

Letter Health Consultation

DOTY LANDFILL SITE

CAMANCHE, IOWA

EPA FACILITY ID: IAD980497556

JUNE 23, 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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LETTER HEALTH CONSULTATION

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Prepared By:

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



Thomas Newton, MPP, REHS
Director

Chester J. Culver
Governor

Patty Judge
Lt. Governor

May 6, 2008

Ronald King
Site Assessment Manager, Superfund Division
US EPA Region 7
901 N 5th Street
Kansas City, KS 66101

RE: Doty Landfill Site, Camanche, Iowa
Arsenic in Private Drinking Water Wells

Dear Mr. King:

This letter has been prepared as a consultation to EPA regarding the levels of arsenic that have been detected within private drinking wells in the vicinity of the Doty Landfill Site located in Camanche, Iowa.

Background and Statement of Issues

The Doty Landfill encompasses 13 acres of land and is located in the southeastern quarter of Section 29, Township 81 North, Range 6 East, Clinton County, Iowa. The site was used as a landfill for municipal solid waste from 1970 to 1975. In addition, local residents have expressed concern that other chemical- or pesticide waste had been disposed at the site. Previous site investigations had been completed in 1992 and in 2005. In October 2007 water samples from private wells located in the vicinity of the Doty Landfill site were collected and analyzed for dissolved metals. Two of the water samples obtained from drinking water wells contained dissolved arsenic above the US EPA Maximum Contaminant Level (MCL) for arsenic of 10 µg/L (micrograms per liter) or 10 ppb (parts per billion). The water samples in question contained dissolved arsenic at concentrations of 19.3 and 14.9 µg/L or 19.3 and 14.9 ppb.

Discussion

The US EPA defines an MCL as, “the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs (Maximum Contaminant Level Goal) as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.(1)” The MCL for arsenic of 10 ppb is based upon toxicological information on the health effect of drinking arsenic at low concentrations and also takes into consideration the treatment technology and cost to enable facilities to provide a safe drinking water supply. The MCLG for arsenic is 0 ppb. In order to determine potential health effects from consuming water that contains dissolved arsenic at concentrations of 19.3 and 14.6 µg/L, it will be necessary to look closer at the toxicological information available that discusses the health effects of drinking water that contains arsenic.

Inorganic arsenic has been recognized as a human poison since ancient times. Large oral doses of arsenic, above 60,000 parts per billion (ppb) in food or water, can result in death. If a person swallows smaller doses of arsenic, 300 to 30,000 ppb in food or water, a person may experience irritation of the stomach and intestine, with symptoms such as stomachache, nausea, vomiting, and diarrhea. Other effects a person might experience from swallowing inorganic arsenic include decreased production of red and white blood cells, which may cause fatigue, abnormal heart rhythm, blood-vessel damage resulting in bruising, and impaired nerve function causing a "pins and needles" sensation in the hands and feet (2).

Perhaps the single-most characteristic effect of long-term oral exposure to inorganic arsenic is a pattern of skin changes. These include a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso, and are often associated with changes in the blood vessels of the skin. A small number of the corns may ultimately develop into skin cancer (2). Studies have been completed that have determined the lowest dose of arsenic where these pattern of skin changes are not observed in individuals who were exposed to arsenic from drinking contaminated well water over many years.

The lowest dose of arsenic exposure where skin changes were not observed was 0.0008 mg/kg/day (2). This dose is also called the no observed adverse effect level or NOAEL dose. The concentration of arsenic found in the water samples must be converted to a dose in order to be compared to the NOAEL. The concentration in the water samples can be converted to a dose by assuming that an average adult (weighing 70 kg) consumes 2 liters (L) of water per day and by using the following equation:

$$19.3 \text{ or } 14.9 \mu\text{g/L} \times 1 \text{ mg}/1000 \mu\text{g} \times 2\text{L}/\text{day} \times 1/70 \text{ kg} = 0.0006 \text{ or } 0.0004 \text{ mg}/\text{kg}/\text{day}$$

The dose at the concentration of arsenic found within the water samples in private wells located in the vicinity of the Doty Landfill site is below the NOAEL dose.

As mentioned before, exposure to drinking water containing arsenic at certain levels can increase the risk of developing cancer. Epidemiological studies completed in Taiwan found that exposure to drinking water containing arsenic at concentrations ranging from 350 to 1,140 $\mu\text{g}/\text{L}$ increased the risks of bladder, kidney, skin, lung, liver, and colon cancer (3). These concentrations are much higher than the levels found within the private wells in the vicinity of the Doty Landfill site.

Conclusions

The levels of dissolved arsenic detected in the private wells in the vicinity of the Doty Landfill site are lower than the NOAEL dose and lower than a level where an increased risk of cancer has been seen in epidemiological studies. Although the levels of arsenic in some of the private wells are slightly greater than the MCL for arsenic, it can be concluded that long term exposure to arsenic at the levels currently detected in the private wells in the vicinity of the Doty Landfill are not expected to cause adverse health effects (**No Apparent Public Health Hazard**). At this time it is not possible to make any conclusions regarding long-term exposure to water from the private wells that showed elevated levels of dissolved arsenic since there are results from only one sampling event.

Recommendations

It is recommended that water from private wells in the vicinity of the Doty Landfill site continue to be monitored for dissolved arsenic to determine if these elevated levels of arsenic remain. Continued monitoring of the wells may enable more definitive conclusions regarding long-term exposure and potential health impacts.

References

1. US Environmental Protection Agency web link:
<http://www.epa.gov/safewater/contaminants/index.html>
2. Agency for Toxic Substances and Disease Registry. Draft Toxicological Profile for Arsenic. Atlanta: US Department of Health and Human Services; September 2005.
3. Report on Carcinogens, National Toxicology Program web link:
<http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s015arse.pdf>

If you have any questions regarding the information in this letter please contact me at (515) 281-8707 or by email at sschmitz@idph.state.ia.us.

Sincerely,

Stuart C. Schmitz, M.S., P.E.
Principal Investigator / Environmental Toxicologist
Hazardous Waste Site Health Assessment Program

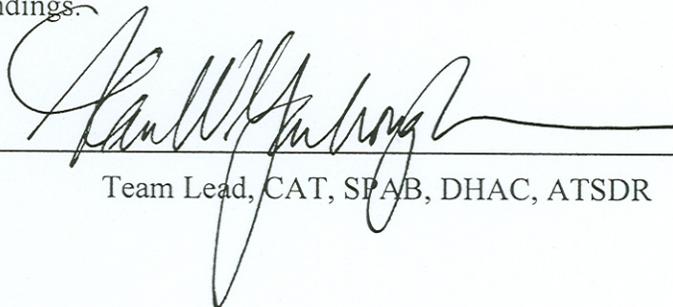
CERTIFICATION

The Iowa Department of Public Health, Hazardous Waste Site Health Assessment Program, has prepared this health consultation for the evaluation of the Doty Landfill site in Comanche, Iowa under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). The document is in accordance with approved methodology and procedures existing when the health consultation was being prepared.



Technical Project Officer, CAT, SPAB, DHAC, ATSDR

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



Team Lead, CAT, SPAB, DHAC, ATSDR