Health Consultation

FORMER FRANKLIN GLASS FACILITY

BUTLER TOWNSHIP, BUTLER COUNTY, PENNSYLVANIA

Prepared by the
Pennsylvania Department of Health

September 30, 2009

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.

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HEALTH CONSULTATION

FORMER FRANKLIN GLASS FACILITY

BUTLER TOWNSHIP, BUTLER COUNTY, PENNSYLVANIA

Prepared By:

Pennsylvania Department of Health
Division of Environmental Health Epidemiology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Summary

INTRODUCTION

At the request of the Pennsylvania Department of Environmental Protection (PADEP) and concerned community members, the Pennsylvania Department of Health (PADOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) prepared this Health Consultation (HC) for the former Franklin Glass facility ("the site") in Butler Township, Butler County, Pennsylvania. The site primarily consists of apartments, recreational athletic fields, and an undeveloped area currently being considered for a rails-to-trails project. Prior to the construction of the housing development and recreational areas, arsenic was reportedly routinely used and disposed of on the site, during the former glass facility operations. PADOH and ATSDR prepared this HC to determine whether residents and recreational visitors to the site would be exposed to arsenic levels that could harm their health. PADOH worked under a cooperative agreement with ATSDR to complete this Health Consultation document.

Conclusions

Based upon a review of the data and information provided, thus far, PADOH and ATSDR conclude that:

Conclusion 1

The levels of arsenic found at the Franklin Glass site could harm the health of ***soil-pica children in the undeveloped creek/proposed rails-to-trails area of the site.***

Basis for conclusion

The calculated exposure doses for soil-pica behavior children exceeded the acute LOAEL for only the undeveloped creek/proposed rails-to-trails area. However, soil-pica behavior represents an ***acute transient exposure scenario,*** of 1 to 2 events per year, because arsenic is rapidly eliminated from the body (typically in soil-pica behavior by excessive vomiting and diarrhea). As such, once eliminated from the body, these acute transient exposure events do not represent a chronic health concern. The exposures dose calculations are based on the maximum sample concentrations and are most likely not representative of the entire undeveloped creek/proposed rails-to-trails area, due to the limited number of samples collected, thus far. PADOH and ATSDR do not reasonably believe children would visit this area on a regular, on-going basis

Next Steps

PADOH and ATSDR will review any additional soil sampling collected on the site by PADEP, to further assist in evaluating potential exposure scenarios to local residents and community members that may visit the site.

Conclusion 2

For ***non-pica children***, the arsenic found at the Franklin Glass site ***could harm their health in the undeveloped creek/proposed rails-to-trails area of the site*** based on the limited samples collected thus far.

Basis for conclusion

Exposure dose calculations for non-pica behavior children showed arsenic dose levels exceeded the chronic MRL and chronic no observed adverse effect level (NOAEL), but were below the chronic LOAEL, for the undeveloped creek/proposed rails-to-trails area of the site only**.** Exposure dose calculations exceeded the chronic MRL for non-pica children, but not the NOAEL or LOAEL, in the residential area, and future sampling will assist in further determining the extent of soil contamination in this area. PADOH and ATSDR do not reasonably believe children would visit this area on a regular, on-going basis.

Next Steps

PADOH and ATSDR will consider reviewing additional soil sampling data, if available and appropriate.

Conclusion 3	Based on a review of the soil sampling data and exposure dose calculations, the on-site soil levels are ***not expected to harm the health of adult and adolescent visitors and residents.***
Basis for conclusion	Exposure dose calculations for adults and adolescents did not exceed the MRL, NOAEL, or LOAEL for all the areas of the site.

For More Information

If you have concerns about your health, you should contact your health care provider. Please call ATSDR at 1-800-CDC-INFO and ask for information on the Former Franklin Glass Facility.

Background and Statement of Issues

Background

At the request of the Pennsylvania Department of Environmental Protection (PADEP) and concerned community members, the Pennsylvania Department of Health (PADOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) prepared this health consultation (HC) for the former Franklin Glass Facility site in Butler Township, Butler County, Pennsylvania. PADEP is investigating the site due to recent concerns regarding the presence of waste materials near a proposed rails-to-trails construction area. During soil excavation activities on the site and subsequent site visits and soil sampling by PADEP, glass was discovered in the soil surface and subsequent soil sampling was performed. This HC document is a response to a request by PADEP, Northwest Regional Office Environmental Cleanup Program, for PADOH and ATSDR to review and provide comment on the surface soil samples for arsenic, collected by PADEP at the site to date. PADEP is investigating the site due to arsenic in soil at levels above Pennsylvania's standard for residential areas. PADOH works under a cooperative agreement with ATSDR.

Site Description

The former Franklin Glass Facility site (also referred to as the Butler Freeport Trail Spur Crossing) is a 30-acre site. The site was a former glass facility operating from the 1930's through the mid-to-late 1960's. During the former glass operations, arsenic was reportedly routinely used in plant products and often disposed of in on-site lagoons. The site currently consists of a baseball field, soccer/football field, skate park, Father Marinaro Community Park and the Franklin Court housing development (Figure 1). The current housing development was constructed in the 1970's on a portion of the site that may have served as a disposal area or lagoon, during the former glass facility operations. The Lighthouse Foundation, a shelter for men, women, and children, is located on the northeast portion of the site. A rails-to-trails project, to construct a trail system from the former railroad tracks, is proposed on an undeveloped creek area on the eastern to southeast portion of the site. The Connoquenessing Creek cuts through the proposed rails-to-trails area. During a site visit, PADOH staff observed a glass disposal pile on the proposed trail way, also referred to as "Glass Mountain" by local residents. The northern portion of the site also contains an undeveloped area, with biking/hiking trails and unrestricted access to the community. [1]

Site Visit

In May 2009, PADOH Health Assessment Program personnel conducted a site visit with PADEP Northwest Regional Office staff. During the site visit, PADOH staff took notes, photographs, and discussed site background information and community concerns.

PADOH observed several areas of the site which contained visible glass material: (1) an exposed soil pile containing glass and building materials, which is adjacent to the

Lighthouse Foundation and the residential area of the site; (2) a small playground area adjacent to and owned by the Lighthouse Foundation has soil with visible glass pieces; and (3) the northern portion of the site, which was not sampled during PADEP preliminary sampling, which contains an undeveloped area with biking/hiking trails and unrestricted access to the community.

Sample Collection

PADEP collected 22 surface soil and stream sediment samples during two sampling rounds on April 27, 2009 (all medals) and May 11, 2009 (arsenic only). Samples were collected from the creek banks, the proposed rails-to-trails area along the former railroad bed, an excavated soil trench area adjacent to the housing development, and recreational areas that include a soccer/football field and baseball field (Figure 2). The samples were analyzed by the PADEP Laboratory for arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. [2]

Sampling Results

PADOH and ATSDR reviewed the environmental sampling data collected to date by PADEP for the site (Table 1). The surface soil sampling data showed arsenic levels ranging from 10 mg/kg to 1,888 mg/kg. Overall, the average concentration of arsenic at the site was 186 mg/kg. The highest levels (1,888 and 623 mg/kg) were located in the creek/undeveloped portion of the site, which is an area currently proposed for a rails-to-trails crossing. The sampling location in the undeveloped creek/proposed rails-to-trails area with the highest arsenic result of 1,888 mg/kg (sample #5a) was re-sampled (sample # 5b) by PADEP with a resulting arsenic concentration of 623 mg/kg. The average concentration of arsenic in the undeveloped creek/proposed rails-to-trails area of the site was 313 mg/kg, with a range of 34 mg/kg to 1,888 mg/kg. The average levels of arsenic in the recreational and residential areas were 41 mg/kg and 59 mg/kg, respectively. During the residential sampling, PADEP also collected a soil sample from the 'clean' soil material used to fill the excavated trench. The fill material contained arsenic levels at 19 mg/kg. Sample results from "Glass Mountain," in the undeveloped creek/proposed rails-to-trails area of the site, contained arsenic levels of 90 mg/kg.

The average soil arsenic levels exceeded the ATSDR Comparison Values (CV), Environmental Media Evaluation Guide (EMEG) for children and adolescents (20 mg/kg) and children exhibiting soil-pica (or soil eating) behavior (10 mg/kg) in the undeveloped creek/proposed rails-to-trails, residential and recreational areas of the site (Table 2). The average soil arsenic levels in the undeveloped creek/proposed rails-to-trails area of the site exceeded the ATSDR EMEG CV for adults (200 mg/kg). Arsenic was the only analyte which exceeded ATSDR CV's, and thus is considered a potential contaminant of concern.

During the April 27, 2009 sampling event, PADEP also analyzed the soil and sediment samples for other metals, including, barium, cadmium, chromium, lead, mercury, selenium and silver (Table 3). None of these metals exceeded ATSDR CV (Table 4).

ATSDR CVs are health or environmental guidelines set well below levels that are known or anticipated to result in adverse health effects. EMEG CVs are estimated chemical concentrations, based on ATSDR Maximum Risk Levels (MRLs). MRLs are 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, when compared against a calculated exposure dose. EMEGs are conservative assumptions about likely exposure, and include such factors as intake rate, exposure frequency and duration, and body weight. Soil arsenic levels at the site also exceeded ATSDR's Cancer Risk Evaluation Guide (CREG) CV of 0.5 mg/kg. CREG CVs are estimated contaminant concentrations that would be expected to cause no more than one excess cancer in a million (10^{-6}) persons exposed during their lifetime (70 years). CREGs are calculated from EPA's cancer slope factors and are based on EPA evaluations and assumptions about hypothetical cancer risks at low levels of exposure. [3]

Discussion

Exposure Pathways

Based on a review of the sampling data and a site visit, PADOH identified several completed exposure pathways, such as at the creek, the proposed rails-to-trails area, the recent soil excavation area and an exposed soil pile in the housing community, for residents and community members who may come in contact with surface soil during general outdoor activities, and particularly for young children playing in the contaminated areas. The environmental sampling data and the resulting exposure dose calculations are based on a limited number of soil samples, specifically 20 surface soil samples. Additional surface soil samples would assist PADOH and ATSDR in determining any exposure scenarios, which potentially could result in adverse health effects to the community.

During a site visit, PADOH observed an exposed soil pile, containing glass and building materials, in the residential area of the site, which was not sampled during PADEP preliminary sampling round. A small playground, adjacent to and owned by the Lighthouse Foundation, also had soil with visible glass pieces. A cover of 'clean' soil, sand, or other alternative barrier, in the portion of the playground with exposed glass, would reduce any potential exposures for children playing in these areas. In addition, the northern portion of the site, which was not sampled during PADEP preliminary sampling investigation, contains an undeveloped area with biking/hiking trails and unrestricted access to the community. Future surface soil samples collected on the exposed soil pile and undeveloped/biking and hiking trails area would assist PADOH and ATSDR in determining any potential exposure scenarios, which potentially could harm people's health.

Exposure Dose Calculations

To evaluate whether the residents and recreational visitors of the site might be exposed to contaminant concentrations that could harm their health, PADOH and ATSDR compared the sampling data for the undeveloped creek/proposed rails-to-trails area, residential area, and recreational area against ATSDR's CVs. CVs are health or environmental guidelines set well below levels that are known or anticipated to result in adverse health effects and are used to identify contaminants at a site that require further evaluation on a site-by-site and case-by-case basis. Exceedance of a CV does not necessarily indicate a level associated with or expected to cause adverse health effects. Rather, exposure levels that exceed a CV indicate a potential risk, and indicate a need for further attention to assess the level of risk. CVs should not be used as predictors of adverse health effects or for setting clean-up levels.

If sampling data exceed the ATSDR CV, an exposure dose is estimated and compared against ATSDR MRLs as well as EPA NOAELs and LOAELs. The NOAEL is the highest dose (from a specific study) at which there are no statistically or biologically significant increases in frequency or severity of adverse effects observed in an animal or human study population; some effects may be produced at this dose, but they are not considered to be adverse, nor precursors to adverse effects. The LOAEL represents the lowest dose from a study that produces statistically or biologically significant increases in frequency or severity of adverse effects in an animal or human study population.
In the absence of complete exposure-specific information, PADOH and ATSDR applied health protective exposure assumptions to estimate exposures as accurately as possible.

When Comparison Values (CVs) are exceeded, the next step in the evaluation process is to calculate theoretical exposure doses and compare the doses to ATSDR's MRL and EPA's no-adverse-effect-level (NOAEL) and lowest-adverse-effect-level (LOAEL) to see if the levels are actually high enough to be reasonably considered to pose a health threat. Estimating an exposure dose requires identifying how much, how often, and how long a person may come in contact with a contaminant in a specific medium (e.g. air, water, soil), for a given population. Specifically, PADOH and ATSDR evaluated exposures for soil-pica children, children, adolescents, and adults that may reside or frequent the site. The primary exposure route of concern for this site is incidental ingestion of surface soil. Soil ingestion could occur by: the inadvertent consumption of soil on hands or food items at the site or brought into the home; inhalation and subsequent ingestion of soil particles in air; mouthing objects with soil particles such as during play activities by children; or intentional ingestion (soil-pica behavior children). [4]

Site-specific exposure dose calculations were computed for soil-pica behavior children, non-pica behavior children, adolescents and adults (Table 5). PADOH and ATSDR divided the site into three areas, including:

1). The undeveloped creek/proposed rails-to-trails area
2). The recreational area (baseball and soccer/football fields)
3). The residential/housing area.

PADOH and ATSDR calculated exposure doses for each of the three areas via soil ingestion based on the average soil arsenic levels, further detailed in Table 1, for children, adolescents and adults. For soil-pica children, PADOH and ATSDR used the maximum arsenic concentration, and not the average, in each of the three areas to calculate exposure dose. Future sampling would further delineate arsenic levels and assist PADOH and ATSDR in calculating exposure doses in this area, and the site as a whole. PADOH and ATSDR utilized the following equation to calculate a site-specific exposure doses for ingestion of soil:

Exposure Dose Equation for Ingestion

$$D = \frac{C \times IR \times \times EF \times CF \text{ x } BF}{BW}$$

Where,

D = exposure dose, milligrams per kilogram per day (mg/kg/day)
C = contaminant concentration (mg/kg)
IR = ingestion rate of soil (mg/day)
EF = exposure frequency (unitless)
AF = bioavailability factor (unitless)
CF = conversion factor, 1×10^{-6} kilograms/milligram (kg/mg)
BW = body weight (kg)

Exposure dose calculations are dependent on assumptions and estimates of ingestion rates, exposure frequency and bioavailability. Ingestion rates for soil-pica behavior children (the recurrent ingestion of unusually high amounts of soil by children aged 6 years and younger and/or individuals who are developmentally delayed) typically range from 1,000-5,000 milligrams per day. PADOH and ATSDR used the conservative or health protective default ingestion rate of 5,000 mg/day for soil-pica behavior, 200 mg/day for non-pica behavior children and 100 mg/day for adolescents and adults. [5] For exposure frequencies, PADOH and ATSDR assumed an exposure frequency of 12 months for the residential/housing areas of the site and an exposure frequency of 9 months for the undeveloped creek/proposed rails-to-trails and recreational areas, since the ground would be frozen and/or contact with the soil would very limited, if any, during the winter months.

The bioavailability of arsenic, or the amount of a substance that when ingested is actually absorbed by the body, can vary widely depending on the chemical form and type of soil and can also affect potential exposure. Studies suggest that arsenic in soil may be imbedded in minerals or occur as insoluble compounds and therefore not taken up by the

body from the gastrointestinal tract [6]. Scientific studies in monkeys estimate the bioavailability of arsenic in soil at 5% to 30% [7,8,9]. In a study using juvenile swine, the relative bioavailability of arsenic from five samples of residential soil contaminated with the arsenical herbicide was conducted. The relative arsenic bioavailability among the five samples, as measured in a swine model, ranged from 18 to 45%. [10]. For this analysis, PADOH and ATSDR utilized a conservative or health protective bioavailability assumption of 50% for non-pica behavior children, adolescents, and adults and 100% for soil-pica behavior children. Lastly, a body weight estimate of 16 kg (35 pounds) for children, 45 kg (100 pounds) for adolescents, and 70 kg (154 pounds) for adults was used in the dose calculations.

Exposure Dose (acute): Soil-pica behavior Children

Exposure doses for soil-pica behavior children exceeded ATSDR MRL for acute oral exposure (0.005 mg/kg/day) in all three areas of the site: the undeveloped creek/proposed rails-to-trails area (0.59 mg/kg/day); the recreational area (0.025625mg/kg/day); and the housing area (0.02 mg/kg/day). The estimated doses in the undeveloped area only exceeded the acute MRL (0.005 mg/kg/day) and the acute LOAEL (0.05 mg/kg/day). The estimated exposure doses in the residential and recreational areas exceeded only the acute MRL (0.005 mg/kg/day), and not the acute LOAEL. However, the exposures and dose calculations are based on a very limited number of samples.

Exposure Dose (chronic): Non-pica behavior Children

For non-pica behavior children, the calculated exposure doses, based on the assumptions described above, for the undeveloped creek/proposed rails-to-trails area, recreational area, and the residential area were 0.0014672 mg/kg/day, 0.0001922 mg/kg/day, and 0.000368 mg/kg/day, respectively. Exposure dose calculations for non-pica behavior children showed arsenic dose levels exceeded the chronic MRL (0.0003 mg/kg/day) and chronic NOAEL (0.0008 mg/kg/day), but were below the chronic LOAEL (0.014 mg/kg/day) for the undeveloped creek/proposed rails-to-trails area of the site only. Exposure dose calculations slightly exceeded the chronic MRL for non-pica children, but not the NOAEL, in the residential area (0.000368 mg/kg/day). Since the initial sampling round, and the resulting exposure dose calculations are based on a limited number of samples, future sampling will assist in further determining the extent of soil contamination in this area.

Exposure Dose (chronic): Adolescents

Exposure dose calculations for adolescent visitors and residents did not exceed the NOAEL, LOAEL, and MRL values for soil ingestion. The calculated exposure dose, based on the assumptions described above, for the undeveloped creek/proposed rails-to-trails area, recreational area, and the residential area were 0.000261 mg/kg, 0.000034 mg/kg, and 0.000066 mg/kg, respectively.

Exposure Dose (chronic): Adults

Exposure dose calculations for adult, recreational visitors and residents did not exceed the NOAEL, LOAEL, and MRL values for ingestion. The calculated exposure dose, based on the assumptions described above, for the undeveloped creek/proposed rails-to-trails area, recreational area, and the residential area were 0.0001677 mg/kg, 0.000022 mg/kg, and 0.000042 mg/kg, respectively.

Contaminant Evaluation

Arsenic

Exposure to arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic combines with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds. Studies have shown that 45 to 85 percent of an ingested dose of arsenic is eliminated within 1 to 3 days; however, some remains for several months or longer.

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans. There is some evidence that long-term exposure to arsenic in children may result in lower IQ scores. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults. EPA is currently revising the assessment for inorganic arsenic.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals have show that large doses of arsenic that cause illness in pregnant females, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues and breast milk. [11]

Children who are exposed via soil-pica behavior at the Franklin Glass site could receive doses of arsenic that might cause temporary effects (e.g., nausea, diarrhea, vomiting and stomach cramps). However, soil-pica behavior represents ***an acute transient exposure scenario***, of 1 to 2 events per year, because arsenic is rapidly eliminated from the body (typically in soil-pica behavior by excessive vomiting and diarrhea). As such, once eliminated from the body, these acute transient exposure events do not represent a chronic health concern [4].

Child Health Considerations

ATSDR and PADOH recognize that children are especially sensitive and at greater risk than adults from exposure to hazardous substances. In communities faced with air, water, or soil contamination, the physical differences between children and adults demand special emphasis. These differences include: 1). Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential; 2). Children are shorter than adults and can breathe or ingest dust and soil close to the ground; and 3). 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 systems 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.

PADOH and ATSDR have taken into account the unique vulnerabilities of infants and children to environmental contaminants during the evaluation at this site. The special concerns related to a childhood exposure have been addressed in this assessment by specifically using exposure scenarios based on a child's soil intake, body weight, and park activities. There is a significant amount of toxicological data available on arsenic and human health effects. However, the data needed to account for an accurate representation of any potential unique concerns related to early-life exposures to arsenic appears to be insufficient. The National Research Council concluded in 2001 that 'There are no reliable data that indicate heightened susceptibility of children to arsenic'. [12]

PADOH and ATSDR suggests that concerned parents monitor their children's behavior while they are playing outdoors to ensure that their children (of any age) are not exhibiting pica behavior and eating excessive amounts of soil and discuss their concerns and/or observed behaviors with their doctor

Conclusions

PADOH and ATSDR reviewed the environmental sampling data, collected thus far. Based on this review, PADOH and ATSDR reached the following conclusions:

> ***PADOH and ATSDR identified several completed exposure pathways, such as at the creek, the proposed rails-to-trails area and the soil excavation area in the housing development***, for residents and community members who may come in contact with surface soil, and particularly for young children playing in the contaminated areas.
>
> ***PADOH and ATSDR consider arsenic in the soil a contaminant of concern for this site, based on the data evaluated at this point.*** Average arsenic levels exceeded the ATSDR CV for adolescents and children at the site. The average

soil arsenic levels in the undeveloped creek/proposed rails-to-trails area of the site only exceeded ATSDR CV for adults.

The levels of arsenic found at the Franklin Glass site could harm the health of ***soil-pica children in the undeveloped creek/proposed rails-to-trails area of the site.***

For ***non-pica children***, the arsenic levels found at the Franklin Glass site ***could harm their health in the undeveloped creek/proposed rails-to-trails area of the site*** based on the limited samples collected thus far.

Based on a review of the soil sampling data and exposure dose calculations, the on-site soil levels are ***not expected to harm the health of adult and adolescent visitors and residents.***

Recommendations

Based on a review of the data provided thus far, PADOH and ATSDR recommend the following:

1. ***PADEP should consider collecting and analyzing additional surface soil samples*** for arsenic, in areas of the site where persons would be expected to have frequent or periodic exposures to soils via ingestion, especially in the baseball field, soccer/football field, and housing development(s). PADOH and ATSDR will provide review and consultation on future environmental sampling, if requested and deemed appropriate, and issue an appropriate public health response.

2. PADEP should also consider collecting ***surface soil samples in the northern portion of the site,*** which was not sampled during the initial soil sampling efforts. This area of the site is currently undeveloped and contains biking/ hiking trails, and could be an exposure pathway to recreational visitors.

3. Based on the sampling data collected to date, the potential exposure scenarios to the community, and to be conservative and protective of public health, ***PADOH and ATSDR recommend that PADEP may wish to consider restricting access, or other appropriate solutions*** (e.g. some mitigation, remediation-type, or other-type activity)***, to reduce the potential exposures to arsenic in the undeveloped creek/proposed rails-to-trails area of the site.*** Such measures could possibly include, but are not limited to: (1) removal of contaminated soil and sediment; (2) erecting a fence, barrier, and/or signage; (3) addition of clean topsoil or other appropriate cover to the area; and/or (4) other feasible measures that would minimize the likelihood of exposure.

4. Since children, based on their physical characteristics, likely behavior, and play activities, are considered to be a more susceptible population for exposure to arsenic in soil, PADOH and ATSDR suggest that concerned parents monitor their children's behavior and outdoor play activities to ensure that their children (of any age) are not exhibiting pica behavior and are not eating excessive amounts of soil. Parents are encouraged to discuss their concerns and/or observed behaviors with their doctor.

5. Contaminated soil can potentially be brought into the home on shoes, clothing, and children's hands after playing. PADOH and ATSDR recommend that residents consider taking the following steps to reduce their potential exposure to arsenic in the soil:

    a. Children should wash their hands when coming in from playing outside and before eating.

    b. Provide children with a covered sand box filled with 'clean' sand or material in which to play, and discourage them from playing in or with the contaminated soil.

    c. Do not eat or smoke in areas with contaminated soil.

    d. Ask family members to remove their shoes by the door, and frequently bathe your pets as they could also track contaminated soil into your home.

    e. Regularly conduct damp mopping and damp dusting of surfaces. Dry sweeping and dusting could increase the amount of contaminated dust in the air. If you have carpets, use a vacuum with a High Efficiency Particulate Air (HEPA) filter.

Public Health Action Plan

The public health action plan for the site contains a description of actions that have been or will be taken by PADOH, ATSDR and other government agencies at the site. The purpose of the public health action plan is to ensure that this health consultation both identifies public health hazards and provides a plan of action designed to mitigate and prevent harmful human health effects resulting from exposure to hazardous substances.

Public health actions that have been taken include:

PADOH conducted a visit of the site and the surrounding community

PADOH met with the PADEP Northwest Regional staff to discuss site background information and community concerns

PADOH and ATSDR completed this HC

Public health action that currently or will be implemented:

PADOH and ATSDR will provide and discuss this HC with the PADEP and community members as appropriate.

PADOH and ATSDR will pursue meetings with the community, as well as state and local government agencies as appropriate.

PADOH and ATSDR will consider reviewing additional environmental sampling data, if requested and deemed appropriate, and issuing a public health comment

PADOH and ATSDR will remain available to discuss any public health questions or concerns related to the site with community members and local authorities as appropriate.

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Certification

This health consultation for the proposed Franklin Glass site was prepared by the PADOH under a cooperative agreement with the ATSDR. It is in accordance with approved methodology and procedures existing at the time the health consultation were initiated. Editorial review was completed by the cooperative agreement partner.

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

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Figures

Figure 1 - Site layout

Figure 2 – Soil sampling locations

Tables

Table 1 - Sampling results for arsenic in soil, in the undeveloped creek/proposed rails-to-trails, recreational, and housing areas (April 27, 2009 and May 11, 2009)

Sample #	Sample location	Results (mg/kg)
SP1	Bank, upstream of proposed bridge crossing	183
SP2	Stream sediment at proposed bridge crossing	79.1
SP3	Hillside above proposed bridge crossing	34.3
SP4	Left of exposed gas line	286
SP5a	Right of exposed gas line	1888
SP5b	Right of exposed gas line	623
SP6	Directional drill location - 1 foot below the surface	56.2
SP7	Coal Run - 25 Yards left of rail road spur	74.5
SP8	Middle of proposed trail	85
SP9	Waste materials along main rail road	90.7
SP10	On proposed trail	40.2
	Average (undeveloped creek/proposed rails-to-trails area)	**313**
SP12	Ball field - outfield	35.8
SP13	Ball field - in field	8.23
SP14	Ball field - near home plate	26.3
SP15	Ball field - dugout	10
SP16	Soccer Field	49.5
SP17	Soccer Field	76.3
SP18	Soccer Field	81.9
	Average (recreational area)	**41**
SP11	Material from excavation area in housing development	63.9
SP19	Housing development -near former site lagoon	54.2
SP20	Housing development -near former site lagoon	59.9
	Average (residential)	**59**
	Average (total)	**186**

Table 2 – ATSDR's comparison values for arsenic in soil

Comparison Value *	Level
EMEG - Acute child pica	10 mg/kg
EMEG - Chronic child non-pica	20 mg/kg
EMEG - Chronic adult	200 mg/kg
CREG (site specific)	20 mg/kg †

* EMEG - Environmental Media Evaluation Guide
CREG - Cancer Risk Evaluation Guide for 1x10 excess cancer risk
† ATSDR suggests using 20mg/kg because the 0.5mg/kg standard is above background

Table 3 - Sampling results for other metals (April 27, 2009)

Analyte	Results (mg/kg)
SP1- Bank, upstream of proposed bridge crossing -	
Lead	372
Chromium	18.3
Cadmium	1.05
Barium	63.4
Silver	0.615
Selenium	4.31
Mercury	0.123
SP2- Stream sediment at proposed bridge crossing -	
Lead	26.9
Chromium	18.2
Cadmium	0.901
Barium	124
Silver	0.901
Selenium	6.31
Mercury	0.18
SP3- Hillside above proposed bridge crossing -	
Lead	16.8
Chromium	13.1
Cadmium	0.628
Barium	43.8
Silver	0.628
Selenium	4.39
Mercury	0.126
SP4- Left of exposed gas line -	
Lead	45.4
Chromium	18.7
Cadmium	0.742
Barium	61.4
Silver	0.619
Selenium	4.33
Mercury	0.124
SP5- Right of exposed gas line -	
Lead	183
Chromium	17.7
Cadmium	3.03
Barium	64.7
Silver	0.513
Selenium	3.59
Mercury	0.103

SP6-Directional drill location – 1 foot below the surface	
Lead	13.2
Chromium	8.4
Cadmium	0.667
Barium	41.3
Silver	0.667
Selenium	4.67
Mercury	0.133
SP7- Coal Run - 25 Yards left of rail road spur -	
Lead	35.8
Chromium	16.5
Cadmium	0.56
Barium	69.4
Silver	0.56
Selenium	3.92
Mercury	0.112
SP8- Middle of proposed trail -	
Lead	90
Chromium	26.9
Cadmium	0.806
Barium	140
Silver	0.62
Selenium	4.34
Mercury	0.124
SP9- Waste materials along main rail road -	
Lead	13
Chromium	3.75
Cadmium	0.657
Barium	27.3
Silver	0.657
Selenium	4.6
Mercury	0.131
SP10- On proposed trail -	
Lead	118
Chromium	14.3
Cadmium	0.529
Barium	51.8
Silver	0.529
Selenium	3.7
Mercury	0.356
SP11- Material from excavation area in housing development -	
Lead	22.3
Chromium	10.6
Cadmium	0.57
Barium	59.9
Silver	0.57
Selenium	3.99
Mercury	0.114

Table 4 – ATSDR CV's for other metals – Chronic EMEG values

	Child CV	Adult CV
Lead	*	*
Chromium	50	700
Cadmium	5	70
Barium	10,000	100,000
Silver	300**	4,000**
Selenium	300	4,000
Mercury	No CV	No CV

* ATSDR does not currently have a CV for lead, but the EPA's residential soil screening value is 400 mg/kg.
** Reference Does Media Evaluation Guide (RMEG) CV

Table 5 – Exposure dose calculations for the soil-pica behavior children, children, adolescent, and adults (arsenic)

Population/ Area	As (mg/kg)	Ingestion Rate (mg/day)	Bioavailability	Exposure Frequency	Dose (mg/kg/ day)
Soil-pica behavior Children * (acute)					
Undeveloped	1888	5,000	100%	1-2 events/yr	0.59
Recreational	82	5,000	100%	1-2 events/yr	0.025625
Housing	64	5,000	100%	1-2 events/yr	0.02
Non-pica behavior Children **					
Undeveloped	313	200	50%	9 months	0.0014672
Recreational	41	200	50%	9 months	0.0001922
Housing	59	200	50%	12 months	0.000368
Adolescent **					
Undeveloped	313	100	50%	9 months	0.000261
Recreational	41	100	50%	9 months	0.000034
Housing	59	100	50%	12 months	0.000066
Adult**					
Undeveloped	313	100	50%	9 months	0.0001677
Recreational	41	100	50%	9 months	0.000022
Housing	59	100	50%	12 months	0.000042

Doses that LOAEL- acute and MRL - acute values
Doses that exceed MRL- acute only
Doses that exceed NOAEL-chronic and MRL-chronic
Doses that exceed MRL-chronic only
* Maximum soil arsenic values used for dose calculations, for acute exposures in soil-pica behavior children
** Average soil arsenic values used for dose calculation for non-pica children, adolescent and adults

Table 6 - Soil screening values for ingestion (arsenic)

Screening standard	Level
NOAEL – chronic	0.0008 mg/kg/day
LOAEL - chronic	0.014 mg/kg/day
LOAEL - acute	0.05 mg/kg/day
MRL- chronic	0.0003 mg/kg/day
MRL – acute	0.005 mg/kg/day
RBC (Ingestion)	0.43 mg/kg

NOAEL – No Observed Adverse Effects Level
LOAEL – Lowest Observed Adverse Effects Level
RBC - Risk-Based Concentration, EPA Region III