

Health Consultation

LEANDER INDEPENDENT SCHOOL DISTRICT
PROPOSED ELEMENTARY SCHOOL #19
(GRANDVIEW HILLS ELEMENTARY)

AUSTIN, TRAVIS COUNTY, TEXAS

EPA FACILITY ID: TXN000606777

FEBRUARY 13, 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

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Prepared By:

Texas Department of State Health Services
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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Purpose and Statement of Issues

In response to a Texas Commission on Environmental Quality (TCEQ) request, the Texas Department of State Health Services (DSHS), Health Assessment and Toxicology Program evaluated the public health implications of exposure to environmental contaminants at the Leander Independent School District (ISD) proposed elementary school #19 (also known as Grandview Hills Elementary). (Note: Appendix A lists abbreviations and acronyms used in this report).

Background

Site Description and History

In response to parental concerns, Leander ISD hired Weston Solutions, Inc. (Weston) to conduct an Environmental Assessment in Spring 2007 to determine if contaminants at Leander ISD proposed elementary school #19 were present in environmental media inside and outside the building at levels that may pose a threat to human health [1]. TCEQ was asked to provide an independent evaluation of this data, and requested an evaluation of the data by DSHS. DSHS provided technical assistance to TCEQ summarizing the public health implications associated with exposure to contaminants present in surface soil, indoor air, sub-slab soil and air, building materials (sheetrock and sheetrock wipes), and the acid neutralization tank, as well as electric and magnetic field (EMF) sample data [2]. A detailed analysis is provided in this Health Consultation.

The proposed public elementary school will be located at 12024 Vista Parke Drive, Austin, Texas on property formerly owned by Sasol North America, Inc. Classrooms and administrative offices will be housed in buildings that were utilized as a chemical research and testing laboratory for surfactants (substances that reduce the surface tension of water) and detergents from 1989 to 2006. Chemicals commonly used on-site included alcohols, aluminum oxides, detergent alkylates, ethoxylates, hydrocarbon solvents, and polyvinyl chloride. Work at the facility was done on the laboratory-scale and used small volumes of chemicals [1].

On January 25, 2007, DSHS personnel from the Radiation Inspection Unit and Health Assessment and Toxicology Program visited the site and toured all the buildings on the property with contractors working on the site and Leander ISD personnel. No present or potential human health exposures from chemical contaminants were observed and there was no visual evidence of past or present chemical releases to the environment.

On April 11, 2007, DSHS personnel met with TCEQ, City of Austin, and Weston to get an update on sampling activities on the property and analysis of samples collected to date. DSHS, TCEQ, and Weston met with concerned parents and a representative from Leander ISD on April 16, 2007 to update them on site activities and to hear concerns from the parents. Specific concerns brought forward by these parents are addressed in this document.

Community Health Concerns

Parents of Leander ISD children were concerned about the potential for adverse health effects in children attending the school. The following concerns have been expressed [3]:

- Is data that was collected during construction activities of adequate integrity/quality?
- Could contamination in the sub-slab migrate into the indoor air?
- What are the potential sources of contamination that were detected on the school property?
- Are the risks to children being evaluated?
- What are the health risks of the chemicals (toxic and/or carcinogenic) that were detected on the property?
- Are mixtures of contaminants being evaluated?

Environmental Sampling

Data available for this Health Consultation include surface soil, indoor air, sub-slab soil and air, building materials (sheetrock and sheetrock wipes), acid neutralization tank, and EMF sample data collected by Weston from February through April 2007 [1]. For this consultation, DSHS relied on the information provided in the referenced documents and assumed adequate quality assurance/quality control procedures were followed with regard to data collection, chain-of-custody, laboratory procedures, and data reporting.

In addition to the data collected by Weston, the DSHS Radiation Inspection Unit conducted an on-site survey and found no viable threat from past radioactive material use inside the building. All readings were at typical background levels, thus radioactivity at this site poses no apparent public health hazard [4]. Health Assessment and Toxicology Program personnel accompanied the Radiation Inspection Unit during the on-site survey.

Public Health Implications

Introduction

Exposure to chemical contaminants drives the Agency for Toxic Substances and Disease Registry (ATSDR) health consultation process. People may be adversely affected by chemicals only if exposure occurs; that is, they must come into contact with the chemicals or absorb the chemicals into their bodies. The presence of chemical contaminants in the environment does not always result in contact, and contact does not always result in the chemical being absorbed into the body. Thus, chemicals have the potential to cause adverse health effects only when people actually come into contact with them through a completed exposure pathway. Whether adverse health effects are possible depends on: 1) the toxicological properties of the chemicals; 2) the manner in which the person contacts the chemical; 3) the concentration of the chemical; 4) how often the exposure occurs; 5) how long the exposure occurs; and 6) how much of the chemical is absorbed into the body during each exposure event.

Pathways Analysis

The most common ways people come into contact with chemicals are by inhalation (breathing), ingestion (eating or drinking), or by dermal contact (contact with or absorption through skin) with a substance containing the contaminant. The exposure pathways of greatest concern for this site are inhalation of contaminants in indoor air and incidental ingestion or direct contact through the skin of contaminants found in surface soil. These two exposure pathways are further discussed in this Health Consultation.

There is no direct exposure to contaminants either in the sub-slab base material or air. The indoor air data is a better indicator of what exposure would be due to vapor intrusion from the sub-slab. Weston has recommended that the sub-floor area be vented by pulling air from under the slab. The installation of such a system would minimize the potential for chemicals to migrate from the sub-slab through the concrete slab into the building and would eliminate vapor intrusion as a possible exposure pathway and thus vapor intrusion would present no public health hazard.

Low levels of chemicals (metals, volatile organic compounds and semi-volatile organic compounds) were found in the sheetrock and wipe samples from various surfaces. Because these surfaces will be covered (painted or sealed) or are not accessible to children, there is no exposure pathway thus no public health hazard.

We did not address the acid neutralization tank as according to documents received from Weston, the tank and its contents would be removed from the site. Information we later received confirmed the removal of the tank [5]. The tank's removal has eliminated a possible exposure pathway, and thus would present no public health hazard.

We also did not address the EMF data as published information is not adequate for addressing public health concerns. Leander ISD is taking steps to reduce EMF exposure by shifting the play area and ball fields away from the power lines.

Determining Contaminants of Concern

To determine the potential health risks associated with the contaminants found in the surface soil and indoor air, we compared each contaminant detected with its media-specific health-based assessment comparison (HAC) value for non-cancer and cancer endpoints. These values are guidelines that specify levels of chemicals in specific environmental media (soil, air, and water) that are considered safe for human contact with respect to identified adverse health effects.

Non-cancer screening values are based on the ATSDR's minimal risk levels (MRLs)¹ or the United States Environmental Protection Agency's (EPA's) reference doses (RfDs)². Both of

¹ An MRL is a contaminant specific exposure dose below those which might cause adverse health effects in the people most sensitive to such chemical-induced effects. MRLs generally are based on the most sensitive chemical-induced end point considered to be of relevance to humans.

these are based on the assumption that there is an identifiable exposure threshold (both for the individual and for populations) below which there are no observable adverse effects. Therefore, MRLs and RfDs are estimates of daily exposures to contaminants that are unlikely to cause adverse non-cancer health effects even if exposure occurs for a lifetime.

For contaminants that are considered to be known human carcinogens, probable human carcinogens, or possible human carcinogens, cancer risk evaluation guides (CREGs) are calculated using EPA's chemical-specific cancer slope factors (CSFs) and an estimated excess lifetime cancer risk of one-in-one million persons exposed for a lifetime.

Standard assumptions for body weight (70 kg adult and 16 kg child), soil ingestion (100 mg/day for adults and 200 mg/day for a child), and inhalation of air (10 m³/day for children 6 to 8 years old, 15 m³/day for children 12 to 14 years old, and 15.2 m³/day for adults) were used to calculate both non-cancer and cancer HAC values. Soil pica behavior (ingestion of more than 1 g of soil per day) may also occur in some children but is rather uncommon. The standard assumption for soil ingestion in pica children is 5,000 mg/day.

The exposure assumptions used to establish these screening levels are conservative with respect to protecting public health; as a result, actual exposures are likely to be lower than those used to calculate the screening values. Exceeding a screening value does not mean that a contaminant represents a public health threat; rather, it suggests that the contaminant warrants further consideration. Assessing the public health significance of contaminants that exceed their respective screening levels involves reviewing and integrating relevant toxicological information with plausible exposures. We may estimate the magnitude of the public health significance by comparing the estimated exposures to identified "no observed" and "lowest observed" adverse effects levels (NOAELs and LOAELs) in animals and to known effect levels in humans, when available. We assess the public health significance of contaminants that exceed screening values by reviewing and integrating relevant toxicological information with reasonable maximum exposure scenarios.

Polycyclic aromatic hydrocarbons (PAHs) are a group of more than 100 different chemicals (including benzo[a]pyrene or BaP) that are generally found in the environment as mixtures, not as single compounds. Because BaP is perhaps the most toxicologically significant PAH, it was used as a surrogate to assess the potential health risks associated with PAHs in soil. Individual PAH concentrations were converted to BaP toxic equivalents (TEQ) using established toxicity equivalency factors (TEFs, Table 1).

Surface Soil

Several contaminants were found in the soil at levels above the most stringent health-based screening values. These values are based on children who exhibit an unusual appetite for non-

² An RfD is an estimate (with a level of uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive groups) that is likely to be without appreciable risk of deleterious effects during a lifetime.

food substances such as soil. These children have been known to eat 25 to 250 times more soil than average children. Areas where children will be playing will be replaced with clean fill, thus it is not likely that children exhibiting pica behavior will be exposed to elevated levels of contaminants.

For children that do not exhibit pica behavior, PAHs were the only contaminants that were detected above their health-based comparison values. BaP was used as a surrogate to assess the relative toxicity of PAHs in surface soil. Using our standard exposure scenario (16 kg child ingesting 200 mg of soil per day) and the soil sample with the highest BaP TEQ (69.52 mg/kg), the estimated exposure dose of PAHs was 0.00087 mg/kg/day. Although no MRL or RfD has been derived for PAHs, there are LOAELs and NOAELs available [6]. An intermediate NOAEL of 1.3 mg/kg/day was observed for mice exposed to BaP. The LOAEL (2.6 mg/kg/day) is based upon the appearance of gastric tumors. There currently are no studies available that evaluate non-cancer chronic exposures. Systemic effects occurred at much higher exposure doses in acute and intermediate duration exposures [6]. The estimated exposure dose of PAHs in soil is several orders of magnitude below the NOAEL and LOAEL for BaP. Thus, we do not expect exposure to PAHs in the soil to result in adverse non-cancerous health effects.

BaP, along with several other PAHs, has been classified by the EPA as a "probable human carcinogen" [6]. This classification is based on animal data where repeated BaP administration in numerous strains of at least four species of rodents and several primates has been associated with increased incidence of total tumors and of tumors at the site of exposure [6]. Human data specifically linking BaP, or any of the other PAHs, to a carcinogenic effect are lacking. Although lung cancer has been found in humans who had received exposure to various mixtures of PAHs known to contain BaP – including cigarette smoke, roofing tar, and coke oven emissions – it is not possible to conclude from this information that BaP, or any other of the PAHs, is the responsible agent [6].

Soil samples collected from stormwater retention ponds and landscaped areas adjacent to the parking lots contained PAHs at concentrations that could cause a low to moderate increased risk for cancer. There also were some contaminants for which health-based screening values were not available. While we would estimate the risks associated with these contaminants to be low, replacing the soil from the contaminated areas with clean fill would remove any potential risk. Information we received from Weston indicates the PAH-containing soils have been removed and replaced with clean soil [7]. Therefore, the exposure pathway has been eliminated and thus the surface soil would present no public health hazard.

Indoor Air

The indoor air sampling measured what was in the air at that particular time. The contaminants measured in the indoor environment were compared with health-based screening values, but several had no formal values available. A review of the indoor air data indicate residual levels of chemicals associated with detergent formulation, fragrances, or common indoor pollutants from consumer-based products found in private homes, commercial buildings, and schools. Based on

the sampling data collected during construction of the school, we believe that exposure to the indoor air would pose no apparent public health hazard. However, the indoor air should be sampled after construction of the school is complete but before the school opens for occupancy. This would allow for the sub-slab vacuum system to be tested and to determine what compounds are present in the indoor air from off-gassing of paint, flooring, and furniture.

Response to Community Health Concerns

Is data that were collected during construction activities of adequate integrity/quality?

The DSHS Health Assessment and Toxicology Program reviews and evaluates environmental data collected by other agencies and contractors. We relied on the information provided in the referenced documents and assumed that adequate quality assurance/quality control procedures were followed with regard to data collection, chain-of-custody, laboratory procedures, and data reporting.

Could contamination in the sub-slab migrate into the indoor air?

The vapor intrusion pathway was eliminated as a potential pathway based upon the recommendation by Weston that the sub-floor area be vented by pulling a slight vacuum under the slab.

What are the potential sources of contamination that were detected on the school property?

The PAHs that were detected in the surface soil are likely present due to runoff from parking lots. Chemicals detected in the indoor air are associated with detergent formulation, fragrances, or common indoor pollutants from consumer-based products found in private homes, commercial buildings, and schools.

Are the risks to children being evaluated?

Because children could be at greater risk than adults from certain kinds of exposure to hazardous substances, and because children are the population of concern for a school, we considered the public health implications for children being exposed to contamination at this site.

What are the health risks of the chemicals (toxic and/or carcinogenic) that were detected on the property?

The health risks of chemicals detected above their health-based screening value are addressed in the public health implications section of this document. Exposure to chemicals that were detected at levels below the most conservative health-based screening value is not expected to result in adverse health effects. Remediation activities such as the removal of soil with elevated PAHs and the installation of a subfloor venting system will help ensure children are not exposed to levels of contamination that might result in adverse health effects.

Are mixtures of contaminants being evaluated?

PAHs in the soil were considered as a mixture of contaminants and the public health implications of exposure to that mixture were considered.

Child Health Considerations

In communities faced with air, water, or food contamination, children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. A child's lower body weight and higher intake rate result in a greater dose of hazardous substance per unit of body weight. Sufficient exposure levels during critical growth stages can result in permanent damage to the developing body systems of children. Children are dependent on adults for access to housing, for access to medical care, and for risk identification. Consequently, adults need as much information as possible to make informed decisions regarding their children's health.

We evaluated whether children attending Leander ISD proposed elementary school #19 would be likely to be exposed to site contaminants at levels of health concern. We evaluated the potential risk to children by using conservative exposure scenarios – scenarios where the exposures are likely to be much higher than those children might actually experience. These evaluations were included in each discussion section.

Conclusion

Based upon our analysis of the February through April 2007 sampling data, and with the removal and replacement of the contaminated soil and the installation of the subfloor venting system, we do not expect to see health effects in adults or children associated with exposure to chemicals in the proposed elementary school and from areas on the school property. Therefore, exposure at the proposed school site from past activities represents no apparent public health hazard. However, additional sampling is needed to evaluate any off-gassing from construction.

Recommendation

The indoor air should be sampled after construction of the school is complete but before the school opens for occupancy.

Public Health Action Plan

Actions Completed

1. On January 25, 2007, DSHS personnel from the Radiation Inspection Unit and Health Assessment and Toxicology Program visited the site and toured all the buildings on the property.
2. On April 11, 2007, DSHS personnel met with TCEQ, City of Austin, and Weston to get an update on sampling activities on the property and analysis of samples collected to date.
3. On April 16, 2007, DSHS, TCEQ, and Weston met with concerned parents and a representative from Leander ISD to update them on site activities and to hear concerns from the parents.
4. On July 13, 2007, a preliminary data review was completed by the DSHS Health Assessment and Toxicology Program and a letter summarizing our preliminary conclusions was submitted to TCEQ, Weston, Leander ISD, EPA, and concerned parents.

Action Planned

This health consultation will be made available to TCEQ, Leander ISD school officials, EPA, and concerned parents.

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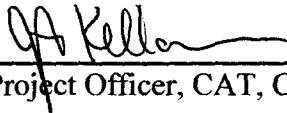
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Leander ISD Proposed Elementary School #19 (Grandview Hills Elementary)

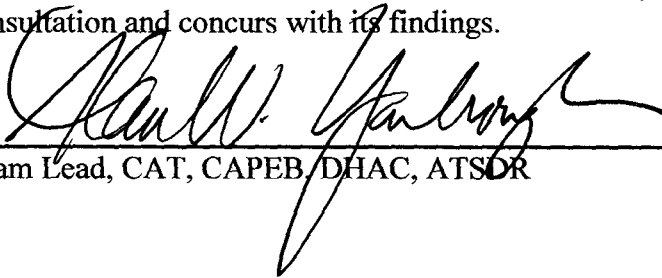
Certification

This public health consultation for Leander ISD Proposed Elementary School #19 (Grandview Hills Elementary), Austin, Travis County, Texas was prepared by the Texas Department of State Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methods and procedures existing when the time the public health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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



Team Lead, CAT, CAPEB, DHAC, ATSDR

Appendix A: Acronyms and Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
BaP	benzo[a]pyrene
CREG	cancer risk evaluation guides
CSF	cancer slope factor
DSHS	Texas Department of State Health Services
EMF	electric and magnetic field
EPA	Environmental Protection Agency
g	grams
HAC	health-based assessment comparison
ISD	Independent School District
kg	kilograms
LOAEL	lowest observed adverse effects level
m ³ /day	cubic meters per day
mg	milligrams
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
MRL	minimal risk level
ND	not detected
NOAEL	no observed adverse effects level
PAH	polycyclic aromatic hydrocarbons
RfD	reference dose
TCEQ	Texas Commission on Environmental Quality
TEF	toxicity equivalency factors
TEQ	toxic equivalents
Weston	Weston Solutions, Inc.

Appendix B: Figure

Figure. Map of Leander ISD Proposed Elementary School #19 (Grandview Hills Elementary) [8].



Appendix C: Tables

Table 1. Toxic Equivalency Factors (TEF) for PAHs [9].

PAH	TEF
Acenaphthene	0.001
Acenaphthylene	0.001
Anthracene	0.01
Benzo(a)anthracene	0.1
Benzo(a)pyrene (BaP)	1
Benzo(b)fluoranthene	0.1
Benzo(g,h,i)perylene	0.01
Benzo(k)fluoranthene	0.1
Chrysene	0.01
Dibenzo(a,h)anthracene	5
Fluoranthene	0.001
Fluorene	0.001
Indeno(1,2,3-cd)pyrene	0.1
2-Methylnaphthalene	0.001
Naphthalene	0.001
Phenanthrene	0.001
Pyrene	0.001

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Table 2. Contaminant that exceeded the HAC value in soil samples. All other compounds were below the detection limit or, if detected, below the HAC value.

Contaminant	Concentration Range (mg/kg)	# Detected/ # Samples Collected	# Samples that exceed HAC value	HAC value (mg/kg)
BaP TEQ	ND-69.52	33/125	22	0.1 (CREG)

ND – Not Detected