

Health Consultation

Surface Soil

LITTLE FARM MOBILE HOME PARK

VILLAGE OF EL PORTAL, MIAMI-DADE COUNTY, FLORIDA

**Prepared by the
Florida Department of Health**

NOVEMBER 4, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR Toll Free at
1-800-CDC-INFO

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

HEALTH CONSULTATION

Surface Soil

LITTLE FARM MOBILE HOME PARK

VILLAGE OF EL PORTAL, MIAMI-DADE COUNTY, FLORIDA

Prepared By:

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

Table of Contents

Foreword	iii
Summary	1
Background and Statement of Issues	2
Community Health Concerns	3
Discussion	3
Pathways Analysis	3
Environmental Data	4
Identifying Contaminants of Concern	5
Public Health Implications	6
Health Outcome Data	10
Child Health Considerations	10
Conclusions	11
Recommendations	11
Public Health Action Plan	11
Authors and Technical Advisors	12
References	13
Tables	14
Figures	16
Certification	20

Foreword

The Florida Department of Health (DOH) evaluates the public health threat of hazardous waste sites through a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry in Atlanta, Georgia. This health consultation evaluates health effects associated with surface soil at the Little Farm mobile home park. The Florida 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. The Miami-Dade County Department of Environmental Resource Management provided the information for this assessment.
- **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 report, the Florida DOH outlines, in plain language, its conclusions regarding any potential health threat posed by surface soil and offers recommendations for reducing or eliminating human exposure to contaminants. The role of the Florida DOH is primarily advisory. For that reason, the evaluation report will typically recommend actions for other agencies, including the US Environmental Protection Agency and the Florida Department of Environmental Protection. If, however, an immediate health threat exists or is imminent, Florida DOH will issue a public health advisory warning people of the danger, and will work 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.

Please write to: Bureau of Environmental Public Health Medicine
Florida Department Health
4052 Bald Cypress Way, Bin # A-08
Tallahassee, FL 32399-1712

Or call us at: 850 245-4299 or toll-free in Florida: 1-877-798-2772

Summary

INTRODUCTION

At the Little Farm mobile home park, the Florida Department of Health's (DOH) and the US Agency for Toxic Substances and Disease Registry's (ATSDR) top priority is to ensure nearby residents have the best information to safeguard their health.

The Little Farm mobile home park is at 8500 Biscayne Boulevard in the Village of El Portal, Miami-Dade County, Florida. This mobile home community was constructed sometime in the 1940s or 1950s on the site of a chicken farm. Surface soil in the southern half of the community is contaminated with arsenic. Residents use municipal water. The Miami-Dade County Health Department requested the Florida DOH assess the health risk from arsenic in the soil.

CONCLUSION #1

Florida DOH concludes that incidental ingestion (swallowing) of very small amounts of arsenic-contaminated soil, especially in the southern half of the park for more than a year could possibly harm children's health. Incidentally ingesting (swallowing) very small amounts of surface soil with the highest arsenic levels over an entire lifetime could result in a low increased theoretical risk of skin cancer.

BASIS FOR DECISION #1

Surface soil in the Little Farm mobile home park is contaminated with arsenic. Children who play in this area likely ingest (swallow) very small amounts of soil. Incidental soil ingestion (swallowing) is common in children less than 6 years old who put soiled finders or toys in their mouths. Based on human studies, scientists predict that swallowing very small amounts of this arsenic-contaminated surface soil for more than a year could cause harm.

CONCLUSION #2

Florida DOH concludes that incidental ingestion (swallowing) of very small amounts of benzo(a)pyrene-contaminated soil is not likely to harm people's health. People incidentally ingesting (swallowing) very small amounts of benzo(a)pyrene-contaminated surface soil over an entire lifetime (70 years) are at a very low increased theoretical risk of cancer.

BASIS FOR DECISION #2

Surface soil in the Little Farm mobile home park is contaminated with benzo(a)pyrene. Children who play in this area likely ingest (swallow) very small amounts of soil. Incidental soil ingestion (swallowing) is common in children less than 6 years old who put

soiled finders or toys in their mouths. Based on human studies, scientists predict that swallowing very small amounts of this benzo(a)pyrene-contaminated surface soil for more than a year is not likely to cause harm.

NEXT STEPS

-
1. Miami-Dade County Department of Environmental Resource Management should continue efforts to force the responsible party to cleanup the contamination and/or prevent/limit exposure.
 2. In the interim, residents should avoid contact with contaminated soil and wash their hands after being outside.

FOR MORE INFORMATION

If you have concerns about your health or the health of your children, you should contact your health care provider. You may also call the Florida DOH toll-free at 877 798-2772 and ask for information about this site.

Background and Statement of Issues

The purpose of this health consultation report is to assess the public health threat from contaminants in surface soil at the Little Farm mobile home park, 8500 Biscayne Boulevard. The Miami-Dade County Health Department (CHD) requested this review (Samir Elmir, personal communication, April 28, 2010). On May 18, 2010, Florida Department of Health (DOH) provided the Miami-Dade CHD a preliminary analysis. Florida DOH recommended the responsible party meet state residential soil cleanup target levels. It also recommended that until the soil meets cleanup levels, residents should avoid contact with contaminated soil and wash their hands after being outside.

Health scientists look at what chemicals are present and in what amounts. They compare those amounts to national guidelines. These guidelines are set far below known or suspected levels associated with health effects. Florida DOH uses guidelines developed to protect children. If chemicals are not present at levels high enough to harm children, they would not likely harm adults.

This assessment considers health concerns of nearby residents and explores possible associations with site-related contaminants. This assessment requires the use of assumptions, judgments, and incomplete data. These factors contribute to uncertainty in evaluating the health threat. Assumptions and judgments in this assessment err on the side of protecting public health and may overestimate the risk.

This assessment estimates the health risk for individuals exposed to the highest measured level of contamination. This assessment, however, does not apply equally to all nearby residents. Not all nearby residents were exposed to the highest measured level of contamination. The health risk for most nearby residents is less than the health risk

estimated in this report. For those residents whose soil, wells, etc. are not contaminated and were not exposed, the health risk is essentially zero.

Site Description

The 11.9-acre Little Farm mobile home park is at 8500 Biscayne Boulevard in the Village of El Portal, Miami-Dade County, Florida, 32138 (Figures 1 and 2). The site consists of 250 mobile homes, a sandwich shop, coin-operated laundry facility, and grocery store. NE 87th Street, a commercial storage building, and a former service station form the northern site border. Biscayne Boulevard, a strip mall, and a retail liquor store border the site on the east. Multi- and single family homes are south of the site. The Little River is on the southwest border of the site. Florida East Coast railroad tracks bound the site on the west [Kimley-Horn 2007].

The site was first developed in the 1930s as a chicken farm known as Little Farm. Sometime in the 1940s or 1950s it became a trailer park. A coin-operated laundry and grocery store were added around 1959 [Kimley-Horn 2007].

Following a 2007 environmental audit, consultants notified the Miami-Dade County Department of Environmental Resource Management (DERM) of on-site soil and ground water contamination. In 2007, Miami-Dade CHD staff went door-to-door in this mobile home community advising residents to avoid contact with the contaminated soil. They also advised Miami-Dade County DERM of the risk and recommended soil cleanup. In 2008 Miami-Dade County DERM began enforcement against the responsible parties. In June 2010, Miami-Dade CHD and Miami-Dade County DERM staff again went door-to-door reminding residents to avoid contact with contaminated soil.

Demographics

Approximately 1,164 people live in or within 0.25 mile of this mobile home community. Forty percent (40%) are white, 40% are African-American, and 20% are Hispanic origin. Thirty-two percent (32%) are less than 18 years old and 68% are older than 18. Fifty percent (50%) or fewer have a high school diploma and 28% have a college degree. Twenty-one percent (21%) do not speak English or do not speak it very well and 71% make less than \$50,000 a year [EPA 2010].

Land Use

Land use north of the Little Farm mobile home park along NE 87th Street and east along Biscayne Boulevard is commercial. Land use to south is for multi- and single-family homes. Land use along a narrow strip to the west is for a railroad line; west of that is multi- and single-family homes.

Community Health Concerns

Florida DOH reviewed previous contamination assessment reports and spoke with county officials but is unaware of any community health concerns. The community may, however, have unexpressed health concerns.

Discussion

Pathway Analyses

Chemical contamination in the environment can harm your health but only if you have contact with those contaminants (exposure). Without contact or exposure, there is no harm to health. If there is contact or exposure, how much of the contaminants you contact (concentration), how often you contact them (frequency), for how long you contact them (duration), and the danger of the contaminant (toxicity) all determine the risk of harm.

Knowing or estimating the frequency with which people could have contact with hazardous substances is essential to assessing the public health importance of these contaminants. To decide if people can contact contaminants at or near a site, Florida DOH looks at human exposure pathways. Exposure pathways have five parts. They are:

1. a source of contamination like a hazardous waste site,
2. an environmental medium like air, water, or soil that can hold or move the contamination,
3. a point where people come into contact with a contaminated medium like water at the tap or soil in the yard,
4. an exposure route like ingesting (contaminated soil or water) or breathing (contaminated air),
5. a population who could be exposed to contamination like nearby residents.

Florida DOH eliminates an exposure pathway if at least one of the five parts referenced above is missing and will not occur in the future. Exposure pathways not eliminated are either completed or potential. For completed pathways, all five pathway parts exist and exposure to a contaminant has occurred, is occurring, or will occur. For potential pathways, at least one of the five parts is missing, but could exist. Also for potential pathways, exposure to a contaminant could have occurred, could be occurring, or could occur in the future.

Compared to ingestion (eating/drinking) and inhalation (breathing), the risk from dermal exposure (skin absorption) is usually insignificant. Therefore, human health risk assessments do not typically quantify the risk from skin absorption.

For this assessment, we evaluate the long-term health threat from incidental ingestion (swallowing) of very small amounts of surface soil (0-6 inches deep). For this completed

pathway, a former chicken farm on the site may be the source. Surface soil is the environmental medium. Residential yards in the mobile home community are the exposure points. Incidental ingestion, accidentally swallowing very small amounts of soil, is the exposure route. Ingestion of very small amounts of soil is common in children younger than 6 years old who put soiled fingers or toys in their mouths (Table 1).

The Miami-Dade Water and Sewer Department provides water to this mobile home community and surrounding area. A consultant for the site owner did not find any private drinking water wells within 0.5 mile of the site [Kimley-Horn 2007]. Therefore, Florida DOH eliminated groundwater as an exposure pathway.

Environmental Data

Between March and October 2007, consultants collected 76 surface soil samples (0-6 inches deep) from locations on the site without impervious (paved) cover (Figure 3). They analyzed volatiles, semi-volatiles, chlorinated pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and metals. They did not, however, analyze every sample for all contaminants [Kimley-Horn 2007]. In April 2008, consultants collected 33 more surface soil samples (0-6 inches deep) from the site (Figure 4). They analyzed for arsenic, lead, and chlorinated pesticides. They did not, however, analyze every sample for all contaminants [Geosyntec 2008].

In 88 of 109 surface soil samples, the concentrations of arsenic were above ATSDR screening guidelines. The areas of surface soil with the highest concentrations of arsenic are in the southern half of the community. In 1 of 3 surface soil samples, the concentrations of benzo(a)pyrene toxicity equivalence (BaP-TEQ) were above ATSDR screening guidelines (Table 2). The concentrations of volatiles, semivolatiles, chlorinated pesticides, PCBs, PAHs, and other metals were below ATSDR screening guidelines.

For this health consultation, testing of surface soil at the Little Farm mobile home park has been adequate to determine the extent of contamination.

Identifying Contaminants of Concern

Florida DOH compares the maximum concentrations of contaminants found at a site to ATSDR and other comparison values. Comparison values are specific for the medium contaminated (soil, water, air, etc.). We screen the environmental data using these comparison values:

- ATSDR Environmental Media Evaluation Guides (EMEGs)
- ATSDR Reference Media Evaluation Guides (RMEGs)
- Florida DEP Soil Cleanup Target Levels (SCTLs)
- EPA Maximum Contaminant Levels (MCLs)
- Other guidelines

When determining which comparison value to use, Florida DOH follows ATSDR's general hierarchy and uses professional judgment.

We select for further evaluation contaminants with maximum concentrations above a comparison value. Comparison values, however, are not thresholds of toxicity. They are not used to predict health effects or to establish clean-up levels. A concentration above a comparison value does not necessarily mean harm will occur. It does, however, indicate the need for further evaluation.

Maximum contaminant concentrations below comparison values are not likely to cause harm and are not evaluated further.

Comparing the highest measured concentrations in soil and groundwater to ATSDR and EPA screening guidelines, Florida DOH selected arsenic and BaP-TEQ as contaminants of concern. Selection of these contaminants does not necessarily mean there is a public health risk. Rather, Florida DOH selected these contaminants for closer scrutiny. Concentrations of other contaminants were below screening guidelines, are not likely to cause illness, and are not evaluated further.

Public Health Implications

Florida DOH provides site-specific public health recommendations on the basis of toxicological literature, levels of environmental contaminants, evaluation of potential exposure pathways, duration of exposure, and characteristics of the exposed population. Whether a person will be harmed depends on the type/amount of contaminant, how they are exposed, how long they are exposed, how much contaminant is absorbed, genetics, and individual lifestyle.

After identifying contaminants of concern, Florida DOH evaluates exposures by estimating daily doses for children and adults. Karmin [1988] explains the concept of dose as follows:

“...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; 1 ounce for each pound of animal.”

This amount per weight is the *dose*. Toxicology uses dose to compare 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 doses in this assessment. A milligram is 1/1,000 of a gram; a kilogram is approximately 2 pounds.

To calculate the daily doses of each contaminant, Florida DOH uses standard and other factors needed for dose calculation [ATSDR 2005; EPA 1997]. We assume that people are exposed daily to the maximum concentration measured. We also make the health protective assumption that 100% of the ingested chemical is absorbed into the body. The percent actually absorbed into the body is likely less. The general formula for estimating a dose is:

$$\text{Dose} = (\text{concentration} \times \text{ingestion rate}) / \text{body weight}$$

ATSDR 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 (swallowing) of contaminated soil, Florida DOH uses the following standard assumptions:

- 1) children incidentally ingest (swallow) an average of 200 milligrams (mg) of soil per day (about the weight of a postage stamp),
- 2) adults incidentally ingest (swallow) an average of 100 mg of soil per day,
- 3) children weigh an average of 16 kilograms (kg) or about 35 pounds,
- 4) adults weigh an average of 70 kg, or about 155 pounds,
- 5) children and adults ingest (swallow) contaminated surface soil at the maximum concentration measured for each contaminant.

Florida DOH estimated the dose for incidental ingestion (swallowing) of surface soil using the following formula:

$$D = (C \times IR \times EF \times CF) / BW$$

D = exposure dose (milligrams per kilogram per day or mg/kg/day)
C = contaminant concentration (milligrams per kilogram or mg/kg)
IR = intake rate of contaminated soil (milligrams per day or mg/day)
EF = exposure factor (unitless)
CF = conversion factor (10^{-6} kilograms per milligram or kg/mg)
BW = body weight (kilograms or kg)

Because the exposure is ongoing, Florida DOH used an exposure factor of 1.

For example, the estimated maximum dose of arsenic for children from incidental ingestion (swallowing) of surface soil is:

$$\begin{aligned} \text{Dose} &= (121 \text{ mg As/kg soil}) \times (200 \text{ mg soil/day}) \times (1) \times (10^{-6} \text{ mg/kg}) / 16 \text{ kg} \\ &= 0.002 \text{ mg/kg/day} \end{aligned}$$

Florida DOH compares estimated exposure doses to ATSDR chemical specific minimal risk levels (MRLs). MRLs are comparison values that establish exposure levels many times lower than levels where no effects were observed in animals or human studies. The MRL is designed to protect the most sensitive, vulnerable individuals in a population. The chronic MRL is an exposure level below which non-cancerous harmful effects are unlikely, even after daily exposure over a lifetime. Although Florida DOH considers concentrations at or below the relevant comparison value reasonably safe, exceeding a comparison value does not imply that we expect adverse health effects. If contaminant concentrations are above comparison values, Florida DOH further analyzes exposure variables (for example, duration and frequency), toxicology of the contaminants, past epidemiology studies, and the weight of evidence for health effects. Florida DOH uses chronic MRLs where possible because exposures are usually longer than a year. If chronic MRLs are not available they use intermediate length MRLs [ATSDR 2005].

For non-cancer illnesses, Florida DOH first estimates the health risk for children. Because children are smaller and swallow more soil than adults, their exposure is higher. Therefore, if children are not at risk, then adults are not either.

For cancer, Florida DOH quantifies the increased theoretical risk by multiplying the estimated dose by the EPA cancer potency slope factor. This is the highest estimated increased cancer risk. The actual increased cancer risk is likely lower. Because of large uncertainties in the way scientists estimate cancer risks, the actual cancer may be as low as zero. If there is no cancer slope (potency) factor, Florida DOH cannot quantify the risk.

Florida DOH usually estimates the cancer risk from lifetime (70 year) exposure. Or they may estimate the cancer risk from exposure over a significant portion of the lifetime (at least 35 years). Studies of animals exposed over their entire lifetime are the basis for calculating most cancer slope factors. Usually, little is known about the cancer risk in animals from less than lifetime exposures. Therefore, it is more appropriate to estimate the cancer risk in people from lifetime exposure. Estimating the cancer risk for children (less than lifetime exposure) may introduce considerable uncertainty.

For most chemicals, too little is known about the combined toxic effect of multiple contaminants to assess the health risk from exposure to mixtures. The science of toxicology is only now addressing this issue. Therefore this report assesses the health threat based on exposure to individual contaminants.

Arsenic

Arsenic is a naturally occurring metal widely distributed in soil. It is usually found combined with oxygen, chlorine, and sulfur. Most arsenic compounds have no smell or special taste [ATSDR 2007]. Arsenic in the Little Farm mobile home park may have come from the former Little Farm chicken farm.

State and federal environmental agencies base their arsenic cleanup standards on workplace studies and laboratory animal studies. Because of uncertainties in these studies, their cleanup standards include large safety factors to ensure public health. Although concentrations slightly above these cleanup standards may not necessarily cause harm, soil should be cleaned up to protect public health.

Non-cancer risk – The maximum dose for children incidentally ingesting (swallowing) very small amounts of surface soil with the highest arsenic levels in the Little Farm mobile home park for more than a year (0.002 mg/kg/day) is above the ATSDR chronic oral MRL (0.0003 mg/kg/day) (Table 3). The chronic oral MRL is based on a human study which demonstrated skin lesions (arsenical dermatosis) at an effect level of 0.014 mg/kg/day; no effects were observed at 0.0008 mg/kg/day. The maximum dose for children at this site is higher than the no-effect level shown in this study. Arsenic has also been associated with cardiovascular effects [ATSDR 2007]. Children exposed daily to the highest levels of arsenic present in the soil at this site could have a slightly increased risk of skin or cardiovascular problems. However, actual exposures are likely to be lower than estimated.

The maximum arsenic dose for adults (0.0002 mg/kg/day) is less than the ATSDR chronic oral MRL of 0.0003 mg/kg/day and thus is not likely to cause any non-cancer illnesses [ATSDR 2007].

Cancer risk – People incidentally ingesting (swallowing) very small amounts of surface soil with the highest arsenic levels in the Little Farm mobile home park over an entire lifetime (70 years) are at a low increased theoretical risk of skin cancer (Table 3). Multiplying the maximum arsenic adult dose (0.0002 mg/kg/day) by the EPA cancer slope factor ($1.5 \text{ mg/kg/day}^{-1}$) results in a low additional increased theoretical cancer risk of 3 in ten thousand (0.0003 or 3×10^{-4}). If you are exposed to the highest level of arsenic in the soil for 70 years you have, at most, a three in ten-thousand additional risk of cancer. To put this into context, the American Cancer Society estimates that one out of every three Americans (or 3,333 in 10,000) will be diagnosed with some form of cancer in their lifetime. Adding the upper-bound estimate of the theoretical increased cancer risk from lifetime exposure to arsenic in the Little Farm mobile home park would increase the cancer incidence from 3,333 in 10,000 to 3,336 in 10,000. Because the increased cancer risk estimate was based on maximum detected arsenic levels, the actual increased cancer risk would be even lower because people would be exposed to an average concentration rather than the maximum, over a lifetime.

Even though the increased theoretical cancer risk from exposure to arsenic in surface soil is “low,” the concentrations are still above state cleanup target levels and should be cleaned up.

Benzo(a)pyrene Toxicity Equivalence (BaP-TEQ)

Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals formed during the incomplete burning of coal, oil, gas, wood, garbage, tobacco, and charbroiled meat. More than 100 different PAHs exist. PAHs generally occur as complex mixtures. PAHs are contained in asphalt used in road construction, crude oil, coal, coal tar pitch, creosote, and roofing tar. PAHs are found throughout the environment in air, soil, and water. Other sources include cigarette smoke, vehicle exhaust, wildfires, agricultural burning, and residential wood burning. PAHs do not easily dissolve in water but stick tightly to soil particles [ATSDR 1995].

To summarize the toxicity of the mixture of carcinogenic PAHs, the laboratory reported PAH concentrations in relation to the toxicity of benzo(a)pyrene, one of the most studied PAHs. In animals, ingestion of benzo(a)pyrene causes cancer of the stomach, esophagus, and larynx. Florida DOH evaluated the toxicity of the carcinogenic PAHs in terms of benzo(a)pyrene toxicity equivalents or BaP-TEQ.

Non-cancer risk - Children and adults who incidentally ingest (swallow) very small amounts of surface soil from the Little Farm mobile home park with the highest BaP-TEQ levels are not likely to suffer any non-cancer illnesses (Table 3). Since ATSDR does not have an MRL and EPA does not have an RfD, Florida DOH compared BaP-TEQ dose estimates directly to animal studies in the ATSDR toxicological profile for PAHs [ATSDR 1995b]. The maximum BaP-TEQ incidental ingestion (swallowing) dose for children (3×10^{-5} mg/kg/day) and adults (2×10^{-6} mg/kg/day) in this mobile home park is millions of times less than the dose causing liver toxicity in mice (120 mg/kg/day).

Cancer risk – People incidentally ingesting (swallowing) very small amounts of surface soil from the Little Farm mobile home park with the highest BaP-TEQ levels over an entire lifetime (70 years) are at a very low increased theoretical risk of stomach, esophagus, or larynx cancer (Table 3). Multiplying the maximum BaP-TEQ adult dose by the EPA cancer slope factor results in a very low additional increased theoretical cancer risk of one in a hundred thousand (1×10^{-5}). If you are exposed to the highest level of BaP-TEQ in the creek sediments for 70 years you have, at most, a one in a hundred thousand increased risk of cancer. Because the increased cancer risk estimate was based on maximum detected BaP-TEQ levels, the actual increased cancer risk would be even lower, because people would be exposed to an average concentration rather than the maximum, over a lifetime.

To put this risk into context, the American Cancer Society estimates that one out of every three Americans (or 33,333 in 100,000) will be diagnosed with some form of cancer in their lifetime. Adding this estimate of the theoretical increased cancer risk from lifetime

exposure to BaP-TEQ in these soils would increase the cancer incidence from 33,333 in 100,000 to 33,334 in 100,000.

Health Outcome Data

Florida DOH epidemiologists did not evaluate area cancer rates for two reasons. First, the maximum theoretical increased cancer risk for exposure to contaminants in the soil at this site is “low” to “very low.” This is the highest estimated increased cancer risk. Second, because the exposed population is relatively small, it is unlikely that exposures at this site would actually cause a case of cancer.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometime engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults; this means they breathe dust, soil and vapors close to the ground. A child’s lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body system of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children’s health.

This assessment takes into account the special vulnerabilities of children. It specifically assesses the health risk for children playing in the soil in the Little Farm mobile home park. Florida DOH found that children exposed to arsenic via incidental soil ingestion (swallowing) are more likely to suffer harm than adults.

Conclusions

1. Children incidentally ingesting (swallowing) very small amounts of surface soil with the highest arsenic levels in the Little Farm mobile home park for more than a year may have an increased risk of premalignant skin lesions (arsenical dermatosis) or cardiovascular problems. People incidentally ingesting (swallowing) very small amounts of surface soil with the highest arsenic levels over an entire lifetime (70 years) are at a low increased theoretical risk of skin cancer.
2. Children and adults who incidentally ingest (swallow) very small amounts of surface soil from the Little Farm mobile home park with the highest BaP-TEQ levels are not likely to suffer any non-cancer illnesses. People incidentally ingesting (swallowing) very small amounts of surface soil from the Little Farm mobile home park with the highest

BaP-TEQ levels over an entire lifetime (70 years) are at a very low increased theoretical risk of stomach, esophagus, or larynx cancer.

Recommendations

1. The Miami-Dade County Department of Environmental Resource Management should continue efforts to force the responsible party to cleanup the contamination and/or prevent/limit exposure.
2. Until soil meets cleanup levels, residents should avoid contact with contaminated soil and wash their hands after being outside.

Public Health Action Plan

Actions Undertaken

In 2007, Miami-Dade CHD staff went door-to-door advising residents to avoid contact with the contaminated soil. They also advised Miami-Dade County DERM of the risk and recommended soil cleanup. In 2008 Miami-Dade County DERM began enforcement against the responsible parties. In June 2010, Miami-Dade CHD and Miami-Dade County DERM staff again went door-to-door reminding residents to avoid contact with contaminated soil.

Actions Underway

The Miami-Dade County DERM is continuing its efforts to force the responsible party to cleanup the contaminated soil or prevent/limit exposure.

Actions Planned

The Miami-Dade County Department of Environmental Resource Management will require the responsible party to cleanup the contamination or prevent/limit exposure.

The Miami-Dade County Health Department will continue to remind residents to avoid contact with contaminated soil.

The Florida DOH will review future soil test results as necessary.

Authors and Technical Advisors

Florida DOH Author

Randy Merchant

Bureau of Environmental Public Health Medicine

Division of Environmental Health

850 245-4299

Florida DOH Designated Reviewer

Randy Merchant

Bureau of Environmental Public Health Medicine

Division of Environmental Health

850 245-4299

US ATSDR Reviewer

Jennifer Freed

Technical Project Officer

Division of Health Assessment and Consultation

References

[ATSDR 1995] Agency for Toxic Substances and Disease Registry. Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHS) (Update). Atlanta: US Department of Health and Human Services; August 1995.

[ATSDR 2005] Agency for Toxic Substance and Disease Registry. Public Health Assessment Guidance Manual (Update). U.S. Department of Health and Human Services, Atlanta, GA. January 2005.

[ATSDR 2007] Agency for Toxic Substances and Disease Registry. Toxicological Profile for Arsenic (Update). Atlanta: US Department of Health and Human Services; August 2007.

[Chiou, et al. 1997] Chiou HY, Huang WI, Su CL, et al. 1997. Dose-response relationship between prevalence of cerebrovascular disease and ingested inorganic arsenic. *Stroke* 28(9):1717-1723.

[EPA 1997] US Environmental Protection Agency, Office of Research and Development. Exposure Factors Handbook. Volumes I, II, and III. EPA/600/ P-95/002F (a, b, and c).

[EPA 2010] US Environmental Protection Agency. Envirofacts. Washington, DC. [Updated March 28, 2010; accessed June 7, 2010]. Available from <http://www.epa.gov/envirofacts.htm>

[Geosyntec 2008] Geosyntec Consultants. Site Assessment Activities. 5 May 2008 Letter Report. Biscayne Park, LLC Property (IW5-9517/File-14058).

[Karmin 1988] Toxicology – A Primer on Toxicology Principles and Applications. Lewis Publications. Chelsea MI. 1988.

[Kimley-Horn 2007] Kimley-Horn and Associates, Inc. Site Assessment Report. Prepared for Biscayne Park, LLC site, NE 83rd Street and Biscayne Boulevard. Miami-Dade, Florida. DERM File Nos. IW5-9517/File-14058. October 25, 2007.

Table 1. Completed Human Exposure Pathways at the Little Farm Mobile Home Park

COMPLETED PATHWAY NAME	COMPLETED EXPOSURE PATHWAY ELEMENTS					TIME
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	
Surface Soil	Former chicken farm	Surface soil	On-site	Ingestion	Little Farm residents	Past, present, and future

Table 2. Contaminants of Concern in Surface Soil (0-6 inches deep) at the Little Farm Mobile Home Park

Contaminants	Concentration Range (mg/kg)	Screening Guideline* (mg/kg)	Source of Screening Guideline	# Above Screening Guideline/Total #
Arsenic	BDL - 121	0.5	ATSDR CREG	88/109
		20	ATSDR Chronic EMEG	18/109
BaP-TEQ	BDL – 1.7	0.1	ATSDR CREG	1/3

BaP-TEQ = benzo(a)pyrene toxicity equivalence

CREG = ATSDR cancer risk evaluation guide for 10⁻⁶ excess cancer risk. EMEG = ATSDR environmental media evaluation guide

BDL = below detection limit mg/kg = milligrams per kilogram

* Screening guidelines only used to select chemicals for further scrutiny, not to judge the risk of illness.

Source of data: Kimley-Horne 2007 and Geosyntec 2008

Table 3. Estimated Maximum Dose and Increased Lifetime Cancer Risk from Incidental Ingestion (Swallowing) Surface Soil at the Little Farm Mobile Home Park

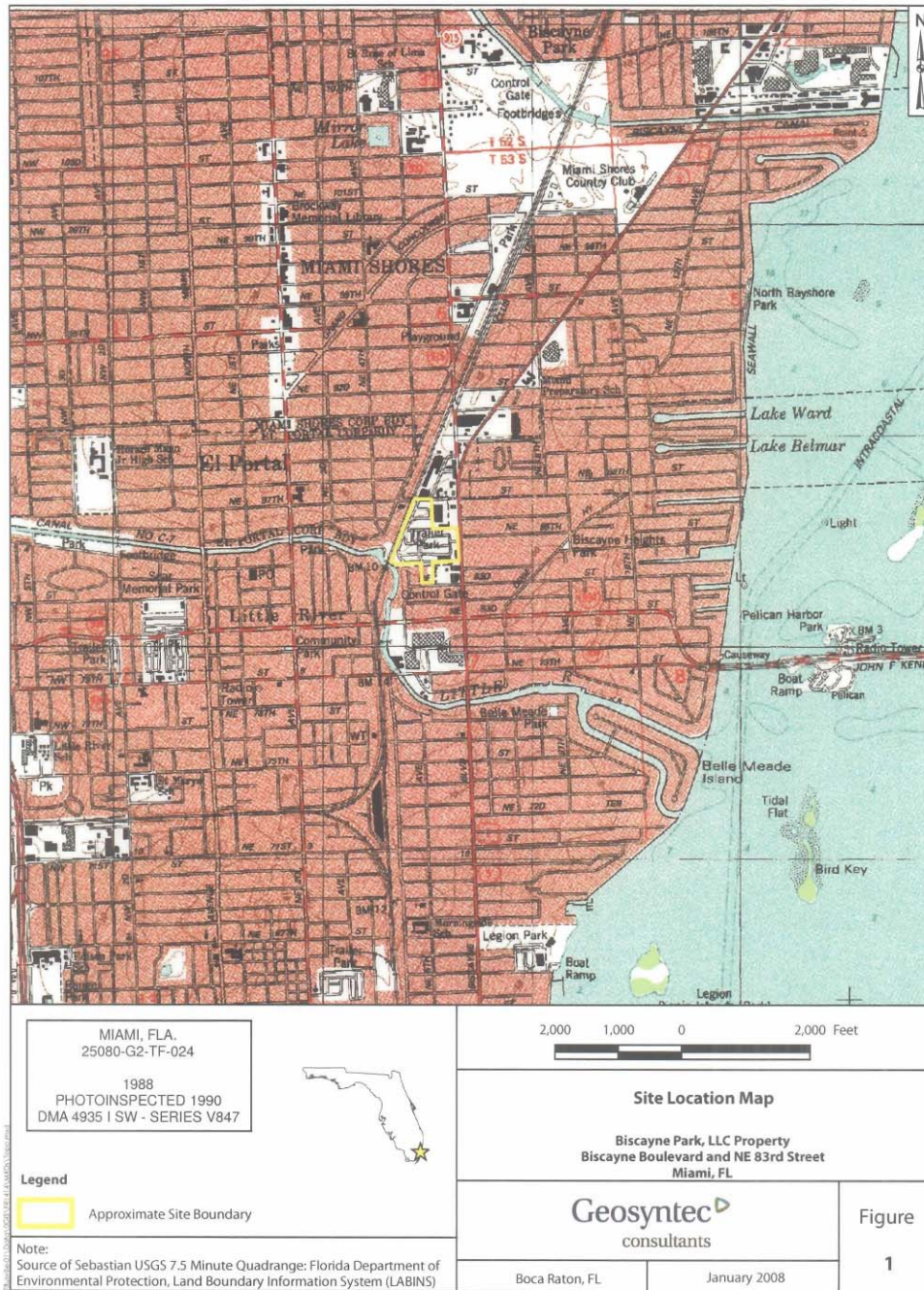
Contaminant	Maximum Concentration (mg/kg)	Estimated Maximum Dose (mg/kg/day)	ATSDR MRL or EPA RfD (mg/kg/day)	Oral Cancer Slope Factor (mg/kg-day)	Source of Oral Cancer Slope Factor	Theoretical Increased Lifetime Cancer
Arsenic	121	child = 0.002 adult = 0.0002	0.0003	1.5	EPA IRIS	3×10^{-4}
BaP-TEQ	1.7	child = 3×10^{-5} adult = 2×10^{-6}	none	7.3	EPA IRIS	1×10^{-5}

BaP-TEQ = benzo(a)pyrene toxicity equivalence

mg/kg/day = milligrams per kilogram per day mg/kg = milligrams per kilogram

RfD = EPA reference dose MRL = ATSDR minimal risk level IRIS = integrated risk information system

Figure 1. Location of Little Farm Mobile Home Park Site in Miami-Dade County



Source: Geosyntec 2008

Figure 2. 2005 Aerial Photograph of the Little Farm Mobile Home Park



Source: Kimley-Horn 2007

Figure 3. 2007 Little Farm Mobile Home Park Surface Soil (0 - 6 inches deep) Sample Locations



Source: Geosyntec 2008

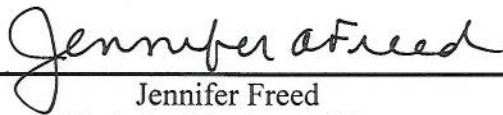
Figure 4. 2008 Little Farm Mobile Home Park Surface Soil (0 - 6 inches deep) Sample Locations



Source: Geosyntec 2008

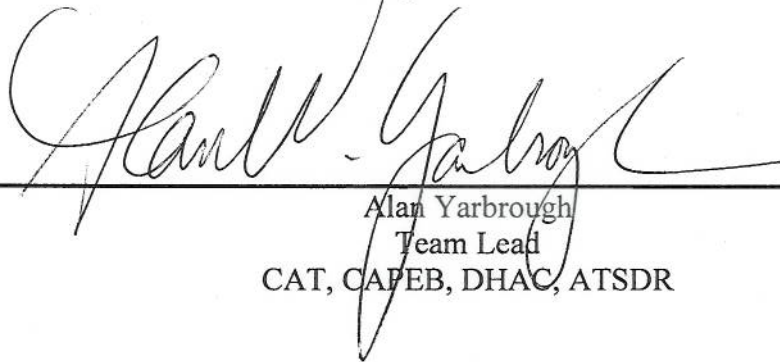
Certification

The Florida Department of Health, Bureau of Environmental Public Health Medicine prepared this health consultation report under a cooperative agreement with the US Agency for Toxic Substances and Disease Registry. Florida DOH followed approved methodologies and procedures existing at the time it began its assessment. Florida DOH completed an editorial review of this document.



Jennifer Freed
Technical Project Officer
CAT, CAPEB, DHAC, ATSDR

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



Alan Yarbrough
Team Lead
CAT, CAPEB, DHAC, ATSDR