Health Consultation

HYDE PARK

AUGUSTA, RICHMOND COUNTY, GEORGIA

APRIL 7, 2008

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

HYDE PARK

AUGUSTA, RICHMOND COUNTY, GEORGIA

Prepared By:

Georgia Department of Human Resources
Division of Public Health
Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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March 18, 2008

Ms. Debra Rossi, Project Director
City of Augusta
530 Green Street, Room 801
Augusta, GA 30911

RE: Health Consultation: Hyde Park, Augusta, Richmond County, GA

Dear Ms. Rossi,

This letter is in response to your request to evaluate recent environmental sampling data collected in the Hyde Park neighborhood in Augusta, to determine if contamination was found at levels that may pose a potential health risk to the community. In response, the Georgia Division of Public Health (GDPH) conducted this Health Consultation under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). A Health Consultation provides advice on a specific public health issue, environmental medium (e.g.; air, soil), and/or environmental sampling event related to human exposure to toxic chemicals found in the environment. A health consultation summarizes the results of the environmental data, exposure pathway(s) analyses, and toxicologic investigation.

To evaluate current soil, sediment, and groundwater conditions, GDPH reviewed the *Phase II Environmental Site Assessment and Site Reuse Feasibility Study*. The study was conducted in 2006 to estimate the extent of contamination and contamination migration in the Augusta Brownfields Study Area, which consists of portions of the Hyde Park neighborhood, the former Goldberg Brothers scrap yard, Fabrister Ranch/Campbell Recycling, and Richmond Recycling (Figure 1).

The following documents were reviewed to assist with this request. A complete list of references is available at the end of this report:

- Gannett Fleming, Inc., *Phase II Environmental Site Assessment and Site Reuse Feasibility Study*; 9/06.
- U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, *Draft Toxicological Profile for Lead (Update)*. February 2006.

The Health Consultation concluded:

1) This site poses **No Apparent Public Health Hazard** for exposure to contaminants in soil and sediment in Hyde Park.

   The public should not access commercial properties with soil known or suspected to be contaminated (unfenced areas of the commercial properties within the

Augusta Brownfields Study Area).

2) This site poses **No Public Health Hazard** for exposure to contaminants in groundwater because residents use the municipal water supply. In addition, since the maximum concentrations of contaminants found in groundwater samples from Hyde Park are below federal drinking water standards, there is no reason to restrict the use of groundwater in the area.

Summary

Soil and sediment samples collected from the Hyde Park neighborhood indicate several contaminants at levels that warranted evaluation. These contaminants either exceeded a soil screening level (lead) or a health guideline established by ATSDR (see Appendix A for a description of the screening levels and health guidelines used in this investigation). After further evaluation, it is determined that there is no health risk to the public from exposure to infrequent and low levels of contaminants in soil and sediment in Hyde Park. However, because lead was found in four soil samples at levels that exceed the screening level, remediation of these four areas is a prudent public health measure.

Soil samples collected from commercial properties within the Augusta Brownfields Study Area show elevated levels of several contaminants. The public should not access commercial properties with soil known or suspected to be contaminated (unfenced areas of the commercial properties within the Augusta Brownfields Study Area).

Groundwater samples obtained from seven monitoring wells located throughout the Hyde Park neighborhood indicate one contaminant above health screening levels: arsenic. Arsenic was found in three off-site monitoring wells at slightly elevated levels (3.01, 3.18, and 5.37 parts per billion [ppb]). The lowest health screening value for arsenic is 3 ppb (well below the federal drinking water standard of 10 ppb). However, exposure to groundwater is not likely because residents are connected to the Augusta municipal water supply, and there are no reports of residents using private water wells in Hyde Park as their drinking water source. Because there is no suspected exposure pathway, no further evaluation was conducted for groundwater. In addition, since the maximum concentrations of contaminants found in groundwater samples from Hyde Park are below federal drinking water standards, there is no reason to restrict the use of groundwater in the area.

The report also indicates the presence of unused water wells on several of the Hyde Park residential properties. For safety and to protect groundwater resources, these unused wells should be properly abandoned.

Toxicological Evaluation

GDPH uses the Agency for Toxic Substances and Disease Registry (ATSDR) comparison values to select contaminants that may warrant further evaluation. Comparison values (CVs) are concentrations of contaminants that can reasonably (and conservatively) be regarded as harmless, assuming default conditions of exposure. The CVs generally include ample safety factors to ensure protection of sensitive populations. Because CVs do not represent thresholds of toxicity, exposure to contaminant concentrations above CVs will not necessarily lead to adverse health effects. CVs and the evaluation process are described in more detail in Appendix A.

Approximately ninety surface and subsurface soil and sediment samples collected from the Hyde Park neighborhood were analyzed for metals, polychlorinated biphenyls (PCBs), and semivolatile organic compounds. Analyses results indicate the presence of arsenic, cadmium, copper, and zinc at levels slightly above the respective lowest CV and were further evaluated. Because each of these metals exceeded a CV in only one sample, the results are not considered representative of soil conditions. In addition, other samples collected did not contain repeated or consistent levels of these contaminants close to the respective CVs. Thus, there is no evidence that these contaminants are present in soil in the Hyde Park neighborhood at levels of health concern. The highest levels of contaminants that exceed a CV are listed in Table 1 (Appendix A).

Lead was detected in several soil and sediment samples. Exposure to elevated levels of lead is potentially harmful, especially to fetuses, infants and young children. Because of the varied nature of lead-containing compounds, ATSDR has not developed a CV for lead; however, ATSDR has developed a mathematical model designed to estimate blood lead levels in the body based upon the actual concentrations of lead in soil, and exposure factors for lead from all sources (Appendix B). Applying the ATSDR Lead Model to the Hyde Park neighborhood reveals that when the highest lead level found in soil is considered, along with other potential sources of lead exposure, no public health hazard exists from exposure to the infrequent and low levels of lead found in soil and sediment.

Because young children are especially vulnerable to the health effects from lead, residents should take precautions to limit children's exposure to all sources of lead. Covering bare soil with grass and other plants, keeping children away from soil near the foundation of older houses with lead-based paint, and preventing children from consuming dirt are measures that can protect children from lead exposure. More information about lead in soil, exposure pathways for lead, the health effects from exposure, and preventing lead exposure can be found in Appendix C.

Recommendations

Based on the results of this Health Consultation, additional public health actions for the Park neighborhood are not warranted at this time.

GDPH will provide health education to residents about preventing lead exposure (Appendix C) and proper water well abandonment (Appendix D).

If additional data become available, the information will be reviewed by GDPH and appropriate actions will be taken. For information regarding this Health Consultation, contact me at 404-657-6534.

Sincerely,

Jane M. Perry

Jane M. Perry, Director
Chemical Hazards Program

REFERENCES

Augusta Chronicle, *Report Revives Call to Move Residents*, http://chronicle.augusta.com;11/06.

Gannett Fleming Inc., *Phase II Environmental Site Assessment and Site Reuse Feasibility Study, Augusta Brownfields Study Area, Augusta, Georgia*; 9/06.

Georgia Environmental Protection Division, *Hazardous Site Inventory*; 7/1/07.

U.S. Environmental Protection Agency, *Soil Screening Guidance: User's Guide*. Publication 9355.4-23; 7/96.

U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, *Soil Comparison Values*; 10/26/07.

U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, *Health Guidelines*; 10/26/07.

U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, *Draft Toxicological Profile for Arsenic (Update)*; 2/06.

U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, *Draft Toxicological Profile for Lead (Update)*; 8/07.

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CERTIFICATION

This letter health consultation was prepared by the Georgia Division of Public Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry. It was completed in accordance with approved methodologies and procedures existing at the time the health consultation was initiated. Editorial Review was completed by the Georgia Division of Public Health.

Technical Project Officer, CAT, CAPEB, DHAC

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

Team Lead, CAT, CAPEB, DHAC, ATSDR

FIGURE 1. SITE MAP

APPENDIX A: TOXICOLOGICAL EVALUATION

Step 1--The Screening Process

In order to evaluate the available data, GDPH used comparison values (CVs) to determine which chemicals to examine more closely. CVs are contaminant concentrations found in a specific environmental media (for example: air, soil, or water) and are used to select contaminants for further evaluation. CVs incorporate assumptions of daily exposure to the chemical and a standard amount of air, soil, or water that someone may inhale or ingest each day. CVs are generated to be conservative and are not site specific. CVs are not intended to be environmental clean-up levels or to indicate that health effects occur at concentrations that exceed these values.

CVs can be based on either carcinogenic (cancer-causing) or non-carcinogenic effects. Cancer-based CVs are calculated from the U.S. Environmental Protection Agency's (EPA) oral cancer slope factors for ingestion exposure, or inhalation risk units for inhalation exposure. Non-cancer CVs are calculated from ATSDR's minimal risk levels, EPA's reference doses, or EPA's reference concentrations for ingestion and inhalation exposure. When a cancer and non-cancer CV exist for the same chemical, the lower of these values is used as a conservative measure. The chemical and media-specific CVs used in the preparation of this health consultation are listed below:

An **Environmental Media Evaluation Guide (EMEG)** is an estimated comparison concentration for exposure that is unlikely to cause adverse health effects, as determined by ATSDR from its toxicological profiles for a specific chemical.

A **Cancer Risk Evaluation Guide (CREG)** is an estimated comparison concentration that is based on an excess cancer rate of one in a million persons exposed over a lifetime (70 years), and is calculated using EPA's cancer slope factor.

Step 2--Evaluation of Public Health Implications

The next step in the evaluation process is to take those contaminants that are above their respective CVs and further identify which chemicals and exposure situations are likely to be a health hazard. Separate child and adult exposure doses (or the amount of a contaminant that gets into a person's body) are calculated for site-specific scenarios, using assumptions regarding an individual's likelihood of accessing the site and contacting contamination. A brief explanation of the calculation of estimated exposure doses used in this health consultation are presented below. Calculated doses are reported in units of milligrams per kilogram per day (mg/kg/day).

Ingestion of contaminants present in soil

Exposure doses for ingestion of contaminants present in soil were calculated using the average detected concentrations of contaminants in milligrams per kilogram (mg/kg [mg/kg = ppm]). The following equation is used to estimate the exposure doses resulting from ingestion of contaminated soil:

$$ED_s = \frac{C \times IR \times EF \times CF}{BW}$$

where;

ED_s = exposure dose soil (mg/kg/day)
C = contaminant concentration (mg/kg)
IR = intake rate of contaminated medium (based on default values of 100 mg/day for adults, 200 mg/day for children, and 5000 mg/day for a children with *pica*)
EF = exposure factor (based on frequency of exposure, exposure duration, and time of exposure)
CF = kilograms of soil per milligram of soil (10^{-6} kg/mg)
BW = body weight (based on average rates: for adults, 70 kg; children, 25 kg; children with *pica*: 16 kg)

Non-cancer Health Risks

The doses calculated for exposure to individual chemicals are then compared to an established health guideline, such as an ATSDR minimal risk level (MRL) or an EPA reference dose (RfD), in order to assess whether adverse health impacts from exposure are expected. Health guidelines are chemical-specific values that are based on available scientific literature and are considered protective of human health. Non-carcinogenic effects, unlike carcinogenic effects, are believed to have a threshold, that is, a dose below which adverse health effects will not occur. As a result, the current practice to derive health guidelines is to identify, usually from animal toxicology experiments, a no observed adverse effect level (NOAEL), which indicates that no effects are observed at a particular exposure level. This is the experimental exposure level in animals (and sometimes humans) at which no adverse toxic effect is observed. The known toxicological values are doses derived from human and animal studies that are summarized in ATSDR's *Toxicological Profiles (www.atsdr.cdc.gov/toxpro2.html).* The NOAEL is modified with an uncertainty (or safety) factor, which reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the human population. The magnitude of the uncertainty factor considers various factors such as sensitive subpopulations (e.g., children, pregnant women, the elderly), extrapolation from animals to humans, and the completeness of the available data. Thus, exposure doses at or below the established health guideline are not expected to cause adverse health effects because these values are much lower (and more human health protective) than doses, which do not cause adverse health effects in laboratory animal studies.

For non-cancer health effects, the following health guidelines were used in this health consultation:

Minimal Risk Levels (MRLs) are developed by ATSDR for contaminants commonly found at hazardous waste sites. The MRL is developed for ingestion and inhalation exposure, and for lengths of exposures: acute (less than 14 days); intermediate (between 15-364 days), and chronic (365 days or greater). ATSDR has not developed MRLs for dermal exposure (absorption through skin).

If the estimated exposure dose to an individual is less than the health guideline value, the exposure is unlikely to result in non-cancer health effects. If the calculated exposure dose is greater than the health guideline, the exposure dose is compared to known toxicological values for the particular chemical and is discussed in more detail in the text of the health consultation. A direct comparison of site-specific exposures and doses to study-derived exposures and doses found to cause adverse health effects is the basis for deciding whether health effects are likely to occur.

It is important to consider that the methodology used to develop health guidelines does not provide any information on the presence, absence, or level of cancer risk. Therefore, a separate cancer risk evaluation is necessary for potentially cancer-causing contaminants detected at this site.

Cancer Risks

Exposure to a cancer-causing chemical, even at low concentrations, is assumed to be associated with some increased risk for evaluation purposes. The estimated risk for developing cancer from exposure to contaminants associated with the site was calculated by multiplying the site-specific doses by EPA's chemical-specific cancer slope factors (CSFs) available at *www.epa.gov/iris*. This calculation estimates a theoretical excess cancer risk expressed as a proportion of the population that may be affected by a carcinogen during a lifetime of exposure. For example, an estimated risk of 1×10^{-6} predicts the probability of one additional cancer over background in a population of 1 million. An increased lifetime cancer risk is not a specified estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime in his or her lifetime following exposure to a particular contaminant under specific exposure scenarios. For children, the theoretical excess cancer risk is not calculated for a lifetime of exposure, but from a fraction of lifetime; based on known or suspected length of exposure, or years of childhood.

Because of conservative models used to derive CSFs, using this approach provides a theoretical estimate of risk; the true or actual risk is unknown and could be as low as zero. Numerical risk estimates are generated using mathematical models applied to epidemiologic or experimental data for carcinogenic effects. The mathematical models extrapolate from higher experimental doses to lower experimental doses. Often, the experimental data represent exposures to chemicals at concentrations orders of magnitude higher than concentrations found in the environment. In addition, these models often assume that there are no thresholds to carcinogenic effects--a single molecule of a carcinogen is assumed to be able to cause cancer. The doses associated with these estimated hypothetical risks might be orders of magnitude lower that doses reported in toxicology literature to cause carcinogenic effects. As such, a low cancer risk estimate of 1×10^{-6} and below may indicate that the toxicology literature supports a finding that no excess cancer risk is likely. A cancer risk estimate greater than 1×10^{-6}, however, indicates that a careful review of toxicology literature before making conclusions about cancer risks is in order.

Results

Soil and sediment samples collected from the Hyde Park neighborhood show that arsenic, cadmium, copper, lead, and zinc exceeded the lowest applicable CVs. Cadmium and zinc are not discussed because, after calculating the doses, they do not exceed the MRL (Table 1) and are not considered human carcinogens.

Arsenic

The calculated exposure dose for children is well below the health guideline or MRL for arsenic as shown in Table 1.

The EPA classifies inorganic arsenic as a human carcinogen based on sufficient evidence from human study data. The numeric risk for getting cancer for individuals exposed to arsenic at the highest concentration found in soil in the Hyde Park neighborhood, based on estimated doses over a 70 year lifespan, is 6×10^{-5} (6 in 100,000). However, the more reasonable risk of developing cancer from exposure to arsenic are considered much lower for residents of the Hyde Park neighborhood because no one will have continuous, repeated exposure to arsenic-contaminated soil over a lifetime.

Copper

The calculated exposure dose for children slightly exceeds the health guideline or MRL for copper as shown in Table 1. However, this level of copper was found in only one sample in the Hyde Park neighborhood and is not indicative of elevated copper levels.

Table 1. Chemicals detected above comparison values in soil

Chemical	Maximum Concentration (ppm)	ATSDR CV (ppm)	Estimated Exposure Dose (mg/kg/day)	MRL (mg/kg/day)	Cancer Risk
Arsenic	27.5	CREG 0.02 EMEG Child: 20	0.0002	0.0003	6 per 100,000
Cadmium	10.3	EMEG Child: 10	0.000015	0.0002	Not applicable
Copper	1740	EMEG: Child: 500	0.014	0.01	Not applicable
Lead	1260	EPA s/l*: 400	* see Lead Model	Not applicable	Not applicable
Zinc	21,900	EMEG Child: 20,000	0.1752	0.3	Not applicable

ppm: parts per million
ATSDR: Agency for Toxic Substances and Disease Registry
mg/kg/day: milligrams per kilogram per day
MRL: Minimum Risk Level
CREG: Cancer Risk Evaluation Guide
EMEG: Environmental Media Evaluation Guide
EPA s/l: U.S. Environmental Protection Agency screening level
* Lead Model: ATSDR
Sources: ATSDR, Soil Comparison Values, 10/26/07; ATSDR Health Guidelines, 10/26/07.

Lead

The U.S. Environmental Protection Agency's residential soil lead screening value is 400 mg/kg. Four soil samples collected from the Hyde Park neighborhood contained lead at levels greater than 400 mg/kg (1260, 750, 503 and 411; and two samples were close to but below 400 mg/kg at 374 and 377 mg/kg).

Lead is a bluish-gray metal that naturally occurs in the environment, but most high levels are the result of human activity. Lead is commonly found in soil near roadways resulting from the previous use of leaded gasoline, older homes with lead-based paint, and some hazardous waste sites. Exposure to elevated levels of lead is potentially harmful, especially to fetuses, infants and young children. Because of the varied nature of lead-containing compounds, ATSDR has not developed a health-based comparison value for lead; however, ATSDR has developed a mathematical model designed to estimate blood lead levels in the body based upon the actual concentrations of lead in soil (Appendix B).

According to the Centers for Disease Control and Prevention, a person's blood lead level is a good indicator of recent exposure to lead and correlates well with health effects. However, lead concentrations in soil do not directly predict adverse health effects. It is estimated that blood lead levels generally raise three to seven micrograms of lead per deciliter (µg/dL) of blood for every l000 mg/kg increase in soil lead concentrations. Based on the results of applying soil lead concentrations found in Hyde Park to the ATSDR lead model, we can conclude that elevated blood lead levels among persons exposed to lead in soil in the Hyde Park neighborhood is not expected.

APPENDIX B: ATSDR LEAD MODEL*

Numerous longitudinal and cross-sectional studies have attempted to correlate environmental lead levels with blood lead levels. The studies have provided a number of regression analyses and corresponding slope factors for various media including air, soil, dust, water, and food. In an attempt to use this valuable body of data, ATSDR has developed an integrated exposure regression analysis. This approach utilizes slope values from selected studies to integrate all exposures from various pathways, thus providing a cumulative exposure estimate expressed as total blood lead. The worktable in the text can be used to calculate a cumulative exposure estimate on a site-specific basis. To use the table, environmental levels for outdoor air, indoor air, food, water, soil, and dust are needed. In the absence of such data, default values can be used. In most situations, default values will be background levels unless data are available to indicate otherwise. Based on the US Food and Drug Administration's Total Diet Study data, lead intake from food for infants and toddlers is about 5 micrograms per day. In some cases, a missing value can be estimated from a known value. For example, EPA has suggested that indoor air can be considered 0.03 times the level of outdoor air.

Empirically determined or default environmental levels are multiplied by the percentage of time one is exposed to a particular source and then multiplied by an appropriate regression slope factor. Slope factor studies were based upon an assumption that exposure is continuous. The slope factors can be derived from regression analysis studies that determine blood lead levels for a similar route of exposure. Typically, these studies identify standard errors describing the regression line of a particular source of lead exposure. These standard errors can be used to provide an upper and lower confidence limit contribution of each estimate of blood lead. The individual source contributions can then be summed to provide an overall range estimate of blood lead. While it is known that such summing of standard errors can lead to errors of population dynamics, detailed demographic analysis (e.g., Monte Carlo simulations) would likely lead to a model without much utility. As a screening tool, estimates provided by the table have a much greater utility than single value central tendency estimates, yet still provide a simple-to-use model that allows the health assessor an easy means to estimate source contributions to blood lead.

* Source: U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, *Draft Toxicological Profile for Lead (Update)*; 2006.

Table 2. Estimated blood lead levels from exposure to environmental and dietary lead for persons exposed to surface soil lead in the Hyde Park neighborhood.

Media	Concentration*	Relative Time Spent (fraction of a day)	Slope Factor**	Estimated Blood Lead Level micrograms per deciliter (µg/dL)	
Outdoor Air	0.15 $\mu g/m^3$	0.2	1.32 (low)[1]	0.0396	
			2.52 (high)[1]		0.0756
Indoor Air	0.15 $\mu g/m^3$	0.8	1.32 (low)[2]	0.1584	
			2.52 (high)[2]		0.3024
Food	5 µg/day	1	0.24 [3]	1.2	
Water	4 µg/day	1	0.16 [4]	0.64	
Soil	1260 mg/kg #	0.2	0.00583 (low)[5]	1.469	
			0.00777 (high)[5]		1.958
Dust	40 mg/kg	0.8	0.00628 (low)[6]	0.201	
			0.008 (high)[6]		0.256
			Total	**3.71**	**4.43**

When suggested default values are a range of values, the average of the range is used as the default value.
Highest off-site surface soil concentration of lead found in all samples collected and analyzed above the EPA screening level of 400 ppm.
* Suggested default values references:

Outdoor Air	0.1–0.2 $\mu g/m^3$ [1]
Indoor Air	0.1–0.2 $\mu g/m^3$ [2]
Food	5 µg/day [3]
Water	4 µg/day [4]
Dust	10–70 mg/kg [5]

** Slope values references

[1,2]Outdoor, Indoor air	1.32 (low)–2.52 (high)	µg/dL per µg Pb/m^3 [6]
[3]Food	0.24	µg/dL per µg Pb/day [8]
[4]Water	0.16	µg/dL per µg Pb/day [8]
[5]Soil	0.00583 (low)–0.008 (high)	µg/dL per µg Pb/kg [6]
[6]Dust	0.00628 (low)–0.008 (high)	µg/dL per µg Pb/kg [6]

For children under the age of six, the Centers for Disease Control and Prevention (CDC) has set a level of concern at 10 micrograms of lead per deciliter of blood (10 ug/dL). This means that children with blood lead levels equal to or greater than 10 ug/dL are considered to have an elevated lead level and require appropriate follow-up. An elevated lead level does not mean that a child will have health effects, especially if caught early, and the source of the lead exposure is removed.

The results of using the ATSDR Lead Model for the Hyde Park neighborhood reveals that when the highest lead level found in soil is considered, along with other potential sources of lead exposure, blood lead levels will not exceed 10µg/dL.

APPENDIX C

FACT SHEET

Lead in Soil

This fact sheet provides general information about lead and its presence in soil, and how to reduce exposure to lead in soil.

What is lead? (pronounced "*led*")

Lead is a naturally occurring, bluish-gray metal found in small amounts in the earth's crust. It has no special taste or smell. Lead contamination can be found in all parts of our environment. Lead has many different uses, but is mostly used in the production of batteries, ammunition, plumbing, roofing, and devices to shield x-rays. Because of health concerns, lead levels in the environment from gasoline, paints, ceramic products, and caulking have been dramatically decreased in recent years.

When released to the air from industry or burning fossil fuels or waste, lead stays in air about 10 days and then falls to the ground. Most of the lead in soil comes from particles falling out of air. Lead in soil does not break down, but is changed by sunlight, air, and water into less toxic compounds. Lead sticks to soil particles and can be transported to food, toys, and groundwater.

How might humans be exposed to lead in soil?

- Ingesting lead-contaminated soil and dust
- Inhalation of lead dust
- Eating some foods grown in lead-contaminated soil and food contaminated with lead dust
- Children putting their hands or toys into their mouth after they've been in contaminated soil
- Close contact with pets carrying contaminated soil and dust

How can lead in soil affect my health?

The Centers for Disease Control and Prevention considers children to have been exposed to an elevated level of lead if the amount of lead in their blood is at least 10 micrograms per deciliter of blood. To test for blood lead levels, one can consult a physician or the local health department about testing procedures.

Studies have tried to link lead levels in soil with blood lead levels, but no conclusions have been made about how much increased blood lead levels can be expected from exposure to lead in soil. Key factors that help determine the amount of lead ingested are the length and frequency if exposure, and a person's age. Because of their size, body weight, frequent hand to mouth activity, and developing systems, children require special emphasis in communities faced with lead contamination.

Lead exposure is more dangerous for young children than any other population. Unborn children can be exposed to lead from their mothers. Harmful effects include premature birth, low birth weight, learning difficulties, and reduced growth rate. These effects are more common after exposure to high levels of lead over a period of time.

How did the Georgia Division of Public Health get involved in investigating my neighborhood?

In late 2007, the City of Augusta asked the Georgia Division of Public Health to review soil and groundwater data collected from the Hyde Park neighborhood. Residents have expressed concern that storm water runoff from hazardous waste sites has contaminated the area. GDPH determined this site poses **No Apparent Public Health Hazard**. However, the public should not access commercial properties with soil known or suspected to be contaminated with lead (unfenced areas of the commercial properties within the Augusta Brownfields Study Area).

How can I reduce my exposure to lead in soil?

There are several things you can do to reduce your contact with lead:

- cover bare soil with grass, plants, gravel, or wood chips
- test garden soil for lead and limit consumption of produce from contaminated soil
- do not let children play in soil near walls of a house, or on bare soil, contaminated with lead
- do not leave toys that children may put in their mouth in contaminated soil
- keep pets away from contaminated areas
- wash hands after playing or working outdoors
- remove shoes before entering the house
- use a doormat to reduce tracking dust and soil indoors

For More Information, Contact:

GEORGIA DEPARTMENT OF HUMAN RESOURCES
Division of Public Health
Environmental Health and Injury Prevention Branch
Chemical Hazards Program
2 Peachtree Street, 13th Floor
Atlanta, Georgia 30303
(404) 657-6534
www.health.state.ga.us/programs/hazards

Other websites with information about lead exposure:

www.atsdr.cdc.gov
www.epa.gov/lead

DPH02/70H

APPENDIX D

FACT SHEET

Abandoned Water Wells

This fact sheet provides general public health information about proper water well abandonment, and was developed for environmental health education.

What is an abandoned well?

An "abandoned well" is a water well or borehole that is no longer in use, that is unable to produce useable water, or is unable to be used because of poor maintenance or significant wear and tear.

Wells are "temporarily abandoned" if they remain unused for a minimum 365 days, or "permanently abandoned" if use is interrupted for more than three years.

What does "proper abandonment" mean?

A "properly abandoned" water well is a well that has been cleared, plugged, and sealed by a licensed well driller or by a county or municipal government. The sealed plug must be constructed to fill the well hole for the length and diameter of the well. Merely capping an abandoned well is not enough to prevent it from becoming a problem.

Why should I properly abandon my well?

Unused water wells that are not properly abandoned leave open holes in the ground. These holes are dangerous. People (especially children), pets, and wild animals can get hurt or trapped after falling into an abandoned well. These holes serve as direct channels for contamination into Georgia's groundwater. They allow contamination to pass straight through to a drinking water source used by many people.

Contamination, such as chemicals and bacteria, may enter the well from the surface environment. These open holes in the ground may also have been used for trash and hazardous debris. The only way to eliminate dangerous conditions and groundwater contamination from unused wells is to properly abandon them.

Are there laws about abandoning water wells?

The State of Georgia Water Well Standards Act of 1985, (OCGA 12-5-120--12-5-137) provides laws to govern the proper abandonment of water wells. To abandon a well, the owner must hire a licensed well driller. For a list of licensed well drillers, contact the Georgia Environmental Protection Division, Watershed Protection Branch at 404-657-6126, or visit their website at *www.gaepd.org*.

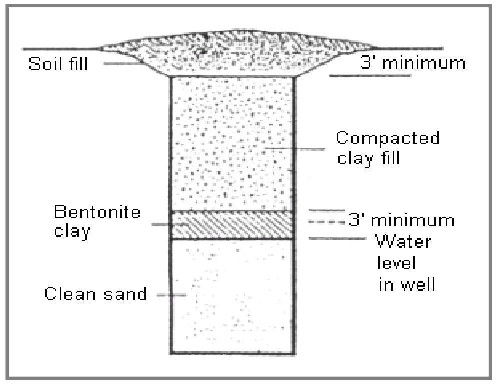
Well type and site geology determine the materials and requirements for plugging abandoned water wells. For example, flowing wells and wells that terminate in bedrock are required to be plugged with cement grout. Shallow, small diameter wells may be effectively plugged with bentonite chips.

How do I know if I have an abandoned water well?

Abandoned wells can be difficult to identify. A typical well casing is a metal pipe 1 ¼ inches to 6 inches in diameter. A typical dug well may be 12 to 36 inches in diameter, or more. Things to look for include pipes sticking out of the ground or floor of a basement, a ring of concrete or bricks surrounding a hole in the ground, or a dip in the land surface. Small buildings, such as sheds, may also house an abandoned well. Unnaturally wet areas may indicate a free flowing well (artesian well) that was never properly sealed. Licensed well drillers in your area can assist you with identifying an abandoned well.

How much will it cost to plug my abandoned well?

Costs vary depending upon the well depth, diameter, location, and other factors. The cost for plugging a well in Georgia usually ranges between $1,000 and $1,500. Well depth and diameter, well type, and local geology require different types of plugging material and methods**.** Your costs may be reduced by having your old well plugged at the time a replacement well is drilled or at the time you connect to municipal water service.



Who can I contact for more information and assistance?

You can contact the Georgia Division of Public Health, Chemical Hazards Program at 404-657-6534, your county cooperative extension office, a registered well drilling contractor, or the Georgia Drillers Association at *www.georgiadrillers.com*.

Proper water well abandonment . . .

1) *Restores protective barrier to minimize groundwater contamination*
2) *Removes physical hazards by removing tempting openings for curious children and animals*
3) *Restores stability to the land surface*
4) *Eliminates or reduces liability*
5) *Protects and improves property values*

For More Information, Contact:

GEORGIA DEPARTMENT OF HUMAN RESOURCES
Division of Public Health
Chemical Hazards Program
2 Peachtree Street, 13th Floor
Atlanta, GA 30303
(404) 657-6534
www.health.state.ga.us/programs/hazards

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