UNION SPRINGS GROUNDWATER CONTAMINATION

SPRINGPORT, CAYUGA COUNTY, NEW YORK

JANUARY 18, 2001

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
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

UNION SPRINGS GROUNDWATER CONTAMINATION

SPRINGPORT, CAYUGA COUNTY, NEW YORK

Prepared by:

Exposure and Investigation Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
Background and Statement of Issues

The Agency for Toxic Substances and Disease Registry (ATSDR) received a request from the Environmental Protection Agency (EPA) to determine (1) the health impact, if any, on people drinking or consuming milk and milk products from cows who consume contaminated groundwater, and (2) the impact, if any, on the cows themselves [1]. Groundwater samples have been collected from private wells in the Cayuga County Towns of Springport, Aurelius, and Fleming. Cayuga County is primarily rural, with at least six dairy farms potentially impacted by this contaminated groundwater. The six dairy farms were included in the sampling events. Analysis of their groundwater revealed vinyl chloride (VC), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and trans-1,2-dichloroethene (trans-1,2-DCE). The concentrations are provided in Table 1.

<table>
<thead>
<tr>
<th>Farm Number</th>
<th>Concentration range for VC*</th>
<th>Concentration range for TCE*</th>
<th>Concentration range for Cis-1,2-DCE*</th>
<th>Concentration range for Trans-1,2-DCE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm # 1</td>
<td>ND</td>
<td>4</td>
<td>33</td>
<td>0.8</td>
</tr>
<tr>
<td>Farm # 2</td>
<td>2</td>
<td>36</td>
<td>510</td>
<td>15</td>
</tr>
<tr>
<td>Farm # 3</td>
<td>20 - 34</td>
<td>ND</td>
<td>6 - 16</td>
<td>0.3 - 1</td>
</tr>
<tr>
<td>Farm # 4</td>
<td>ND</td>
<td>0.5</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Farm # 5</td>
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<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Farm # 6</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

* All concentrations reported in ppb. 
ND = not detected.

The New York State Departments of Health and Environmental Conservation are investigating to determine the groundwater contamination source [2]. The New York State Department of Health (NYS DOH) is addressing human exposure to contaminated groundwater by disseminating toxicological information through both fact sheets and public meetings. EPA is presently providing bottled water to people whose private wells have contamination levels that exceed federal drinking water standards [2]. The Cayuga County Department of Health and the NYS DOH are also conducting further sampling of residential wells to identify potential exposures.
Discussion

Sampling of groundwater at three dairy farms confirms levels of VC, TCE, and/or cis-1,2-DCE above drinking water standards. Dairy cows at these farms potentially consume this water at a rate in excess of 30 gallons a day. People who drink milk or consume dairy products from these cows are potentially exposed to this contamination. Young children, women who are pregnant or breast feeding, individuals with compromised organ function (particularly liver function), and the elderly potentially could be susceptible to milk and dairy products from these cows.

ATSDR literature searches did not reveal any studies of VC, TCE, or cis-1,2-DCE concentrations in cows’ milk after the cows consumed water containing any or all of these chemicals. In humans, however, these volatile organic compounds (VOCs) are rapidly and completely absorbed and distributed following ingestion, and even that storage is limited by rapid metabolism and excretion [3, 4, 5]. Although there are no data, one would not expect concentrations in the parts per billion range in the cows’ drinking water to be transferred to their milk, especially not at elevated levels. Absent actual data, however, only sampling the milk for these contaminants can determine their presence and quantities.

Assessing the health impact of cows who drink water at the reported levels is speculative. For humans, drinking water standards are based on cancer effects for 70 years of exposure. A dairy cow’s life expectancy is approximately ten years. Cows’ stomachs are also considerably different from human stomachs. A cow’s stomach consists of four chambers saturated with microflora such as protozoa and bacteria. Such microflora provide ample opportunity for metabolism and excretion prior to absorption of these chemicals into the cow’s bloodstream and, ultimately, into milk used for drinking and other dairy products.

For example, ATSDR has an acute minimum risk level (MRL) for oral exposure to TCE of 0.2 milligrams per kilogram per day (mg/kg/day). Assuming a cow weighs 726 kg and consumes 114 liters of water per day, that cow would be exposed at a level 1/30th of ATSDR’s MRL level. EPA does not have a reference dose (Rfd) for TCE. Although these projections are speculative, ATSDR believes the levels of exposure do not indicate health problems for cows.

ATSDR Child Health Initiative

ATSDR recognizes that infants and children may be more vulnerable to exposures than adults in communities faced with contamination of their air, water, soil, or food. This vulnerability results from the following factors:

- Children are more likely to play outdoors and bring food into contaminated areas.
- Children are shorter than adults, and are therefore more likely to breathe dust, soil, and heavy vapors close to the ground.
- Children weigh less than adults, resulting in higher doses of chemical exposure relative to body weight.
The developing bodily systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. As part of its Child Health Initiative, ATSDR is committed to evaluating children’s special interests. Young children might be potentially susceptible to milk and dairy products from the cows previously discussed. However, as also discussed, ATSDR does not expect concentrations in the parts per billion range in the cows’ drinking water to be transferred to their milk at elevated levels.

Conclusions

Although there are no data on VC, TCE, or cis-1,2-DCE concentrations in cows’ milk after the cows consumed water containing any or all of these chemicals, one would not expect concentrations in the parts per billion range in the cows’ drinking water to be transferred to their milk, especially not at elevated levels. Although speculative, ATSDR believes the levels of exposure do not indicate health problems for cows.

Recommendations

- Sample cows’ milk from Union Springs area dairy farms for vinyl chloride, trichloroethene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene.
Prepared by

Danielle M. Langmann, MS
Environmental Health Scientist
Petitions Response Section
Exposure Investigations and Consultation Branch
Division of Health Assessment and Consultation

John S. Wheeler, PhD, DABT
Toxicologist
Health Consultation Section
Exposure Investigations and Consultation Branch
Division of Health Assessment and Consultation

Reviewed by

Theresa I. McDarmont, MSPH
Environmental Health Scientist
Petitions Response Section
Exposure Investigations and Consultation Branch
Division of Health Assessment and Consultation

Maurice C. West, PE, DEE
Deputy Branch Chief, Exposure Investigations and Consultation Branch
Division of Health Assessment and Consultation
References


