

Letter Health Consultation

FORSYTH COUNTY MUNICIPAL SOLID WASTE LANDFILL

FORSYTH COUNTY, GEORGIA

DECEMBER 12, 2007

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

FORSYTH COUNTY MUNICIPAL SOLID WASTE LANDFILL

FORSYTH COUNTY, GEORGIA

Prepared By:

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



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Date:

Christy Kehn-Lewis
Geologist, Land Protection Branch
Environmental Protection Division
Georgia Department of Natural Resources
4220 International Pkwy
Tradeport Offices Suite 104
Atlanta, GA 30354

Dear Ms. Kehn-Lewis

This letter is in response to your request to evaluate potential exposure to cis-1, 2-dichloroethene (cis-DCE) detected in a domestic well southwest of the Hightower Road Municipal Landfill in Forsyth County, Georgia. Residents living on a farm southwest of the landfill have several wells and natural springs on their property that have been sporadically contaminated by site-related contaminants in the past. These residents specifically expressed concern about exposure to cis-1, 2-dichloroethene. As discussed, the Georgia Division of Public Health (GDPH) agreed to address the following questions:

- Based on available data, is there a health risk to the family living on the farm from exposure to cis-1, 2-dichloroethene, specifically their daughter and infant grandchild, and are there health risks to their farm animals?
- Based on available data and past exposure, are the residents at risk for lung damage, kidney damage, cancer, learning disabilities, and other health effects from exposure to cis-1, 2-dichloroethene?

Included below is a list of documents GDPH reviewed in order to address this request:

1. Georgia Environmental Protection Division, *Domestic Well Sampling Data*, September 13, 2007
2. Georgia Environmental Protection Division, *Telephone Communication*, August 13, 2007
3. Forsyth County Resident, *Letter to the Governor: Concerns Regarding Cis-1,2-Dichloroethylene Detected in Private Well*, July 2007
4. Atlantic Coast Consulting, Inc., *Interim Assessment of Corrective Measures*, June 13, 2007

5. Georgia Environmental Protection Division, *Letter to Resident: Domestic Well Sample Analysis*, April, 2007
6. Atlantic Coast Consulting, Inc., *Letter to GEPD Re: Domestic Well Sample Analysis*, March , 2007
7. Atlantic Coast Consulting, Inc., *Hightower Road MSWL Assessment of Corrective Measures*, October 8, 2004

Discussion and Toxicological Summary:

In December 2006, cis-DCE was detected in the residents' potable domestic well below regulatory levels. Forsyth County requested that the resident install a pre-home drinking water filtration system, which was installed in early March 2007. Water samples were taken pre- and post- filter, after the filtration system was installed and the filtration system was deemed inadequate. The filtration system was subsequently replaced in late March 2007. Sampling results in April 2007, along with more recent sampling results show that the replacement filtration system is adequately removing contaminants.

Exposure to 10 parts per billion (ppb) of cis-DCE may have occurred through drinking, breathing, or skin contact of household residents over a four month period from December 2006 through March 2007. However, the exposure level was well below health-based screening comparison values (CVs) of 3000 ppb for a child and 10,000 ppb for an adult, which are considered to be safe and protective of human health if ingested, inhaled, or absorbed through the skin. Therefore, further toxicological evaluation was not conducted.

It should be noted that methylene chloride was also found above a CV in the residents drinking water well in April 1999, May 2001, and November 2005 but has not been detected in subsequent analyses. The highest concentration of methylene chloride found was 6.7 ppb; far below levels known to cause adverse health effects. Moreover, exposure to methylene chloride occurred for very brief periods as described by the sampling data. Therefore, GDPH concludes that adverse health effects are not expected from this exposure.

Conclusions:

- Based on available data, the residents are not being exposed to cis-DCE; their filtration system is adequate and protective of human health. Additionally, although residents were exposed to cis-DCE in the past, the levels they were exposed to are not at levels of health concern. Moreover, on site groundwater monitoring shows a general trend in decreasing concentrations of VOCs.
- Regarding concerns about the health of their farm animals, the residents were referred to their farm animal veterinarian. For concerns about general farm and animal condition, the residents may contact the University of Georgia Agricultural Sciences Cooperative Extension Service. For concerns about farm animal exposure to chemicals, they may also contact the Georgia State Veterinarian's Office, and the Veterinary Toxicologists at the University of Georgia, College of Veterinary Medicine.

- Based on available data and past exposure, the residents are not at increased risk for lung damage, kidney damage, cancer, learning disabilities, or other health effects from their brief exposure to cis-1, 2-dichloroethene in their water supply.
- Although residents were exposed in the past to methylene chloride at levels above a CV, adverse health effects are not expected to occur because the exposure is far below levels known to cause adverse health effects. They are currently not being exposed to methylene chloride.

Recommendations:

Based on available information, GDPH recommends that:

- The resident continues to use a filtration system on the domestic well in use at the time of inquiry.
- The resident maintains this filtration system per manufacturer specifications.
- Forsyth County continue to conduct sampling and analysis of the residents' domestic well water to ensure that the installed filtration system is working.

If additional data becomes available in the future, GDPH will be glad to consider a separate request for an evaluation. If there are any questions regarding this health consultation, please contact Julia McPeck (404) 657-4002 or Frank Sanchez (404) 463-3769.

Sincerely,

Julia McPeck
Chemical Hazards Program Consultant
State Environmental Health Section
Division of Public Health
Georgia Department of Human Resources

REFERENCES

1. Forsyth County Resident, *Letter to the Governor Re: Concerns Regarding Cis-1,2-Dichloroethylene Detected in Private Well*, July 2007
2. Atlantic Coast Consulting, Inc., *Letter to GEPD Re: Domestic Well Sample Analysis*, March , 2007
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6. Georgia Environmental Protection Division, *Domestic Well Sampling Data*, September 13, 2007
7. Georgia Environmental Protection Division, *Telephone Communication*, August 13, 2007
8. Agency for Toxic Substances and Disease Registry, *Toxicological Profile for Methylene Chloride*, September 2006
9. Agency for Toxic Substances and Disease Registry, *Toxicological Profile for cis-1,2-dichloroethene*, September 2006

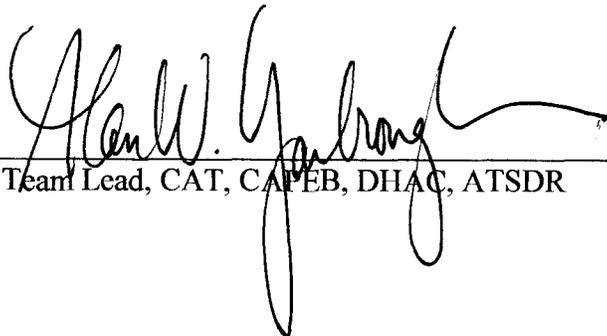
CERTIFICATION

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 (ATSDR). 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

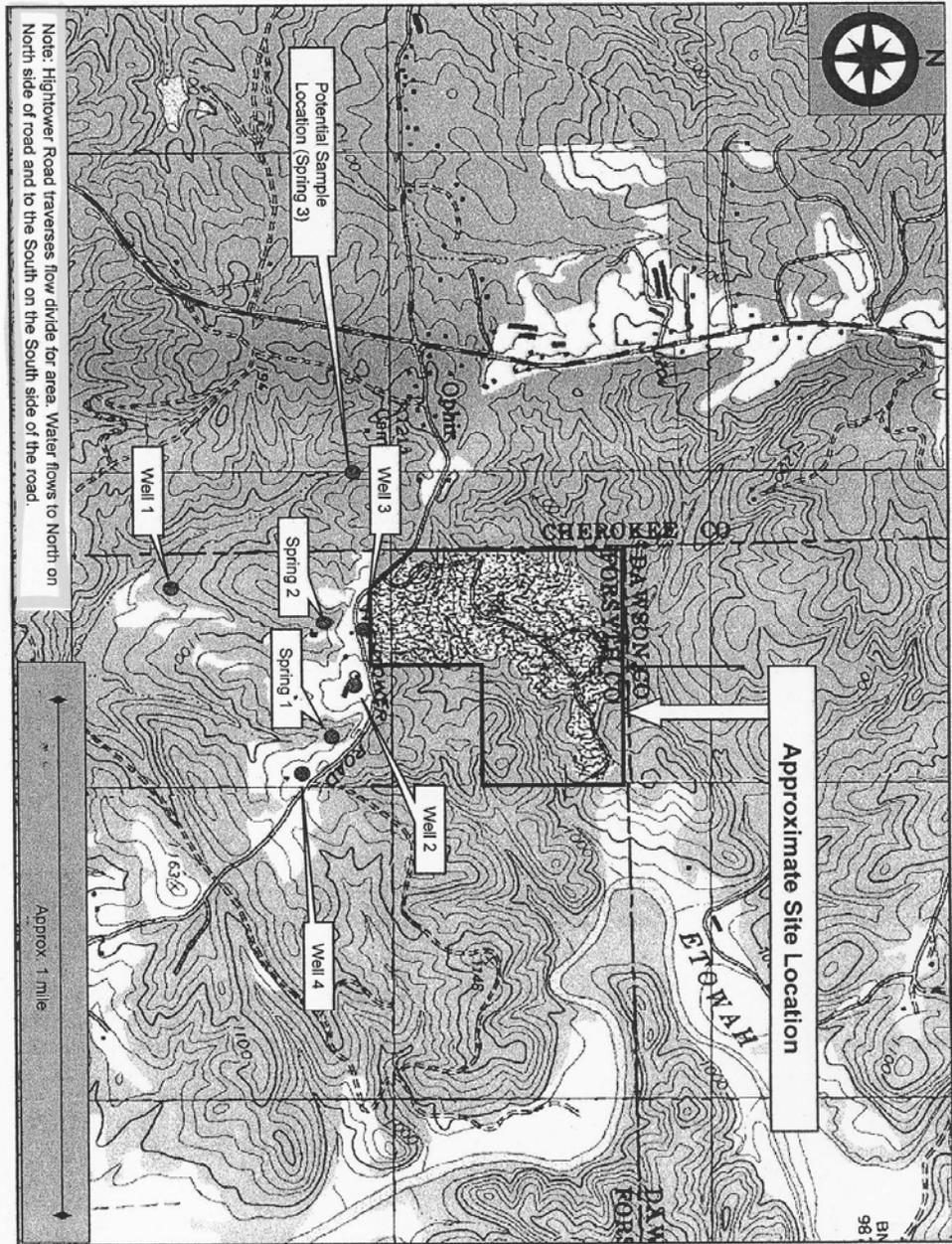
The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.



Team Lead, CAT, CAPEB, DHAC, ATSDR

APPENDIX A: MAP OF OFF-SITE DOMESTIC WELLS

Note: Topographic map from USGS 7.5 Minute Ball Ground (East) Quadrangle



Off Site Sample Locations
 Forsyth County - Hightower Road Landfill
 Project No. G020-101



APPENDIX B: EXPLANATION OF 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 non-site specific. The CV is used as a screening level during the public health assessment process where substances found in amounts greater than their CVs might be selected for further evaluation. 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 public health assessment are:

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. Usually little or no information is available for a site to know exactly how much exposure is actually occurring, so assessors assume that maximum exposure is taking place. That assumption would include any worse case scenarios where someone received a maximum dose. Actual exposure is likely much less than the assumed exposure.

An explanation of the calculation of estimated exposure doses used in this public health assessment are presented below. Calculated doses are reported in units of milligrams per kilogram per day (mg/kg/day).

Ingestion of contaminants present in groundwater

Exposure doses for ingestion of contaminants present in water were calculated using the maximum detected concentrations of contaminants in milligrams per liter (mg/L [mg/L = 1000 x ppb]). The following equation is used to estimate the exposure doses resulting from ingestion of contaminated groundwater:

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

where;

ED_w = exposure dose water (mg/kg/day)

C = contaminant concentration (mg/kg)

IR = intake rate of contaminated medium (based on default values of 2 L/day for adults; 1 L/day for children)

EF = exposure factor (based on frequency of exposure, exposure duration, and time of exposure). The exposure factor used is 1, based on exposure for 1 year, 24 hours/day, 7 days/week, 52 weeks/year.

CF = kilograms of contaminant per liter of water (10⁻⁶ kg/L)

BW = body weight (based on average rates: for adults, 70 kg; children, 25 kg)

** A conservative approximate duration of 1 year was used as the length of time for exposure to be most protective. Exposure is expected to be briefer. There is no evidence that previous site activity contributed additional exposure and remediation will eliminate future exposure.*

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 public health assessment:

A **minimal risk level (MRL)** is an estimate of the daily human exposure to a chemical that is likely to be without a significant risk of harmful effects over a specified period of time. MRLs are 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 public health assessment. A direct comparison of site-specific exposure 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 than 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.