contaminants from soil.

Treatability Studies: Testing a treatment method on contaminated groundwater, soil, etc., to determine whether and how well the method will work.

Trichloroethylene (TCE): A stable, colorless liquid with a low boiling point. TCE has many industrial applications, including use as a solvent and as a metal degreasing agent. TCE may be toxic to people when inhaled, ingested, or through skin contact and can damage vital organs, especially the liver [see Volatile Organic Compounds].

Unilateral [Administrative] Order: [see Administrative Order].

Upgradient: An upward hydrologic slope; demarks areas that are higher than contaminated areas and, therefore, are not prone to contamination by the movement of polluted groundwater.

Vacuum Extraction: A technology used to remove volatile organic compounds (VOCs) from soils. Vacuum pumps are connected to a series of wells drilled to just above the water table. The wells are sealed tightly at the soil surface, and the vacuum established in the soil draws VOC-contaminated air from the soil pores into the well, as fresh air is drawn down from the surface of the soil.

Vegetated Soil Cap: A cap constructed with graded soils and seed for vegetative growth, to prevent erosion [see Cap].

Vitrification: The process of electrically melting wastes and soils or sludges to bind the waste in a glassy, solid material more durable than granite or marble and resistant to leaching.

Volatile Organic Compounds (VOCs): VOCs are manufactured as secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and widespread industrial use, they are commonly found in soil and groundwater.

Waste Treatment Plant: A facility that uses a series of tanks, screens, filters, and other treatment processes to remove pollutants from water.

Wastewater: The spent or used water from individual homes or industries.

Watershed: The land area that drains into a stream or other water body.

Water Table: The upper surface of the groundwater.

Weir: A barrier to divert water or other liquids.

Wetland: An area that is regularly saturated by surface or groundwater and, under normal circumstances, is capable of supporting vegetation typically adapted for life in saturated soil conditions. Wetlands are critical to sustaining many species of fish and wildlife. Wetlands generally include swamps, marshes, and bogs. Wetlands may be either coastal or inland. Coastal wetlands have salt or brackish (a mixture of salt and fresh) water, and most have tides, while inland wetlands are nontidal and freshwater. Coastal wetlands are an integral component of estuaries.

Wildlife Refuge: An area designated for the protection of wild animals, within which hunting and fishing are either prohibited or strictly controlled.

Some Common Contaminants at NPL Sites

Contaminant Category	Example Chemical Types	Sources	Potential Health Threats*
Heavy Metals	Arsenic, Barium, Beryllium, Cadmium, Cobalt, Copper, Chromium, Lead, Manganese, Mercury, Nickel, Silver, Selenium, Zinc	Electroplating, batteries, paint pigments, photography, smelting, thermometers, fluorescent lights, solvent recovery	Tumors, cancers, and kidney, brain, neurological, bone and liver damage
Volatile Organic Compounds (VOCs)	Trichloroethylene (TCE), Perchloroethylene (PCE), Acetone, Benzene, Ketone, Methyl chloride, Toluene, Vinyl Chloride, Dichlorethylene	Solvents and degreasers, gasoline octane enhancers, oils and paints, dry cleaning fluids, chemical manufacturing.	Cancers, kidney and liver damage, impairment of the nervous system resulting in sleepiness and headaches, leukemia
Pesticides/ Herbicides	Chlordane, DDT 4-4, DDE, Heptachlor, Aldrin, Endrin, Atrazine, Dieldrin, Toxaphene	Agricultural applications, pesticide and herbicide production	Various effects ranging from nausea to nervous disorders. Dioxin is a common by-product of the manufacture of pesticides and is both highly toxic and a suspected carcinogen.
Polychlorinated biphenyls (PCBs)	—	Electric transformers and capacitors, insulators and coolants, adhesives, caulking compounds, carbonless copy paper, hydraulic fluids.	Cancer and liver damage.
Creosotes	Polyaromatic hydrocarbons (PAHs), Polynuclear aromatics (PNAs), Phenolic Tars, Pentachlorophenol (PCP)	Wood preserving, fossil fuel combustion	Cancers and skin ulcerations with prolonged exposure
Radiation (Radionuclides)	Radium-226, Radon, Uranium-235, Uranium-238	Mine tailings, radium products, natural decay of granites	Cancer

Sources: *Toxic Chemicals—What They Are, How They Affect You (EPA, Region 5)*
Glossary of Environmental Terms (EPA, 1988)

**The potential for risk due to these contaminants is linked to a number of factors; for example, the length and level of exposure and environmental and health factors such as age*

*U.S. G.P.O.: 1993-341-835:81032