



# Public Health Assessment

## Federal Creosote Site Manville, Somerset County

CERCLIS # NJ0001900281

### Public Comment Release

Public Comment Period:  
July 10 - August 21, 2000

*Prepared Under a Cooperative Agreement with the:*

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY**

*All comments must be submitted in writing to:*

**Health Assessment Project Manager  
NJ Department of Health and Senior Services  
Consumer and Environmental Health Services  
PO Box 360  
Trenton, NJ 08625-0360**

## **THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION**

**Section 104 (i) (6) (F) of the Comprehensive Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states “...the term ‘health assessment’ shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations, and studies available from the Administrator of EPA.”**

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

**Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.**

**Public Health Assessment**

**Federal Creosote Site  
CERCLIS # NJ0001900281**

Public Comment Draft  
July 10, 2000

Prepared By:  
Hazardous Site Health Evaluation Program  
Consumer and Environmental Health Services  
Division of Epidemiology, Environmental and Occupational Health  
New Jersey Department of Health and Senior Services

Under a Cooperative Agreement With:  
The Agency For Toxic Substances and Disease Registry

**Table of Contents**

Summary ..... 1

Purpose and Health Issues ..... 2

Background ..... 3

    A. Site Description and History ..... 3

    B. Demographics, Land Use, and Natural Resources ..... 6

    C. Site Visit ..... 7

Discussion ..... 7

    A. Contaminants of Concern ..... 7

    B. Pathways of Exposure ..... 10

    C. Health Effects From Exposures ..... 11

    D. Health Outcome Data ..... 14

    E. Community Health Concerns ..... 14

Recommendations ..... 15

Public Health Action Plan ..... 15

    A. Public Health Actions Taken ..... 15

    B. Public Health Actions Planned ..... 16

ATSDR Child Health Initiative ..... 16

Certification ..... 18

Preparer of Report: ..... 19

References ..... 20

## **Summary**

The Federal Creosote site is a 53 acre site which includes a 15 acre shopping/commercial area and a 35 acre housing development. These two areas were built over a former wood treatment facility in which railroad ties were treated with coal tar creosote from approximately 1910 to 1956. After operations ceased, two lagoons and two canals containing used coal tar creosote were covered with fill, the site was graded, and the area developed for commercial and residential purposes. The residential portion, built in the mid-1960s, is known as the Claremont Development.

Contaminants consistent with the components of creosote were first discovered in a residential sump pump in 1996. Investigations by the New Jersey Department of Environmental Protection (NJDEP), and later the United States Environmental Protection Agency (USEPA), found polycyclic aromatic hydrocarbons (PAHs) in surface and subsurface soils from residential properties within the Claremont Development. The source of these compounds is suspected to be the former canals and lagoons, which still contain a concentrated creosote sludge, and underlie or abut several residences.

The USEPA has conducted surface and subsurface soil sampling, indoor air monitoring, lagoon and canal delineation, and installed monitoring wells. In July 1998, approximately 16 homes with the highest levels of PAHs in surface soil were temporarily remediated (i.e., ground cover was put in place to eliminate exposure to contaminated soils). Residents of at least 17 homes are expected to be permanently relocated in order to remove canal and lagoon material. Other residents may also be temporarily relocated at a later time to remove other areas of canal and lagoon material, and creosote-contaminated soils.

The Agency for Toxic Substances and Disease Registry (ATSDR) has performed several health consultations on the site which indicate that long term exposure to contaminants found in surface soil are not likely to result in health effects. However, sub-surface soils contain higher levels of PAHs, and residents should avoid activities that may result in contact with sub-surface soil. Exposures to creosote and its constituents in soil can occur through dermal exposure, and through inhalation and ingestion of soil-borne contaminants. Exposure is unlikely to occur through ingestion of vegetables grown at the residences.

The New Jersey Department of Health and Senior Services (NJDHSS) and the ATSDR conclude that exposure to surface soil represents no apparent public health hazard. Although levels of coal tar creosote constituents found in surface soil do not pose a public health hazard for routine land use and outdoor activities, any activities that would disturb deeper soil as near as two feet below ground level could result in exposures that may pose a health risk. The NJDHSS and ATSDR concur with the USEPA's plan to relocate residents to remediate the site. The NJDHSS and the ATSDR recommend that, as source material and sub-surface soil is removed or otherwise remediated, precautions should be taken to ensure that contaminants do not migrate to non-contaminated properties. The NJDHSS and ATSDR will further evaluate public health risks from exposures to groundwater as data becomes available.

The ATSDR has provided consultation to the USEPA and to area residents on health issues

relating to the site. The ATSDR and the NJDHSS will continue to evaluate environmental data in the context of public health concerns, and ensure that residents and health care providers are kept informed of these issues.

### **Purpose and Health Issues**

This Public Health Assessment evaluates actual and potential human exposures to contaminants measured on the residential portion of the Federal Creosote site. It also serves to document community health concerns relating to the site. In addition, this Public Health Assessment is being conducted because the Federal Creosote site was added to the National Priorities List on January 19, 1999.

Housing was built over buried canals and lagoons containing coal tar creosote, which can result in residents being exposed to creosote and its constituent components. Coal tar creosote is a mixture of hundreds of individual components, including polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs). These contaminants have been detected in surface and subsurface soils.

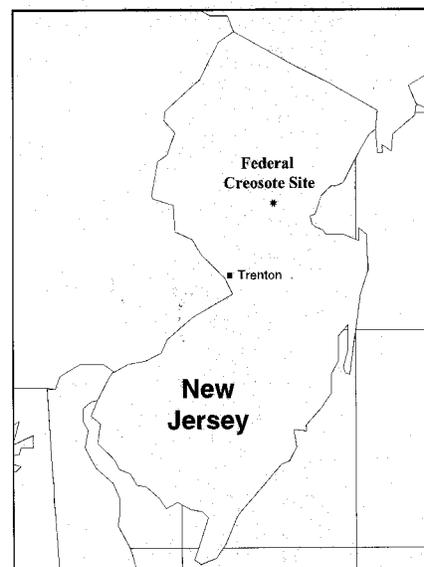
Creosote exposure occurs through ingestion, inhalation, or dermal contact with soil. It also occurs through inhalation of volatile PAHs in indoor air, or through ingestion of vegetables grown in contaminated soil. Because this is a residential site, it is reasonable to expect that people may come in contact with contaminants. Health effects of exposure are more fully described below under "Discussion."

## Background

### A. Site Description and History

The Federal Creosote (FC) site occupies 53 acres in a residential/commercial area in Manville, Somerset County, NJ (see Figure 1). Between 1910 and 1956 the Federal Creosoting Company operated a wood treatment plant on the site. Specifically, railroad ties and telephone poles were treated with coal tar creosote, which acts as a wood preservative and water-proofing agent. These activities generated process waste, including creosote-contaminated sludges, sediments, process residuals, preservative drippings, and spent process liquids. Area soil was also contaminated. Two canals and two buried lagoons were used to transport and hold, respectively, spent creosote during operations.

Sometime after the plant ceased operations, the site was sold to a developer. Fill material was used to cover the canals and lagoon areas, although the original coal tar creosote and associated wastes were not removed. In the early 1960s, a parcel of approximately 15 acres of the site was developed as a shopping mall and commercial area. In the mid-1960s, 137 houses were built on another 35 acres of the site. This development is known as the Claremont Development. The Claremont Development is roughly triangular in shape. It is bordered on the west by the borough's Main Street and on the north and east by railroad tracks (see Figure 2).



**Figure 2**

In April 1996, the New Jersey Department of Environmental Protection (NJDEP) was notified that a sump pump located in a residence in the Claremont Development was discharging an unknown liquid with a strong chemical odor. The NJDEP reported the presence of a thick, dark brown, tar or oil-like substance flowing from the sump pump. The substance was found to be petroleum based, ignitable, and soluble in alcohol. The following January, excavation of a sinkhole which had formed around a storm sewer pipe in the development revealed a black tar-like substance in the soil. Analysis of this material indicated that it contained contaminants consistent with the composition of creosote.

The U.S. Environmental Protection Agency (USEPA) conducted subsurface and surface soil sampling in October 1997 and February 1998, and found polycyclic aromatic hydrocarbons (PAHs) at 37 residences. PAHs are the largest group of compounds found in coal tar creosote. The USEPA determined that levels of PAHs at nineteen of the properties posed an unacceptable long-term health risk. In July 1998, the USEPA placed sod, mulch, or other ground cover at these 19 residences over any existing areas of bare soil to act as a barrier to direct contact with soil.

The former lagoons and canals continue to be a source of contamination. The USEPA estimates

that the lagoons and canals contain approximately 43,900 cubic yards of source material. It also estimates that there is approximately 78,900 cubic yards of contaminated soil.

The Agency for Toxic Substances and Disease Registry (ATSDR) has prepared several Health Consultations at the request of the USEPA and residents. These are summarized below:

<b><u>Date of Health Consultation</u></b>	<b><u>Issues of Concern</u></b>	<b><u>Conclusions and Recommendation</u></b>
May 1, 1997	ATSDR was asked to evaluate the public health implications of exposure to creosote and its constituents (PAHs, VOCs) at the levels found on site during the USEPA's preliminary site investigation.	<p>The Health Consultation describes the general effects of exposure to coal tar creosote and the most likely route of exposure in a residential setting. It concluded the following:</p> <ul style="list-style-type: none"><li>• PAHs detected in subsurface soils pose a threat to residents if the material is unearthed;</li><li>• creosote entering one residence through the sump pump may pose a skin contact hazard.</li></ul> <p>The consultation recommended further site characterization through additional surface soil (0 to 3 inches depth) sampling. It also recommended that the presence of private potable wells be determined.</p>
May 15, 1997	ATSDR was asked to provide action levels for indoor air contaminants relative to the site.	<p>ATSDR provided health-based guidelines for benzene and naphthalene, suggesting levels at which action would need to be taken. Three levels were provided: evacuation (immediately hazardous and unsafe for habitation), short-term (less than 14 days), and long-term (more than 1 year) exposures. Benzene and naphthalene were chosen as the basis for developing health-based guidelines because they are components of coal tar creosote, and because of their toxicity and volatility.</p>

January 16, 1998

The USEPA conducted surface soil sampling, as recommended in the 5/1/97 health consultation, and requested an evaluation of the data.

Several residences had elevated levels of PAHs in surface soil. Using a worst-case scenario, ATSDR concluded that the PAHs in surface soil did not present an acute health threat, but did present a potential long-term health threat on some properties. It recommended the following:

- additional sampling be conducted (the data used for this consultation was from only one sample per yard, and might not represent the true extent of contamination)
- residents should be advised not to dig into areas of creosote contamination.

April 24, 1998

A resident requested information about the safety of eating home grown vegetables.

Based upon assumptions regarding the uptake of contaminants from soil into plants, and the amount of home-grown vegetables typically consumed, ATSDR concluded that:

- there is a potential for toxicologically relevant levels of PAHs to adhere to or be taken up by the edible portions of vegetables grown on the site,
- the consumption of these vegetables may add to the risks already present from exposure to PAHs in soil.

Because these conclusions were based on studies in other places and not on actual testing of produce at this site, ATSDR recommended that future sampling include areas where residents have vegetable gardens.

February 11, 1999 This consultation evaluated additional surface soil sampling results recommended in the 1/16/98 health consultation.

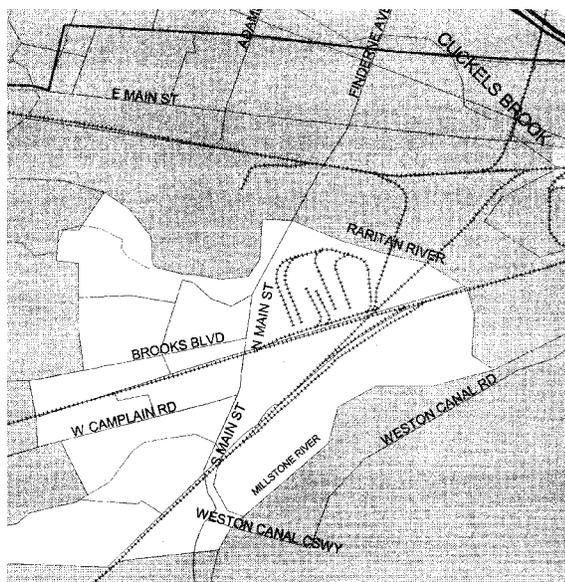
Approximately ten to twelve surface soil samples were collected at each of 133 properties in the development. PAHs, lead and cadmium detected in surface soil were found at concentrations below those associated with acute or chronic health effects. ATSDR concluded that PAHs, lead and arsenic found in surface soil at this site do not pose a public health hazard.

In October 1998, several residents also spoke with an ATSDR medical officer regarding specific health concerns.

The USEPA and the NJDEP conducted indoor air monitoring at 126 residential and commercial properties in the Claremont Development in 1997. Although several residences exhibited low levels of volatile organic compounds, including naphthalene, these contaminants were determined to be a result of storage and use of household products, and were not volatilizing from the site.

The USEPA has been and continues to monitor the municipal water supply for migration of site contaminants. There is no evidence that the plume has spread to the municipal wells; however, groundwater from monitoring wells is contaminated with components of creosote. The USEPA has largely delineated the extent of subsurface soil contamination and defined the boundaries of the former canals and lagoons. The USEPA has installed additional groundwater monitoring wells, and will be sampling sediments from the Millstone and Raritan Rivers. The USEPA is also working with residents to develop a schedule to remediate properties that is both acceptable to the community and protective of public health.

### B. Demographics, Land Use, and Natural Resources



The Federal Creosote site is in a residential and commercial area of the Borough of Manville in Somerset County. Population data from 1990 indicate that there are 10,567 residents occupying 4,119 households in the Borough of Manville. The Claremont Development has 137 households, with an estimated population of approximately 350 persons.

Two municipal wells are located approximately 1/4 mile northeast from the site. These wells serve as a potable water source for both the immediate community and the surrounding area. The remainder of the community's water supply is from the Elizabethtown Water Company, which draws from wells near the confluence of the Millstone and the

Figure 3. Manville

Raritan Rivers.

The area surrounding the site is used for a variety of purposes, including commercial and retail uses along Main Street, and other residential areas to the southeast across railroad tracks. The former Johns Manville asbestos product manufacturing facility occupied the area immediately north of the northern railroad line. There are no surface water features within the Claremont development other than storm drains. The Millstone River is located approximately 1/4 mile south east of the site, and the Raritan River is approximately 1/2 mile to the north.

### C. Site Visit

Representatives of the NJDHSS (S. Kubiak) and the ATSDR (T. Mignone) conducted a site visit on April 20, 1999. The site is a residential area of 137 single family homes. The Norfolk Southern Railroad tracks are adjacent to approximately 16 back yards on the northwest side of Valerie Drive and three properties on East Camplain Road. CSX Railroad tracks lie along 22 properties on East Camplain Road, and several properties on N. Park St. and N. Bank Street.

## **Discussion**

This section lists the contaminants found at the Federal Creosote site, discusses the likelihood of human exposure to those contaminants (“exposure pathways”), and reviews the possible health effects from exposure to these contaminants. Finally, community health concerns not covered elsewhere are noted and addressed.

### A. Contaminants of Concern

Coal tar creosote is a complex mixture of over 300 identified compounds. There may be 10,000 other chemicals present in trace amounts in the mixture. Coal tar creosote is distilled from coal tar, which is derived from coal. The source of the coal (which can contain numerous and varying organic and inorganic compounds) and the distillation methods used to produce coal tar creosote are the reasons that there are so many different compounds at different concentrations that can be found in any individual batch of product. Generally, at least 75% of coal tar creosote consists of polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs). The other major constituents of coal tar creosote are tar acids (phenols, cresols, and xylenols) and tar bases (pyridine and lutidine derivatives).

Health guidelines are developed for individual contaminants commonly found at hazardous waste sites. When exposure (or dose) is below a health guideline level, then adverse health effects are unlikely to occur. Examples of health guidelines are the ATSDR's Minimal Risk Level (**MRL**) and the USEPA's Reference Dose (**RfD**). For compounds that can cause cancer, ATSDR has developed a Cancer Risk Evaluation Guide (**CREG**). The CREG is the amount of a contaminant in the environmental medium of concern that is associated with a one in one million excess cancer risk (that is, one additional cancer in one million exposed people). Environmental Media Evaluation Guides (**EMEG**) have also been developed by ATSDR to represent a level of contamination in a specific medium (air, drinking water, or soil) that is not likely to pose a threat to health.

MRLs are developed for each type of exposure, such as acute (up to 14 days), intermediate (15 to

364 days), and chronic (365 days and greater). ATSDR presents these MRL's in Toxicological Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status.

Because there are so many possible combinations of compounds, there is no MRL for creosote. There are no MRLs for acute, intermediate or chronic exposure, whether through ingestion, inhalation, or dermal contact, for any of the PAHs except for intermediate ingestion exposures to four of the PAHs.

Compounds detected in samples at levels above health based guidelines will be discussed individually. However, the cumulative or synergistic effects of mixtures of contaminants may increase their public health significance. Additionally, individual or mixtures of contaminants may have the ability to produce greater adverse health effects in children as compared to adults. This situation depends upon the specific chemical being ingested or inhaled, what happens to the chemical once it enters the body, and its toxicity.

Since there is no standard against which coal tar creosote found at this site can be measured, some of the compounds expected to be in the mixture were measured instead, as an indirect way to identify the presence of coal tar creosote. The USEPA, in several sampling rounds beginning in 1997, detected the following components of coal tar creosote and other contaminants likely to be found at a former wood preservative site:

*Residential Surface Soil (0 - 6 inches)*

Contaminant	Range Measured	Comparison Value	Comment
Total PAHs <sup>1</sup>	65 to 758 mg/kg (six properties with highest levels)	NA	Sampling event October 1997  1 sample each from approximately 25 properties
	non-detect to 33 mg/kg (remaining properties sampled)		
Lead	< 180 - 4,780 mg/kg	NA	Sampling event Spring 1998  10 - 12 samples from each of 133 residences
Arsenic	< 12 - 16 mg/kg	0.6 (EMEG for pica child)	
Benzo[a]pyrene equivalents <sup>2</sup>	0.03 - 43 mg/kg	0.1 (CREG) (for benzo[a]pyrene)	

<sup>1</sup> Total PAHs is defined as the sum of each individual PAH measured in the sample

<sup>2</sup> Benzo[a]pyrene equivalent defined: Seven of the PAHs are known to cause cancer in animals. The most potent carcinogen of these seven is benzo[a]pyrene. The toxicity of each of the other six PAHs is compared to that of benzo[a]pyrene, giving a toxicity-equivalent factor. This factor describes how carcinogenic it is relative to benzo[a]pyrene. In calculating benzo[a]pyrene-equivalent concentrations, the concentration of each PAH is multiplied by its toxicity equivalent factor. The resulting weighted concentrations are summed to calculate the benzo[a]pyrene-equivalent carcinogenic PAH value.

*Subsurface soil*

The Borough of Manville conducted a preliminary assessment of contamination in December 1996 and March 1997. Soil boring samples were taken adjacent to a storm sewer and at one residence. Two samples were taken from the residential property. PAHs were detected in all three samples; total xylenes and benzene were detected in one of the residential samples at levels above NJDEP residential soil clean-up levels.

The USEPA has completed more extensive sub-surface soil sampling to delineate the site and determine the location of the creosote. They have identified 28 properties that lie above the highly contaminated canals and lagoons, and an additional 54 properties with lower levels of creosote contaminants in soil. All of the 28 properties on canals and lagoons will have the source material removed. Seventeen of those properties will require permanent relocation of the residents and demolition of the houses prior to the removal of contaminated sub-surface soil and source material.

The 54 properties with lower levels of contaminants in sub-surface soil will undergo remediation, which will include removal of soil to depths of 2 to 10 feet, and replacement with clean fill. At 6 of the 54 properties, soil contamination extends below 10 feet, which is the maximum depth that EPA will remediate. However, because NJDEP regulations require cleanup to bedrock, owners of these 6 properties have been offered buyouts, because the properties will have deed restrictions put in place.

#### *Indoor Air*

The USEPA conducted air sampling in 126 homes in the development in 1997. The New Jersey Department of Environmental Protection administered a questionnaire to the residents of these homes. The purpose of the investigation was to determine if volatile organic compounds and polycyclic aromatic hydrocarbons from the coal tar creosote were affecting indoor air quality. The questionnaire was designed to rule out contaminants which might be a result of household and other consumer products used by the residents. The USEPA found the following:

- benzene was not detected at levels that would be expected from a creosote site;
- elevated levels of naphthalene were found in several homes; however, these levels were traced to the residents' use of mothballs or moth flakes;
- several residences had elevated levels of various volatile organic compounds, which were found to be a result of the use and/or in-home storage of solvents, polishes, paint thinners, degreasers, insecticides, fuel components, and cleaners;
- natural gas leaks were detected in nearly 20% of the homes tested.

#### *Groundwater*

Monitoring wells located on the site indicate that groundwater is contaminated with components of creosote. The USEPA has or will install approximately 50 monitoring wells on- and off-site to delineate the full nature and extent of the plume. Analyses of these data are expected to be completed in the autumn of 2000.

#### B. Pathways of Exposure

Exposure occurs when a completed *exposure pathway* exists. An exposure pathway is the route a contaminant takes from a site to a person. It consists of five elements. All of the elements must be present at the same time, or can reasonably be expected to be present at some time. These are:

- a *source* of contamination
- environmental *media and transport* mechanisms
- a *point* of exposure
- a *route* of exposure, and,
- a receptor *population*.

Other pathways considered are "**potential pathways**," that is, those in which exposure might have occurred, may be occurring, or may yet occur; and "**eliminated pathways**," that is, 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.

The ATSDR and the NJDHSS reviewed environmental sampling results to learn if completed exposure pathways exist now or in the past, or are likely to occur in the future. Where these pathways exist, the ATSDR and NJDHSS also determine the impact these contaminants might have on health, based upon the amount of contamination present, the ways that people are exposed to the contaminants, and the length of time people may have been exposed.

Surface and sub-surface soil and indoor air have been tested for contamination relating to coal tar creosote. In addition, the likelihood of exposure through garden vegetable contamination has been considered. A summary of completed and potential exposure pathways is presented below.

Pathway Name	Exposure Pathway Element				Time	Complete or Potential
	Environmental Media	Point of Exposure	Route of Exposure	Receptor Population		
Residential soil in Claremont Development	Surface soil	Residential yards	Dermal	Residents in several houses in Claremont Development above former creosote lagoons	Past	Complete
Sump pump	Sump material (raw product)	At the pump	Dermal	Residents over former lagoons and canals	Past	Complete
Sump pump	Sump material (raw product)	At the pump	Inhalation	Residents over former lagoons and canals	Past	Complete

Pathway Name	Exposure Pathway Element				Time	Complete or Potential
	Environmental Media	Point of Exposure	Route of Exposure	Receptor Population		
Residential soil in Claremont Development	Subsurface soil	Residential yards	Dermal	Residents above former creosote lagoons and canals	Past Present Future	Potential
Residential soil in Claremont Development	Subsurface soil	Residential yards	Inhalation	Residents above former creosote lagoons and canals	Past Present Future	Potential
Residential soil in Claremont Development	Subsurface soil	Residential yards	Ingestion	Residents above former creosote lagoons and canals	Past Present Future	Potential
Garden vegetables	Contaminated garden produce	Residence	Ingestion	Residents growing food products in contaminated soil	Past Present Future	Potential
Potable water	Groundwater	Residence	Ingestion	Residents served by the municipal water supply	Future	Potential

Other than the sump pump inhalation exposure, indoor air has been eliminated as an exposure pathway because contaminant levels measured were less than health-based guidelines, and because they were not from coal tar creosote.

The USEPA has placed monitoring wells throughout the area to learn the extent of groundwater contamination. Although municipal wells are presently unaffected by the site, the groundwater beneath the site is contaminated with components of creosote. Because there are no private wells in the community, there is no pathway associated with groundwater at the present time. However, there is a potential that public wells could be affected in the future if the site is not remediated.

### C. Health Effects From Exposures

For those compounds which were found in a completed or potential exposure pathway, information on health effects at the levels measured in the environmental media are discussed.

The toxicity of coal tar creosote varies according to both its constituent compounds and the route of exposure (oral, dermal, inhalation). Based on industrial and animal studies, the most likely health effects from coal tar creosote exposure are to the respiratory, dermal and ocular systems. Dermal exposure to coal tar creosote is associated with the most serious effects, including skin damage and sensitivity to sunlight, or reddening, blistering or peeling of the skin. It may also cause irritation of the respiratory tract. Some of the PAHs, including benzo[a]pyrene, are known animal and probable human carcinogens.

#### *Exposures through surface soil*

Surface soil is of concern because of the high probability that residents may have contact with this environmental medium. Children are especially at risk because they are the most likely segment of the population to ingest soil. Soil ingestion may be accidental, as in putting items in their mouths that may have soil on them, or deliberate in the case of pica children. (Pica is a condition in which a person deliberately eats non-food items, such as dirt or paint chips.) Children's activities may also place them at higher risk for exposures to their skin (dermal exposure). Adults who garden or landscape may also have an increased risk of dermal exposure to soil contaminants.

Two rounds of surface soil sampling have occurred which formed the basis of two earlier health consultations (ATSDR, January 16, 1998; ATSDR, February 11, 1999). In the first of these, total PAHs were measured and converted to benzo[a]pyrene equivalents. For the highest benzo[a]pyrene equivalent, cancer assessments were performed for children and adults. A cancer assessment is a calculation based upon actual contaminant levels, assumed daily ingestion amounts, and a cancer slope factor established by the USEPA. As noted in the January 16, 1998 Health Consultation, the cancer risk for adults at this site is 1.8 excess cancer cases for each 10,000 individuals exposed. For children, a cancer risk assessment yielded a cancer risk factor of almost 7 excess cancers per 10,000 children exposed. The Health Consultation then states that the actual cancer risk is likely to be much lower than the calculated risk, because 1) the calculations assume that there is daily (year round) ingestion of soil with the highest levels of contaminants measured; 2) PAHs bind to soil by varying degrees, depending upon the size of the particular PAH and the amount of organic material in the soil. By being bound to the soil, these PAHs are not as available to be taken up by the body. It also makes them less likely to be absorbed dermally; 3) there is an assumption that there is no vegetative cover over these areas; and 4) areas of suspected contamination were chosen for sampling, although there was no visible contamination of the soil. To ensure public health and safety, the USEPA provided temporary remediation of nineteen properties with the highest soil PAH levels.

Because only a limited number of properties were evaluated, and only one sample per property was collected, ATSDR recommended that more extensive sampling of surface soil be conducted to be more representative of residential exposures to surface soil contaminants. In early 1998, nearly all of the properties in the Claremont Development were tested more thoroughly for metals, volatile and semi-volatile organic compounds, pesticides and PCBs, in order to characterize site contamination. ATSDR evaluated lead, arsenic and PAH results for their health implications. Sampling data is more thoroughly reviewed in the February 11, 1999 Health Consultation. PAHs (in benzo[a]pyrene equivalents) at the highest levels found in surface soil were below levels associated with cancer or non-cancer effects in adults and children, including pica children.

The February 11, 1999 ATSDR Health Consultation uses 500 mg/kg of lead in residential soil as a level of public health concern. One residence had one sample with lead above this level. Follow-up sampling at this property was conducted to determine the extent of lead contamination. These follow-up samples did not have lead levels in excess of 500 mg/kg, and the earlier result is believed to be an anomaly.

Arsenic levels exceed the EMEG for a pica child, but are below levels that are hazardous to non-pica children and adults. The cancer risk to a pica child from benzo[a]pyrene equivalent exposures is 6.8 excess cancers per 10,000 people exposed. For the reasons discussed above, it is unlikely that exposures to arsenic in soil actually occur at levels that would result in this cancer risk.

#### *Exposures through sub-surface soil*

Coal tar creosote has been visually identified in sub-surface soil, at less than 2 feet below ground level in some properties in the Claremont Development. Polycyclic aromatic hydrocarbons and volatile organic compounds have been measured at varying depths.

Human exposure to sub-surface contaminants is not as likely as exposure to surface soil. Sub-surface soil is, however, a potential completed exposure pathway for residents living on contaminated properties. The ATSDR May 1, 1997 and January 16, 1998 Health Consultations discuss the health issues related to coal tar creosote and the PAHs found in sub-surface soil. The levels of PAHs found are associated with dermal effects. Long-term exposure to the cancer-causing PAHs may increase the risk of developing cancer.

#### *Exposures through garden produce*

Residents were concerned that produce grown on-site would increase their exposures to site-related contaminants. The ATSDR performed a health consultation on this issue in April 1998. Vegetables can become contaminated by PAHs in two ways: PAHs may be adsorbed (adhere to) the plant surface, or they may be taken up into the plant. Some of the PAHs that are found on plant surfaces are washed away by rain, or break down into other products. At harvest time, some of those remaining can be removed by washing or peeling. Only a small percentage (less than 1 percent) of the PAHs in soil are taken up by the plant. Although PAH concentrations in garden produce are generally less than that of the soil in which they are grown, consumption of vegetables grown on the more highly contaminated properties was thought to increase an individual's total PAH intake to unacceptable levels.

Because of the surface soil remedial activities that have occurred, and the low levels of PAHs which may have been taken up by plants in the past and present, the ATSDR believes that residents are not likely to be exposed to levels of PAHs in garden produce at levels which may affect health.

#### *Exposures through groundwater*

The USEPA has indicated that creosote has entered area groundwater. Delineation of the extent of the plume is ongoing. While municipal wells, located 1/4 mile from the site, are not currently impacted, the USEPA believes that removal of the source material is necessary to prevent further contamination to groundwater.

#### D. Health Outcome Data

Health outcome data was not evaluated for this site. An evaluation of health outcome data for the small number of individuals who may be affected by the site may not yield scientifically meaningful information.

#### E. Community Health Concerns

Community concerns, as related to the ATSDR, relate to the effects of long-term exposures to creosote. There are also concerns on its potential effects on children's health. Residents wanted assurances that remediation would not result in additional exposures through dust and soil movement.

Because of the expected permanent and temporary removal of people from their homes, ATSDR met with residents in January 1999 to discuss stress-related issues.

### **Conclusions**

On the basis of the information reviewed, the NJDHSS and the ATSDR conclude the following:

1. Past and present exposures to surface soil represent no apparent public health hazard, as levels of PAHs and other contaminants measured are not likely to result in adverse health effects under realistic exposure scenarios. Through meetings and conversations between residents and ATSDR regional staff, residents have not indicated that they have had skin irritations or other dermal effects expected from creosote exposure; therefore, the NJDHSS concludes that exposures likely to produce acute effects have not occurred in the past. However, this conclusion does not rule out the need to continue remedial activities.
2. Exposure to sub-surface soil does not pose a public health hazard as long as the sub-surface soil is not disturbed through digging or other activities. The NJDHSS and the ATSDR recognize that source material (creosote) and its components (including PAHs) remain in residential sub-surface soil. Sub-surface contamination at this site may pose a long-term public health hazard to those residents living above or adjacent to the former canals or lagoons if soil at levels of 2 feet below ground surface is disturbed.
3. Exposure to site contaminants through ingestion of garden produce represents no apparent public health hazard, as produce is unlikely to take up PAHs from soil at levels of health concern.
4. Exposure to site contaminants in groundwater represents an indeterminate public health

hazard, and may pose a future public health hazard if it remains unremediated and the public supply wells, presently not impacted by the site, become affected. This pathway will be further examined after the USEPA completes its monitoring.

5. The ATSDR and the NJDHSS conclude that the USEPA plan to relocate residents is appropriate in order to remove source material from the site.

## **Recommendations**

The NJDHSS and ATSDR recommend that the USEPA continue its remedial plans to remove source material from the site. The ATSDR, the USEPA, and the NJDHSS should continue to ensure that community concerns are addressed, particularly as they relate to temporary or permanent relocation of residents. During remedial activities, the USEPA should take suitable precautions to minimize release of dusts and airborne contamination to surrounding residences (whether or not they are occupied).

The USEPA should also continue its delineation of ground water contamination to ensure that public water supplies remain unaffected by the site.

Residents should continue to avoid exposure to sub-surface soil, particularly in areas near the former lagoons and canals.

## **Public Health Action Plan**

The Public Health Action Plan (PHAP) for the Federal Creosote site contains a description of the actions to be taken by ATSDR and/or NJDHSS 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 ATSDR/NJDHSS to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR/NJDHSS are as follows:

### **A. Public Health Actions Taken**

1. The ATSDR has developed indoor air guidelines for residential exposure to coal tar creosote-related contaminants.
2. The ATSDR has reviewed surface and subsurface soil data within the context of human exposure pathways.
3. The ATSDR has discussed specific medical concerns with residents. It has also ensured that issues relating to the community's level of stress were addressed early in the site evaluation

process.

4. The ATSDR has met and continues to meet regularly (at least bi-monthly) with residents, in both public and private forums, to discuss community concerns and the outcomes of the health consultations.
5. The ATSDR has conducted a stress management workshop specifically for those residents who will be permanently relocated from their homes.

#### **B. Public Health Actions Planned**

1. The ATSDR and NJDHSS will continue to evaluate site data for its relevance to public health, and inform the community of these evaluations.
2. The NJDHSS will assess the need for, and provide as necessary, health care provider education related to this site.
3. The ATSDR should continue to ensure that the community's level of stress is monitored as families are permanently or temporarily relocated during the USEPA's remediation of individual properties.
4. The NJDHSS and ATSDR will evaluate potential exposures to groundwater as data becomes available from the USEPA.
5. NJDHSS will place this health assessment in area repositories, and will provide copies to persons who request it.
6. ATSDR will reevaluate and expand the Public Health Action Plan when needed. New environmental, toxicological, health outcome data, or the results of implementing the above proposed actions, may determine the need for additional actions at this site.

#### **ATSDR Child Health Initiative**

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 emitted from waste sites. They are more likely to be exposed because they play outdoors and they 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 the growing child can sustain permanent damage if toxic exposures occur during critical growth stages. Children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care. The NJDHSS and the ATSDR evaluated the likelihood of children living on or near the Federal Creosote site being exposed to contaminants at levels of public health

concern. Children may be exposed to contaminants that may pose a long-term risk to health if they have exposure to sub-surface soil. This is because children are more likely than adults to have contact with and ingest soil. Eliminating children's exposure to contaminated soil, either temporarily through barriers or permanently through removal of soil or dissociation of the household, is prudent and protective of children's health.

## **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 is in accordance with approved methodology and procedures existing at the time the Public Health Assessment was begun.

---

Gregory V. Ulirsch  
Technical Project Officer  
Superfund Site Assessment Branch (SSAB)  
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.

---

Richard Gillig  
Acting Chief, SSAB, DHAC, ATSDR

Site Team/Authors

**Preparer of Report:**

Sharon L. Kubiak  
Program Specialist 1; Health Assessment Project  
Consumer and Environmental Health Services  
New Jersey Department of Health and Senior Services

**ATSDR Regional Representative:**

Thomas Mignone  
Regional Representative; Region II  
Regional Operations  
Office of the Assistant Administrator

**ATSDR Technical Project Officer:**

Gregory V. Ulirsch  
Environmental Health Engineer  
Superfund Site Assessment Branch (SSAB)  
Division of Health Assessment and Consultation

**Any questions concerning this document should be directed to:**

James Pasqualo  
Health Assessment Project Manager  
New Jersey Department of Health and Senior Services  
Consumer and Environmental Health Services  
PO Box 360  
Trenton, NJ 08625-0360

## **References**

1. Agency for Toxic Substances and Disease Registry, Health Consultation, Federal Creosote Site, Manville, NJ; May 1, 1997
2. Agency for Toxic Substances and Disease Registry, Health Consultation, Federal Creosote Site, Manville, NJ; May 15, 1997
3. Agency for Toxic Substances and Disease Registry, Health Consultation, Federal Creosote Site, Manville, NJ; January 16, 1998
4. Agency for Toxic Substances and Disease Registry, Health Consultation, Federal Creosote Site, Manville, NJ; April 24, 1998
5. Agency for Toxic Substances and Disease Registry, Health Consultation, Federal Creosote Site, Manville, NJ; February 11, 1999
6. Agency for Toxic Substances and Disease Registry, Toxicological Profile for Creosote (Update); August 1996
7. Agency for Toxic Substances and Disease Registry, Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs), Update, August 1995
8. Agency for Toxic Substances and Disease Registry, Toxicological Profile for Lead (Draft Update); February 1998
9. US Environmental Protection Agency, Summary Report: Indoor Air Monitoring at Federal Creosote Site; September 9, 1997.
10. US Environmental Protection Agency, Superfund Proposed Plan: Federal Creosote Site, Manville, New Jersey; April 1999
11. New Jersey Department of Environmental Protection, Soil Cleanup Criteria (Rev. 5/3/99)
12. US Environmental Protection Agency, Superfund Program Proposed Plan: Federal Creosote Site; April 2000