

Health Consultation

Offsite Soil
(Mitchell Heights Neighborhood)

THE FORMER HERNANDO COUNTY
DEPARTMENT OF PUBLIC WORKS

BROOKSVILLE, HERNANDO COUNTY, FLORIDA

SEPTEMBER 26, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation 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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HEALTH CONSULTATION

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THE FORMER HERNANDO COUNTY DEPARTMENT OF PUBLIC WORKS
BROOKSVILLE, HERNANDO COUNTY, FLORIDA

Prepared By:

Florida Department of Health
Bureau of Community Environmental Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Foreword

This document summarizes the Florida Department of Health's evaluation of off-site soil sampling results from a neighborhood adjacent to the Hernando County Department of Public Works (DPW) former Fleet Maintenance Compound in Brooksville, Florida. The off-site soil sampling was completed by Hernando County consultant Creative Environmental Solutions Inc. The Florida Department of Health (DOH) evaluates site-related public health issues through the following processes:

- Evaluating exposure: Florida DOH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is on the site, and how human exposures might occur. Usually, the Florida DOH does not collect its own environmental sampling data. Creative Environmental Solutions Inc. (CES) provided the information for this Health Consultation.
- Evaluating health effects: If we find evidence that exposures to hazardous substances are occurring or might occur, Florida DOH scientists will determine whether that exposure could be harmful to human health. We focus this report on public health; that is, the health impact on the community as a whole, and base it on existing scientific information.
- Developing recommendations: In this evaluation report, the Florida DOH outlines its conclusions regarding any potential health threat posed by contaminated soils near the Hernando County DPW site. Recommendations are made for reducing or eliminating human exposure to contaminants. The role of the Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason, the evaluation report will typically recommend actions for other agencies, including the USEPA and the Florida Department of Environmental Protection (DEP). If, however, an immediate health threat exists or is imminent, the Florida DOH will issue a public health advisory warning people of the danger, and will work with other agencies to resolve the problem.
- Soliciting community input: The evaluation process is interactive. The Florida DOH starts by soliciting and evaluating information from various government agencies, individuals or organizations responsible for cleaning up the site, and those living in communities near the site. We share any conclusions about the site with the groups and organizations providing the information. Once we prepare an evaluation report, the Florida DOH seeks feedback from the public.

If you have questions or comments about this report, we encourage you to contact us.

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Summary and Statement of Issues

This health consultation report assesses the public health threat from exposure to contaminated soil in the Mitchell Heights neighborhood adjacent the former Hernando County Department of Public Works (DPW) hazardous waste site in Brooksville. In the fall of 2005, due to community concerns, the Florida Department of Health (DOH) began assessing the public health threat. Storm water runoff from the DEP site may have carried contaminated sediments into the Mitchell Heights neighborhood. Mitchell Heights residents may have been exposed to contaminated sediments via incidental ingestion (accidentally swallowing small amounts of soil) or by inhalation (breathing dust created from the contaminated soil). Florida DOH examined current and past exposures in the Mitchell Heights neighborhood.

Hernando County contracted with CES to test soil in the Mitchell Heights neighborhood on two occasions: 35 locations in May and June, 2006, and then 22 additional locations in March 2007. The County found the highest levels of soil contamination where especially heavy rains continue to carry site storm water runoff over the ditch/berm and into a yard on "A" Street. Although most of the contaminant levels in this yard are below screening values, they are higher than in other yards. These analytical results confirm observations of deposition of sediments from the site in this one yard on "A" Street.

Although most of the contaminants found in the yard at the "A" Street residence were below screening values, arsenic, lead, and PCBs (polychlorinated biphenyls) were found above screening values and are examined as contaminants of concern. The Florida DOH calculated the corresponding doses for ingestion and inhalation for both arsenic and PCBs. Available data indicate that current levels of arsenic and PCBs in Mitchell Heights' surface soil are not likely to cause illness. Levels of arsenic and PCBs in Mitchell Heights' **subsurface** soil were not likely to cause illness from past exposures.

Measured blood lead levels for adults in Mitchell Heights are below the OSHA workplace standard of 40 micrograms per deciliter (ug/dL). In the past, residents of one house on "A" Street in Mitchell Heights may have been exposed via incidental ingestion to lead in soil at a concentration slightly above the residential soil standard. Although there is a large degree of uncertainty, models predict that in the past, residents of this one house may have had blood lead levels as high as 3.8 ug/dL. Some studies suggest an increased risk of hypertension, tooth decay, decrease in kidney function, and an increase in immunoglobulin E (an antibody that regulates immune system response) at blood lead levels above 2 or 3 ug/dL (ATSDR 2005). Therefore, in the past, residents of this one house on "A" Street may have been at a slightly increased the risk of these illnesses.

In addition to evaluating current and past exposure pathways, Florida DOH compiled a list of health concerns from various public meetings and mailed questionnaires. In this report, Florida DOH provides background information on each health concern and then explores its relationship to contaminants associated with the former Hernando DPW site.

Background

The Hernando County Department of Public Works (DPW), former Fleet Maintenance Compound, is at 201 West Martin Luther King Boulevard, Brooksville, Hernando County, Florida (Figure 1). The DPW site encompasses approximately 5 acres and is surrounded by residential communities. In 1955, Hernando County purchased the property and used it as a public works facility for approximately 50 years.

Hernando County used the DPW site for a variety of functions: storage of mosquito control materials; road striping/maintenance equipment; road sign fabrication; election voting machine storage; heavy equipment parking/storage; vehicle maintenance operations; and pesticide, herbicide, paint, solvent and petroleum product (gasoline, diesel, used waste oil, kerosene and hydraulic fluid) storage (Figure 2). Arsenic, cadmium, chromium, lead, polychlorinated biphenyls (PCBs), total recoverable petroleum hydrocarbons (TRPHs), semi-volatile organic compounds and volatile organic compounds (VOCs) have been found in soil on the DPW site.

In 1994, a Hernando County consultant observed evidence of contamination on the site (ES&S 1994).

“Observations made on 5 November 1992 showed the presence of stained asphalt between the Hernando County voting machine warehouse and the DPW maintenance and dispatch building. Rain water from this chemical storage area runs into a storm water drain north of the maintenance and dispatch building. The outfall of this ditch at the southern edge of the property showed the presence of possible petroleum sheen on the water as well as discoloration of the soils within the drain. Evidence of release of kerosene was noted by soil staining and stressed vegetation on the southern edge of the property. At the time of the site visit, hydraulic oil from a scraper was pooled on the soils in this area. A fourth fuel pump located on the southern edge of the subject property southwest of the maintenance building was noted as having degradation of soils and vegetation. The run-off from all of these areas is contained by an “L” shaped retention ditch along the eastern and southern border of the property. This ditch, particularly at the out-falls of the storm water drains, contains signs of environmental degradation, including soil staining and distressed vegetation.”

The Hernando DPW site and the adjacent Mitchell Heights neighborhood have a significant north to south slope. Prior to the mid-1980s, storm water runoff from the Hernando DPW site flowed unimpeded downhill into the adjacent Mitchell Heights neighborhood. Since the site was unpaved, this storm water runoff also washed site sediments into the Mitchell Heights neighborhood.

Sometime prior to the mid-1980s, Hernando County filled in the southern part of the DPW site. This left a steep 1:3 slope between the southern edge of the site and yards in the Mitchell Heights neighborhood. The elevation drops about 10 feet in about 30 feet between the site and the neighborhood. Also sometime prior to the mid-1980s, Hernando County constructed a ditch and berm along the southern site boundary. This ditch carries storm water run off from the site to the southeast corner of the site and then into drainage ditches in the Mitchell Heights neighborhood. Sometime prior to the mid-1990s, Hernando County paved the site, significantly reducing the amount of sediments carried by storm water runoff into the Mitchell Heights neighborhood.

After especially heavy rains, however, storm water runoff still overflows the ditch/berm carrying sediments into the backyard of one property on “A” Street. In 2005, Florida DOH observed evidence of recent overflow of the ditch/berm and sediment deposition in this property on “A” Street.

The Mitchell Heights neighborhood is a predominantly African American community (Figure 3). In 2000, the Census Bureau determined that more than 420 people lived within a ¼- mile radius of the

Hernando County DPW site. Of those 420 residents approximately 84% were African American, 14% were White and 2% were other racial/ethnic groups including Hispanic or Latino (Census, 2000).

In the fall of 2005, due to community concerns, the Florida Department of Health (DOH) started the health assessment process at the Hernando County DPW site. At the time of the Florida Department of Health's site visit in September 2005, the DPW site was paved except for an area of petroleum tank removal. Access to the site was restricted by a chain link fence and warning signs were posted. (Figure 4). DOH staff observed two storm drains on the paved area of the site drain directly into a ditch along the southern border. This ditch drains into a cement culvert in the southeast corner of the site. Discharge from this culvert flows south into drainage ditches in the Mitchell Heights neighborhood. DOH staff observed a pattern of sediment deposition in a yard on "A" Street indicating storm water runoff from the DPW site over the berm. Staff observed that a few residences had vegetable gardens separated a few feet from the berm by a chain link fence. In 2006, at the request of the Florida Department of Environmental Protection (DEP) and DOH, the initial offsite soil sampling was conducted along the eastern, western and southern boundaries of the site. On behalf of the Hernando County Board of Commissioners, Creative Environmental Solutions Inc. (CES) conducted the sampling. Based on the 2006 sampling results, the Florida Department of Health (DOH) determined that the available data were insufficient to evaluate the public health threat. The DOH met with the Hernando County Administrator and explained that additional offsite surface soil sampling, farther out into the neighborhood, toward the Bethune street lift station would be necessary to characterize the public health threat. CES conducted the recommended off-site surface soil samples in March 2007.

Because of potential runoff of site chemicals to nearby gardens, the Florida DOH coordinated fruit and vegetable testing (collards, grapefruit, mustard greens, oranges, tangerines and turnips). The Florida Department of Agriculture and Consumer Services (DACS) tested fruits and vegetables (produce) from four nearby gardens for metals and pesticides. Because of its use on the site, malathion was the main pesticide of concern. However, this chemical was not found in the fruits or vegetables. Calculated doses of metals and other pesticides from eating the homegrown produce were less than recommended dietary intake levels and less than or equal to Agency for Toxic Substance and Disease Registry (ATSDR) Minimal Risk Levels. Therefore, the levels of metals and pesticides found in the fruits and vegetables in Mitchell Heights are not likely to cause illness (ATSDR 2007a).

Because of lead in Mitchell Height's soil, the Hernando County Health Department tested 18 resident's blood lead levels and blood pressure. Blood lead levels ranged from <2 to 7 microgram per deciliter (ug/dL) and blood pressure ranged from 93/66 to 160/58 mmHG.

Discussion

Due to the length of operation of the DPW site, confirmed on-site contamination, and storm water/sediment runoff into the Mitchell Heights neighborhood; residents may have been exposed to site-related contaminants. Mitchell Heights residents may have been exposed via incidental ingestion (accidentally swallowing small amounts of sediments) or by inhalation (breathing dust created from the contaminated sediments).

Sampling History

Hernando County tested soil in the Mitchell Heights neighborhood on two occasions. The County first tested the soil in 2006 at the request of the Florida DEP and Florida DOH (CES 2006). The County sampled 35 locations (Figure 5), twenty two surface soil samples (SS-1 thru SS-22) at a depth of 0-0.5' and at 0.5'-2' and thirteen additional samples (DPT-OS-1 thru DPT-OS-15) at depths of 0-0.5', 0.5'-2', 2'-4' and 4'-6'. The County had the soil samples analyzed for pesticides (organophosphorus and organochlorine) and metals (arsenic, lead, chromium, cadmium, selenium and barium). The analytical data indicates that arsenic, lead, cadmium and chromium were present in offsite soils. DOH compared screening values with the levels detected in order to select contaminants of concern. Screening values are established to be protective of human health and to protect the most sensitive members of a given community. Values below these screening guidelines do not require further evaluation. The County found chromium and cadmium at levels well below the screening values and are not contaminants of concern. The County found arsenic and lead at levels above the screening values and we examine them as contaminants of concern (Table 1).

At the request of FDOH, the County tested more soil in the Mitchell Heights in March 2007 (CES 2007). The County collected twenty two surface soil samples at a depth of 0 to 3 inches (Figure 6). Typically, the Florida DOH estimates the likelihood of illness from the exposure to the top three inches of soil. For the most part, people are exposed to the top three inches of soil during daily activities. The County collected the first ten samples (OS-SS-A thru OS-SS-J) from the yard of a residence on "A" Street where storm water runoff overflowed the southern boundary berm and deposited sediments from the site. Out of the ten samples collected from this residence, seven contained PCBs, and one contained dieldrin. In one location, the County found PCBs at a level above the screening value. DOH examined PCBs as contaminants of concern (Table 1). The County collected the remaining twelve soil samples (OS-SS-K thru OS-SS-V) from the drainage ditches along Bethune Street south of the DPW site. The County had the soil samples analyzed for metals (including arsenic, cadmium, chromium and lead) organochlorine pesticides (including DDT), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). Hernando County did not find any contaminants above screening values in these samples. To reduce flooding, Hernando County periodically removes accumulated sediments in the drainage ditches of the Mitchell Heights neighborhood. Therefore, current contaminant levels in these ditches may not be representative of past conditions.

Hernando County found the highest levels of off-site contamination where especially heavy rains continue to carry site storm water runoff over the ditch/berm and into the yard on "A" Street. Although most of the contaminants levels in this yard are below screening values, they are higher than in other yards. These analytical results confirm observations of deposition of sediments from the site in this one yard on "A" Street.

For the purpose of this health consultation report, DOH has determined that the soil in the Mitchell Heights neighborhood has been adequately characterized.

Toxicological Evaluation

The Florida DOH evaluates exposures by estimating daily doses for children and adults. Kamrin (1988) explains the concept of dose in the following manner:

. . .all chemicals, no matter what their characteristics, are toxic in large enough quantities. Thus, the amount of a chemical a person is exposed to is crucial in deciding the extent of toxicity that will occur. In attempting to place an exact number on the amount of a particular

compound that is harmful, scientists recognize they must consider the size of an organism. It is unlikely, for example, that the same amount of a particular chemical that will cause toxic effects in a 1-pound rat will also cause toxicity in a 1-ton elephant.

Thus instead of using the amount that is administered or to which an organism is exposed, it is more realistic to use the amount per weight of the organism. Thus, 1 ounce administered to a 1-pound rat is equivalent to 2,000 ounces to a 2,000-pound (1-ton) elephant. In each case, the amount per weight is the same; i.e., 1 ounce for each pound of animal.

This amount per weight is the *dose*. Toxicology uses dose to compare the toxicity of different chemicals in different animals. We use the units of milligrams (mg) of contaminant per kilogram (kg) of body weight per day (mg/kg/day) to express dose in this public health consultation. A milligram is 1/1,000 of a gram; a kilogram is approximately 2 pounds.

To calculate the daily dose of each contaminant, the Florida DOH uses standard assumptions about body weight, ingestion and inhalation rates, duration of exposure (period of time), and other factors needed for dose calculation (ATSDR 1992, EPA 1997). We assume that people are exposed daily to the maximum concentration measured at the site. ATSDR's toxicological profiles on contaminants discuss toxicity from three exposure routes - inhalation, ingestion, and dermal (skin) exposure. For each of these exposure routes, ATSDR also groups health effects by duration (length) of exposure. Acute exposures are those with duration of 14 days or less; intermediate exposures are those with duration of 15 - 364 days; and chronic exposures are those that occur for 365 days or more (or an equivalent period for animal exposures). ATSDR Toxicological Profiles also provide information on the environmental transport and regulatory status of contaminants.

To estimate exposure from incidental ingestion of contaminated residential soil, Florida DOH used the following assumptions:

- 1) Children 1 - 4 years of age ingest an average of 200 mg of soil per day,
- 2) Adults ingest an average of 100 mg of soil per day,
- 3) Children 1 - 4 years of age weigh an average of 15 kg,
- 4) Adults weigh an average of 70 kg,
- 5) Children and adults ingest contaminated soil at the maximum concentration measured for each contaminant.

For each of the following contaminants of concern, we considered three exposure scenarios: 1) current health threat from incidental ingestion of contaminated surface soil, 2) current health threat from inhalation of contaminated dust, and 3) past health threat from incidental ingestion of **subsurface** soil. For current exposure scenarios (#1 and #2), we use the highest contaminant concentrations in off-site surface soil. For past exposure scenario (#3), we used the highest contaminant concentrations in off-site sub-surface soil (0.5 - 2 feet deep). We assume that in the past, residents on "A" Street were exposed to contaminated sediments washed into their yards from the DPW site. Over time with continued sediment deposition, these sediments that were once on the surface are now buried 0.5 to 2 feet deep.

Arsenic

Arsenic is a naturally occurring metal that is a common component of the earth's crust. Low levels of arsenic can be found throughout the environment, these low levels are often referred to as background levels. While arsenic can be released into the environment from natural sources, releases

from anthropogenic (man-made) sources are much more prevalent. Man-made sources can include metal mining and smelting, wood combustion, coal combustion, waste incineration and pesticide application.

To be protective of human health, we assumed that the arsenic that was found in the off-site soils was in the more toxic inorganic form. Hernando County found elevated levels of arsenic on the DPW site. Storm water runoff from the site carried arsenic containing sediments into the Mitchell Heights community. Currently arsenic was detected above screening guidelines in two samples. The highest arsenic level found in surface soil was 2.31 milligrams per kilogram (mg/kg). The corresponding incidental ingestion dose is 0.000031 milligrams per kilogram per day (mg/kg/day). This dose is approximately 58 times lower than the lowest dose in human studies (0.0018 mg/kg/day) known to cause human health effects (ATSDR 2006a) (Table 3).

Therefore, incidental ingestion of arsenic measured in residential surface soils of the Mitchell Heights community is not expected to cause non-cancer illness.

The highest estimated arsenic exposure from inhalation of arsenic contaminated dust is 0.000000020 milligrams per cubic meter (mg/m³). This exposure is approximately thirty five thousand times lower than the lowest concentration that causes observable adverse effects in human studies (ATSDR 2006a) (Table 3).

Inhalation of dust from the highest off-site arsenic surface soil concentration measured in the soils in the Mitchell Heights neighborhood is not expected to cause illness in residents.

To evaluate a theoretical cancer risk from incidental ingestion of arsenic, the US EPA developed a cancer slope factor based on a human study where subjects developed skin cancer. The cancer slope factor is multiplied by a lifetime average daily dose. The highest estimated ingestion dose in Mitchell Heights is adjusted to create the lifetime average daily dose for a 70 year life expectancy. The maximum theoretical excess cancer risk for lifetime exposure of incidental ingestion of arsenic is one additional cancer per one million people, classified as “no apparent increased risk.”

To evaluate a theoretical cancer risk from inhalation of arsenic, the US EPA developed an inhalation risk unit, from a human study where subjects developed lung cancer. The unit risk is multiplied by an inhalation concentration which has been adjusted for a lifetime of 70 years. The estimated maximum theoretical excess cancer risk for lifetime inhalation of arsenic in Mitchell Heights is one additional cancer per ten million people, classified as “no significant increased risk.”

Lead

Lead is a naturally occurring metal that can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining and manufacturing. Adults and children may be exposed to lead by hand-to-mouth contact after exposure to lead-containing soil or dust. Most exposure to lead comes from accidental ingestion rather than dermal exposure. Environmental exposure to lead has long been recognized as a public health problem particularly among children. Excessive concentrations of lead in soil have been shown to increase blood lead levels in young children (ATSDR 1999, 2005).

Typically, people are only exposed to the top three inches of soil during daily activities. The highest surface soil (0-0.5 feet deep) lead level (60 mg/kg) was at a residence on “A” Street in the Mitchell Heights neighborhood directly south of the site. This lead level was well below the soil screening guideline of 400 mg/kg. Therefore, lead levels in Mitchell Heights' surface soil are not a public

health threat. In 2006 the Hernando County Health Department tested 18 Mitchell Heights residents and found blood lead levels in most were below detection limits. Resident blood lead levels are examined in more detail in a separate report.

The highest **subsurface** (0.5-2.0 feet deep) lead level, also at the same residence on “A” Street, however, was 421 mg/kg. We assume that in the past, this soil was at the surface and residents were exposed via incidental ingestion and/or inhalation of dust. Over time with continued sediment deposition, these sediments that were once on the surface are now buried 0.5 to 2 feet deep.

Using a predictive model, Florida DOH estimates that past exposure to 421 mg/kg of lead in the **subsurface** soil at one residence on “A” Street, could have caused blood levels of 0.3 – 3.8 micrograms per deciliter (ug/dL) (Table 4). Estimated blood lead levels more accurately predict health effects than traditional dose estimates.

Various governmental agencies have not established a safe level of lead in the blood. For children (1-5 years old), the US Centers for Disease Control and Prevention (CDC) recommends retesting and exposure prevention for blood lead levels 10-14 ug/dL. For blood lead levels in children of 15-19 ug/dL, CDC recommends nutritional counseling and an environmental audit. For blood lead levels in children of 20-44ug/dL, CDC recommends an environmental audit/remediation and medical evaluation. For adult workers, the US Occupational Safety and Health Administration recommends an evaluation when blood lead levels exceed 40 ug/dL.

Measured blood lead levels for adults in Mitchell Heights are below the OSHA workplace standard of 40 micrograms per deciliter (ug/dL). In the past, residents of one house on “A” Street in Mitchell Heights may have been exposed via incidental ingestion to lead in soil at a concentration slightly above the residential soil standard. Although there is a large degree of uncertainty, models predict that in the past residents of this one house may have had blood lead levels as high as 3.8 ug/dL. Some studies suggest an increased risk of hypertension, tooth decay, decrease in kidney function, and an increase in immunoglobulin E (an antibody that regulates immune system response) at blood lead levels above 2 or 3 ug/dL (ATSDR 2005). Therefore, in the past, residents of this one house on “A” Street may have been at a slightly increased risk of these illnesses.

Polychlorinated biphenyls (PCB)

There are no known natural sources of polychlorinated biphenyls (PCBs) in the environment. Old fluorescent lighting fixtures, electrical devices or appliances and hydraulic fluids may contain PCBs. The manufacture of PCBs stopped in the United States in 1977. Evidence indicates that PCBs build up in the environment and can cause a variety of health effects. Since PCBs are resistant to environmental degradation they remain in soil for long periods of time.

Current levels of PCBs in Mitchell Heights' surface soil are not likely to cause illness. Also levels of PCBs in Mitchell Heights' **subsurface** soil were not likely to cause illness from past exposures.

The highest estimated PCBs dose from incidental soil ingestion is 0.000013 mg/kg/day, approximately 385 times lower than the lowest known observable adverse effect level in animal studies(0.005 mg/kg/day) (Table 3). Therefore, incidental ingestion of PCBs measured in residential surface soils of the Mitchell Heights neighborhood is not expected to cause non-cancer illness.

The highest estimated PCB exposure from inhalation of contaminated dust is 0.000000009 milligrams per cubic meter (mg/m³) which is millions of times less than the lowest observable

adverse effect level in animal studies (1.5 mg/m³). Therefore, inhalation of dust from the highest concentration of PCBs in Mitchell Heights' surface soil is not expected to cause illness.

To evaluate a theoretical cancer risk from incidental ingestion of PCBs, the US EPA developed a cancer slope factor based on animal studies. The cancer slope factor is multiplied by a lifetime average daily dose. The highest estimated ingestion dose in Mitchell Heights is adjusted to create the lifetime average daily dose for a 70 year life expectancy. The maximum theoretical excess cancer risk for lifetime exposure of incidental ingestion of PCBs is one additional cancer per one million people, classified as “no apparent increased risk.” There are not enough human or animal studies available to evaluate a theoretical cancer risk from inhalation of PCB-contaminated dust.

Child Health Considerations

The Agency for Toxic Substances and Disease Registry (ATSDR) and the Florida DOH recognize that the unique vulnerabilities of infants and children demand special attention when faced with contamination in their environment. Children are at a greater risk than are adults to certain kinds of exposure to hazardous substances. Because they play outdoors and because they often carry food into contaminated areas, children are more likely to be exposed to contaminants in the environment. Children are shorter than adults, which mean they breathe dust, soil, and heavy vapors closer to the ground. They are also smaller, resulting in higher doses of chemical exposure per body weight. If toxic exposures occur during critical growth stages, the developing body systems of children can sustain permanent damage. In the Mitchell Heights neighborhood, at the one residence on “A” Street children as well as adults may have been at a slightly increased risk of of hypertension, tooth decay, decrease in kidney function, and an increase in immunoglobulin E (an antibody that regulates immune system response) at blood lead levels above 2 or 3 ug/dL (ATSDR 2005). Probably most important, however, is that children depend on adults for risk identification and risk management, housing, and access to medical care. Thus, adults should be aware of public health risks in their community, so they can guide their children accordingly.

Other susceptible populations may have different or enhanced responses to toxic chemicals than will most persons exposed to the same levels of that chemical in the environment. Reasons may include genetic makeup, age, health, nutritional status, and exposure to other toxic substances (like cigarette smoke or alcohol). These factors may limit that persons' ability to detoxify or excrete harmful chemicals or may increase the effects of damage to their organs or systems.

Community Health Concerns

The Florida DOH provided a health concerns comment form at various public meetings. DOH compiled a list of community health concerns from the mailed responses (Table 5). Florida DOH provides background information on each reported health concern and then explores its relationship to site specific contamination from the DPW site (Table 6). The studies used for comparison are the studies included in the ATSDR toxicological profile for each contaminant of concern. The toxicological profiles characterize the toxicological and adverse health effects information for a specific chemical. Each toxicological profile is available electronically at www.atsdr.cdc.gov/toxpro2.html.

Conclusions

Surface soil in the Mitchell Heights neighborhood is “No Apparent Public Health Hazard.”

1. Current exposures to chemicals in Mitchell Heights surface soil are not likely to cause illness.
2. In the past, residents of one house on “A” Street may have been at a slightly increased risk of hypertension, tooth decay, decrease in kidney function, and an increase in immunoglobulin E (an antibody that regulates immune system response).

Recommendations

1. Stop storm water runoff from the former Hernando County Department of Public Works site from overflowing the drainage ditch into one property on “A” Street.

Public Health Action Plan

1. If future land use on the former Hernando County Department of Public Works site changes, on-site contaminant levels should be reviewed to determine the public health threat.
2. The Florida DOH will review additional Mitchell Heights soil data if they become available.

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Appendix A. Figures and Tables

Figure 1: Hernando County Florida Department of Health

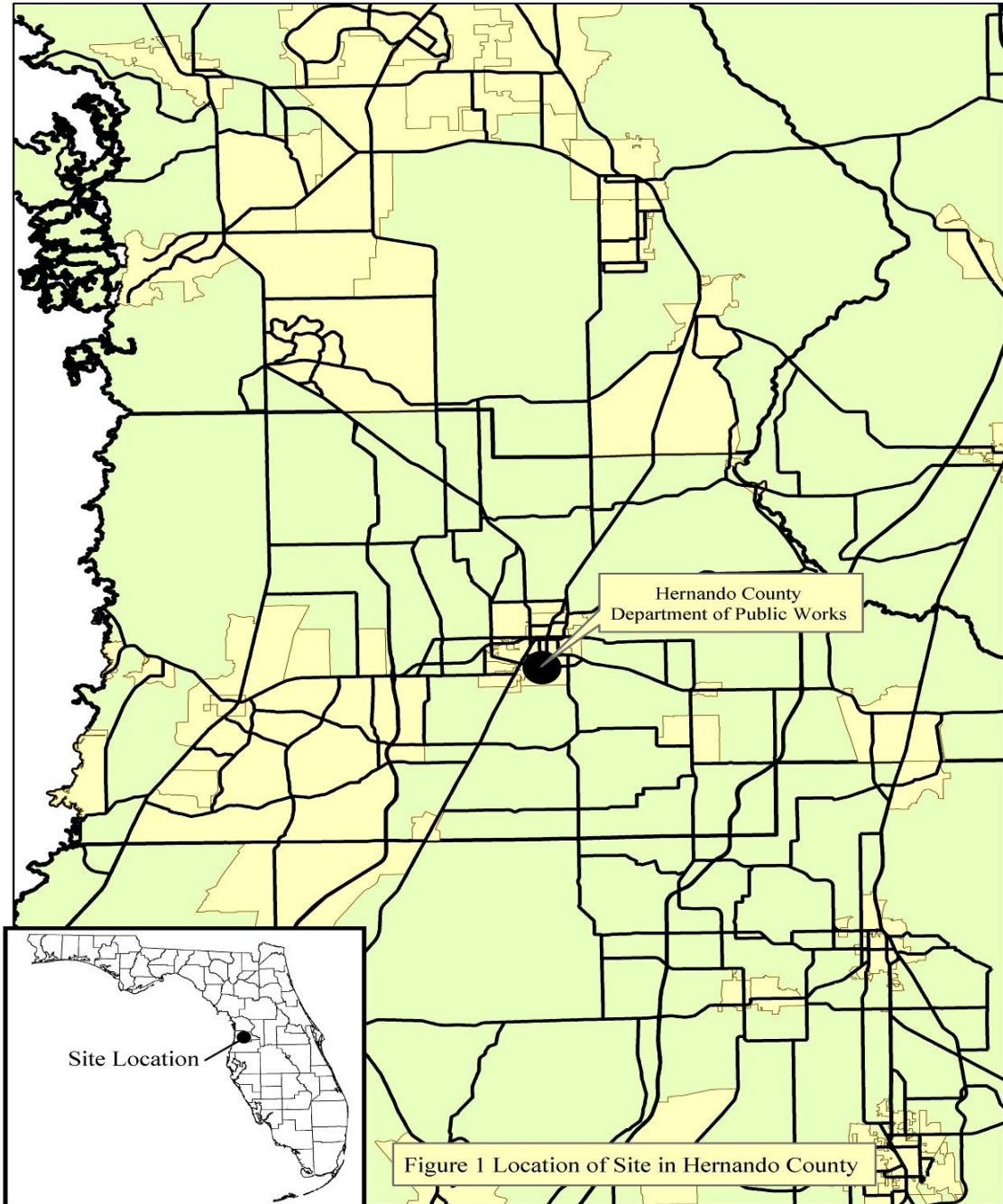


Figure 2: 1999 Aerial Photograph of Hernando County DPW and Mitchell Heights neighborhood



0 0.015 0.03 0.06 0.09 0.12 Miles

Figure 4. Photograph of Hernando County DPW south boundary ditch. View from southeast site corner facing west.



Figure 5 Sampling Event 2 Locations

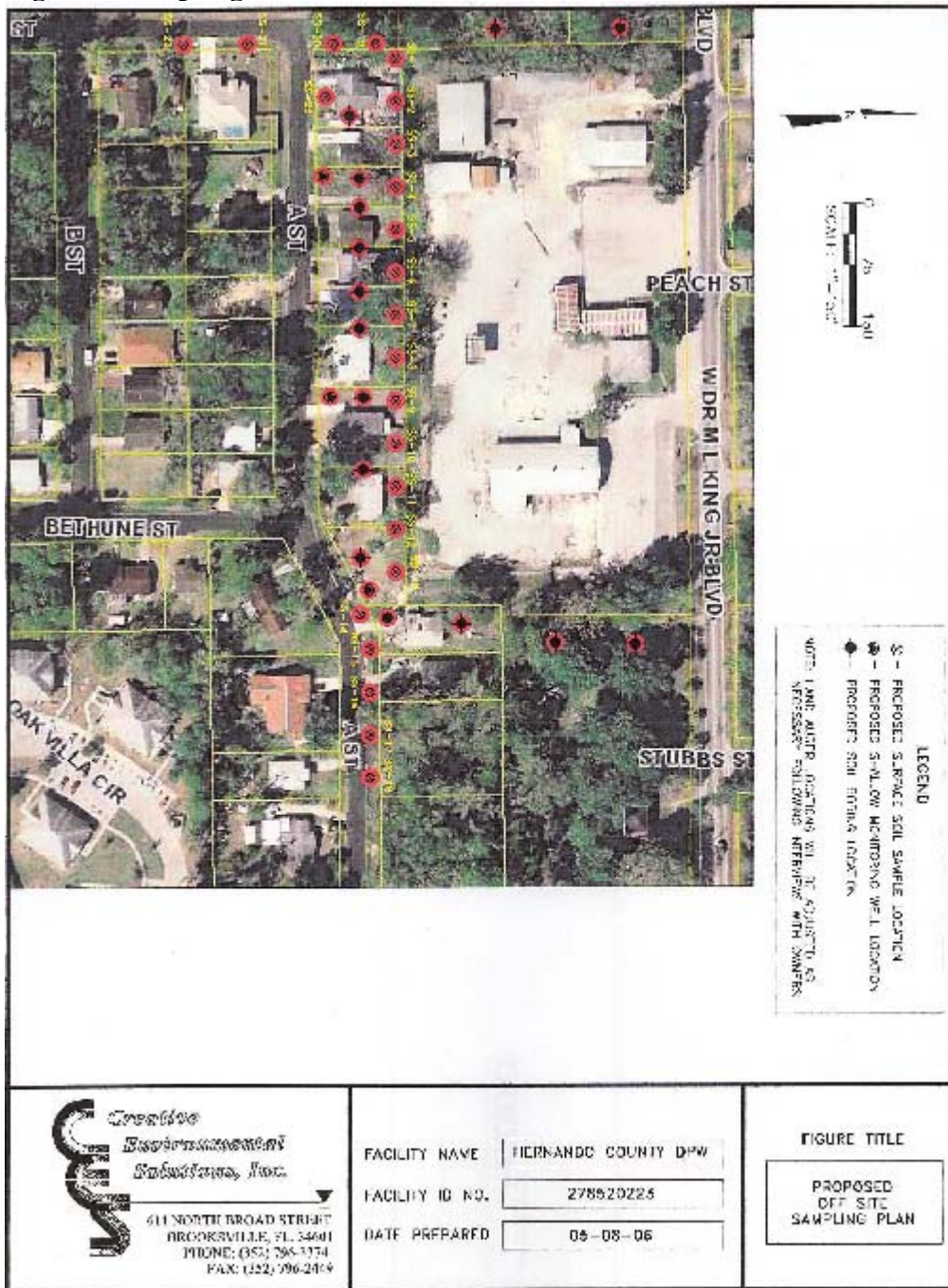
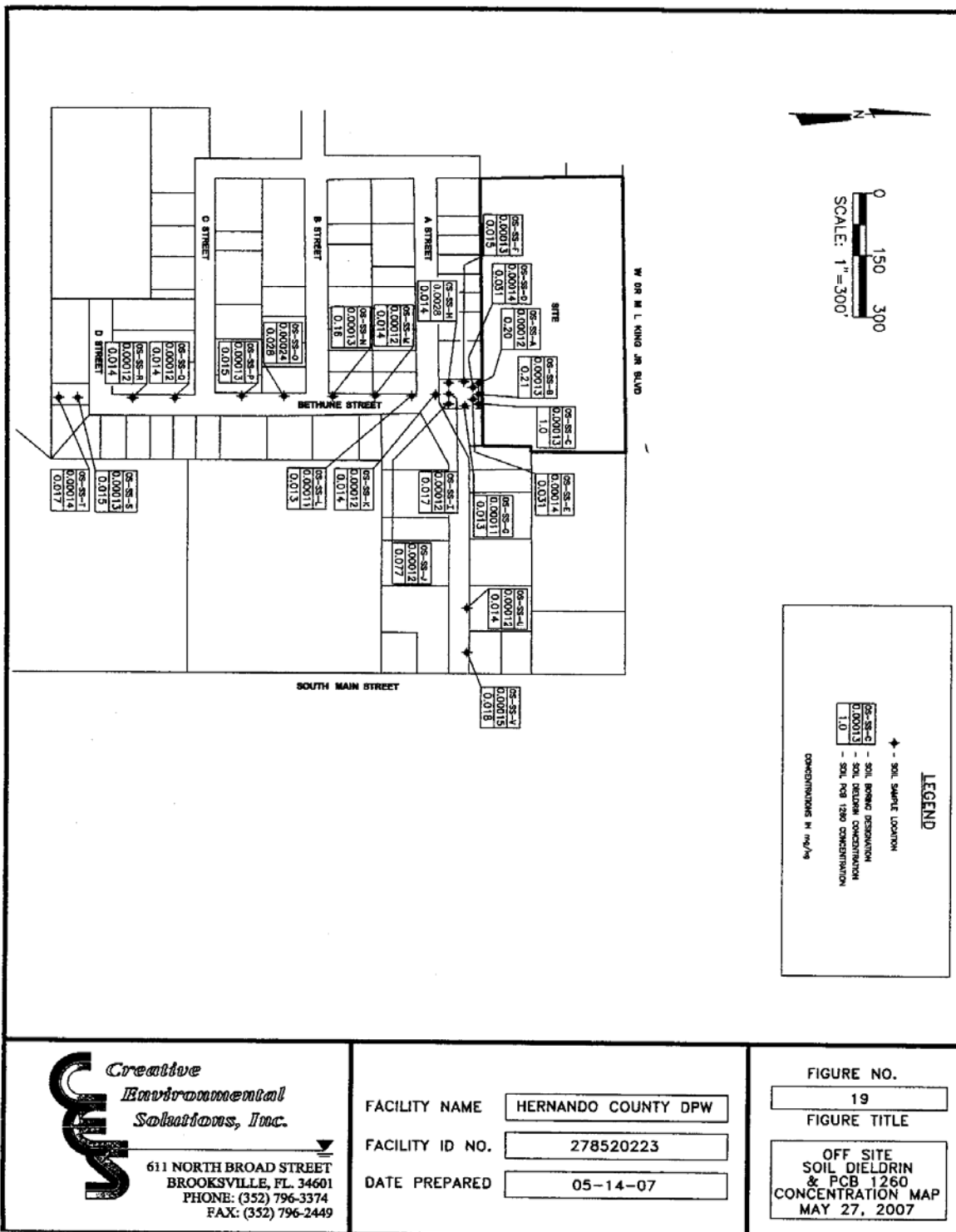


Figure 6: Sampling Event 2 locations



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FACILITY NAME: HERNANDO COUNTY DPW
FACILITY ID NO.: 278520223
DATE PREPARED: 05-14-07

Table 1: Contaminants of Concern in Off-Site Surface Soils (0 – 0.5 feet below land surface)

Contaminants of Concern	Highest Concentration (mg/kg)	Screening Guideline (mg/kg)	Number of Samples Above Screening Guideline
Arsenic	2.31	0.5*	2/57
Lead	60	400**	1/57
PCBs	1.0	0.4*	1/57

mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
*=ATSDR Screening Guideline
**=DEP Screening Guideline
Source: [CES 2006, CES 2007]

Table 2: Contaminants of Concern in Off-Site Subsurface Soils (0.5 – 2 feet below land surface)

Contaminants of Concern	Highest Concentration (mg/kg)	Screening Guideline (mg/kg)	Number of Samples Above Screening Guidelines
Arsenic	2.03	0.5*	1/57
Lead	421	400**	1/57
PCBs	NA	0.4*	1/57

mg/kg = milligrams per kilogram
SCTL = Florida DEP Soil Concentration Target Level
*=ATSDR Screening Guideline
**=DEP Screening Guideline
NA=Not available
Source: [CES 2006]

Table 3: Estimated Maximum Dose from Exposure to Off-Site Surface Soil

Contaminants of Concern (maximum concentration) (mg/kg)	Chronic Oral MRL (mg/kg/day)	Estimated Ingestion Dose (mg/kg/day)		Inhalation MRL (mg/m ³)	Estimated Inhalation (mg/m ³)	
		Child	Adult		Child	Adult
Arsenic (2.31)	0.0003	0.000031	0.000003	None	0.000000020	0.000000035
PCBs (1.0)		0.000013	0.000001	None	0.000000009	0.000000015

0.02

PCBs = Polychlorinated biphenyls

MRL = Minimal Risk Level. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure

Chronic = Chronic exposure length of more than 365 days

mg/kg = milligrams per kilogram

mg/m³ = milligrams per cubic meter air

mg/kg/day = milligram chemical per kilogram body weight per day

Table 4: Estimated Adult Blood Lead Concentrations from Exposure to Off-Site Subsurface Soil

Media	Conc. *		Time	Slope'		Low	High
	low	high		low	high		
Air (out) *	0.1	0.2	0.33	1.59	3.56	0.05247	0.23496
Air (in) *	0.3	0.6	0.33	1.53	3.56	0.15147	0.70488
Food*	5	5	0.33	0.016	0.0195	0.0264	0.032175
Water*	4	4	0.33	0.03	0.06	0.0396	0.0792
Soil	0.493	421	0.33	0.002	0.016	0.000325	2.22288
Dust	0.493	421	0.33	0.004	0.004	0.000651	0.55572
Total						0.270916	3.829815

ug/dL = micrograms per deciliter

Table created with information from the ATSDR Draft Toxicological Profile for Lead 2005.

Source: [ATSDR 2005e]

Model Parameters and Assumptions for Tables 1-4.

Exposure Medium: Groundwater
Exposure Point: **On-site tap water**
Scenario Time frame: Future
Land Use Conditions: Residential

Receptor Population: Residents

These doses were calculated using Risk Assistant software by Hampshire Research Institute, Version 2.0. The part of this software Florida DOH uses allows us to set custom exposures that we can use for every site with accepted values for groundwater consumption, shower inhalation exposure and dermal exposure parameters (EPA, 1991).

The following doses were calculated using the following values:

Adult body weight-	70 kg
Child body weight-	15 kg
Adult water consumption-	2 liters/day
Child water consumption-	1 liter/day
Adult shower time-	0.2 hours
Adult skin surface area-	23,000cm ²
Child skin surface area-	7,200cm ²

* The air concentration is given in milligrams per cubic meter because the values for inhalation studies in most of the Toxicological Profiles are given in these units. The air concentration is not a dose; therefore it is the same for adults and children.

µg/L = microgram per liter of water
mg/kg/day = milligrams per kilogram body weight per day
mg/m³ = milligrams per cubic meter

N.D.- Not detected
N.A.- Not applicable

N.S.- Not significant

Exposure Medium: Soil
Exposure Point: **On-site soil and dust**
Scenario Time frame: Future
Land Use Conditions: Residential

Receptor Population: Residents

These doses were calculated using Risk Assistant software and accepted values for soil consumption, dust inhalation exposure and dermal exposure parameters (EPA, 1991).

The following doses were calculated using the following values:

Adult body weight-	70 kg
Child body weight-	15 kg
Adult soil consumption-	100 mg/day
Child soil consumption-	200 mg/day
Adult/Child shower time-	0.2 hours
Adult skin surface area-	23,000cm ²
Child skin surface area-	7,200cm ²

* The air concentration is given in milligrams per cubic meter because the values for inhalation studies in most of the Toxicological Profiles are given in these units. The air concentration is not a dose; therefore it is the same for adults and children.

mg/kg = milligram per kilogram of soil
mg/kg/day = milligrams per kilogram body weight per day

Table 5: Community Health Concerns

Health, Environmental and Other Concerns Collected from the Mitchell Heights Community

(Taken verbatim from original Community Health, Environmental and Other concerns worksheets).

Health Concerns:

“health problems believed because of contaminated water entering my home (inside and outside).”
“We were unaware”
“My family are associating some of the illnesses that have occurred and are recurring and some of are chronic diseases with the contamination in the area.”
Illnesses (past, present and ongoing) also chronic associated with contamination in the area
Health effects from eating fruit and vegetables
Possible adverse effects to children from playing in yard and ditches where there is runoff from the site
“Water that ran off the DPW site have come into our home (in two of the bedrooms, utility room and into the kitchen)”
“Concerned about breathing atmosphere and breathing the horrible smells from back there in recent years”
Allergies
Prone to infections (such as MRSA)
Carcinogens (arsenic, benzene) causing health problems
Skin irritations
Upper respiratory
Chronic bronchitis
Cystic fibrosis
Contracting diseases
Contracting cancer, respiratory (problems) such as lung, heart disease, and others like kidney and liver disease*
High blood pressure
Problems with kidney, liver, digestive system, chronic coughing
“I am greatly concerned about the health and the health of my children who were raised here in Mitchell Heights.
We have lived in Mitchell Heights about thirty years (30).
We have had problems from severe headaches to more serious medical problems.
I am very serious that many of my problem come from the contamination running through the Mitchell Heights area.

Environmental Concerns:

Death of fruit trees including: bananas, peaches, oranges, tangerine, and plum; also hedges and flower trees
“Contamination, unsafe and unsanitary trash and dirty water rolling into yard and washing property away”
Onsite concerns about mosquito control, road striping and repair operation as well as truck repair and refueling;
also tanks and drums holding pesticides, paint, paint thinner, hydraulic fluid, gasoline and diesel fuel all ending up in the ground,
contaminating soil and groundwater
Soil: Grass never grows
“I am deeply concerned about pollution in the air as well as contamination in the area.”
“About the waste that went into the ground causing me to contract some or all of the above diseases.”*
Exposure to lethal doses of insecticide.
Ground soaked with toxic material, i.e. petroleum, oil, diesel fuel.
“When it rains, water pours down in yard and settles, soaking ground with toxic waste and washing away property.”
“Mitchell Heights has been polluted with all kinds of waste products, especially open ditches, lead poison,
you name it and we in Mitchell Heights live it.”

Other Concerns:

Unaware of contamination
“My concern is we shouldn’t be living in a contaminated area. It’s not healthy, by no means, even if they are cleaning up the contaminated areas. We can’t trust our lives with this. If it is cleaned up, who wants to live in an area that has been contaminated for years? We can’t trust that.”
“Water settling in yard and ditches. Small children playing. Dangerous snakes and other insect bites, drownings, etc.”
Lack of action on county’s part (even after 1991 whistleblower report)
“How are you planning on helping fix the problem that has already caused such discomfort in people’s lives, such as myself?”
“What are you going to do about correcting the problem?”
“Exposure to the toxic situation in Mitchell Heights has created health issues for many members of my family. My son lives on “C” Street. He was infected with (MRSA) after working in his yard was on medication for many weeks. Someone needs to do something to ensure there will be no more health issues due to toxic waste.”
“That my family and I have put up with this situation for many years known that our trusted people in authority knew about it all the time. I am very disappointed about this situation and the way it was handled and we still don’t have any results.”

Health Concerns Background Information

Allergies:

An allergy is a very common disorder. Allergies are caused when the immune system wrongly identifies a harmless substance as an illness causing threat. An allergen is a harmless substance that triggers an immune system response. An allergic reaction occurs after the body has been sensitized, after repeated exposures to an allergen. The immune system mistakenly reacts to the allergen as it would to a harmful virus or bacteria. An antibody is then produced to defend the body. When the antibody makes contact with the allergen, chemicals (histamine is the most common chemical produced) are produced that trigger allergy symptoms.

The most common symptoms are itchy, watery eyes, sneezing, runny nose, hives, and inflammation of the nasal passages. In severe cases, allergies can cause anaphylactic shock. Anaphylactic shock is a sudden severe allergic reaction that can be fatal if not treated immediately. The most common allergens are plant pollens, dust mites, mold, pet dander, medications (like aspirin or penicillin), and certain foods. The cause of allergies is still being investigated. It is known, that genetic predisposition and environment are risk factors in the development of allergies. Allergies affect a large number of people in the United States. Approximately one in five Americans has a chronic allergy (AMA 2003).

Available studies have not shown an association between allergies and any of the contaminants of concern identified in Mitchell Heights' surface soil.

Cancer:

Cancer is very common. The American Cancer Society estimates that one in four Americans will be diagnosed with some form of cancer during their lifetime and one in three Americans will die of cancer. Cancer is second only to heart disease as a cause of death in the US (ACS 2006). Cancer is not just one disease, but a group of them. Cancer happens when something damages the way the body controls a group of cells. After that, cells grow rapidly and no longer in a normal way. Growths that are cancerous or malignant can form within any tissue or organ system. Malignancies are usually grouped into two categories:

Non-tumor forming - This includes leukemia, which is a type of cancer in which white blood cells displace normal blood. Lymphoma is another type, which starts in the lymph nodes.

Tumor forming - This includes carcinoma, which is kind of tumor that starts in the surface layer of an organ or body part and may spread to other parts of the body. They commonly occur more often in older people. A second kind of tumor-forming cancer is sarcoma. This tumor grows in connective tissue like muscle, bone, fat or cartilage.

Risk factors for cancer include family history, age (60% of all cancers in the US occur in people over 65), environmental factors (cigarette smoking, alcohol consumption, pollution from industrial waste, and radiation), geography, diet (high in saturated fat/high alcohol intake), viral infections, and inflammatory diseases (MERCK 2003).

Excluding nonmelanoma skin cancer, the most common types of cancer in Florida are prostate (men), breast (women), lung/bronchus, colorectal, bladder, head/neck, uterine (women), and non-Hodgkin's lymphoma. Cancer cluster investigations seek to determine if an unexpected number of cases of cancer have occurred. These investigations are limited by a number of factors (DOH 2006).

Exposure to arsenic is associated with an increased risk of cancer. To evaluate a theoretical cancer risk from incidental ingestion of arsenic, the US EPA developed a cancer slope factor based on a human study where subjects developed skin cancer. The cancer slope factor is multiplied by a lifetime average daily dose. The highest estimated ingestion dose in Mitchell Heights is adjusted to create the lifetime average daily dose for a 70 year life expectancy. The maximum theoretical excess cancer risk for lifetime exposure of incidental ingestion of arsenic is one additional cancer per one million people, classified as "no apparent increased risk."

To evaluate a theoretical cancer risk from inhalation of arsenic, the US EPA developed an inhalation risk unit, from a human study where subjects developed lung cancer. The unit risk is multiplied by an inhalation concentration which has been adjusted for a lifetime of 70 years. The estimated maximum theoretical excess cancer risk for lifetime inhalation of arsenic in Mitchell Heights is one additional cancer per ten million people, classified as "no significant increased risk."

Chronic Bronchitis:

Bronchitis is a respiratory disease that can be either chronic (lasting more than 2 years) or acute (lasting less than 6 weeks). The mucous membranes in the lung's bronchial passages become swollen and inflamed. The tiny airways in the lungs become constricted. This condition is usually accompanied by thick phlegm and breathlessness. Chronic bronchitis is a serious long-term disorder that in most cases requires regular medical treatment. Several factors can cause chronic bronchitis. Repeated attacks of acute bronchitis, which weaken and irritate bronchial airways over time, can result in chronic bronchitis. Industrial pollution can lead to bronchitis. Chronic bronchitis is found in higher-than-normal rates among coal miners, grain handlers, metal molders, and other people who are continually exposed to dust. But the chief cause is heavy, long-term cigarette smoking, which irritates the bronchial tubes and causes them to produce excess mucus. The symptoms of chronic bronchitis are also worsened by high concentrations of sulfur dioxide and other pollutants in the atmosphere (Medicinenet.com).

Available chronic arsenic ingestion studies indicate an association with bronchitis at 0.015 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 480 times lower than the dose that causes bronchitis in these studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of bronchitis.

Cystic Fibrosis:

Cystic fibrosis is a hereditary disease that causes certain glands to produce abnormal secretions, resulting in tissue and organ damage, especially in the lungs and the digestive

tract. In children, respiratory tract infections are a common symptom of cystic fibrosis (CF) and occur because of bacterial growth in the bronchial secretions and walls of the airways. About 15% of adults with CF develop insulin-dependent diabetes because of scarring to the pancreas. In the United States, it occurs in approximately 1 of 3,300 of white infants and about 1 of 15,300 black infants and is rare in Asians. (MERCK)

Available studies have not shown an association between cystic fibrosis and any of the contaminants of concern identified in Mitchell Heights surface soil.

Digestive Problems:

The digestive system includes not only the stomach, small intestine, and large intestine, which move food, but also associated organs such as the pancreas, liver and gallbladder, which produce digestive enzymes, remove toxins, and store substances necessary for digestion (MERCK). Because the digestive system is made up of many different organs, digestive disorders can be caused by many factors. Symptoms can vary widely, they can include; diarrhea, constipation, bleeding, dyspepsia (gnawing or burning sensation in lower abdomen), nausea and vomiting. A medical professional usually determines the kind of disorder by the symptoms and if necessary using a diagnostic procedure. Digestion problems can vary widely and must be treated on a case by case basis by a medical professional.

Available chronic arsenic ingestion studies indicate an association with digestive disorders at 0.015 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 480 times lower than the dose that causes digestive disorders in these ingestion studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of digestive disorders.

Available chronic polychlorinated biphenyl (PCB) ingestion studies indicate an association with digestive disorders at 0.080 mg/kg/day. The highest level of PCBs found in the surface soil in the Mitchell Heights community is approximately 6100 times lower than the dose that causes digestive disorders in these ingestion studies (ATSDR 2000). Therefore, the highest PCB levels in Mitchell Height's surface soil are not expected to cause a higher incidence of digestive disorders.

Headaches, (Severe headaches):

Headaches are very common. Seven out of 10 Americans are affected. Pain can be anywhere in the head and can go down into the neck. Sinus headaches (common with sinusitis or when the membrane lining the sinus is inflamed), rebound headaches and cluster headaches are some less common types. Tension headaches and migraines are the two most common types. A dull pain characterizes tension headaches. Stress, worry, too much caffeine, alcohol, eyestrain, and overexertion can also trigger headaches. Migraines typically include throbbing pain. The pain is usually centered on only one side of the head. Migraines can be prompted by many factors, including changes in hormone levels, reactions to allergies (especially to food), and stress. Family history is a factor in who will likely get migraines. More women than men have migraines (AMA 2003, MERCK 2003).

Available chronic arsenic ingestion studies indicate an association with headaches at 0.005 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 180 times lower than the dose that causes headaches in ingestion studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of headaches.

Heart Disease:

In the United States, heart disease (also known as cardiovascular disease, which relates to both the heart and the blood vessels) is the leading cause of death among both men and women. Coronary artery disease is the most common type of this disease in the US. The number of deaths associated with coronary artery disease goes up with age and affects people of all races. The incidence of the disease is extremely high among African Americans and Southeast Asians. Coronary artery disease is a condition in which the blood supply to the heart muscle is partly or completely blocked. A buildup of cholesterol and fatty materials on the wall of the coronary artery most commonly cause coronary artery disease. The symptoms of heart disease include chest pain, shortness of breath, fatigue, irregular heartbeats, dizziness, fainting, and sometimes swelling (legs, ankles, and feet). When the heart does not get enough blood flow, it can cause tightness or a squeezing feeling in the chest. Doctors call this angina. Pain in the chest can also be caused by an inflammation of the sac (pericarditis) surrounding the heart. Pleurisy (inflammation of the membranes covering the lungs) can cause pain that gets worse when someone inhales. Mitral valve prolapse caused by bulging of the left atrium and left ventricle, can cause brief episodes of stabbing pain. Victims usually feel this pain below the left breast. Shortness of breath is a very common symptom of heart failure. Fluid buildup in the spaces of the lungs is a condition called pulmonary congestion. If blood flow to the muscles is not enough for someone's body, feelings of fatigue and weakness result. Palpitations, or irregular heartbeats, when someone also is having shortness of breath and chest pain are usually symptoms of a serious disorder. Lightheadedness and fainting can result when the blood flow to the heart is not enough for a person's body (AMA 2003, MERCK 2003).

Available chronic arsenic ingestion studies indicate an association with heart disease at 0.002 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 65 times lower than the dose that causes heart disease in ingestion studies (ATSDR 2005). Available arsenic inhalation studies indicate an association with heart disease at 0.36 mg/m³. The highest concentration of arsenic found in the surface soil in the Mitchell Heights community is approximately 18 million times lower than the concentration that causes heart disease in inhalation studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Heights' surface soil are not expected to cause a higher incidence of heart disease.

High Blood Pressure (Hypertension):

Primary hypertension is high blood pressure with no known cause. When the cause is known (such as heart disease and kidney disease), it is known as secondary hypertension. Ninety percent of all people with high blood pressure have primary hypertension. Blood pressure commonly goes up with age. A blood pressure of 120/80 mmHg (diastolic/systolic) is considered normal while a blood pressure of 140/90mmHg is

considered high. As people age, it is very common for the diastolic pressure to be elevated. When the blood pressure is elevated for an extended period, the heart enlarges. The heart's walls also thicken due to increased strain. The heart does not work as well; the thickened walls become stiff making the heart work even harder. Over time, the heart will begin to have abnormal rhythms. This may result in heart failure. Risk factors for high blood pressure include obesity, smoking, stress, diet (high in sodium and saturated fats), drinking too much alcohol and lack of exercise (MERCK 2003).

Measured and predicted blood lead levels for children and adults in Mitchell Heights are below CDC and OSHA guidelines. Using a predictive model, Florida DOH estimates that past exposure to 421 mg/kg of lead in the **subsurface** soil at one residence on "A" Street in the Mitchell Heights neighborhood could have caused blood levels of 0.3 – 3.8 micrograms per deciliter (ug/dL). Some studies, however, have suggested an increased risk of hypertension, at blood lead levels as low as 2 or 3 ug/dL (ATSDR 2005). Therefore, past exposure to lead in the **subsurface** soil at one residence on "A" Street in Mitchell Heights may have increased the risk of hypertension, tooth decay, decrease in kidney function, and an increase in immunoglobulin E.

Immune System (Prone to infections):

The immune system fights infection. The lymphatic system is the group of organs that make up the immune system. This system is composed of the adenoids, tonsils, lymph nodes, thymus, spleen, appendix, and bone marrow. It makes the body's natural and adaptive immune response work to fight off diseases from bacteria, viruses, and fungi. The immune system also combats cells that are not normal in the body, such as cancer (MERCK 2003).

Available polychlorinated biphenyl (PCB) ingestion studies indicate an association with immune system dysfunction at 0.005 mg/kg/day. The highest level of PCBs found in the surface soil in the Mitchell Heights community is approximately 385 times lower than the dose that causes immune system dysfunction in these ingestion studies (ATSDR 2000). Therefore, the highest PCB levels in Mitchell Height's surface soil are not expected to cause a higher incidence of immune system dysfunction.

Measured and predicted blood lead levels for children and adults in Mitchell Heights are below CDC and OSHA guidelines. Using a predictive model, Florida DOH estimates that past exposure to 421 mg/kg of lead in the **subsurface** soil at one residence on "A" Street in the Mitchell Heights neighborhood could have caused blood levels of 0.3 – 3.8 micrograms per deciliter (ug/dL). Some studies, however, have suggested an increased risk of an increase in immunoglobulin E (an antibody that regulates immune system response) at blood lead levels as low as 2 or 3 ug/dL (ATSDR 2005). Therefore, past exposure to lead in the **subsurface** soil at one residence on "A" Street in Mitchell Heights may have increased the risk of an increase in immunoglobulin E.

Kidney Disease/Problems:

The main function of the kidneys is to filter and cleanse the blood. The kidneys also keep the body's balance of water and filter/rid the body of metabolic wastes and electrolytes (such as sodium and potassium). The kidneys also help control blood pressure by

regulating sodium levels in the blood. The kidneys make an enzyme called rennin that controls blood pressure. In addition, the kidneys secrete hormones that help control the production of red blood cells and the growth and upkeep of bones.

When kidneys do not work correctly, it can take many forms including acute/chronic kidney failure, nephritis (or inflammation), blood vessel disorders and tubular/cystic kidney disorders. Acute kidney failure is the sudden inability of the kidneys to filter metabolic waste products from the blood. Acute kidney failure can result from any disease that disrupts kidney function, decreases blood flow to the kidneys or obstructs urine flow. Chronic kidney failure is the slow decline in the kidney's ability to filter metabolic waste. Chronic kidney failure can result from the same disorders that lead to acute kidney failure. The two most common causes of chronic kidney failure are diabetes mellitus and hypertension (high blood pressure). Nephritis is inflammation of the kidneys. In general, this can happen when someone has an infection, has an immune response, or was exposed to a toxin. When the blood vessels in the kidneys are not working as they should, it can lead to kidney damage, blood pressure going up and kidney failure. There are many known causes of these kinds of disorders including: blockages in renal (kidney) arteries, inflammation of blood vessels and injury to kidneys or blood vessels around them. Tubular and cystic kidney disorders get in the way of the kidney's filtration system. When that happens, cysts can form. Most kinds of tubular and cystic kidney problems disorders are genetic and occur in families (AMA 2003, MERCK 2003).

Available chronic arsenic ingestion studies indicate an association with kidney dysfunction at 0.08 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 2500 times lower than the dose that causes kidney dysfunction in ingestion studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of kidney problems.

Measured and predicted blood lead levels for children and adults in Mitchell Heights are below CDC and OSHA guidelines. Using a predictive model, Florida DOH estimates that past exposure to 421 mg/kg of lead in the **subsurface** soil at one residence on "A" Street in the Mitchell Heights neighborhood could have caused blood levels of 0.3 – 3.8 micrograms per deciliter (ug/dL). Some studies, however, have suggested an increased risk of decreased kidney function at blood lead levels as low as 2 or 3 ug/dL (ATSDR 2005). Therefore, past exposure to lead in the **subsurface** soil at one residence on "A" Street in Mitchell Heights may have increased the risk of decreased kidney function.

Liver Disease:

The liver does many things needed to maintain life. These include the breakdown of harmful or toxic substances absorbed from the intestine or made in the body. The liver also takes care of sugar storage, processes drugs, and makes protein and about half of the body's cholesterol. There are two main types of liver dysfunction. The first group results when the cells in the liver do not work properly. This results in hepatic lipidosis (fatty liver), cirrhosis and hepatitis. The second type of disorder occurs when there is a bile flow blockage resulting in bile stones and cancer. The most common causes of fatty liver are alcoholism, obesity, diabetes and increased serum (blood) triglyceride (a group

of organic compounds that occur naturally) levels. Not getting proper nutrition, genetic metabolic problems and drugs can cause fatty liver. Fat builds up in individual liver cells. The buildup can lead to permanent scarring and cirrhosis. Cirrhosis is a chronic degeneration of healthy liver cells that that scar tissue gradually replaces. Scar tissue keeps the liver from working as it should, then toxins buildup and the liver fails. Cirrhosis is the third most common cause of death in the United States among people aged 45 – 65. The most common cause of cirrhosis in the U.S. is alcohol abuse. In other parts of the world, such as Asia and Africa, chronic hepatitis is the major cause of cirrhosis. Hepatitis is inflammation of the liver. Most of the time doctors sort hepatitis by whether or not a virus causes it. Viral hepatitis is the most common form of the disease. At least five viruses cause hepatitis: A, B C, D and E. In the US, hepatitis A, B and C are the most common. Alcohol abuse, certain drugs and exposure to poison commonly cause non-viral hepatitis. The most common symptoms of hepatitis are localized swelling, pain and nausea (feeling sick to your stomach) (AMA 2003, MERCK 2003).

Available chronic arsenic ingestion studies indicate an association with liver dysfunction at a dose of 0.006 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 190 times lower than the dose that causes liver dysfunction in ingestion studies (ATSDR 2005). Therefore, the arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of liver problems.

Available polychlorinated biphenyl (PCB) inhalation studies indicate an association with liver dysfunction at a concentration of 1.5 mg/m³. The maximum concentration of PCB-contaminated dust from surface soil in the Mitchell Heights community is millions of times lower than the concentration that causes liver dysfunction in inhalation studies (ATSDR 2000). Available chronic PCB ingestion studies indicate an association with liver dysfunction at a dose of 0.04 mg/kg/day. The highest level of PCBs found in the surface soil in the Mitchell Heights community is approximately 3000 times lower than the dose that causes liver disease in ingestion studies (ATSDR2000). Therefore, PCB levels in Mitchell Height's surface soil are not expected to cause a higher incidence of liver problems.

MRSA:

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacterial infection that is resistant to certain antibiotics. These infections are commonly referred to as staph infections. Bacteria are microscopic, single-celled organisms. Thousands of different kinds of bacteria live throughout the world. Bacteria can live in the environment, on the skin, in the airways, in the mouth, and in the digestive tracts of people and animals. Staph infections, including MRSA, occur most frequently in a hospital setting. The infection can spread among persons in hospitals being treated for unrelated illnesses. Immuno-suppressed patients in healthcare facilities, such as nursing homes, rehabilitation facilities and dialysis centers are commonly affected by staph infections. These healthcare-associated staph infections are highly contagious and in many cases are life threatening. Surgical wound infections, urinary tract infections, bloodstream infections and pneumonia are just some of the ways that MRSA can threaten. MRSA can also occur outside healthcare related

situations and cause illness in people who have not been in the hospital or had a surgical procedure. These types of infections, known as community-associated MRSA (CA-MRSA) are usually manifested as skin infections, and occur in otherwise healthy people. Recent studies have shown that MRSA is becoming much more common in the community setting. MRSA infections are highly contagious and can be spread in a variety of ways. It is important to consult a healthcare provider to for diagnosis and learn ways to prevent the spread of these types of infections (CDC website).

Available studies have not shown an association between MRSA infection and any of the contaminants of concern identified in surface soil collected in the Mitchell Heights neighborhood.

Skin Irritations:

Skin irritations such as itching and rashes develop as the result of infection, irritation or an immune system reaction. The skin is the first part of the immune system it defends against harmful substances and provides a shield from the sun. The skin is constantly working to protect the body and as a result, skin disorders are very common and in most cases the cause can not be determined. Dermatitis, psoriasis and eczema are just a few of the many skin disorders that commonly occur. Dry skin, allergies (irritants such as poison ivy or wool), drug reactions, parasite infestations and certain system disorders can all cause skin irritations. Changes in skin color and texture typify a rash. Symptoms of rashes can vary quite a bit from person to person. Common symptoms of rashes include redness, skin eruptions, blisters, itching, swelling and inflammation. The most common causes of rashes are allergic reactions (to a drug, plants or food) and bacterial and viral infections (AMA 2003).

Available chronic arsenic ingestion studies indicate an association with skin irritation at a dose of 0.0018 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 58 times lower than the dose that causes skin irritation in ingestion studies (ATSDR 2005). Available arsenic inhalation studies indicate that arsenic shows an association with skin irritation at a concentration of 0.078 mg/m³. The concentration of arsenic found in the surface soil in the Mitchell Heights community is millions of times lower than the concentration that causes skin irritation in inhalation studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of skin irritation.

Available chronic PCB ingestion studies indicate that PCBs have been shown to have an association with skin irritation at a dose of 0.005 mg/kg/day. The level of PCBs found in the surface soil in the Mitchell Heights community is approximately 385 times lower than the dose that causes skin irritation in ingestion studies (ATSDR 2000). Therefore, the highest PCB levels in Mitchell Height's surface soil are not expected to cause a higher incidence of skin irritation.

Upper Respiratory Problems/Chronic Coughing:

Asthma and allergies are the most common causes of respiratory and breathing problems in the United States. Asthma affects at least 17 million people in the United States and is

becoming more widespread. It can affect people of any age or gender, but tends to begin in childhood. The incidence of asthma is highest in cities where there is more pollution (MERCK 2003, AMA 2003). Asthma is a chronic but reversible immunological condition that causes inflammation, excessive mucous secretion (phlegm) and constriction (narrowing) of the lung's airways. Asthma can produce coughing, wheezing, and shortness of breath. Researchers also report respiratory effects following oral exposures of humans to inorganic arsenic. In general, respiratory effects have not been widely associated with repeated oral ingestion of low arsenic doses.

Available chronic arsenic ingestion studies indicate an association with respiratory dysfunction at a dose of 0.015 mg/kg/day. The highest level of arsenic found in the surface soil in the Mitchell Heights community is approximately 484 times lower than the dose that causes respiratory dysfunction in ingestion studies (ATSDR 2005). Therefore, the highest arsenic levels in Mitchell Height's surface soil are not expected to cause a higher incidence of respiratory problems.

Glossary of Environmental Health Terms

Absorption: How a chemical enters a person's blood after the chemical has been swallowed, has come into contact with the skin, or has been breathed in.

Acute Exposure: Contact with a chemical that happens once or only for a limited period of time. ATSDR defines acute exposures as those that might last up to 14 days.

Adverse Health Effect: A change in body function or the structures of cells that can lead to disease or health problems.

ATSDR: The Agency for Toxic Substances and Disease Registry. ATSDR is a federal health agency in Atlanta, Georgia, that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

Background Level: An average or expected amount of a chemical in a specific environment. Or, amounts of chemicals that occur naturally in a specific environment.

Biota: Used in public health, things that humans would eat including animals, fish and plants.

Cancer: A group of diseases that occur when cells in the body become abnormal and grow, or multiply, out of control.

Carcinogen: Any substance shown to cause tumors or cancer in experimental studies.

CERCLA: See Comprehensive Environmental Response, Compensation, and Liability Act.

Chronic Exposure: A contact with a substance or chemical that happens over a long period of time. ATSDR considers exposures of more than one year to be *chronic*.

Completed Exposure Pathway: See **Exposure Pathway**.

Comparison Value: (CVs) Concentrations or the amount of substances in air, water, food, and soil that are unlikely, upon exposure, to cause adverse health effects. Comparison values are used by health assessors to select which substances and environmental media (air, water, food and soil) need additional evaluation while health concerns or effects are investigated.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): CERCLA was put into place in 1980. It is also known as **Superfund**. This act concerns releases of hazardous substances into the environment, and the cleanup of these substances and hazardous waste sites.

ATSDR was created by this act and is responsible for looking into the health issues related to hazardous waste sites.

Concern: A belief or worry that chemicals in the environment might cause harm to people.

Concentration: How much or the amount of a substance present in a certain amount of soil, water, air, or food.

Contaminant: See **Environmental Contaminant**.

Dermal Contact: A chemical getting onto your skin. (see **Route of Exposure**).

Dose: The amount of a substance to which a person may be exposed, usually on a daily basis. Dose is often explained as “amount of substance(s) per body weight per day”.

Dose / Response: The relationship between the amount of exposure (dose) and the change in body function or health that result.

Duration: The amount of time (days, months, years) that a person is exposed to a chemical.

Environmental Contaminant: A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than that found in **Background Level**, or what would be expected.

Environmental Media: Usually refers to the air, water, and soil in which chemicals of interest are found. Sometimes refers to the plants and animals that are eaten by humans. **Environmental Media** is the second part of an **Exposure Pathway**.

U.S. Environmental Protection Agency (EPA): The federal agency that develops and enforces environmental laws to protect the environment and the public’s health.

Epidemiology: The study of the different factors that determine how often, in how many people, and in which people will disease occur.

Exposure: Coming into contact with a chemical substance.(For the three ways people can come in contact with substances, see **Route of Exposure**.)

Exposure Assessment: The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.

Exposure Pathway: A description of the way that a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical.

ATSDR defines an exposure pathway as having 5 parts:

- Source of Contamination,
- Environmental Media and Transport Mechanism,
- Point of Exposure,
- Route of Exposure, and
- Receptor Population.

When all 5 parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these 5 terms is defined in this Glossary.

Frequency: How often a person is exposed to a chemical over time; for example, every day, once a week, twice a month.

Hazardous Waste: Substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.

Health Effect: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

Indeterminate Public Health Hazard: The category is used in Public Health Assessment documents for sites where important information is lacking (missing or has not yet been gathered) about site-related chemical exposures.

Ingestion: Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (See **Route of Exposure**).

Inhalation: Breathing. It is a way a chemical can enter your body (See **Route of Exposure**).

LOAEL: Lowest Observed Adverse Effect Level. The lowest dose of a chemical in a study, or group of studies, that has caused harmful health effects in people or animals.

MRL: Minimal Risk Level. An estimate of daily human exposure by a specified route and length of time -- to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.

NPL: The National Priorities List. (Which is part of **Superfund**.) A list kept by the U.S. Environmental Protection Agency (EPA) of the most serious, uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or is being looked at to see if people can be exposed to chemicals from the site.

NOAEL: No Observed Adverse Effect Level. The highest dose of a chemical in a study, or group of studies, that did not cause harmful health effects in people or animals.

No Apparent Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where exposure to site-related chemicals may have occurred in the past or is still occurring but the exposures are not at levels expected to cause adverse health effects.

No Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where there is evidence of an absence of exposure to site-related chemicals.

PHA: Public Health Assessment. A report or document that looks at chemicals at a hazardous waste site and tells if people could be harmed from coming into contact with those chemicals. The PHA also tells if possible further public health actions are needed.

Plume: A line or column of air or water containing chemicals moving from the source to areas further away. A plume can be a column or clouds of smoke from a chimney or contaminated underground water sources or contaminated surface water (such as lakes, ponds and streams).

Point of Exposure: The place where someone can come into contact with a contaminated environmental medium (air, water, food or soil). For examples: the area of a playground that has contaminated dirt, a contaminated spring used for drinking water, the location where fruits or vegetables are grown in contaminated soil, or the backyard area where someone might breathe contaminated air.

Population: A group of people living in a certain area; or the number of people in a certain area.

PRP: Potentially Responsible Party. A company, government or person that is responsible for causing the pollution at a hazardous waste site. PRP's are expected to help pay for the clean up of a site.

Public Health Assessment(s): See PHA.

Public Health Hazard: The category is used in PHAs for sites that have certain physical features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.

Public Health Hazard Criteria: PHA categories given to a site which tell whether people could be harmed by conditions present at the site. Each are defined in the Glossary. The categories are:

- Urgent Public Health Hazard
- Public Health Hazard
- Indeterminate Public Health Hazard
- No Apparent Public Health Hazard
- No Public Health Hazard

Receptor Population: People who live or work in the path of one or more chemicals, and who could come into contact with them (See **Exposure Pathway**).

Reference Dose (RfD): An estimate, with safety factors (see **safety factor**) built in, of the daily, lifetime exposure of human populations to a possible hazard that is not likely to cause harm to the person.

Route of Exposure: The way a chemical can get into a person's body. There are three exposure routes:

- breathing (also called inhalation),
- eating or drinking (also called ingestion), and
- or getting something on the skin (also called dermal contact).

Safety Factor: Also called **Uncertainty Factor**. When scientists don't have enough information to decide if an exposure will cause harm to people, they use "safety factors" and formulas in place of the information that is not known. These factors and formulas can help determine the amount of a chemical that is not likely to cause harm to people.

SARA: The **Superfund Amendments and Reauthorization Act** in 1986 amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from chemical exposures at hazardous waste sites.

Sample Size: The number of people that are needed for a health study.

Sample: A small number of people chosen from a larger population (See **Population**).

Source (of Contamination): The place where a chemical comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an **Exposure Pathway**.

Special Populations: People who may be more sensitive to chemical exposures because of certain factors such as age, a disease they already have, occupation, sex, or certain behaviors (like cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Superfund Site: See **NPL**.

Survey: A way to collect information or data from a group of people (**population**). Surveys can be done by phone, mail, or in person. ATSDR cannot do surveys of more than nine people without approval from the U.S. Department of Health and Human Services.

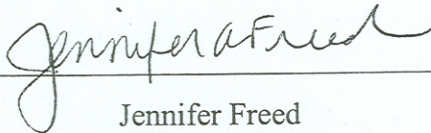
Toxic: Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.

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

Urgent Public Health Hazard: This category is used in ATSDR's Public Health Assessment documents for sites that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects and require quick intervention to stop people from being exposed.

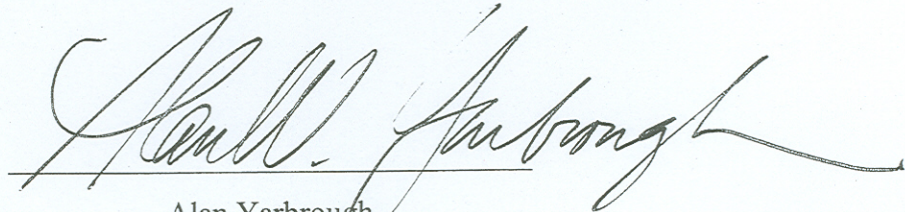
CERTIFICATION

The Florida Department of Health, Division of Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began and completed editorial review.



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



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