Letter Health Consultation

Evaluation of Air Quality

LEO MILLER ROAD SITE
TAFT, SAN PATRICIO/ARANSAS COUNTIES, TEXAS

EPA FACILITY ID: TXN000606818

Prepared by the
Texas Department of State Health Services

MAY 15, 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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LETTER HEALTH CONSULTATION

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TEXAS DEPARTMENT OF STATE HEALTH SERVICES

1100 West 49th Street • Austin, Texas 78756
P.O. Box 149347 • Austin, Texas 78714-9347
1-888-963-7111 • www.dshs.state.tx.us
TDD: 1-800-735-2989

DAVID L. LAKEY, M.D.
COMMISSIONER

April 15, 2009

Bret Kendrick
On Scene Coordinator
U.S. EPA, Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

RE: Evaluation of Air Quality
Leo Miller Road Site
CERCLIS No. TXN000606818
Taft, San Patricio/Aransas Counties, Texas

Dear Mr. Kendrick:

In August 2008, you asked the Texas Department of State Health Services (DSHS) under cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate the effects of ambient air emissions from the Sherwin Alumina bauxite processing facility on the health of the Leo Miller Road community. DSHS has reviewed available ambient air information for the area. The results of our review are presented in this letter.

Background and Statement of Issues

The Leo Miller Road Community consists of approximately 20 residential homes, observed by the Environmental Protection Agency (EPA) site inspection team, adjacent to the Sherwin Alumina Red Mud Lagoons (RMLs), in Taft, Texas [1]. Based on the 2000 census, Taft consists of predominantly White (71%) residents, 67% of whom are Hispanic or Latino. Approximately 26% of the residents are below the poverty level [2].

Based on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) petition, residents' health concerns include the following: respiratory illnesses (chronic obstructive pulmonary disease, bronchitis, lung cancer, bronchial spasms, asthma, siderosis, and pneumonicosis), burning in eyes, skin, nose, and throat, exacerbation of allergies, sinusitis, digestive problems, headaches, nose bleeds, lethargy and fatigue, persistent cough, hypertension, Alzheimer's, and beryllium disease [3, 4]. Additionally, you mentioned that residents have reported burning/irritation of their eyes and nose during wind storms and during outdoor activities such as mowing their grass.

The Sherwin Alumina bauxite processing facility has been in operation since 1953 under several different owners [1]. The facility consists of 10,643.041 acres of pastureland, of which, 3,316 acres are devoted to RMLs [5].

A review of available Texas Commission on Environmental Quality (TCEQ), formerly known as the Texas Natural Resource Conservation Commission (TNRCC), EPA, and Sherwin Alumina documents was conducted to determine if adverse health effects are possible from exposure to red mud dust and/or airborne contaminants in the area.

Discussion

Previous Investigations

In January 2008, Dynamac Corporation, under contract by EPA, completed a Preliminary Assessment (PA) of the site in response to a petition from South Texans Opposing Pollution (S.T.O.P.) [1]. The petition was based on the red mud dust that was reportedly affecting personal property and health [3]. The PA concluded that the air and groundwater migration pathways are the pathways of concern for the site. Based on the site inspection memorandum, residents have private wells, but they do not drink the water because it has a "brackish" taste [6]. This is consistent with the groundwater well testing results provided to DSHS, in which the sodium levels were above the US EPA Secondary Maximum Contaminant Level (MCL) for sodium. Because residents don't use the groundwater as a source for drinking water, the groundwater pathway is not complete; therefore, the groundwater does not pose a public health hazard.

In a May 2008 document, Naismith Engineering presented additional information to the EPA on Sherwin Alumina's behalf [5]. Toxicity Characteristic Leaching Procedure (TCLP) results and pH data shown in the report support that the red mud is not a characteristic Resource Conservation and Recovery Act (RCRA) waste. However, several samples of the red mud were pH 12.3 [5]. This is higher (more alkaline) than neutral (pH of 7).

On May 6-7, 2008, EPA conducted site investigation activities, including visual inspection of homes and property in the affected community. At the same time, wipe samples were collected to determine if a release from the RMLs was occurring. To determine if a release had occurred, the dust samples collected in the nearby homes had to exceed background concentrations by a factor of three. Several metals (aluminum, antimony, barium, cadmium, chromium, iron, lead, and magnesium) met the definition of a release. These metals are also constituents of the red mud. During the visual inspection of property, a red mud-like residue was observed on the exterior of homes, on windowsills, inside a residential swimming pool, and on kitchen counter tops [7].

The TCEQ conducted a mobile monitoring event from May 20 to May 23, 2008 to collect air quality data and determine how the dust from the RML might be affecting air quality [8].

Environmental Sampling Data

DSHS reviewed the May 2008 mobile monitoring data [8]. Three locations, two downwind and one upwind, were chosen for sampling sites. The downwind sites were located on Leo Miller Road. See Figure 1. Samples were analyzed for Total Suspended Particulates (TSP), Particulate Matter less than or equal to 10 microns (PM_{10}), and metals. The data were compared to the

ATSDR Health Assessment Comparison (HAC) values and National Ambient Air Quality Standards (NAAQS), where appropriate. Further explanation of the HAC values is provided in the Appendices of this document.

With the exception of manganese, none of the contaminants for which HAC values are available were above their respective non-cancer comparison values. Several analytical Method Detection Limits (MDLs) were above their respective Cancer Risk Evaluation Guide (CREG). For contaminants where the MDL exceeded the CREG or where the HAC value was exceeded, further evaluation was conducted. This includes the following metals: arsenic, beryllium, cadmium, chromium (assuming all hexavalent), and manganese.

TSP Metals

Particulate matter (TSP) was analyzed for sorbed metals. A particle greater than 10 microns (larger than PM_{10}) is not considered respirable. Respirable particles can be inhaled and become trapped in the lungs where contaminants from the particles can partition into respiratory mucus and enter the blood stream. Particles that are not respirable are typically “coughed up” and subsequently swallowed.

Table 1 shows the metal concentrations that are above the cancer or non-cancer inhalation screening values in TSP (which includes particles of all sizes), the HAC value exceeded, the extrapolated dose if coughed up and swallowed, and the health guidelines for ingestion.

Table 1: TSP Metal Concentrations Compared to Health Guidelines for Ingestion

	Highest Value or 1/2 Highest MDL (µg/m^3)	HAC Value (µg/m^3)/type of HAC Value	Daily Exposure Dose if Ingested (mg/kg/day)	ATSDR's Chronic Oral MRL (mg/kg/day)	EPA's Chronic Oral RfD (mg/kg/day)
Arsenic	0.17	0.0002/CREG	0.000049	0.0003	0.0003
Beryllium	0.0055	0.0004/CREG	0.000002	0.002	0.002
Cadmium	0.0115	0.0006/CREG	0.000003	0.0002	0.0005
Chromium	0.113	0.00008/CREG	0.000032	NA	0.003
Manganese	0.163	0.04/EMEG/MRL	0.000047	NA	0.05

NOTES: Chromium health based screening values are based on hexavalent chromium. MRL=ATSDR’s Minimum Risk Level, RfD=EPA’s Reference Dose, CREG=Cancer Risk Evaluation Guide, EMEG=Environmental Media Evaluation Guide, NA=no value is available

Although the concentrations or MDLs for arsenic, beryllium, cadmium, chromium, and manganese were above the CREG or the EMEG/MRL for inhalation, these metals were not on respirable particles. When the data are converted to an ingested exposure dose, assuming 20 cubic meters (m^3) of air inhaled each day by a 70 kilogram (kg) adult, the resulting exposure doses do not exceed the health guidelines for ingestion.

PM_{10} Metals

Limited PM_{10} metals data were available for review. The PM_{10} subset of particles includes respirable particles. All metals data were below the non-cancer HAC values. No measurable concentrations exceeded the CREG; however, as seen with the TSP data, the analytical MDL was higher than the CREG for arsenic, beryllium, cadmium, and hexavalent chromium.

The estimated lifetime cancer risk was calculated based on one-half of the MDL for these metals. Cancer risk is equal to the concentration of the contaminant in air multiplied by the EPA’s

Inhalation Unit Risk (IUR) and an exposure factor. The exposure factor accounts for the length of time that someone might be exposed to a contaminant. For the purpose of this evaluation, a default residency time of 30 years was considered in a 70-year lifetime. Table 2 shows the estimated increased risk of cancer over a lifetime based on this exposure period and one-half of the highest MDL for each metal.

Table 2: PM_{10} Metal Concentrations and Estimated Cancer Risk

	Highest PM_{10} Value (MDL) µg/m^3	1/2 MDL µg/m^3	Inhalation Unit Risk µg/m^3	Estimated Lifetime Cancer Risk
Arsenic	<0.097	0.048500	0.0043	8.94E-05
Beryllium	<0.003	0.001500	0.0024	1.54E-06
Cadmium	<0.006	0.003000	0.0018	2.31E-06
Chromium	<0.065	0.032500	0.012	1.67E-04

NOTES: MDL=method detection limit

None of the cancer risk estimates were considered unacceptable (risk greater than 1×10^{-4}). The cancer risk for chromium is based on hexavalent chromium. This is a very conservative estimate. It is unlikely that hexavalent chromium would be present in the red mud dust, given the pH is alkaline. Based on the speciation of chromium and high pH, the chromium is likely all trivalent. There is no cancer risk associated with trivalent chromium. Therefore, the estimated lifetime cancer risk due to chromium exposure is exponentially lower than the value calculated for hexavalent chromium. There is no apparent increased lifetime cancer risk expected due to exposure to the PM_{10} metal concentrations.

NAAQS Parameters

Lead and bulk PM_{10} levels are regulated by NAAQS rules, which are set to protect public health. The lead and PM_{10} data were reviewed to determine regulatory compliance. Lead concentrations were below the MDL in TSP and in PM_{10} measurements. The MDLs for these particulate fractions were below the NAAQS levels.

PM_{10} data from five samplers ranged from 26 µg/m^3 to 45 µg/m^3 and are below the NAAQS levels (150 µg/m^3), which are based on short-term (24-hour) exposures. The sample duration period ranged from 4 hours to 9 hours. $PM_{2.5}$ data were not collected. $PM_{2.5}$ standards are 15.0 µg/m^3 in an annual average and 35 µg/m^3 in a 24-hour exposure period. Based on this data, it seems unlikely that the particulate matter exceeds the regulatory limits. More data would be helpful to determine regulatory compliance.

pH

The documented pH of red mud samples ranges from 10.5 to 12.3 [9, 5]. Although the dust itself is dry, the alkaline properties are maintained, and it will become corrosive when in contact with water or moist surfaces. Mucus membranes are a moist surface and may become irritated when in contact with the high pH dust. Inhalation of corrosive dust can cause irritation and burns of the airway. This can cause coughing and difficulty breathing [10].

Symptom survey studies and animal studies involving dust from the World Trade Center attacks of 2001 indicate that pulmonary inflammation and hyperresponsiveness of the airway occurred during exposure to the resulting dust, which had a high pH (pH 9.3 to 11.5) [11, 12]. Some of the symptoms of residents and rescue workers were consistent with Reactive Airways Dysfunction Syndrome and irritant-induced asthma, which results after occupational exposure to high levels of irritant vapor [12, 13]. The World Trade Center Dust carried a variety of contaminants, in addition to have an elevated pH. The residents from this area who were exposed to the dust continued to experience adverse health effects one year later [12]. It is not known if the health effects caused by high pH alone will persist once the nuisance dust events from Sherwin Alumina end.

When high pH dust contacts skin, it will not cause irritation until they become moist. Once the dusts become moist, it may burn skin. The volume of high pH dust that will cause irritation is unknown and will vary from person to person. Occupational exposure studies have indicated eye and skin irritation in miners after exposure to high pH (10.5) dust from mining trona [13]. Although the miners would be exposed to higher amounts of dust at a slightly lower pH than the Leo Miller Road community, the symptoms are the same.

The severity of irritation and inflammation for respiratory, ocular, and dermal contact will depend on the amount of dust exposure. Inhalation of high pH dust particles may aggravate existing respiratory conditions in sensitive individuals. Residents should take care when working in the yard or participating in other strenuous activities in dusty conditions. A dust mask may prevent inhalation of dust particles, and long-sleeved shirts and pants will be helpful in preventing dermal exposure.

Red mud dust was observed on the exterior of residential buildings and inside homes. It is apparent that the residents are being exposed to the high pH dust. The residents have reportedly experienced respiratory symptoms that may be attributed to exposure to high pH dust (bronchial spasms, asthma, cough, burning in eyes, skin, nose, and throat). These are adverse health effects from exposure that has been going on for more than one year. Based on this information, the high pH dust meets the ATSDR criteria for a public health hazard. Additional information about the hazard categories is available in Appendix B to this letter.

Conclusions

Although several metals either exceeded health based screening values or were not detected when the method detection limits were *above* the health based screening values, it is not likely that exposure to these substances will result in adverse health effects to the general population. Based on this information, exposure to the metal contaminants in the red mud dust appear to pose no apparent public health hazard.

However, during nuisance dust events, people may experience health effects associated with irritant dust, including upper respiratory irritation and hyperresponsive airways. Sensitive individuals may experience more pronounced effects. Because the pH of the nuisance dust is directly associated with the some of the reported health concerns as cited in literature for lower pH dust exposure, the pH of the dust may pose a public health hazard. It is not known how long these health effects will last once the exposure to high pH dust ends.

Recommendations

The pH of the dust appears to be causing adverse health effects in the adjacent community during nuisance dust events. When dust levels are elevated, individuals with asthma may want to refrain from spending prolonged periods of time outdoors to reduce the exposure to irritants. Additionally, residents may choose to wear dust masks and protective clothing while performing strenuous outdoor activities during nuisance dust periods.

Additionally, the facility should keep the red mud lagoons irrigated to prevent nuisance dust events. In the event the submersion of the lagoons is not practicable, other environmental management techniques (i.e. capping, topsoil, and seeding) should be considered.

Public Health Action Plan

DSHS staff will educate community members about ways to prevent exposure to the dust during nuisance dust events and conduct outreach to physicians to let them know about the possible health effects.

DSHS will also continue to work with the EPA to insure protection of public health.

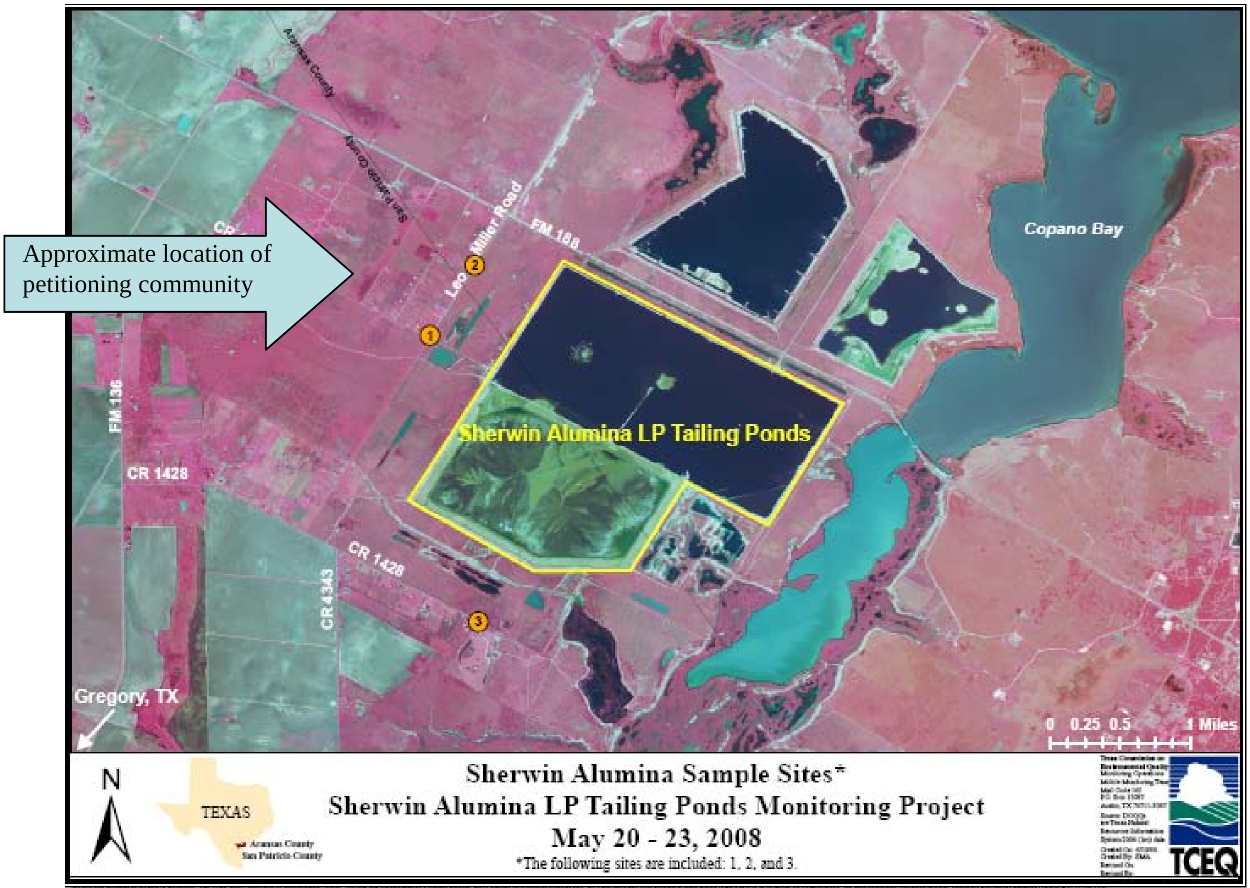
Please contact me at 1.800.963.7111 ext. 3961 if you have any questions about these findings.

Sincerely,

Michelle N. Bost, MS, CHMM
Environmental Specialist

Figure

Figure 1: Sherwin Alumina Sample Sites, adapted from TCEQ



Appendices

Appendix A – Health Assessment Comparison (HAC) Values

To simplify the health assessment process, ATSDR, EPA, Oak Ridge National Laboratories (ORNL), and some of the individual states have compiled lists of chemical substances that have been evaluated in a consistent, scientific manner in order to derive toxicant doses (health guidelines) and/or toxicant concentrations (environmental guidelines), exposures to which, are confidently felt to be without significant risk of adverse health effects, even in sensitive sub-populations.

Health Guidelines

Health guidelines are derived from the toxicologic or epidemiologic literature with many uncertainty or safety factors applied to insure that they are amply protective of human health. They are generally derived for specific routes of exposure (e.g., inhalation, oral ingestion, or dermal absorption) and are expressed in terms of dose, with units of milligrams per kilogram per day (mg/kg/day).

Media-specific HAC values for non-cancer health effects under oral exposure routes are generally based on ATSDR's chronic oral minimal risk levels (MRLs) or EPA's oral reference doses (RfDs). Chronic oral MRLs and RfDs are based on the assumption that there is an identifiable exposure dose (with units of mg/kg/day) for individuals, including sensitive subpopulations (such as pregnant women, infants, children, the elderly, or individuals who are immunosuppressed), that is likely to be without appreciable risk for non-cancer health effects over a specified duration of exposure.

Environmental Guidelines

Environmental guidelines for specific media (e.g., air, soil/sediment, food, drinking water, etc.) are often derived from health guidelines after making certain assumptions about 1) the average quantities of the specific media that a person may assimilate into the body per day (i.e., inhale, eat, absorb through the skin, or drink) and 2) the person's average body weight during the exposure period. Environmental guidelines are expressed as chemical concentrations in a specific medium with units such as micrograms per cubic meter ($\mu g/m^3$), milligrams per kilogram (mg/kg), micrograms per liter (µg/l), parts per million (ppm), or parts per billion (ppb). If these values are based on ATSDR's oral MRLs, they are known as environmental media evaluation guides (EMEGs); if they are based on EPA's RfDs, they are called reference dose media evaluation guides (RMEGs).

For airborne contaminants, ATSDR health assessors frequently use ATSDR's inhalation minimal risk levels (inhalation MRLs) or EPA's inhalation reference concentrations (RfCs). Inhalation MRLs and RfCs are all based on the assumption that there is an identifiable exposure concentration in air [with units of micrograms per cubic meter ($\mu g/m^3$) or parts per billion by volume (ppbv)] for individuals, including sensitive subpopulations (such as pregnant women, infants, children, the elderly, or individuals who are immunosuppressed), that is likely to be without appreciable risk for non-cancer health effects over a specified duration of exposure. Since it is already in the form of a concentration in a particular medium, the inhalation MRL is also called the EMEG for air exposures.

These environmental guidelines are frequently referred to as "screening values" or "comparison values" since the contaminant concentrations measured at a Superfund or other hazardous waste site are frequently "compared" to their respective environmental guidelines in order to screen for those substances that require a more in-depth evaluation. Since comparison values are health-based (i.e., derived so as to be protective of public health) and they are frequently employed in conducting public health assessments, they are frequently referred to as health assessment comparison values or HAC values.

Other HAC value names have been coined by the various EPA Regions or other state or federal agencies including EPA Regional Screening Levels (RSLs), EPA's health effects assessment summary tables (HEAST) "dose-response values" (DRVs), California's "reference exposure levels" (RELs), and Texas Commission on Environmental Quality's "effects screening levels" (ESLs). These values are occasionally used when there are no published MRLs, RfDs, or RfCs for a given contaminant.

HAC values for non-cancer effects (specifically ATSDR's oral and/or inhalation MRLs) may be available for up to three different exposure durations: acute (14 days or less), intermediate (15 to 365 days), or chronic (366 days or more). As yet, EPA calculates RfD or RfC HAC values only for chronic exposure durations.

HACs for Cancer Effects

When a substance has been identified as a carcinogen, the lowest available HAC value usually proves to be the cancer risk evaluation guide (CREG). For oral exposures, the CREG (with units of mg/kg or ppm) is based on EPA's chemical-specific cancer slope factor (CSF) (also referred to as oral slope factor or OSF) and represents the concentration that would result in a daily exposure dose (in mg/kg/day) that would produce a theoretical lifetime cancer risk of 1×10^{-6} (one additional cancer case in one million people exposed over a 70 year lifetime).

For inhalation exposures, the CREG (in µg/m^3) is based on the EPA's inhalation unit risk (IUR) value and is calculated as CREG = $10^{-6} \div$ IUR. The inhalation CREG represents the ambient air concentration that, if inhaled continuously over a lifetime, would produce a theoretical excess lifetime cancer risk of 1×10^{-6} (one additional cancer case in one million people exposed over a 70 year lifetime).

Imputed or Derived HAC Values

The science of environmental health and toxicology is still developing, and sometimes, scientific information on the health effects of a particular substance of concern is not available. In these cases, ATSDR scientists will occasionally look to a structurally similar compound, for which health effects data are available, and assume that similar health effects can reasonably be anticipated on the basis of their similar structures and properties. Occasionally, some of the contaminants of concern may have been evaluated for one exposure route (e.g., the oral route) but not for another route of concern (e.g., the inhalation route) at a particular NPL site or other location with potential air emissions. In these cases ATSDR scientists may do what is called a route-to-route extrapolation and calculate the inhalation RfD, which represents the air concentration (in µg/m^3) that would deliver the same dose (in mg/kg/day) to an individual as the published oral RfD for the substance. This calculation involves making certain assumptions about the individual's inhalation daily volume (in m^3/day), which represents the total volume of air inhaled in an average day, the individual's body weight (in kg), a similarity in the oral and inhalation absorption fraction, and – once the contaminant has been absorbed into the bloodstream – that it behaves similarly whether it came through the GI tract or the lungs. Because of all the assumptions, route-to-route extrapolations are employed only when there are no available HAC values for one of the likely routes of exposure at the site.

Use of HAC Values

When assessing the potential public health significance of the environmental sampling data collected at a contaminated site, the first step is to identify the various plausible site-specific pathways and routes of exposure based on the media that is contaminated (e.g., dust, soil, sediment, sludge, ambient air, groundwater, drinking water, food product, etc.). Once this is done, maximum values for measured contaminant concentrations are generally compared to the most conservative (i.e., lowest) published HAC value for each contaminant. If the maximum contaminant concentration is below the screening HAC value, then the contaminant is eliminated from further consideration, but if the maximum concentration exceeds the screening HAC, the contaminant is identified as requiring additional evaluation. However, since the screening HAC value is almost always based on a chronic exposure duration (or even a lifetime exposure duration, in the case of comparisons with CREG values) and the maximum contaminant concentration represents a single point in time (which would translate to an acute duration exposure), one cannot conclude that a single exceedance (or even several exceedances) of a HAC value constitutes evidence of a public health hazard. That conclusion can be reached only after it has been determined that peak concentrations are exceeding acute-exposure-duration HAC values, intermediate-term average concentrations are exceeding intermediate-exposure-duration HAC values, or long-term average concentrations are exceeding chronic-exposure-duration HAC values.

Appendix B – ATSDR Public Health Conclusion Categories

CATEGORY A. URGENT PUBLIC HEALTH HAZARD*	CATEGORY B. PUBLIC HEALTH HAZARD*	CATEGORY C. INDETERMINATE PUBLIC HEALTH HAZARD	CATEGORY D. NO APPARENT PUBLIC HEALTH HAZARD*	CATEGORY E. NO PUBLIC HEALTH HAZARD
This category is used for sites where short-term exposures (<1 year) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.	This category is used for sites that pose a public health hazard due to the existence of long-term exposures (>1 year) to hazardous substances or conditions that could result in adverse health effects.	This category is used for sites in which critical data are *insufficient* with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.	This category is used for sites where human exposure to contaminated media might be occurring, might have occurred in the past, and/or might occur in the future, but the exposure is not expected to cause any adverse health effects.	This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.
Criteria: Evaluation of available information† indicates that site-specific conditions or likely exposures have had, are having, or are likely to have in the future, an adverse effect on human health and requires immediate action or intervention. Such site-specific conditions or exposures might include the presence of serious physical or safety hazards, such as open mine shafts, poorly stored or maintained flammable/explosive substances, or medical devices which, upon rupture, could release radioactive materials.	**Criteria**: Evaluation of available relevant information† suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants (including radionuclides) have had, are having, or are likely to have in the future, an adverse effect on human health that requires one or more public health interventions. Such site-specific exposures might include the presence of serious physical hazards, such as open mine shafts, poorly stored or maintained flammable/explosive substances, or medical devices, which, upon rupture, could release radioactive materials.	**Criteria**: The health assessor must determine, using professional judgment, the criticality of such data and the likelihood that the data can be obtained and will be obtained in a timely manner. Where some data are available, even limited data, the health assessor is encouraged to the extent possible to select other hazard categories and to support their decision with clear narrative that explains the limits of the data and the rationale for the decision.	**Criteria**: Evaluation of available information† indicates that, under site-specific conditions of exposure, exposures to site-specific contaminants in the past, present, or future are not likely to result in any adverse effects on human health.	**Criteria**: Sufficient evidence indicates that no human exposures to contaminated media have occurred, none are now occurring, and none are likely to occur in the future.

* Each of these designations represents a professional judgment made on the basis of critical data that ATSDR regards as sufficient to support a decision.
It does not imply, however, that the available data are necessarily complete. In some cases, additional data may be required to confirm or further support the decision.
† Examples include environmental and demographic data; health outcome data; community health concerns information; and toxicologic, medical, and epidemiologic data.

References

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CERTIFICATION

This Letter Health Consultation 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 methodology and procedure existing at the time the health consultation was initiated.

Jeff Kellam
Technical Project Officer
Division of Health Assessment and Consultation (DHAC)
ATSDR

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

Gregory V. Ulirsch for AY

Alan Yarbrough
Cooperative Agreement Team Leader, DHAC, ATSDR