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SUBJECT: HRS Risk Assessment for Cabot/Koppers Site

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# Health Assessment for

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CABOT CARBON/KOPPERS SITE

CERCLIS NO. FLD980709356

ALACHUA COUNTY

GAINSVILLE, FLORIDA

Agency for Toxic Substances and Disease Registry  
U.S. Public Health Service

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## SUMMARY

The former location of Cabot Carbon Corporation is a 49-acre site near the intersection of North 23rd Avenue and North Main Street in Gainesville, Alachua County, Florida. The Koppers site is located on 82 acres of land immediately west of the former Cabot property. The Remedial Investigation report of May, 1987 indicated that sediments from the ditches, lagoons, and soils of both sites had high concentrations of arsenic. Surficial aquifers of both sites were contaminated with arsenic, chromium, 2,4-dimethylphenol, and benzene; the Kopper site surficial aquifer also contained 4,6-dinitro-o-cresote. Intermediate aquifers of both sites were contaminated with chromium.

## BACKGROUND

### A. SITE DESCRIPTION

The Cabot Carbon/Koppers National Priorities List (NPL) site consists of two adjacent properties in North Central Gainesville near the intersection of North 23rd Avenue and North Main Street. Koppers comprises the western side of the site and is still operating. Cabot formerly operated on the property that makes up the eastern side of the site (see Figure 1).

The 82-acre Koppers property is an active operating subsidiary of Koppers, Inc. The company preserves wood utility poles and timbers using two different chemical solutions: creosote and chromated copper arsenate (CCA). In the past, pentachlorophenol was also used as a wood preservative.

Pine stumps were processed at the 49-acre Cabot Carbon facility from 1945-1965 for the production of naval stores and charcoal. Approximately 6,000 gallons of crude wood oil and pitch were generated per day. Process wastewater containing residual pine tar was discharged to unlined surface impoundments. Periodically, the accumulated tar was scraped out and sold. After Cabot Carbon ceased operation, the property was purchased in 1966 by a local developer who drained the surface impoundments and allowed the phenolic contents to flow off the site through an adjacent (north) 50-acre wetland and into a storm water ditch that flows into the local natural drainage system, Hogtown Creek. The environmental damage to Hogtown Creek following this incident was detectable for five miles downstream.

The former Cabot property was sold again in 1977 to the developer who built the existing shopping complex on the southern half of the site (the northern portion of the former Cabot property is primarily undeveloped, with the exception of an aluminum recycling business, and is densely vegetated). During the shopping complex construction activities, the remaining pine tar sludges from the waste water holding ponds were mixed into the topsoil, and an unlined storm water retention pond was built over the site of the former waste impoundments (north of the shopping complex - see Figure 2). Subsequently, a dark-stained, phenolic smelling leachate began to appear in the uncovered drainage ditch along North Main Street.

## THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i) (7) (A) of the Comprehensive Environmental 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. Additional health assessments may be conducted for this site as more information becomes available to ATSDR.

HEALTH ASSESSMENT  
CABOT CARBON/KOPPERS SITE  
GAINSVILLE, ALACHUA COUNTY, FLORIDA

Prepared by:  
State Health Office  
Florida Department of Health and Rehabilitative Services (HRS)

Prepared for:  
Agency for Toxic Substances and Disease Registry (ATSRD)

# ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

## A. ON-SITE CONTAMINATION

### 1. Cabot Carbon Site

The following contaminants of concern were reported in the RI of 1987. Samples for the RI were taken in 1984 and 1985. Contaminants at the former Cabot Carbon site are listed below.

<u>MEDIA</u>	<u>CONTAMINANT</u>	<u>RANGE</u>
Surface Soil (0 - 2 ft.)	Arsenic	<0.1 - 52 (mg/kg)
Surficial Aquifer (20 - 35 ft.)	Arsenic	0.001 - 0.073 (mg/L)
	Chromium	0.04 - 0.47 (mg/L)
	Benzene	ND - 0.15 (mg/L)
	2,4-Dimethylphenol	ND - 6.0 (mg/L)
Intermediate Aquifer (35 - 180 ft.)	Chromium	0.11 - 0.19 (mg/L)

### 2. Koppers Site Contamination

The following contaminants of concern were reported in the RI of 1987. Samples were taken in 1984 and 1985. Contaminants at the Koppers site are listed below.

<u>MEDIA</u>	<u>CONTAMINANT</u>	<u>RANGE</u>
Surface Soil (0 - 2 ft.)	Arsenic	<0.1 - 79 (mg/kg)
Surficial Aquifer (20 - 35 ft.)	Arsenic	ND - 0.126 (mg/L)
	Chromium	0.1 - 0.18 (mg/L)
	Benzene	ND - 0.08 (mg/L)
	2,4-Dimethylphenol	TR - 0.4 (mg/L)
	4,6-Dinitro-o-creosote	ND - 32 (mg/L)
Intermediate Aquifer (35 - 180 ft.)	Chromium	0.09 (mg/L)

ND - Not Detectable

TR - Trace

## 1. OFF-SITE CONTAMINATION

Off-site sampling was not included in the RI. It will be included in the Feasibility Study to be completed in early 1989.

## 2. PHYSICAL HAZARDS

Potential physical hazards at the former Cabot Carbon site are an open lagoon and a water level control box located in the northwest corner of the site. Potential physical hazards at the Koppers site are stockpiled wood in the framing area and a pile of 55-gallon drums filled with creosote in the lumber yard.

## DEMOGRAPHICS

The Cabot Carbon and Koppers sites are located in an industrial, residential, and commercial zoned area and will probably remain so in the foreseeable future. At least seven schools are located within a 1-mile radius of the sites. The 1980 population of the Gainesville standard metropolitan statistical area (SMSA) was approximately 151,300.

## EVALUATION

### SITE CHARACTERIZATION (DATA NEEDS AND EVALUATION)

#### 1. Environmental Media

The sampling done in conjunction with the RI did not adequately address the extent of contamination. Off-site testing will be included in an amendment to the RI prior to the feasibility study (FS) of 1989. This sampling should also provide information on background levels of metals in the surface soils and in the shallow and intermediate aquifers.

#### 2. Demographics and Land Use

Because the Cabot Carbon/Koppers site is located in an industrial, residential, and commercial area, this Health Assessment is aimed at residential use of land and water in the future.

In 1980, the Gainesville SMSA had 2,612 people per square mile, therefore, the population within a one-half mile radius from the Cabot/Koppers sites is about 2,000.

#### 3. Quality Assurance and Quality Control (QA/QC)

The Quality Assurance and Quality Control data included in the RI consist of the results of analyses of several blank and duplicate samples. Conclusions presented in this Health Assessment are based on the data contained in the RI. The validity of the conclusions is, therefore, dependent on the quality of the data provided.

## B. ENVIRONMENTAL PATHWAYS

The environmental pathways of concern are soils, surface water and its sediments, and ground water. The environmental media in which the most contaminants of concern are found is the surficial aquifer which contains arsenic, chromium, benzene, 2,4-dimethylphenol and 4,6-dinitro-o-cresote. Although the properties of some of these chemicals indicate that they have a tendency to be sorbed to soils, their presence in ground water indicates potential for contamination plume movement.

Soil at the site consists of fine-grained sand with coarse-grained sand and silty clay lenses. Monitoring wells at the site indicate: 1) the soil layer averages 10 feet in thickness, and 2) the water table ranges from 6 to 8 feet below the land surface. Below the surficial soil layer lie the sands of the Pleistocene-aged marine terrace deposits which average 15-20 feet in thickness. These strata overlie the Hawthorn Formation which averages fifty feet in thickness. The Hawthorn Formation is comprised of marine sediments with lenses of limestone, sand, and impermeable clay. The low permeability clay lenses cause the intermediate aquifer, which occurs in the Hawthorn Formation, to be confined. Wells are developed in the intermediate aquifer. Ocala Group limestones and dolomites occur below the Hawthorn Formation on an average of 80 feet below the land surface. These carbonate rocks comprise the Floridan Aquifer which is the primary source of potable water in the area.

According to past studies, the surficial aquifer flows to the northeast on the Koppers property, and to the northeast and east on the Cabot property. A ground water divide at the southern edge of the Koppers property trends north-south and partially controls the east and west flow directions of the unconfined surficial aquifer. The ground water gradient in the unconfined aquifer is also influenced by local topography and by the presence of an underground "creek" on the Koppers property. This general northeastern surficial ground water flow direction would explain the appearance of phenolic compounds in the North Main Street ditch after a storm water holding pond was installed at the location of the former Cabot Carbon wastewater holding ponds (see Figure 2).

Considerable well development has taken place in the intermediate aquifer, and water levels are determined by the interplay of the hydraulic characteristics of the unconfined aquifer and the Floridan Aquifer (i.e., the three aquifers are hydraulically connected). Regional and local flow of the Floridan Aquifer is to the northeast. Potentiometric contours in the Floridan Aquifer in this part of Gainesville are primarily influenced by the 16 million gallons/day pumping rates of the City of Gainesville's north well field located approximately 2 miles to the northeast of the Cabot/Koppers site.

The drainage ditch, Hogtown Creek, and the storm water retention pond are the only surface water bodies in the area. All have been sampled and phenol, arsenic and chromium were found at concentrations lower than levels appropriate for health concerns. As a result, fencing of these surface water bodies is not essential for protection of community health at this time. It is recommended, that additional warning signs should be



posted along the ditch because the existing signs are few and the distance between them exceeds 300 feet. Treatment of surface water at the Kanapha Sewage Treatment Plant may alleviate much of the surface water's contribution to off-site contamination via the drainage ditch, however, bioaccumulation in the drainage ditch, Hogtown Creek and the storm water run-off lagoon have not been addressed.

Current activities of the Koppers site may also result in soil or surface water contamination attributable to surface water run-off during periods of heavy rain. Treatment chemicals may be mixed with rainfall in three different areas. First, the sludge in the containment trench under the steam-treatment cylinders was at a lower level than the surrounding land surface. This gradient would allow surface water run-off to flood these trenches and wash away the sludge. Second, the 2-foot high containment below the CCA tank farm and mix area was nearly full of yellowish green liquid during the site visit and was directly open to rain catchment; and third, treated wood was stacked on bare ground without cover. Average annual rainfall for the Gainesville area is 50", and torrential rains accompanying thunderstorms are common.

Sampling data showed only arsenic at levels above health concern at the Cabot/Kopper site. Natural background levels of arsenic in soil are about 5 ppm, and most inorganic arsenic compounds, except heavy metal salts, are reasonably soluble (Stokinger, 1981). Arsenic is strongly bound by clays, humus, and less often sand. The metal becomes mobile with hydrolysis. Arsenic mobility is inversely related to the iron and aluminum content of the soil (Kabata-Pendias and Pendias, 1985). For these reasons, arsenic should be relatively mobile at the site because the soil is sandy.

In addition to arsenic, the sediments present in the wastewater lagoons on both the Cabot Carbon and Koppers sites have not been removed or treated on-site. Therefore, it is likely that chemicals dissolved in the surficial aquifer are still present in the soil although sampling data did not document their presence at levels of health concern.

Potential environmental pathways are off-site ground water migration and windblown dust from contaminated surface soils. Neither of these environmental pathways were addressed by the 1987 RI. However, the HRS Alachua County Public Health Unit conducted a survey of the private residences in the area surrounding the site in 1986. Six wells were identified along Hogtown Creek and have been sampled for three years, 1986-1988. None of the wells showed contamination attributable to contaminants from Hogtown Creek. May and June are historically dry months in Alachua county and dry conditions potentially lead to increased water utilization, creating the opportunity for migration of water in the creek into the ground water. For this reason, a revisit of these wells is scheduled for May of 1989. Both groundwater migration and windblown contaminants present significant health concerns because of the close proximity of these contaminated media to potential receptor populations, including workers, residents, and visitors to the shopping complex.

### C. HUMAN EXPOSURE PATHWAYS

The contamination of the environmental media previously identified constitute the following human exposure pathways.

1. Ingestion, inhalation and dermal absorption of contaminated soil. There are no cement or asphalt roads at Koppers and wind and extensive vehicle movement cause the plant to be very dusty. Other airborne hazards at the site are strong chemical fumes from the treated wood in the framing area and chemical fumes near the treatment cylinders. The exposed population would be site workers the north and south ends of the site were not fenced and the fence had been torn down at several places on the west side. This allows exposure of trespassers. Furthermore, residences are located within 30 feet of the Koppers property line on the west.
2. Ingestion and dermal absorption of contaminated ground water from the surficial aquifer. The water table aquifer on-site contains several contaminants above the levels of health concern. The RI indicates that this aquifer is not currently used as a potable supply source for domestic uses. However, because the water table aquifer discharges to the drainage ditch east of the Cabot site, and constitutes the entire contents of the ditch during times of low flow, accidental ingestion and dermal absorption of contaminated surface water and sediments may accrue from the contaminated water table aquifer. From observations made during the site visit, it was apparent that children play near and possibly in the drainage ditch in the quarter-mile downstream of the lift station, and children were seen returning from school to the trailer park which is located next to the drainage ditch.
3. Ingestion and dermal absorption of contaminated ground water from the intermediate aquifer. The on-site intermediate aquifer contains chromium at levels of health concern; however, no receptor population has been identified. Off-site contamination of the intermediate aquifer or Floridan Aquifer wells has not been addressed, but has not been detected in private potable wells near Hogtown Creek.
4. Ingestion and dermal absorption of contaminated surface water. Although surficial aquifer discharge constitutes the entire contents of the drainage ditch during times of low flow, accidental ingestion and dermal absorption of contaminated surface water and sediments may accrue from surface water that originates at times of storm water run-off. Storm water run-off would include eroded sediments from the two sites and would make up the contents of the storm water retention pond in addition to the drainage ditch and Hogtown Creek. Ingestion of contaminants could potentially also accrue from the food-chain as a result of bioaccumulation.

## PUBLIC HEALTH IMPLICATIONS

### A. CONTAMINANTS OF CONCERN

Arsenic, chromium, benzene, 2,4-dimethylphenol and 4,6-dinitro-o-creosote are the contaminants of concern. Arsenic is present in soil and ground water; the remaining contaminants have only been detected at levels of health concern in the surficial ground water. Public water systems serve the entire area and, therefore, consumption of this resource is not expected. Populations at potential risk of exposure to contaminants associated with the site are workers at the Koppers plant (and trespassers), people who may come in contact with the drainage ditch, residents who live in close proximity to the Koppers site and remedial workers.

### B. SOIL CONTAMINATION

Potential human pathways of exposure to on-site soil are ingestion, inhalation of suspended particles and dust, and direct dermal contact. Arsenic is present in the on-site soil at levels which may pose a potential health threat to all trespassers, workers on the Koppers site, and persons coming in contact with contaminated soil in the undeveloped (and unpaved) portion of the former Cabot site. During the site visit, it was noticed that the fence bounding the western site of Koppers was bent over and/or torn down in at least six places. Trespassers had obviously entered the site in the past, and in doing so facilitated easier access to the site.

Arsenic toxicity is influenced by the valence of the compound. Trivalent forms are generally more toxic than pentavalent forms, however, arsenic exists in a number of ionic forms including  $-3$ ,  $0$ ,  $+3$ , and  $+5$ ; depending on environmental conditions (EPA 1984).

Short-term exposure to arsenic via ingestion has resulted in symptoms including muscular cramps, facial edema, gastrointestinal damage, vomiting, diarrhea, and general vascular collapse (EPA, 1985). Chronic exposure, such as that found in industrial settings, may result in injury to the skin, mucous membranes, gastrointestinal tract, nervous system, and only rarely the circulatory system and liver. Symptoms reported with acute exposure are also present with longer exposures (Stokinger, 1981). Arsenic poisoning resulting from ingestion of contaminated drinking water (at 0.050 mg/l) produced weight loss, diarrhea, debility, anorexia, bronchitis, and skin disorders. Reduction in the concentration of arsenic reduced the incidence of these symptoms (EPA, 1985).

Epidemiologic evidence suggests arsenic's carcinogenic potential through exposure in occupational settings by inhalation. Increases in skin and lung cancer have been found, in addition to liver tumors and blood dyscrasias (IARC, 1982).

### C. GROUND WATER CONTAMINATION

Exposure to the levels of chromium, arsenic, 2,4-dimethylphenol, benzene and 4,6-dinitro-o-creosote present in on-site ground water could adversely affect public health. Because there are no known receptors at present, exposure to contaminated on-site ground water from the surficial aquifer or intermediate aquifer is not a health concern. This does not rule out a potential for future exposure if the site is not remediated and contamination migrates to the Floridan Aquifer.

### D. SURFACE WATER CONTAMINATION

Analyses of surface water at the lift station indicated the presence of contaminants such as benzene, o-creosote, m/p-creosote, and 2,4-dimethylphenol. Concentrations of the compounds were below the levels at which health would be affected, however, creosote-like and phenolic odors are noticeable.

Off-site contamination was not addressed in the RI for the Cabot Carbon/Koppers sites; therefore, contamination off the site which poses a threat to public health cannot be evaluated at this time.

### CONCLUSION AND RECOMMENDATIONS

This site is of a potential health concern because of the potential risk to human health resulting from possible exposure to hazardous substances at concentrations that result in adverse health effects. As noted in the Environmental Contamination and Physical Hazards sections, human exposure to arsenic, chromium, benzene, 2,4-dimethylphenol, and 4,6-dinitro-o-creosote may occur via contact with contaminated ground water. Persons may be exposed to arsenic through contact with contaminated surface soil. The susceptible receptor populations are workers at Koppers site, nearby residents, and people involved daily in business at this contaminated commercial area. Ground water at both sites is contaminated but a susceptible receptor population has not been identified. Most residents in the vicinity of the site should be connected to municipal water supplies, however an area survey for the presence of wells has not been carried out and the presence of domestic supply wells or irrigation wells cannot be ruled out.

In addition, ATSDR recommends the following:

1. Health advisories should be considered to alert the workers at the Koppers site and those who work or play in the contaminated area at the former Cabot site of potential exposure via ingestion and dermal absorption of arsenic in soil, and of chromium, arsenic, benzene, and 2,4-dimethylphenol in ground water.
2. Access to the storm water retention lagoon should be restricted. The posting of warning signs may be sufficient. Additional warning signs should also be posted along the ditch.

- X/3. Samples of ground water and soil should be tested from the residential areas located south or east/west of the Cabot/Koppers sites to provide a better understanding of the possible background levels of contaminants, especially metals.
4. Additional surface water monitoring should be done at the Koppers site, specifically at the confluence of the underground creek from Koppers with the drainage ditch on North Main Terrace.
5. Tests for arsenic in soil and PAHs in ground water should use detection limits less than the EPA's maximum allowable contaminant levels.
6. Repair the broken fence on the east and west sides of the Koppers property and control access at the front and back of the site to prevent unsupervised access and trespassing.
7. Relocation of the creosote waste drums from the lumber yard to the drum storage house should be considered at the Koppers portion of the site. Studies should be carried out to establish if bioaccumulation occurs in flora or fauna and if these flora and fauna represents a pathway for human exposure.
- X/10. Additional testing for chemicals related to wood preserving should be considered in soil and surface water and ground water. Examples of these types of chemicals include trichlorophenol, dichlorophenol, dioxin, and tetrachlorodibenzo-p-dioxin and tetrachlorodibenzofurans which are breakdown products of chlorinated biphenyls and chlorinated naphthalene.
11. In accordance with CERCLA as amended, the Cabot Carbon/ Koppers site has been evaluated for appropriate follow-up with respect to health effects studies. Although there are indications that human exposure to on-site/off-site contaminants may be currently occurring and may have occurred in the past, this site is not being considered for follow-up health studies at this time because the exposure selection criteria was not satisfied. This may change with the RI Amendment.

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