AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

DISMAL SWAMP SITE
(a/k/a WOODBROOK ROAD DUMP)
SOUTH PLAINFIELD, MIDDLESEX COUNTY, NEW JERSEY
EPA FACILITY ID: NJSFN0204260
JUNE 20, 2003

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency=s opinion, indicates a need to revise or append the conclusions previously issued.

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PUBLIC HEALTH ASSESSMENT

DISMAL SWAMP SITE
(a/k/a WOODBROOK ROAD DUMP)

SOUTH PLAINFIELD, MIDDLESEX COUNTY, NEW JERSEY

EPA FACILITY ID: NJSFN0204260

Prepared by:

New Jersey Department of Health and Senior Services
Hazardous Site Health Evaluation Program
Consumer and Environmental Health Services
Division of Epidemiology, Environmental and Occupational Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, fullscale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E60), Atlanta, GA 30333.

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Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as Superfund)
CREG	Cancer Risk Evaluation Guides
EWA	Edison Wetlands Association
GIS	Geographic Information System
HCV	Health Comparison Value
ICP	Inductive Plasma Coupling
NJDEP	New Jersey Department of Environmental Protection
NJDHSS	New Jersey Department of Health and Senior Services
NPL	National Priorities List
PCBs	polychlorinated biphenyls
PHAP	Public Health Action Plan
PPB	parts per billion
PPE	personal protective equipment
PPM	parts per million
RI/FS	remedial investigation/feasibility study
SVOCs	semi-volatile organic compounds
TETCO	Texas Eastern Terminal Company
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

Summary

The Dismal Swamp site (a.k.a. the Woodbrook Road Dump site) is an inactive, non-permitted dumping area located near the intersection of Woodbrook and Metuchen Roads in South Plainfield, Middlesex County, New Jersey. The approximately 70 acre site is comprised of two individual landfills, referred to as Area A and Area B. The landfills are approximately 200 feet apart and are separated by the Bound Brook. They are situated within the Dismal Swamp Natural Wildlife Refuge, the largest natural wildlife refuge in Middlesex County. The land deed for the portion of the refuge where the two landfills are located is currently held by Texas Eastern Terminal Company. Duke Energy Gas Transmission and its subsidiary, Texas Eastern Transmission Corporation, are in operation at the property which has "no trespass" postings.

During the 1940's and 1950's, the individual family-owned landfills accepted both household and industrial wastes. In the late 1950's, new state health regulations came into effect which influenced the eventual closing of the two landfills. In September 1999, the Edison Wetlands Association notified the New Jersey Department of Environmental Protection of the discovery of partially buried and leaking capacitors at the Dismal Swamp site. Analysis of samples collected from the capacitors and surrounding stained soil confirmed elevated levels of polychlorinated biphenyls, and the assistance of the United States Environmental Protection Agency was requested. In March 2000, approximately 26 capacitors were placed in drums and removed from the site. Subsequently, environmental sampling was conducted throughout the site which confirmed that hazardous substances from the site impacted the Dismal Swamp wetland system. The site was proposed to be added to the National Priorities List of Superfund sites on September 13, 2001. There have been no reported individual health complaints allegedly associated with the Dismal Swamp site at this time.

The New Jersey Department of Health and Senior Services, in conjunction with the Agency for Toxic Substances and Disease Registry, recommend the Public Health Hazard Category of ***"No Apparent Public Health Hazard"*** for the Dismal Swamp site. Although contamination by polychlorinated biphenyls at significant concentrations was determined in capacitor dumps located on and near the Area A landfill, potential incidental exposure to occasional trespassers who might come in contact with contaminated soil would not be of sufficient magnitude or duration to constitute a public health concern. Polychlorinated biphenyl "hotspots" should be isolated to prevent exposure. Exposures to polychlorinated biphenyls and other contaminants (lead, other metals, semi-volatile organic compounds) detected elsewhere on the site would not likely be expected to result in an increased risk of carcinogenic or non-carcinogenic health outcomes (including dermatitis). However, this depends upon the frequency, duration, and location of unauthorized access to the site. It is also dependent upon current land use patterns which may possibly change in the future. Impact to groundwater should be further investigated. Duke Energy workers who access the site in the course of performing work duties may be at risk of exposure, but this should be minimal. Until such time that the nature and extent of site contaminants are fully established as part of a planned United States Environmental Protection Agency remedial investigation/feasibility study, unauthorized access to the Area A landfill, particularly the capacitor dump areas, and to a lesser extent Area B landfill, should be restricted.

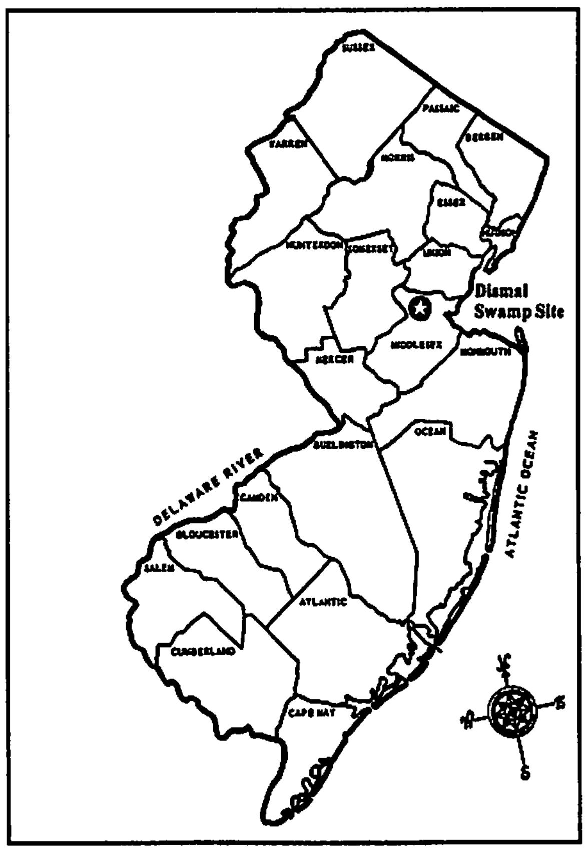
Purpose and Health Issues

On September 13, 2001, the United States Environmental Protection Agency (USEPA) proposed to add the Dismal Swamp site, South Plainfield, Middlesex County, New Jersey, to the National Priorities List (NPL) of Superfund sites. The New Jersey Department of Health and Senior Services (NJDHSS), in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), prepared the following Public Health Assessment to review environmental data obtained from the site, define potential human exposure to contaminants, and to determine whether the exposures are of public health concern.

Background

Demography and Land Use

The Dismal Swamp site (a.k.a. Woodbrook Road Dump site) is an inactive, non-permitted dumping area located near the intersection of Woodbrook and Metuchen Roads in South Plainfield, Middlesex County, New Jersey (see inset). The current deed holder for the site is Texas Eastern Terminal Company (TETCO). Duke Energy Gas Transmission, Houston, Texas, a manager of natural gas and electric supply, delivery, and trading businesses, and its subsidiary Texas Eastern Transmission Corporation, are currently in operation at the property.



Dismal Swamp Site
N 40° 33' 41.63"; W 74° 24'10.49"

The approximately 70 acre site is comprised of two individual landfills. The landfills, identified on South Plainfield tax maps as Block 388, Lots 1 ("Area B" landfill) and 26 ("Area A" landfill) respectively, are approximately 200 feet apart and are separated by the Bound Brook (Figure 1). The Bound Brook eventually joins the Raritan River northwest of the site. The landfills are situated within the Dismal Swamp Natural Wildlife Refuge, the largest natural wildlife refuge in Middlesex County, spanning parts of Edison, Metuchen, and South Plainfield. The Dismal Swamp Natural Wildlife Refuge is unique in that it represents one of the last remaining wetland ecosystems located in a highly urbanized environment (Zatz undated). It is also a designated "priority wetlands" by the United States Fish and Wildlife Service and the USEPA.

By definition, wetlands generally are land areas that become saturated with water for some period of time. They are important for a number of reasons including flood prevention, filtration and purification of surface water, and the provision of habitat for numerous animal species. Some animals that live in other habitats use wetlands for migration and/or reproduction. The Dismal Swamp Natural Wildlife Refuge is home to nearly 200 species of birds, amphibians, and reptiles (Spadoro 2001). Animals listed on both the Federal Endangered and Threatened Species List and the New Jersey Endangered and Threatened Species List have been sighted on the Dismal Swamp Natural Wildlife Refuge (USEPA 2001a). Beavers have recently been sighted, a first for Middlesex County in approximately 150 years (Lane 2002).

The Dismal Swamp site is bordered to the northwest by the South Plainfield Compost Facility (a transfer station for residential yard waste), the South Plainfield Recycling Center, and a police firing range, to the east by wetlands and some single family housing, to the southwest by the Edison Tyler estates, a residential development of approximately 1,000 units, and to the west by various light industry. CSX (formerly Conrail) railroad tracks lie to the northeast of the site. Geographic Information System (GIS) spatial analysis technology, in conjunction with 2000 United States Census data, were used by the ATSDR to estimate that there are approximately 10,000 individuals residing within a one mile radius of the Dismal Swamp site (see Figure 2).

Public drinking water for the Borough of South Plainfield is provided by the Middlesex Water Company and the Elizabethtown Water Department. Both surface and groundwater serve as the source of drinking water; the Raritan, Millstone, and Delaware Rivers are among the surface water sources (Middlesex Water Company 2000; Elizabethtown Water Company 2000). According to 1990 United States Census data, there are 325 reported private drinking water wells located in South Plainfield. In the neighboring town of Edison, there are approximately 30 private potable wells in use which are located within one mile of the Dismal Swamp site (J. Elliot, Edison Department of Health and Human Resources, personal communication, 2001). There are currently three private residences and one farm located either on or along the perimeter of the site using private wells for their source of drinking water. Wells for these properties were tested by the USEPA for polychlorinated biphenyls (PCBs), metals, pesticides, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs); contaminant levels were below current New Jersey drinking water standards.

Site History

During the 1940's and 1950's, the individual family-owned landfills (or "dumps") accepted both household and industrial wastes. In the late 1950's, new state health regulations came into effect requiring landfills to be "capped" (covered with soil) nightly. These regulations also made additional requirements on vehicles used in garbage transit. This effectively put the two landfills out of business (L. Randolph, Chairman, South Plainfield Environmental Commission, personal communication, 2001). At that time, the primary purpose of these new regulations was on vector control rather than environmental contamination control (J. Grun, Health Officer, Edison Department of Health and Human Resources).

The Dismal Swamp Natural Wildlife Refuge currently is used for recreational purposes by dirt riders, hunters, cyclists, and hikers. The portion of the refuge where the two landfills (Areas A and B) are located are privately owned by TETCO and posted as no trespass.

In September 1999, the Edison Wetlands Association (EWA), a non-profit organization whose mission is to protect and preserve the natural resources of Middlesex County, notified the New Jersey Department of Environmental Protection (NJDEP) of the discovery of partially buried and leaking capacitors at the Dismal Swamp site. A capacitor is an electronic device that stores electric charge and electrical potential energy. It consists essentially of two conducting parallel plates separated by an insulating material or "dielectric." PCBs are oily liquids which were commonly used as dielectric material in capacitors. Analysis of samples collected from the capacitors and surrounding stained soil confirmed high levels of PCBs.

Several capacitors were labeled as being manufactured by Cornell Dubilier Electronics, Inc., South Plainfield, New Jersey. Cornell Dubilier Electronics, Incorporated is a manufacturer of electronic parts and components, including capacitors. It was located approximately one mile from the Dismal Swamp site at 333 Hamilton Boulevard, South Plainfield. According to a recent Public Health Assessment, Cornell Dubilier allegedly dumped PCB contaminated materials and other hazardous substances directly onto the ground resulting in on- and off-site soil contamination; PCB-contaminated dust was also detected in homes of nearby residents (NJDHSS 2000). Due to this PCB contamination, a fish consumption advisory was issued for several area waterways, including the Bound Brook (ATSDR 1997). The Cornell Dubilier Electronics, Inc. site is currently known as the Hamilton Industrial Park and Cornell Dubilier is no longer in operation at this location.

Subsequent to the NJDEP Bureau of Emergency Response investigation of the Dismal Swamp site, the NJDEP requested the assistance of the USEPA in conducting a removal action at the site. In March 2000, approximately 26 capacitors (whose condition ranged from intact and rust-free to completely rusted) were placed in drums and removed from the site by TETCO under USEPA oversight. Some fencing and warning signs were installed at access points in an attempt to prevent off-road vehicles from entering the site. The stated purpose of these actions was to stabilize the site while investigation into the nature and extent of contamination continued (USEPA 2000). No soil removal or remediation occurred at this time.

Subsequently, the USEPA collected and analyzed soil, sediment, surface water, ground water, and residential potable well samples. Results of sampling confirmed that hazardous substances from the site impacted the Dismal Swamp wetland system requiring further remedial action; residential potable wells were found to be free of site-related (or other significant) contamination. On August 9, 2001, the NJDEP requested that the site be placed on the National Priorities List (NPL) of Superfund sites. The site was proposed by the USEPA to be added to the NPL on September 13, 2001.

Prior ATSDR Involvement

No prior ATSDR or NJDHSS investigation has been conducted at this site.

Site Visit

On November 15, 2001, a site visit to the Dismal Swamp site was conducted by representatives of the NJDHSS, USEPA, and EWA. NJDHSS representatives were Steven Miller, Stella Tsai, Mary Baird, and Julie Petix. The site visit commenced at approximately 10 am. Following a brief rain shower, the day was sunny with temperatures in the mid 60's.

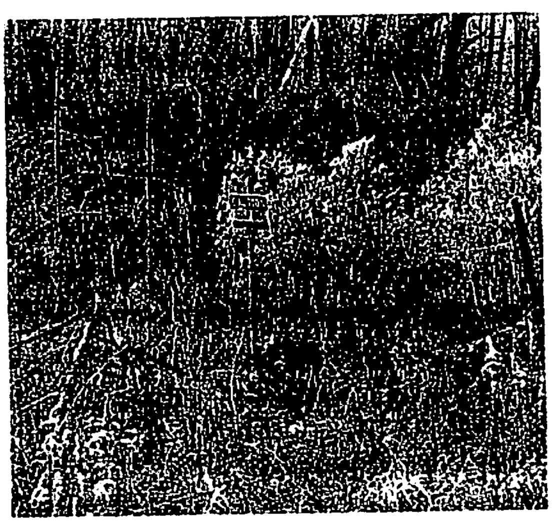

Broken capacitor observed on site.

The site consists of two landfills (Area A and Area B). Area B was inspected first. Area B was easily accessible and was not well posted although a few signs were noticed along its perimeter. Area B is best described as a sprawling landscape littered with clusters of trash consisting of numerous glass bottles, tires, rubber hoses, roofing shingles, plastic containers, shoe soles, children's toys, rusted metal drums, broken pottery, and other household waste items. A broken capacitor and several tree stands used for deer hunting were also observed. Pungent, decaying odors were noticed. Patches of oily sheen were observed on a portion of the Bound Brook.

Following the Area B inspection, Area A was inspected. Area A was better posted with private property signs (which stated no hunting, fishing, trespassing, etc.) both within and along its perimeter. Area A was relatively easy to access although guardrails and fencing have been installed intermittently, presumably to discourage off-road vehicle and on-foot access. Trash observed on Area A included automobile parts, plastic flower pots, and concrete chunks. Shotgun shells were also present on the site. Based upon the trash observed, it appeared that some dumping had occurred fairly recently.

During the site visit, a resident of a home situated on the site was interviewed. The resident stated that they have lived in the house for over 30 years and use a private well for drinking water. No health complaints were reported and no unpleasant odors have been noticed. According to the resident, the water quality of the well had been tested by several governmental agencies and found to be satisfactory.

On Thursday, January 10, 2002, a second site visit of the Dismal Swamp site was conducted by representatives of the NJDHSS, USEPA, Middlesex County Public Health Department, Edison Department of Health and Human Resources, and Duke Energy. NJDHSS representatives were James Pasqualo, Steven Miller, Mary Baird, and Julie Petix. The site visit commenced at approximately 11 am. The day was sunny with temperatures in the mid to upper 40's. Area B was inspected first. The ground surface of Area B was very wet with widespread mud and ice. There were numerous glass bottles, most of which were broken in countless pieces.


Safety netting used to cordon off PCB hotspot.

Area A was inspected next. Two distinct PCB "hotspots" on or near where capacitors had been dumped were posted with "Caution, Keep Out, Contaminated Area" signs by TETCO. Plastic, orange safety netting was used to cordon off these hotspots but appeared to poorly delineate the periphery of contamination.

Following the site visit, a brief discussion was held with site visit representatives at the Duke Energy facility located on Coolidge Street. According to the USEPA representative, the USEPA will conduct a Responsible Party search of the site, followed by a remedial investigation/feasibility study (RI/FS).

Community Concerns

According to the EWA, whose Triple C Ranch and Nature Center is located adjacent to the site, the Dismal Swamp site is widely used by dirt riders, hunters, cyclists, and hikers. The Executive Director of the EWA has stated that he has personally observed individuals covered from head to toe in mud from participating in recreational activities on the site.

The NJDHSS contacted the Middlesex County Public Health Department, the Edison Department of Health and Human Resources, the Borough of South Plainfield, and the South Plainfield Environmental Commission. Other than the concerns voiced by the EWA, there are no reported community concerns and no reported individual health complaints associated with the Dismal Swamp site at this time. The South Plainfield Environmental Commission voiced concern regarding PCB contamination at the site.

Discussion

Assessment Methodology

The general method for determining whether a public health hazard exists to a community is to evaluate the environmental and human components that lead to human exposure. An exposure pathway is the process by which an individual is exposed to contaminants from a source of contamination and consists of the following five elements:

(1) source of contamination;
(2) environmental media (e.g., air, groundwater, surface water, soil, sediment, biota);
(3) point of exposure (i.e., location of potential or actual human contact with a contaminated medium);
(4) route of exposure (e.g., inhalation, dermal contact/absorption, ingestion); and
(5) receptor population.

Exposure pathways are further classified into three groups: (1) "completed pathways," i.e., those in which exposure is reasonably likely to have occurred, to occur, or to occur in the future; (2) "potential pathways," i.e., those in which exposure might have occurred, may be occurring, or may yet occur; and, (3) "eliminated pathways," i.e., those that can be eliminated from further analysis because one of the five elements is missing and will never be present, or in which no contaminants of concern can be identified.

After an exposure pathway is designated as completed, potential, or eliminated, a two-step methodology is followed to evaluate public health issues related to exposure pathways at hazardous waste sites. First, representative environmental monitoring data is obtained for the site of concern and a list is compiled of site-related contaminants. Contaminant levels are compared to established health screening values. For substances that exceed established health screening values, site-specific conditions are evaluated to determine likely exposure scenarios for a given exposure pathway. Given this exposure scenario, a dose is estimated and compared with scientific studies to determine whether the extent of exposure indicates a public health hazard.

Health screening values are considered conservative because they include ample safety factors that account for most sensitive populations. If, however, a contaminant is found at levels greater than its health screening value, the pollutant is designated as a contaminant of concern to be examined further in the assessment. Since health screening values are based on conservative (i.e., protective) assumptions, the presence of contaminant concentrations greater than a health screening value does not necessarily mean that adverse health effects will occur among the exposed population.

The focus of this Public Health Assessment was on soil contaminants detected at the Dismal Swamp site. Environmental soil sampling data provided by the USEPA for the Dismal Swamp site were organized by the NJDHSS as Area A landfill versus Area B landfill, categorized as surface soil, test pit surface soil, or test pit below surface soil, and analyzed. Test pit samples were comprised of composite and grab samples (P. Mannino, USEPA, personal communication, 2002). A composite sample is a sample composed of several discrete samples combined in a known proportion (NJDEP undated). Contaminants selected from the site's USEPA Hazard Ranking System Documentation Package (USEPA 2001a) for comparison with health screening values were based on the probability of soil persistence and the possibility of human exposure due to soil contact. Minimum, average, and maximum concentrations are provided in Tables 1 - 14; average concentrations above health screening values are provided in bold font. Although maximum values are presented, average concentrations are more likely to be representative of potential human exposures at the site.

On-Site Contamination: Area A Landfill and Capacitor Dumps

For this discussion, "on-site" is defined as the Area A landfill and nearby adjacent areas to the west and south.

Soil PCBs

Soil PCB samples from on or near Area A consisted of: 1) samples collected from two "hotspots" (main and secondary hotspots) where capacitors were reportedly dumped; 2) a footpath near the two hotspot areas; and 3) several locations throughout Area A. "Hotspots" and footpath samples were collected at 0-2 inches depth. In addition to the hotspots and footpath, surface soil (0-6 inches depth) and test pit soil (0-6 inches depth and 2-5.5 feet depth) were collected. Ranges of results (minimum versus maximum concentrations) of PCB contamination are summarized in Table

1. The health screening value and NJDEP Soil Cleanup Criteria (N.J.A.C. 7:26D) for PCBs are provided for comparison purposes. NJDEP Soil Cleanup Criteria are based on human health impacts but also take into consideration environmental impacts.

Maximum soil PCB concentrations were as follows: free product (approximately1,000,000 ppm) from the main capacitor dump hotspot (0-2 inches depth); 8,700 ppm from the secondary capacitor dump hotspot (0-2 inches depth); 30 ppm from the footpath near the capacitor dump hotspots (0-2 inches depth); 580 ppm in surface soil, 19,000 ppm in test pit soil (0-6 inches depth); and 250 ppm in test pit soil (2-5.5 feet depth). It should be noted that PCB concentrations ranging between 10 and 100 ppm were detected in surface soil located hundreds of feet away from the two capacitor dump hotspots. These are described further below.

Soil Metals

Maximum surface soil (0-6 inches depth) concentrations of selected metals on Area A landfill included: 20.1 ppm of arsenic; 3,750 ppm of lead; and 13 ppm of thallium (Tables 2, 3, 4). These metals do not appear to be distributed in any particular pattern in Area A. Nearly one third (7/24) of the lead surface soil sample results were higher than 1,200 ppm; the USEPA considers an average concentration of 1,200 ppm lead in residential bare soil (children's non-play area) to be a soil-lead hazard (USEPA 2001b).

Maximum test pit soil (0-6 inches depth) concentrations of selected metals included: 23.4 ppm of arsenic; 3,030 ppm of lead; and 16.9 ppm of thallium (Tables 2, 3, 4).

Maximum test pit soil (2-6 feet depth) concentrations of selected metals included: 48.7 ppm of arsenic; 30,400 ppm of lead; and 31.4 ppm of thallium (Tables 2, 3, 4).

Soil SVOCs

Maximum surface soil (0-6 inches depth) concentrations of selected SVOCs on Area A landfill included: 1.4 ppm of benzo(a)anthracene; 1.4 ppm benzo(a)pyrene; 1.8 ppm benzo(b)fluoranthene; 56 ppm bis(2-ethylhexyl)phthalate; 0.44 ppm di-n-octylphthalate; 0.73 ppm indeno(1,2,3-cd)pyrene; 1.1 ppm phenanthrene; and 2.3 ppm pyrene (Table 5). Maximum concentrations for the first four SVOCs are above health screening values.

Maximum test pit soil (0-6 inches depth) concentrations of selected SVOCs included: 0.73 ppm of benzo(a)anthracene; 0.78 ppm benzo(a)pyrene; 0.87 ppm benzo(b)fluoranthene; 1,300 ppm bis(2-ethylhexyl)phthalate; 360 ppm di-n-octylphthalate; 0.75 ppm indeno(1,2,3-cd)pyrene; 0.2 ppm phenanthrene; and 1.3 ppm pyrene (Table 6). Maximum concentrations for benzo(a)pyrene and bis(2-ethylhexyl)phthalate are above health screening values.

Maximum test pit soil (2-6 feet depth) concentrations of selected SVOCs included: 0.42 ppm of benzo(a)anthracene; benzo(a)pyrene was below the detection limit; 0.42 ppm benzo(b)fluoranthene; 13 ppm bis(2-ethylhexyl)phthalate; 0.12 ppm di-n-octylphthalate; 0.49 ppm indeno(1,2,3-cd)pyrene; 0.074 ppm phenanthrene; and 0.8 ppm pyrene (Table 7). All of these SVOCs are below health screening values.

On-Site Contamination: Area B Landfill

For this discussion, "on-site" is defined as the Area B landfill.

Soil PCBs

Soil PCB samples from Area B consisted of samples collected from surface soil (0-6 inches depth) and test pit soil (0-6 inches depth and 2-6 feet depth). In addition, samples were collected from Woodbrook Road along the southeastern border of Area B. Ranges of results (minimum versus maximum concentrations) of PCB contamination are summarized in Table 8. The health screening value and NJDEP Soil Cleanup Criteria (N.J.A.C. 7:26D) for PCBs are provided for comparison purposes. NJDEP Soil Cleanup Criteria are based on human health impacts but also take into consideration environmental impacts.

Maximum soil PCB concentrations were as follows: 6.9 ppm in surface soil, 12 ppm in test pit soil (0-6 inches depth); 2.4 ppm in test pit soil (2-6 feet depth); and 52 ppm from Woodbrook Road (0-2 inches depth). Although these maximum concentrations are substantially lower than those detected in the Area A landfill, they are all above the NJDEP Non-Residential Cleanup Criteria for PCBs.

Soil Metals

Maximum surface soil (0-6 inches depth) concentrations of selected metals included: 112 ppm of arsenic; 3,840 ppm of lead; and 1.1 ppm of thallium (Tables 9, 10, 11). The concentrations of metals detected in Area B showed no particular pattern.

Maximum test pit soil (0-6 inches depth) concentrations of selected metals included: 14.1 ppm of arsenic; 2,400 of lead; and 11.5 ppm of thallium (Tables 9, 10, 11).

Maximum test pit soil (2-6 feet depth) concentrations of selected metals included: 110 ppm of arsenic; 8,920 ppm of lead; and 36 ppm of thallium (Tables 9, 10, 11).

Soil SVOCs

Maximum surface soil (0-6 inches depth) concentrations of selected SVOCs included: 9.4 ppm of benzo(a)anthracene; 7.3 ppm benzo(a)pyrene; 6.2 ppm benzo(b)fluoranthene; 7.6 ppm bis(2-ethylhexyl)phthalate; 3.9 ppm di-n-octylphthalate; 4.3 ppm indeno(1,2,3-cd)pyrene; 10 ppm phenanthrene; and 15 ppm pyrene (Table 12). Maximum concentrations for four of the SVOCs (benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; and indeno(1,2,3-cd)pyrene) were above health screening values.

Maximum test pit soil (0-6 inches depth) concentrations of selected SVOCs included: 6.2 ppm of benzo(a)anthracene; 5.4 ppm benzo(a)pyrene; 5.1 ppm benzo(b)fluoranthene; 4.8 ppm bis(2-ethylhexyl)phthalate; di-n-octylphthalate was below the detection limit; 2.2 ppm indeno(1,2,3-cd)pyrene; 7 ppm phenanthrene; and 9.2 ppm pyrene (Table 13). Concentrations for the same four compounds (benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; and indeno(1,2,3-cd)pyrene) were again above health screening values.

Maximum test pit soil (2-6 feet depth) concentrations of selected semi-volatile organic compounds included: 0.98 ppm of benzo(a)anthracene; 0.88 ppm benzo(a)pyrene; 0.73 ppm benzo(b)fluoranthene; 1.5 ppm bis(2-ethylhexyl)phthalate; di-n-octylphthalate was below the detection limit; 0.55 ppm indeno(1,2,3-cd)pyrene; 1.1 ppm phenanthrene; and 1.7 ppm pyrene (Table 14). Two of these SVOCs (benzo(a)anthracene; benzo(a)pyrene) were above health screening values.

Location of On-Site Contamination Exclusive of the Capacitor Dump Areas

Data provided represent samples collected at grid points throughout the landfill areas, and the spatial distribution of "hits" for PCBs, metals, and SVOCs in surface soils, including shallow test pit data, was determined according to a sampling grid (Figure 3). "Hits" are defined as soil levels greater than or equal to the NJDEP Non-Residential Cleanup Criteria. The areas surveyed do not include the capacitor dumps, but some are near them. Reference to the grid map provided in Figure 3 illustrates the distance of the samples from the hotspots and other landmarks. "Hits" were found throughout the landfills, but the preponderance for PCBs, lead, and thallium were in Area A. Some SVOCs concentrations were higher on the Area B landfill, including benzo(a)pyrene. In the following discussion, average concentrations are considered since they are more likely to be representative of potential human exposure at the site than are maximum concentrations.

PCBs. In addition to the two capacitor dump hotspots, there are a number of soil sample results that are greater than the NJDEP Non-Residential Cleanup Criteria. Several surface soil samples immediately adjacent to the capacitor dumps in the southeast corner of Area A (coordinates 1,6 and 1,5) range from 4.1 to 43 ppm PCBs (Figure 3). Additionally, there are two surface soil samples in the interior of Area A (coordinates 2,2 and 2,6) which range from 6.6 to 20 ppm PCBs. There are three elevated concentrations of PCBs on the northern side and border of Area A, toward the Bound Brook at coordinates 3,2, 4,2, and 4,3. These surface soil samples range from 2.7 to 580 ppm PCBs. Several shallow test pits in Area A had high PCB concentrations which ranged from 2.6 to 300 ppm PCBs. In contrast, Area B had only two surface soil locations with PCB concentrations greater than 2 ppm. These were coordinates 6,4 and 7,3 at 5,100 and 6,900 ppm, respectively. This may correspond to single capacitor remnants observed during a site visit. Two shallow test pit samples (coordinates 7,3 and 5,5) had only 12 and 2.2 ppm PCBs, respectively. These concentrations are all below those detected in the two capacitor dumps but are still higher than the NJDEP Non-Residential Cleanup Criteria of 2 ppm.

Arsenic. Elevated (above the NJDEP Non-Residential Cleanup Criteria) surface soil concentrations of arsenic were uncommon in Area A or B, although one sample result obtained from the Area B landfill (coordinate 6,1) was 112 ppm. The average concentration of arsenic in surface soils (Area A = 9.1 ppm; Area B = 21 ppm) was approximately half of or equal to the NJDEP Residential and Non-Residential Cleanup Criteria of 20 ppm. The NJDEP considers the background level for arsenic in New Jersey soils to be 20 ppm.

Lead. Elevated concentrations of lead in surface soil were detected in both Areas A and B landfills, with the average concentration of lead detected in each Area (Area A = 935 ppm; Area B = 1,153 ppm) above the NJDEP Non-Residential Cleanup Criteria of 600 ppm. These average concentrations, however, were below the USEPA soil lead hazard standard of 1,200 ppm for residential (children's non-play area) bare soil (USEPA 2001b). This standard was established to be protective of children less than six years of age who are particularly vulnerable to the toxic effects of lead. Individual lead concentrations greater than 1,200 ppm were detected in both Areas A and B surface soils. In Area A, there were 10 individual sample results which ranged from 1,280 to 3,750 ppm lead; in Area B, there were four individual sample results which ranged from1,630 - 3,790 ppm lead. These sample locations were found throughout each of the landfill areas.

Thallium. No elevated concentrations of thallium were detected in Area B surface soils. The average concentration of thallium in Area A surface soil was 10.6 ppm, five times higher than the NJDEP Non-Residential Cleanup Criteria of 2 ppm. Five of the six elevated surface soil sample results in Area A were located between the Bound Brook and the capacitor dumps.

In contacting the NJDEP to obtain a background level for thallium in New Jersey, the NJDHSS was informed that Inductive Plasma Coupling (ICP), a laboratory analytical method for metal analysis, has been found to give false positive values for thallium. When more traditional analytical methods were used to re-analyze samples, positive results for thallium were reduced or found to be below the detection limit (K. Schick, NJDEP, personal communication, 2002). Laboratory data sheets for the Dismal Swamp site indicate that ICP was the analytical method utilized for metals (including thallium) analysis.

SVOCs. Except for benzo(a)pyrene, average concentrations of SVOCs detected in Area A and B surface soils (see Tables 5 and 12) were all substantially below the NJDEP Non-Residential Cleanup Criteria of 0.66 ppm. The average concentration of benzo(a)pyrene detected (1.6 ppm) on the Area B landfill exceeded the NJDEP Non-Residential Cleanup Criteria of 0.66 ppm. Ambient levels comparable to this have been detected in relatively uncontaminated urban parkland, however (P. Sanders, NJDEP, personal communication, 2002).

Pathways Analysis

Completed Pathways

The only conceivable receptor populations at the Dismal Swamp site are trespassers and Duke Energy employees. The NJDHSS could not establish a point of exposure, or location, of actual human contact with contaminated soil particularly with respect to PCB "hotspot" areas. Additionally, there are no populations routinely exposed to site contaminants. Based upon current site conditions and available information, there are no established completed human exposure pathways at the Dismal Swamp site.

Potential Pathways

Potential receptor populations at the Dismal Swamp site are trespassers and Duke Energy employees. Potential routes of exposures include incidental dermal contact with or incidental ingestion following dermal contact with surface soils from PCB "hotspot" areas. Other potential points of exposure include possible off-site potable well contamination.

Elements of the potential exposure pathways for the Dismal Swamp site are summarized in the following chart:

Potential Human Exposure Pathways Associated with the Dismal Swamp Site				
Pathway Name	Environmental Medium	Point of Exposure	Route of Exposure	Exposed Population
on-site surface soil	surface soil and dust	surface soil, dust associated with the Dismal Swamp site	skin contact, incidental ingestion, inhalation	trespassers, Duke Energy workers who may access the site
potable wells	groundwater	adjacent potable wells	ingestion, skin contact	area residents who use potable well water as their source of drinking water

Surface Soil

The contaminants of primary public health concern in soil are PCBs and lead. In surface soils, PCBs are concentrated in the capacitor dumps located on and near the Area A landfill (see Figure 1). Lower concentrations of PCBs occur elsewhere on the site. Average lead concentrations detected in Areas A and B landfills were above the NJDEP Non-Residential Cleanup Criteria of 600 ppm, but below 1,200 ppm, the USEPA soil lead hazard standard for residential (children's non-play area) bare soil. Individual lead concentrations greater than 1,200 ppm were detected in both Areas A and B surface soils. Because unauthorized access to the Dismal Swamp site is possible, a potential human exposure pathway may be associated with incidental contact with (or ingestion of dust from) surface soils. Children less than six years of age are particularly vulnerable to the toxic effects of lead. However, young children are not expected to frequent the Dismal Swamp site and, as such, would not be considered a potential at-risk population.

Incidental contact with high concentrations of PCBs are presumed to be due to an acute (i.e., less than 15 days) exposure scenario rather than a longer term exposure. Area A is situated in a remote wooded area. Orange safety netting cordons off the hotspots and discourages but does not prevent access. Duke Energy employees who access the site should be informed of the risks and wear appropriate personal protective equipment (PPE), e.g., safety shoes with protective disposable booties, as a precautionary measure. This should be sufficient to interrupt a potential exposure pathway. Area B, while relatively more accessible than Area A, exhibits much lower concentrations of PCBs (on average, just above the ATSDR Cancer Risk Evaluation Guide, or CREG, for one in a million excess cancer risk for lifetime exposure). The presence of habitual trespassers in either of the capacitor dump "hotspots," Area A, or Area B is considered unlikely. Chronic exposure scenarios, consequently, are also considered unlikely.

Groundwater

To evaluate the potential pathway associated with contaminated groundwater, private potable wells located on or close to the site were tested by the USEPA. Available data indicate the wells identified and sampled to be free of site related (or other significant) contamination. As part of the future RI/FS, the USEPA will implement a potable well survey to identify and characterize area wells located down gradient of the Dismal Swamp site (P. Mannino, USEPA, personal communication, 2002).

Public Health Implications

Based upon the evaluation of USEPA data made available to the NJDHSS, it is apparent that there are three distinct levels of PCB contamination at the Dismal Swamp site. The two capacitor dump hotspots are considered extremely contaminated, the Area A landfill (exclusive of hotspots) is moderately contaminated, and the Area B landfill is relatively uncontaminated. Although the most prominent contaminants detected at the Dismal Swamp site are PCBs, SVOCs and metals (particularly lead) were also detected and are discussed in the Superfund Hazard Ranking report (USEPA 2001a).

The Dismal Swamp site remains relatively easy to access despite measures taken by TETCO to secure the area. Any entry on the property except by Duke Energy employees is considered trespassing. Ease of access to Areas A, B, and the capacitor dump "hotspots" is similar (even though the main hotspot is cordoned), and exposure scenarios were considered roughly the same. Recreational activity may occur at the site but it is not likely to be protracted or recurrent. The primary route of any exposure at the Dismal Swamp site would be dermal contact with contaminated surface soil. Trespassers such as dirt riders throw up a great deal of soil on unprotected riders. The hotspots comprise a very small proportion of the Dismal Swamp site and the likelihood of exposure is very small, however.

Data for the capacitor dump "hot spots" and the footpath near the capacitor dumps are limited to PCBs at a depth of 0-2 inches. Because levels of PCBs were very high and there exists the potential for an adult/young adult to be exposed for a short term duration, an acute (up to14 days) exposure scenario was considered. Based upon information presented in the ATSDR Toxicological Profile for PCBs, incidental (acute duration) dermal contact with the very high levels of PCBs detected in the hotspots could result in dermatitis. However, it would not be expected to increase lifetime excess cancer risk due to incidental ingestion of soil following dermal exposure under current plausible exposure scenarios. The same is true for intermediate length (15-365 days) exposure scenarios, but these are less likely to occur.

By comparison, PCB contamination of Areas A and B landfills is more moderate. These and several other detected contaminants were assessed to determine what level of hazard they pose in the two landfill areas. It was assumed that persons exposed for an intermediate duration (15-365 days) would be subjected to a reasonable average of the contaminants present. Dermatitis would not be expected to be an issue at these levels. No increased cancer risk is expected to occur under current likely exposure scenarios.

In summary, potential exposures to PCBs detected in Areas A and B surface soils were considered separately from the capacitor dump PCB hotspots. If exposures were to occur at "hotspot" concentrations, then individuals may develop dermatitis. Exposures to PCBs at levels detected in non-hotspot areas are not expected to cause dermatitis. Health effects from exposures to non-hotspot soil contaminants are not likely to constitute a public health concern. Similarly, because of the concentrations of PCBs and the unlikely presence of trespassers with sufficient frequency and duration to constitute a significant exposure dose, chronic exposure would not be expected to result in significant risk of carcinogenic or non-carcinogenic outcomes.

General health information for the contaminants detected at the Dismal Swamp site is provided in Appendix A. This information has been compiled by the ATSDR and is available in full from the sources identified in the Appendix.

Child Health Considerations/Potentially Sensitive Populations

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances because they eat and breathe more than adults. They also play outdoors and often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

Conclusions

Hazard Category for the Dismal Swamp Site

The NJDHSS and the ATSDR have evaluated the Dismal Swamp site to constitute ***"No Apparent Public Health Hazard."*** A potential human exposure pathway was identified through contact with on site soil contaminants (PCBs). With the exception of the maximally contaminated capacitor dump areas, an occasional trespasser making incidental contact with PCB contaminated surface soils as presently documented would not likely experience a significant (acute) exposure dose through dermal contact or ingest enough contaminated soil or dust to constitute an exposure of public health significance. The recurrent presence (chronic exposure) on the site by an individual trespasser necessary to constitute an exposure dose of public health significance is unlikely. The public health significance of this potential pathway, however, is dependent upon the frequency, duration, and location of unauthorized access to the site. It is also dependent upon current land use patterns which may possibly change in the future. Duke Energy workers who may access the site in the course of performing work duties may be at risk of exposure, but this should be minimal and can be prevented with the appropriate use of PPE.

Very high levels of soil PCBs contamination were detected in the capacitor dump hotspots located on and near Area A. If exposures were to occur at "hotspot" concentrations, then individuals may develop dermatitis. Significant contamination was also detected elsewhere in both Area A and B landfills. Until such time that the nature and extent of site contaminants are fully established as part of a planned USEPA RI/FS, unauthorized access to the Area A landfill, particularly the capacitor dump hotspots, and to a lesser extent Area B landfill, should be restricted.

Other contaminants detected at the Dismal Swamp site were metals (including arsenic, lead, thallium) and SVOCs. For arsenic, most samples were found at or below New Jersey ambient levels. Average lead concentrations detected in Areas A and B landfills were above the NJDEP Non-Residential Cleanup Criteria of 600 ppm, but below 1,200 ppm, the USEPA soil lead hazard standard for residential (children's non-play area) bare soil. This standard was established to be protective of children less than six years of age who are particularly vulnerable to the toxic effects of lead. Individual lead concentrations greater than 1,200 ppm were detected in both Areas A and B surface soils. Because unauthorized access to the Dismal Swamp site is possible, a potential human exposure pathway may be associated with incidental contact with (or ingestion of dust from) surface soils. Young children less than six years of age are not expected to frequent the Dismal Swamp site and, as such, would not be considered a potential at-risk population. No elevated concentrations of thallium were detected in Area B surface soils, however, the average concentration of thallium detected in Area A surface soil exceeded the NJDEP Non-Residential Cleanup Criteria of 2 ppm. This may be due, however, to problems associated with laboratory analytical methodology. With the exception of benzo(a)pyrene, average concentrations of SVOCs detected in Area A and B surface soils were all substantially below the NJDEP Non-Residential Cleanup Criteria of 0.66 ppm. According to the NJDEP, the average concentration of benzo(a)pyrene detected in the Area B landfill is comparable to ambient levels found in uncontaminated New Jersey urban parkland.

The focus of this Public Health Assessment was on contaminants highlighted in the USEPA Hazard Ranking System Documentation Package. Future environmental monitoring/investigations may determine other and/or additional contaminants of concern.

Recommendations

The appropriate environmental regulatory agency should ensure that unauthorized access to the Dismal Swamp site is actively and effectively restricted to ensure the potential pathway associated contaminated soil remains interrupted and/or minimized.

Because Area A represents the location of the primary potential human exposure pathway associated with the Dismal Swamp site, hotspots within and near this area should be isolated to prevent exposure. Risk management efforts to accomplish this goal should be reviewed for effectiveness by the appropriate environmental agencies.

Duke Energy employees who access the site should be informed of the risks and wear appropriate personal protective equipment (PPE), e.g., safety shoes with protective disposable booties, as a precautionary measure.

Impact to groundwater should be further investigated as part of the RI/FS to be implemented by the USEPA. This includes a well search of private area wells located down gradient of the Dismal Swamp site to identify and test potable wells potentially impacted by site contaminants.

Future environmental sample analysis for thallium should take into consideration the possibility of problems associated with the ICP laboratory analytical method for metal analysis.

Exposure pathways and public health implications are dependent upon the current land use of the site. If in the future land use pattens of the Dismal Swamp site change, public exposure pathways and health implications should be reevaluated.

Public Health Action Plan

The Public Health Action Plan (PHAP) for the Dismal Swamp site contains a description of the actions to be taken by the NJDHSS and/or ATSDR at or in the vicinity of the site subsequent to the completion of this Public Health Assessment. The purpose of the PHAP is to ensure that this health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of the NJDHSS and ATSDR to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by NJDHSS and ATSDR are as follows:

Public Health Actions Taken

1. Community concerns regarding site access issues have been formally communicated to the USEPA and the NJDEP.

2. Available environmental data and other relevant information for the Dismal Swamp site have been reviewed and evaluated to determine human exposure pathways and public health issues.

3. The NJDHSS has prepared a site-specific public health Citizen's Guide for the Dismal Swamp site which will be made available to the Middlesex County Public Health Department, the Edison Department of Health and Human Resources, the Borough of South Plainfield, the South Plainfield Environmental Commission, the EWA, and other interested parties.

Public Health Actions Planned

1. As warranted, the NJDHSS will work to complement community outreach activities performed by the USEPA and NJDEP.

2. Commensurate with future monitoring and/or remediation activities at the Dismal Swamp site, public health implications and the potential for completed human exposure pathways will be re-evaluated. If additional data become available to indicate that there are completed human exposure pathways attributable to the Dismal Swamp site, the current designated Hazard Category for the site will be reconsidered.

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Certification

This Public Health Assessment was prepared by the New Jersey Department of Health and Senior Services (NJDHSS) under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It has been produced in accordance with approved methodology and procedures existing at the time the Public Health Assessment was begun.

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Division of Health Assessment and Consultation (DHAC)
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Public Health Assessment and concurs with its findings.

Roberta Erlwein
Chief, SPS, SSAB, DHAC
ATSDR

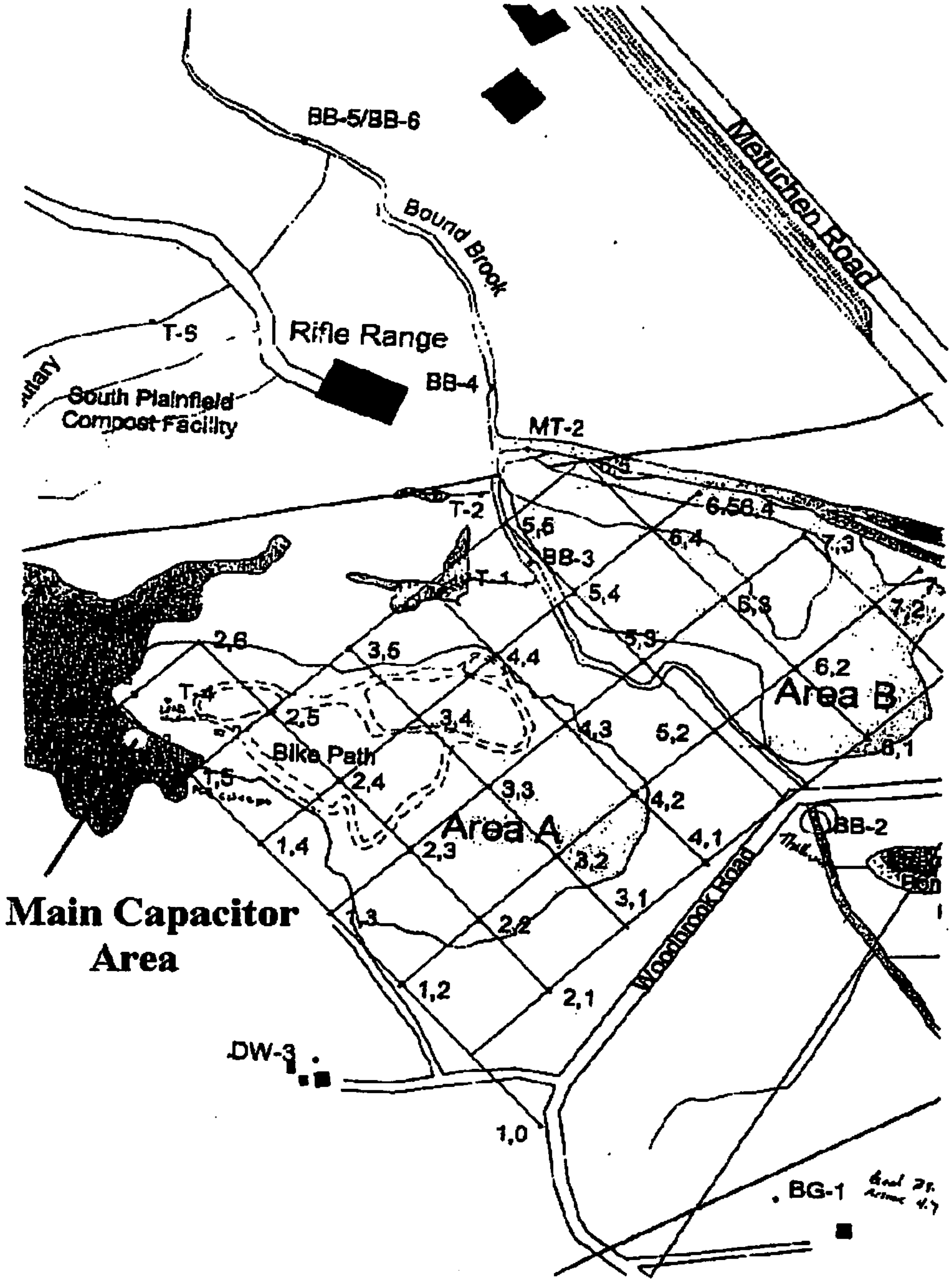
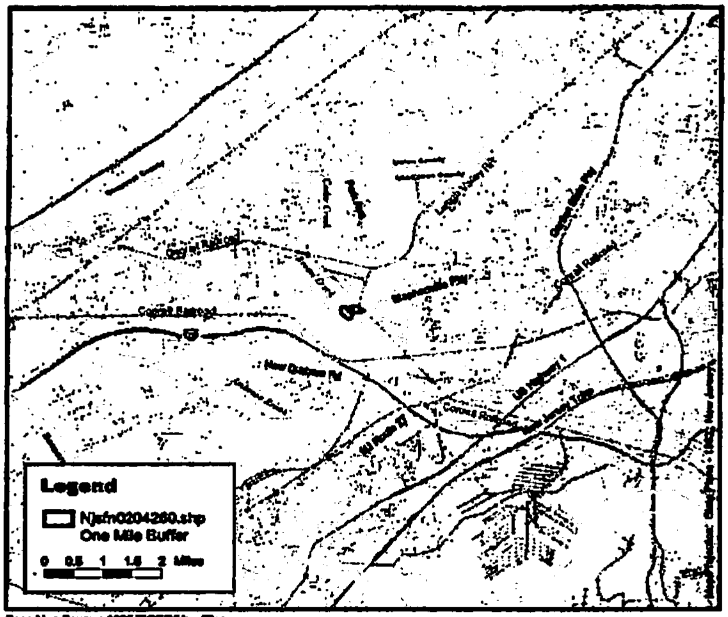


Figure 1 - Dismal Swamp site, Area A and B landfills.

Dismal Swamp

South Plainfield, New Jersey

EPA Facility ID NJSFN0204260



Base Map Source: 1995 TIGER/Line Files

Demographic Statistics
Within One Mile of Site*

Total Population	10235
White alone	5448
Black alone	902
Am. Indian, Eskimo, Aleut	18
Asian alone	3485
Native Hawaiian and Other Pacific Islander alone	4
Some other race alone	191
Two or more races	189
Hispanic Origin	554
Children Aged 6 and Under	963
Adults Aged 65 and Older	1086
Females Aged 15 - 44	2399
Total Housing Units	3734

Demographics Statistics Source: 2000 US Census
*Calculated using an area-proportion spatial analysis technique

Figure 2 - Demographic information for a one mile radius of the Dismal Swamp site.

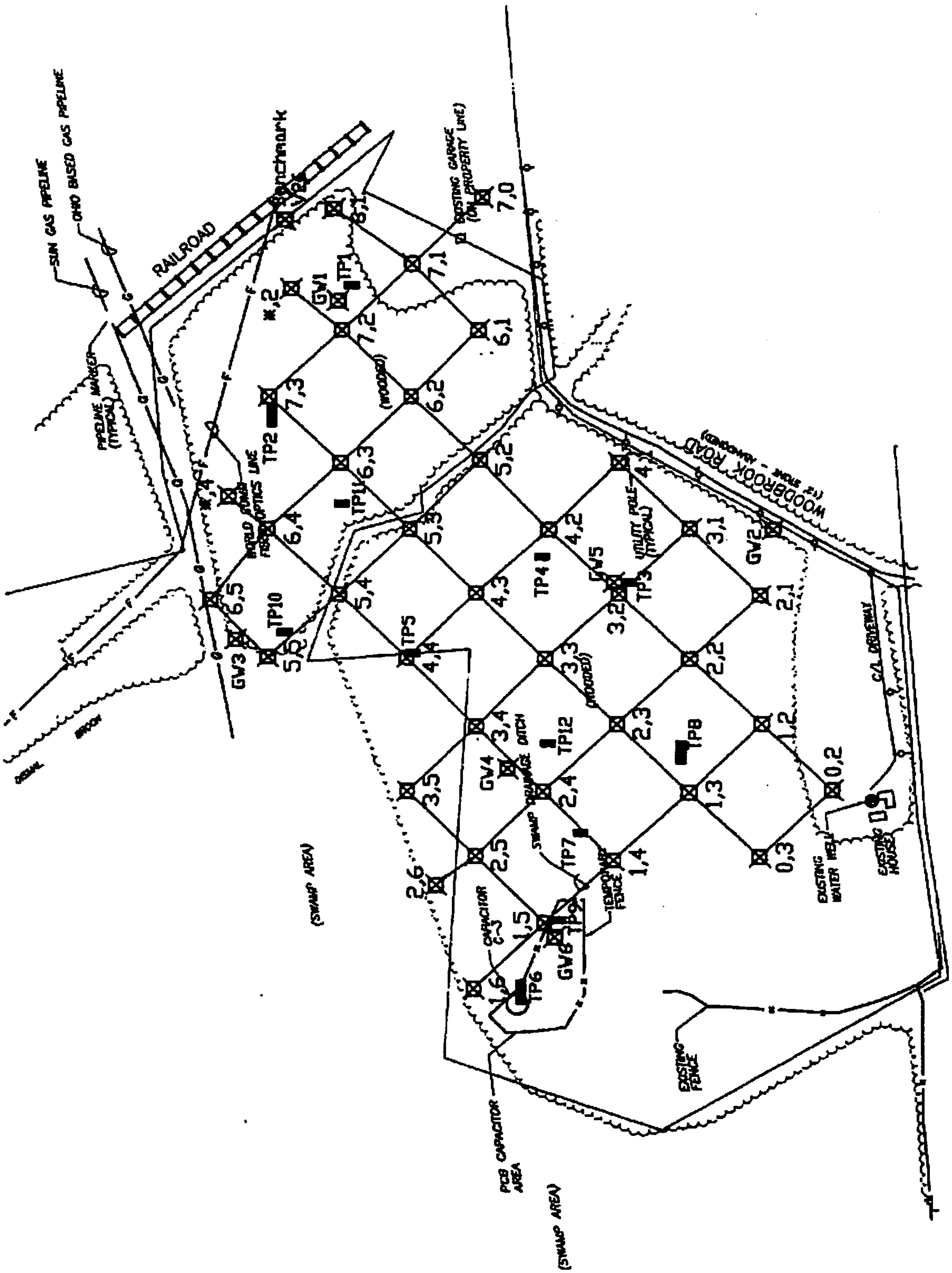


Figure 3 - Sampling grid and coordinates for the Dismal Swamp site.

Table 1
Dismal Swamp Site, "Area A" Soil PCBs

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
main capacitor dump hotspot 0-2 inches depth	56 (grab samples)	7.6	**200,072**	1,000,000 J	0.4 (CREG)	0.49	2
secondary capacitor dump hotspot 0-2 inches depth	21 (grab samples)	280 J	**2,583**	8,700	0.4 (CREG)	0.49	2
footpath near capacitor dumps 0-2 inches depth	50 (composite samples)	0.083	**2.9**	30	0.4 (CREG)	0.49	2
surface soil*	168	0.004	**22.3**	580 D	0.4 (CREG)	0.49	2
test pit, 0-6 inches depth*	56	0.020	**1,238**	19,000	0.4 (CREG)	0.49	2
test pit, subsurface soil 2-5.5 feet depth*	103	0.045 J	**30.6**	250 D	0.4 (CREG)	0.49	2

CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated; D = identified in an analysis at a secondary dilution factor
*the sampling area is exclusive of the two capacitor dumps (main and secondary) and comprises most of the Area A landfill
note: all results exclusive of concentration levels detected inside of capacitors
BOLD = average concentration detected at or above health screening value

Table 2
Dismal Swamp Site, "Area A" Soil Arsenic

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	24	2.7	**9.1**	20.1	0.5 (CREG)	20[1]	20[1]
test pit, 0-6 inches depth	5	2.7	**16.7**	23.4 J	0.5 (CREG)	20[1]	20[1]
test pit, subsurface soil (2-6 feet depth)	15	3.8	**19.9**	48.7 J	0.5 (CREG)	20[1]	20[1]

[1]cleanup standard proposal is based on natural background
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated
BOLD = average concentration detected at or above health screening value

Table 3
Dismal Swamp Site, "Area A" Soil Lead

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	24	44	935	3,750	not available	400	600
test pit, 0-6 inches depth	5	9.5	1,896	3,030	not available	400	600
test pit, subsurface soil (2-6 feet depth)	15	11.5	2,735	30,400	not available	400	600

Table 4
Dismal Swamp Site, "Area A" Soil Thallium

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	24	7.4	**10.6**	13	5.5 (RBC) (N)	2[1]	2[1]
test pit, 0-6 inches depth	5	12.9	**15.5**	16.9 J	5.5 (RBC) (N)	2[1]	2[1]
test pit, subsurface soil (2-6 feet depth)	15	3.5	**14.3**	31.4 J	5.5 (RBC) (N)	2[1]	2[1]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
J = estimated
BOLD = average concentration detected at or above health screening value

Table 5
Dismal Swamp Site, "Area A" Surface Soil (0 - 6 inches depth) SVOCs

Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
benzo(a)anthracene	23	0.042 J	0.26	1.4	0.87 (RBC) (C)	0.9	4
benzo(a)pyrene	23	0.049 J	**0.27**	1.4	0.1 (CREG)	0.66[1]	0.66[1]
benzo(b)fluoranthene	23	0.038 J	0.30	1.8	0.87 (RBC) (C)	0.9	4
bis(2-ethylhexyl)phthalate	23	0.1 J	6.3	56	50 (CREG)	49	210
di-n-octylphthalate	23	0.2 J	0.32	0.44 J	1,600 (RBC) (N)	1,100	10,000[2]
indeno(1,2,3-cd)pyrene	23	0.062 J	0.24	0.73	0.87 (RBC) (C)	0.9	4
phenanthrene	23	0.048 J	0.24	1.1	not available	not available	not available
pyrene	23	0.045 J	0.39	2.3	2,300 (RBC) (N)	1,700	10,000[2]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
[2]health based criterion exceeds the 10,000 ppm maximum for total organic contaminants
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated
BOLD = average concentration detected at or above health screening value

Table 6
Dismal Swamp Site, "Area A" Test Pit Soil (0 - 6 Inches Depth) SVOCs

Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
benzo(a)anthracene	6	below detection limit	0.73 J	0.73 J	0.87 (RBC) (C)	0.9	4
benzo(a)pyrene	7	below detection limit	**0.78 J**	0.78 J	0.1 (CREG)	0.66[1]	0.66[1]
benzo(b)fluoranthene	7	below detection limit	**0.87 J**	0.87 J	0.87 (RBC) (C)	0.9	4
bis(2-ethylhexyl)phthalate	7	0.066 J	**187.9**	1,300 D	50 (CREG)	49	210
di-n-octylphthalate	7	6.5 J	183.3	360 JD	1,600 (RBC) (N)	1,100	10,000[2]
indeno(1,2,3-cd)pyrene	7	below detection limit	0.75 J	0.75 J	0.87 (RBC) (C)	0.9	4
phenanthrene	7	below detection limit	0.2 J	0.2 J	not available	not available	not available
pyrene	7	1.2 J	1.3	1.3 J	2,300 (RBC) (N)	1,700	10,000[2]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
[2]health based criterion exceeds the 10,000 ppm maximum for total organic contaminants
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated; D = identified in an analysis at a secondary dilution factor; BOLD = average concentration detected at or above health screening value

Table 7
Dismal Swamp Site, "Area A" Test Pit Soil (2 - 6 Feet Depth) SVOCs

Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
benzo(a)anthracene	14	0.11 J	0.27	0.42 J	0.87 (RBC) (C)	0.9	4
benzo(a)pyrene	14	below detection limit	below detection limit	below detection limit	0.1 (CREG)	0.66[1]	0.66[1]
benzo(b)fluoranthene	14	0.15 J	0.29	0.42 J	0.87 (RBC) (C)	0.9	4
bis(2-ethylhexyl)phthalate	14	0.042 J	2.7	13	50 (CREG)	49	210
di-n-octylphthalate	14	0.08 J	0.1	0.12 J	1,600 (RBC) (N)	1,100	10,000[2]
indeno(1,2,3-cd)pyrene	14	0.12 J	0.31	0.49 J	0.87 (RBC) (C)	0.9	4
phenanthrene	14	below detection limit	0.07 J	0.074 J	not available	not available	not available
pyrene	14	0.14 J	0.37	0.8 J	2,300 (RBC) (N)	1,700	10,000[2]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
[2]health based criterion exceeds the 10,000 ppm maximum for total organic contaminants
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated

Table 8
Dismal Swamp, "Area B" Soil PCBs

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	111	0.079 J	**1.1**	6.9 J	0.4 (CREG)	0.49	2
test pit, 0-6 inches depth	35	0.23 J	**2.7**	12 J	0.4 (CREG)	0.49	2
test pit, subsurface soil 2-6 feet depth	63	0.058 J	**1.0**	2.4 J	0.4 (CREG)	0.49	2
Woodbrook Road 0-2 inches depth	28 (composite samples)	0.017	0.022	0.028	0.4 (CREG)	0.49	2

CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated
BOLD = average concentration detected at or above health screening value

Table 9
Dismal Swamp Site, "Area B" Soil Arsenic

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	14	3.9	**21**	112	0.5 (CREG)	20[1]	20[1]
test pit, 0-6 inches depth	4	7.2 J	**9.8**	14.1 J	0.5 (CREG)	20[1]	20[1]
test pit, subsurface soil (2-6 feet depth)	9	3.2	**33**	110 J	0.5 (CREG)	20[1]	20[1]

[1]cleanup standard proposal is based on natural background
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated
BOLD = average concentration detected at or above health screening value

Table 10
Dismal Swamp Site, "Area B" Soil Lead

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	14	65.4	1,153	3,840	not available	400	600
test pit, 0-6 inches depth	4	89.4	931	2,400 J	not available	400	600
test pit, subsurface soil (2-5.5 feet depth)	9	12.2	2,062	8,920 J	not available	400	600

J = estimated

Table 11
Dismal Swamp Site, "Area B" Soil Thallium

Location	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
surface soil	14	0.5	0.9	1.1	5.5 (RBC) (N)	2[1]	2[1]
test pit, 0-6 inches depth	4	3	**6.1**	11.5	5.5 (RBC) (N)	2[1]	2[1]
test pit, subsurface soil (2-5.5 feet depth)	9	14.1 J	**20.5**	36	5.5 (RBC) (N)	2[1]	2[1]

Note: for surface soil samples, contaminant also found in blank
[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
J = estimated
BOLD = average concentration detected at or above health screening value

Table 12
Dismal Swamp Site, "Area B" Surface Soil (0-6 Inches Depth) SVOCs

Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
benzo(a)anthracene	15	0.14 J	**1.7**	9.4 J	0.87 (RBC) (C)	0.9	4
benzo(a)pyrene	15	0.13 J	**1.6**	7.3 J	0.1 (CREG)	0.66[1]	0.66[1]
benzo(b)fluoranthene	15	0.2 J	**1.3**	6.2 J	0.87 (RBC) (C)	0.9	4
bis(2-ethylhexyl)phthalate	15	0.18 J	1.7	7.6 J	50 (CREG)	49	210
di-n-octylphthalate	15	below detection limit	3.9 J	3.9 J	1,600 (RBC) (N)	1,100	10,000[2]
indeno(1,2,3-cd)pyrene	15	0.092 J	**0.88**	4.3 J	0.87 (RBC) (C)	0.9	4
phenanthrene	15	0.1 J	1.8	10 J	not available	not available	not available
pyrene	15	0.25 J	2.4	15 J	2,300 (RBC) (N)	1,700	10,000[2]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
[2]health based criterion exceeds the 10,000 ppm maximum for total organic contaminants
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated
BOLD = average concentration detected at or above health screening value

Table 13
Dismal Swamp Site, "Area B" Test Pit Soil (0 - 6 Inches Depth) SVOCs

Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
benzo(a)anthracene	3	0.081 J	**2.4**	6.2	0.87 (RBC) (C)	0.9	4
benzo(a)pyrene	3	0.07 J	**2.6**	5.4 J	0.1 (CREG)	0.66[1]	0.66[1]
benzo(b)fluoranthene	3	0.077 J	**2.6**	5.1 J	0.87 (RBC) (C)	0.9	4
bis(2-ethylhexyl)phthalate	3	0.51 J	2.9	4.8 J	50 (CREG)	49	210
di-n-octylphthalate	3	below detection limit	below detection limit	below detection limit	1,600 (RBC) (N)	1,100	10,000[2]
indeno(1,2,3-cd)pyrene	3	0.092 J	**1.1**	2.2 J	0.87 (RBC) (C)	0.9	4
phenanthrene	3	0.087 J	3.5	7	not available	not available	not available
pyrene	3	0.16 J	3.9	9.2	2,300 (RBC) (N)	1,700	10,000[2]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
[2]health based criterion exceeds the 10,000 ppm maximum for total organic contaminants
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated; D = identified in an analysis at a secondary dilution factor
BOLD = average concentration detected at or above health screening value

Table 14
Dismal Swamp, "Area B" Test Pit Soil (2 - 6 Feet Depth) SVOCs

Substance	No. Samples Analyzed	Minimum Concentration Detected (ppm)	Average Concentration Detected (ppm)	Maximum Concentration Detected (ppm)	Health Screening Value (ppm)	NJDEP Residential Cleanup Criteria (ppm)	NJDEP Non-Residential Cleanup Criteria (ppm)
benzo(a)anthracene	10	0.059 J	0.33	0.98 J	0.87 (RBC) (C)	0.9	4
benzo(a)pyrene	10	0.21 J	**0.55**	0.88 J	0.1 (CREG)	0.66[1]	0.66[1]
benzo(b)fluoranthene	10	0.078 J	0.33	0.73 J	0.87 (RBC) (C)	0.9	4
bis(2-ethylhexyl)phthalate	10	0.041 J	0.49	1.5 J	50 (CREG)	49	210
di-n-octylphthalate	10	below detection limit	below detection limit	below detection limit	1,600 (RBC) (N)	1,100	10,000[2]
indeno(1,2,3-cd)pyrene	10	0.064 J	0.22	0.55 J	0.87 (RBC) (C)	0.9	4
phenanthrene	10	0.075 J	0.42	1.1 J	not available	not available	not available
pyrene	10	0.095 J	0.66	1.7 J	2,300 (RBC) (N)	1,700	10,000[2]

[1]health based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level
[2]health based criterion exceeds the 10,000 ppm maximum for total organic contaminants
RBC = USEPA Risk-based Concentration for residential soils; (C) = carcinogenic effects, (N) = non-carcinogenic effects
CREG = ATSDR Cancer Risk Evaluation Guide for 1E-06 (one in a million) excess cancer risk
J = estimated; D = identified in an analysis at a secondary dilution factor
BOLD = average concentration detected at or above health screening value

Appendix A

The ATSDR ToxFAQs, found at www.atsdr.cdc.gov/toxfaq.html, are summaries of hazardous substances developed by the ATSDR Division of Toxicology (ATSDR downloaded 2001). More detailed information on these hazardous substances is available from the ATSDR Toxicological Profiles and Public Health Statements. ToxFAQs provide answers to the most frequently asked questions (FAQs) about exposure to hazardous substances found around hazardous waste sites and the effects of exposure on human health. Excerpts for the contaminants detected at the QRC site and neighboring properties are described below.

ToxFAQs™

Frequently Asked Questions About Contaminants Found at Hazardous Waste Sites

Arsenic

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

HIGHLIGHTS: Exposure to higher than average levels of arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found at 1,014 of the 1,598 National Priority List sites identified by the USEPA.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization, the Department of Health and Human Services, and the USEPA have determined that inorganic arsenic is a human carcinogen.

Is there a medical test to show whether I've been exposed to arsenic?

There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels or arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Bis(2-ethylhexyl)phthalate (also known as di(2-ethylhexyl)phthalate)

What is di(2-ethylhexyl)phthalate (DEHP)?
(Pronounced die 2-eth'yl hex'yl thal'ate)

Di(2-ethylhexyl) phthalate is a manufactured chemical that makes plastic more flexible. It is also called DEHP. DEHP is a colorless liquid with almost no odor. DEHP is in polyvinyl chloride (PVC) plastic products like toys, vinyl upholstery, shower curtains, adhesives, and coatings. Vinyl plastic may contain up to 40% DEHP.

DEHP is also used in inks, pesticides, cosmetics, and vacuum pump oil. It is used to detect leaks in protective face gear, and as a test material for filtration systems. Trade names for DEHP are Platinol DOP®®, Octoil®®, Silicol 150®®, Bisoflex 81®®, and Eviplast 80®®. Use of trade names is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry, the Public Health Service, or the U.S. Department of Health and Human Services

What happens to di(2-ethylhexyl)phthalate (DEHP) when it enters the environment?

- DEHP is everywhere in the environment because of its use in plastics, but it evaporates into air and dissolves into water at very low rates.
- DEHP from plastic materials, coatings, and flooring can increase indoor air levels.
- It dissolves faster in water if gas, oil, or paint removers are present.
- It attaches strongly to soil particles.
- Small organisms in surface water or soil break it down into harmless compounds.
- It doesn't break down easily in deep soil, or in lake or river bottoms.
- It is in plants, fish, and other animals, but animals high on the food chain are able to breakdown DEHP, so tissue levels are usually low.

How might I be exposed to di(2-ethylhexyl)phthalate (DEHP)?

- Using medical products packaged in plastic such as blood products.
- Eating some foods packaged in plastics, especially fatty foods like milk products, fish and seafood, oils, but levels still usually quite low.
- Drinking well water near waste sites, but levels usually are low.
- Breathing workplace air or indoor air where DEHP is released, but usually not at levels of concern.
- Fluids from plastic intravenous tubing if used extensively as for kidney dialysis.

How can di(2-ethylhexyl)phthalate (DEHP) affect my health?

There is no evidence that DEHP causes serious health effects in humans. Most of what we know about the health effects of DEHP comes from high exposures to rats and mice. Adverse effects in animals were generally seen only at high doses or with long-term exposures. You are not likely to be exposed to these very high levels. Moreover, absorption and breakdown of DEHP in humans is different than in rats and mice, so the effects seen in rats and mice may not occur in humans. The studies in rats and mice with DEHP in the air produced no serious harmful effects. There was no effect on lifespan or the ability to reproduce.

Brief exposure to very high levels of DEHP in food or water damaged sperm, but the effect reversed when DEHP was removed from the diet. Longer exposures to high doses affected the ability of both males and females to reproduce and caused birth defects. High levels of DEHP damaged the livers of rats and mice. Long exposures of rats to DEHP caused kidney damage similar to the damage seen in the kidneys of long-term dialysis patients.

Whether or not DEHP contributes to human kidney damage, is unclear at present. You should have no health effects from skin contact with products containing DEHP because it cannot be taken up easily through the skin.

How likely is di(2-ethylhexyl)phthalate (DEHP) to cause cancer?

The Department of Health and Human Services (DHHS) has determined that DEHP may reasonably be anticipated to be a carcinogen. There is no evidence that DEHP causes cancer in humans, but high exposures in rats and mice increased liver cancer. Based on these studies, the Department of Health and Human Services (DHHS) has determined that DEHP may reasonably be anticipated to be a carcinogen.

Is there a medical test to show whether I've been exposed to di(2-ethylhexyl)phthalate (DEHP)?

A test is available that measures a breakdown product of DEHP called mono(2-ethylhexyl)phthalate (MEHP). MEHP is measured in your urine or blood. This test is good only for recent exposures because DEHP remains in your body for only a short time. These tests require special equipment that is not routinely available in a doctor''s office.

Has the federal government made recommendations to protect human health?

The EPA proposed a limit of 6 parts DEHP per billion parts of drinking water (6 ppb). The Food and Drug Administration (FDA) limits the types of food packaging materials containing DEHP. The Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH) limits the average level of DEHP in workplace air to 5 milligrams per cubic meter (mg/m^3) over an 8-hour workday and 10 mg/m^3 for a 15-minute exposure.

Di-*n*-octylphthalate

How can di-*n*-octylphthalate affect my health?

Little information is known about the health effects that might be caused by di-*n*-octylphthalate. It is not known what happens when you breathe or ingest the chemical.

Some rats and mice that were given very high doses of di-*n*-octylphthalate by mouth died. Mildly harmful effects have been seen in the livers of some rats and mice given very high doses of di-*n*-octylphthalate by mouth for short (14 days or less) or intermediate periods (15 to 365 days) of time, but lower doses given for short periods of time generally caused no harmful effects.

No information is available on the health effects of having di-*n*-octylphthalate in contact with human skin. It can be mildly irritating when applied to the skin of animals.

It is not known whether or not di-*n*-octylphthalate could affect the ability to have children, or if it could cause birth defects.

How likely is di-*n*-octylphthalate to cause cancer?

Di-*n*-octylphthalate is not known to cause cancer in humans or animals.

Di-*n*-octylphthalate has not been classified as to its carcinogenicity by the Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), or the EPA.

Is there a medical test to show whether I've been exposed to di-*n*-octylphthalate?

Di-*n*-octylphthalate and its principal breakdown products can be measured in urine, blood, and tissues. However, it is not known if they are specific for di-*n*-octylphthalate or for how long after exposure occurs the test is useful. These facts cannot be used to determine how much di-*n*-octylphthalate you were exposed to or predict whether harmful effects will occur.

This test is not part of a routine medical examination, but it can be done by the doctor's request at special laboratories.

Has the federal government made recommendations to protect human health?

The EPA has recently determined that there is not enough evidence to say that di-*n*-octylphthalate causes harmful effects in humans or the environment.

The EPA requires that spills or accidental releases into the environment of 5,000 pounds or more of di-*n*-octylphthalate be reported to the EPA.

Lead

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the USEPA.

PAHs

note: these include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene

HIGHLIGHTS: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the USEPA.

What are polycyclic aromatic hydrocarbons (PAHs)?

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

How likely are polycyclic aromatic hydrocarbons (PAHs) to cause cancer?

The Department of Health and Human Services has determined that some PAHs may reasonably be expected to be carcinogens. Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

PCBs

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the USEPA.

What are polychlorinated biphenyls (PCBs)?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the United States by the trade name Aroclor. The manufacture of PCBs was stopped in the United States in 1977 because of evidence they build up in the environment and can cause harmful health effects.

How likely are polychlorinated biphenyls (PCBs) to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services has concluded that PCBs may reasonably be anticipated to be carcinogens. The USEPA and the International Agency for Research on Cancer have determined that PCBs are probably carcinogenic to humans.

Thallium

What is thallium?
(Pronounced thal'ee-um)

Pure thallium is a bluish-white metal that is found in trace amounts in the earth''s crust. In the past, thallium was obtained as a by-product from smelting other metals; however, it has not been produced in the United States since 1984. Currently, all the thallium is obtained from imports and from thallium reserves.

In its pure form, thallium is odorless and tasteless. It can also be found combined with other substances such as bromine, chlorine, fluorine, and iodine. When it's combined, it appears colorless-to-white or yellow.

Thallium is used mostly in manufacturing electronic devices, switches, and closures, primarily for the semiconductor industry. It also has limited use in the manufacture of special glass and for certain medical procedures.

What happens to thallium when it enters the environment?

- Thallium enters the environment primarily from coal-burning and smelting, in which it is a trace contaminant of the raw materials.
- It stays in the air, water, and soil for a long time and is not broken down.
- Some thallium compounds are removed from the atmosphere in rain and snow.
- It's absorbed by plants and enters the food chain.
- It builds up in fish and shellfish.

How might I be exposed to thallium?

- Eating food contaminated with thallium may be a major source of exposure for most people.
- Breathing workplace air in industries that use thallium.
- Smoking cigarettes.
- Living near hazardous waste sites containing thallium (may result in higher than normal exposures).
- Touching or, for children, eating soil contaminated with thallium.
- Breathing low levels in air and water.

How can thallium affect my health?

Exposure to high levels of thallium can result in harmful health effects. A study on workers exposed on the job over several years reported nervous system effects, such as numbness of fingers and toes, from breathing thallium.

Studies in people who ingested large amounts of thallium over a short time have reported vomiting, diarrhea, temporary hair loss, and effects on the nervous system, lungs, heart, liver, and kidneys. It has caused death. It is not known what the effects are from ingesting low levels of thallium over a long time.

Birth defects were not reported in the children of mothers exposed to low levels from eating vegetables and fruits contaminated with thallium. Studies in rats, however, exposed to high levels of thallium, showed adverse developmental effects.

It is not known if breathing or ingesting thallium affects human reproduction. Studies showed that rats that ingested thallium for several weeks had some adverse reproductive effects. Animal data suggest that the male reproductive system may be susceptible to damage by low levels of thallium.

There is no information available on the health effects of skin contact with thallium in people or animals.

How likely is thallium to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified thallium as to its human carcinogenicity.

No studies are available in people or animals on the carcinogenic effects of breathing, ingesting, or touching thallium.

Is there a medical test to show whether I've been exposed to thallium?

There are medical tests available to measure levels of thallium in urine and hair. In addition, thallium can also be measured in blood; however, this is not a good indicator of exposure since thallium only stays in blood a very short time.

These tests require special equipment that is not usually available in most doctor''s offices. In addition, these tests cannot determine if adverse health effects will occur from the exposure to thallium.

Has the federal government made recommendations to protect human health?

The EPA requires that discharges or accidental spills into the environment of 1,000 pounds or more of thallium be reported.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 0.1 milligrams per cubic meter (0.1 mg/m^3) for thallium in workplace air. The American Conference of Governmental Industrial Hygienists (ACGIH) has established the same guidelines as OSHA for the workplace.

The National Institute for Occupational Safety and Health (NIOSH) has recommended that 15 mg/m^3 of thallium be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Appendix B

Summary of Public Comments and Responses
Dismal Swamp Site Public Health Assessment

The public was invited to review the draft Public Health Assessment of the Dismal Swamp site during the public comment period which occurred on April 9 through May 9, 2003. No comments were received during this period.

Appendix C
ATSDR Glossary of Terms

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency with headquarters in Atlanta, Georgia, and 10 regional offices in the United States. ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. ATSDR is not a regulatory agency, unlike the U.S. Environmental Protection Agency (EPA), which is the federal agency that develops and enforces environmental laws to protect the environment and human health. This glossary defines words used by ATSDR in communications with the public. It is not a complete dictionary of environmental health terms. If you have questions or comments, call ATSDR's toll-free telephone number, 1-888-42-ATSDR (1-888-422-8737).

General Terms

Absorption
The process of taking in. For a person or an animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

Acute
Occurring over a short time [compare with chronic].

Acute exposure
Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with intermediate duration exposure and chronic exposure].

Additive effect
A biologic response to exposure to multiple substances that equals the sum of responses of all the individual substances added together [compare with antagonistic effect and synergistic effect].

Adverse health effect
A change in body function or cell structure that might lead to disease or health problems

Aerobic
Requiring oxygen [compare with anaerobic].

Ambient
Surrounding (for example, ambient air).

Anaerobic
Requiring the absence of oxygen [compare with aerobic].

Analyte
A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study
A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Antagonistic effect
A biologic response to exposure to multiple substances that is less than would be expected if the known effects of the individual substances were added together [compare with additive effect and synergistic effect].

Background level
An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

Biodegradation
Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

Biologic indicators of exposure study
A study that uses (a) biomedical testing or (b) the measurement of a substance [an analyte], its metabolite, or another marker of exposure in human body fluids or tissues to confirm human exposure to a hazardous substance [also see exposure investigation].

Biologic monitoring
Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath) to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

Biologic uptake
The transfer of substances from the environment to plants, animals, and humans.

Biomedical testing
Testing of persons to find out whether a change in a body function might have occurred because of exposure to a hazardous substance.

Biota
Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

Body burden
The total amount of a substance in the body. Some substances build up in the body because they are stored in fat or bone or because they leave the body very slowly.

CAP [see Community Assistance Panel.]

Cancer
Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

Cancer risk
A theoretical risk for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Carcinogen
A substance that causes cancer.

Case study
A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

Case-control study
A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease.

CAS registry number
A unique number assigned to a substance or mixture by the American Chemical Society Abstracts Service.

Central nervous system
The part of the nervous system that consists of the brain and the spinal cord.

CERCLA [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980]

Chronic
Occurring over a long time [compare with acute].

Chronic exposure
Contact with a substance that occurs over a long time (more than 1 year) [compare with acute exposure and intermediate duration exposure]

Cluster investigation
A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors.

Community Assistance Panel (CAP)
A group of people from a community and from health and environmental agencies who work with ATSDR to resolve issues and problems related to hazardous substances in the community. CAP members work with ATSDR to gather and review community health concerns, provide information on how people might have been or might now be exposed to hazardous substances, and inform ATSDR on ways to involve the community in its activities.

Comparison value (CV)
Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

Completed exposure pathway [see exposure pathway].

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
CERCLA, also known as Superfund, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances. This law was later amended by the Superfund Amendments and Reauthorization Act (SARA).

Concentration
The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Contaminant
A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

Delayed health effect
A disease or an injury that happens as a result of exposures that might have occurred in the past.

Dermal
Referring to the skin. For example, dermal absorption means passing through the skin.

Dermal contact
Contact with (touching) the skin [see route of exposure].

Descriptive epidemiology
The study of the amount and distribution of a disease in a specified population by person, place, and time.

Detection limit
The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

Disease prevention
Measures used to prevent a disease or reduce its severity.

Disease registry
A system of ongoing registration of all cases of a particular disease or health condition in a defined population.

DOD
United States Department of Defense.

DOE
United States Department of Energy.

Dose (for chemicals that are not radioactive)
The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An "exposure dose" is how much of a substance is encountered in the environment. An "absorbed dose" is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

Dose (for radioactive chemicals)
The radiation dose is the amount of energy from radiation that is actually absorbed by the body. This is not the same as measurements of the amount of radiation in the environment.

Dose-response relationship
The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

Environmental media
Soil, water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

Environmental media and transport mechanism
Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where human exposure can occur. The environmental media and transport mechanism is the second part of an exposure pathway.

EPA
United States Environmental Protection Agency.

Epidemiologic surveillance [see Public health surveillance].

Epidemiology
The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

Exposure
Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].

Exposure assessment
The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

Exposure-dose reconstruction
A method of estimating the amount of people's past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

Exposure investigation
The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

Exposure pathway
The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Exposure registry
A system of ongoing followup of people who have had documented environmental exposures.

Feasibility study
A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

Geographic information system (GIS)
A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

Grand rounds
Training sessions for physicians and other health care providers about health topics.

Groundwater
Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].

Half-life ($t_{1/2}$)
The time it takes for half the original amount of a substance to disappear. In the environment, the half-life is the time it takes for half the original amount of a substance to disappear when it is changed to another chemical by bacteria, fungi, sunlight, or other chemical processes. In the human body, the half-life is the time it takes for half the original amount of the substance to disappear, either by being changed to another substance or by leaving the body. In the case of radioactive material, the half life is the amount of time necessary for one half the initial number of radioactive atoms to change or transform into another atom (that is normally not radioactive). After two half lives, 25% of the original number of radioactive atoms remain.

Hazard
A source of potential harm from past, current, or future exposures.

Hazardous Substance Release and Health Effects Database (HazDat)
The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

Hazardous waste
Potentially harmful substances that have been released or discarded into the environment.

Health consultation
A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with public health assessment].

Health education
Programs designed with a community to help it know about health risks and how to reduce these risks.

Health investigation
The collection and evaluation of information about the health of community residents. This information is used to describe or count the occurrence of a disease, symptom, or clinical measure and to evaluate the possible association between the occurrence and exposure to hazardous substances.

Health promotion
The process of enabling people to increase control over, and to improve, their health.

Health statistics review
The analysis of existing health information (i.e., from death certificates, birth defects registries, and cancer registries) to determine if there is excess disease in a specific population, geographic area, and time period. A health statistics review is a descriptive epidemiologic study.

Indeterminate public health hazard
The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

Incidence
The number of new cases of disease in a defined population over a specific time period [contrast with prevalence].

Ingestion
The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].

Inhalation
The act of breathing. A hazardous substance can enter the body this way [see route of exposure].

Intermediate duration exposure
Contact with a substance that occurs for more than 14 days and less than a year [compare with acute exposure and chronic exposure].

In vitro
In an artificial environment outside a living organism or body. For example, some toxicity testing is done on cell cultures or slices of tissue grown in the laboratory, rather than on a living animal [compare with in vivo].

In vivo
Within a living organism or body. For example, some toxicity testing is done on whole animals, such as rats or mice [compare with in vitro].

Lowest-observed-adverse-effect level (LOAEL)
The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

Medical monitoring
A set of medical tests and physical exams specifically designed to evaluate whether an individual's exposure could negatively affect that person's health.

Metabolism
The conversion or breakdown of a substance from one form to another by a living organism.

Metabolite
Any product of metabolism.

mg/kg
Milligram per kilogram.

mg/cm2
Milligram per square centimeter (of a surface).

mg/m3
Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

Migration
Moving from one location to another.

Minimal risk level (MRL)
An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see reference dose].

Morbidity
State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life.

Mortality
Death. Usually the cause (a specific disease, a condition, or an injury) is stated.

Mutagen
A substance that causes mutations (genetic damage).

Mutation
A change (damage) to the DNA, genes, or chromosomes of living organisms.

National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or NPL)
EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

National Toxicology Program (NTP)
Part of the Department of Health and Human Services. NTP develops and carries out tests to predict whether a chemical will cause harm to humans.

No apparent public health hazard
A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

No-observed-adverse-effect level (NOAEL)
The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

No public health hazard
A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

NPL [see National Priorities List for Uncontrolled Hazardous Waste Sites]

Physiologically based pharmacokinetic model (PBPK model)
A computer model that describes what happens to a chemical in the body. This model describes how the chemical gets into the body, where it goes in the body, how it is changed by the body, and how it leaves the body.

Pica
A craving to eat nonfood items, such as dirt, paint chips, and clay. Some children exhibit pica-related behavior.

Plume
A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

Point of exposure
The place where someone can come into contact with a substance present in the environment [see exposure pathway].

Population
A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

Potentially responsible party (PRP)
A company, government, or person legally responsible for cleaning up the pollution at a hazardous waste site under Superfund. There may be more than one PRP for a particular site.

ppb
Parts per billion.

ppm
Parts per million.

Prevalence
The number of existing disease cases in a defined population during a specific time period [contrast with incidence].

Prevalence survey
The measure of the current level of disease(s) or symptoms and exposures through a questionnaire that collects self-reported information from a defined population.

Prevention
Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

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

Public comment period
An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

Public health action
A list of steps to protect public health.

Public health advisory
A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

Public health assessment (PHA)
An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health [compare with health consultation].

Public health hazard
A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects.

Public health hazard categories
Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

Public health statement
The first chapter of an ATSDR toxicological profile. The public health statement is a summary written in words that are easy to understand. The public health statement explains how people might be exposed to a specific substance and describes the known health effects of that substance.

Public health surveillance
The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

Public meeting
A public forum with community members for communication about a site.

Radioisotope
An unstable or radioactive isotope (form) of an element that can change into another element by giving off radiation.

Radionuclide
Any radioactive isotope (form) of any element.

RCRA [see Resource Conservation and Recovery Act (1976, 1984)]

Receptor population
People who could come into contact with hazardous substances [see exposure pathway].

Reference dose (RfD)
An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

Registry
A systematic collection of information on persons exposed to a specific substance or having specific diseases [see exposure registry and disease registry].

Remedial investigation
The CERCLA process of determining the type and extent of hazardous material contamination at a site.

Resource Conservation and Recovery Act (1976, 1984) (RCRA)
This Act regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed of, or distributed.

RFA
RCRA Facility Assessment. An assessment required by RCRA to identify potential and actual releases of hazardous chemicals.

RfD [see reference dose]

Risk
The probability that something will cause injury or harm.

Risk reduction
Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

Risk communication
The exchange of information to increase understanding of health risks.

Route of exposure
The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].

Safety factor [see uncertainty factor]

SARA [see Superfund Amendments and Reauthorization Act]

Sample
A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see population]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

Sample size
The number of units chosen from a population or an environment.

Solvent
A liquid capable of dissolving or dispersing another substance (for example, acetone or mineral spirits).

Source of contamination
The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

Special populations
People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Stakeholder
A person, group, or community who has an interest in activities at a hazardous waste site.

Statistics
A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to determine whether differences between study groups are meaningful.

Substance
A chemical.

Substance-specific applied research
A program of research designed to fill important data needs for specific hazardous substances identified in ATSDR's toxicological profiles. Filling these data needs would allow more accurate assessment of human risks from specific substances contaminating the environment. This research might include human studies or laboratory experiments to determine health effects resulting from exposure to a given hazardous substance.

Superfund [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act (SARA)

Superfund Amendments and Reauthorization Act (SARA)
In 1986, SARA amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

Surface water
Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with groundwater].

Surveillance [see public health surveillance]

Survey
A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see prevalence survey].

Synergistic effect
A biologic response to multiple substances where one substance worsens the effect of another substance. The combined effect of the substances acting together is greater than the sum of the effects of the substances acting by themselves [see additive effect and antagonistic effect].

Teratogen
A substance that causes defects in development between conception and birth. A teratogen is a substance that causes a structural or functional birth defect.

Toxic agent
Chemical or physical (for example, radiation, heat, cold, microwaves) agents that, under certain circumstances of exposure, can cause harmful effects to living organisms.

Toxicological profile
An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

Toxicology
The study of the harmful effects of substances on humans or animals.

Tumor
An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

Uncertainty factor
Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a safety factor].

Urgent public health hazard
A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

Volatile organic compounds (VOCs)
Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

Other glossaries and dictionaries:
Environmental Protection Agency (http://www.epa.gov/OCEPAterms/)

National Center for Environmental Health (CDC)
(http://www.cdc.gov/nceh/dls/report/glossary.htm)

National Library of Medicine (NIH) (http://www.nlm.nih.gov/medlineplus/mplusdictionary.html)

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