

Letter Health Consultation

PRAIRIE VISTA DEVELOPMENT AREA
ALTOONA, IOWA

**Prepared by the
Iowa Department of Public Health**

SEPTEMBER 30, 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

PRAIRIE VISTA DEVELOPMENT AREA

ALTOONA, IOWA

Prepared By:

Iowa Department of Public Health
Under a 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

September 23, 2009

[REDACTED]

RE: Health Consultation
Prairie Vista Development Area – Altoona, Iowa

Dear [REDACTED]:

This letter has been prepared as a consultation to evaluate human health impacts from runoff from a farm field adjacent to your property in the Prairie Vista Development of Altoona, Iowa. We understand your concern, and want you to know that the Iowa Department of Public Health's priority is to ensure that you have the best information possible to safeguard your health and the health of your family. That information is included in following paragraphs.

Background and Statement of Issues

You contacted the Iowa Department of Public Health to express your concern about the runoff from a farm field adjacent to you primary residence at [REDACTED]. At your request, personnel from the Iowa Department of Natural Resources visited your property on April 29, 2009, and collected a sample of water from the surface drainage way that runs through the backyard of your property. This water sample was analyzed for the chemicals atrazine, acetochlor, and desethyl atrazine. In addition to the sample that was obtained for chemical analysis, other measurements were taken from the water within the drainage way, as well as from the sump located inside the basement of your home. These measurements included pH, temperature, and ammonia levels.

A follow-up visit by personnel from the Iowa Department of Natural Resources was completed on June 23, 2009 to collect additional water samples within the drainage way and a water sample from the sump located within the basement in your home. The second set of water samples were analyzed in the laboratory for the chemicals atrazine, acetochlor, metolachlor (sump only), ammonia nitrogen, nitrite nitrogen, and nitrate nitrogen. In addition to the samples that were obtained for laboratory chemical analysis, field parameters (temperature, pH, ammonia, nitrites, and nitrates) were measured in the water within the drainage way and from within the basement sump inside your home.

This letter consultation will evaluate the health impacts of exposure to the chemicals that have been detected in water from within the surface drainage way and basement sump. The exposures that will be considered in this health consultation will include exposure to children playing in the drainage way and the potential of exposure to chemicals detected within the basement sump water.

Discussion – Exposure to Water within Drainage Way

The following is a discussion of the potential for exposure to chemicals in the water within the drainage way. There is a potential for exposure to chemicals in the water within the drainage way through the inadvertent consumption of water and through dermal absorption of chemicals in the water within the drainage way by children while playing in the drainage way. The following table is a summary of the maximum concentration of chemicals found in the water within the drainage way during the two visits to your property reported to us by the Iowa Department of Natural Resources.

A comparison can be made between the levels of chemicals found in the water within the drainage way to levels of chemicals found within water that have the potential to cause adverse health impacts to individuals. The Agency of Toxic Substances and Disease Registry (ATSDR) has determined and published a set of comparison values for substances that may be found in air, water and soil. Comparison values (environmental guidelines) are measures of substance concentrations that are set well below levels that are known or anticipated to result in adverse health effects. The following table also includes comparison values for those chemicals found in water within the drainage way that have corresponding published comparison values.

Table 1 – Maximum Concentration of Chemicals Found in Water within Drainage Way and Comparison Values (1,2)

Chemical Parameter	Maximum Concentration	Comparison Values	Exposure Frequency / Person	Units
Atrazine	8.7	3 20 100	Chronic / Child Intermediate / Child Intermediate / Adult	µg/l µg/l µg/l
Acetochlor	2.3	200 700	Chronic / Child Chronic / Adult	µg/l µg/l
Metolachlor	NA	200	Chronic / Child	µg/l
Ammonia	1,200	30,000	Chronic / Adult	µg/l
Nitrites	1,500	1,000	Chronic / Child	µg/l
Nitrates	6,500	10,000	Chronic / Child	µg/l

µg/l is micrograms per liter or parts per billion

NA means not analyzed

NC means no comparison value

“Chronic” exposure is for longer than 1 year

“Intermediate” exposure is between 14 days and 1 year

As you can see at Table 1, the levels of acetachlor, ammonia, and nitrate found in the water within the drainage way are below comparison values. Since comparison values are set well below levels that are known or anticipated to result in adverse health effects, the Iowa Department of Public Health concludes that exposure to acetachlor, ammonia, and nitrate in the water within the drainage way will not adversely effect the health of any person or child who may be exposed to water within the drainage way.

Exposure to Atrazine

The concentration of atrazine in the water within the drainage way is greater than one of the comparison values shown in Table 2. The atrazine concentration in the water within the drainage way, and corresponding comparison value are as follows:

- Atrazine at 8.7 µg/l (comparison value of 3 µg/l for chronic exposure to a child)

Since the level of atrazine in the water within drainage way is above one of its comparison values, it is important to look more closely at how the comparison value of 3 µg/l has been calculated and toxicological information that has been developed for atrazine. The comparison value for atrazine is 3 µg/l. This value is the maximum contaminant level set by the U.S. Environmental Protection Agency (EPA) for drinking water. EPA has set this level of protection based on the best available science to prevent potential health problems.

Toxicological profiles have been developed by ATSDR for a variety of chemicals. These toxicological profiles identify and review the key literature that describe a substance's toxicologic properties and includes information on health effects, chemical and physical properties, and information on use and human exposure. A toxicological profile has been developed for atrazine (3). The toxicological profile for atrazine indicates that the lowest dose of atrazine that has shown to have an adverse health impact in humans and animals is a dose of 1 mg/kg/day (1 milligram of atrazine per kilogram of body weight per day of exposure).

You might ask how much water, similar to the water within the drainage way, would a child have to ingest to equal the lowest dose that caused an adverse health effect in humans and animals (1 mg/kg/day)? If we assume that a child weighs approximately 15 kg (33 pounds), then we can calculate the amount of water containing 8.7 µg/l atrazine (the concentration within the drainage way) to give a dose of 1 mg/kg/day is:

$$\frac{1 \text{ mg}}{\text{kg} \times \text{day}} \times 15 \text{ kg} \times \frac{\text{liter}}{8.7 \text{ } \mu\text{g}} \times \frac{1000 \text{ } \mu\text{g}}{\text{mg}} = 1,724 \frac{\text{liters}}{\text{day}}$$

The calculation above indicates that an average sized child would have to consume over 1,700 liters or about 450 gallons per day of water from the drainage way to get enough atrazine in their body equivalent to the lowest dose known to cause an adverse health effect in humans and animals. This is obviously an impossibility, and therefore it can be concluded that accidentally or intentionally drinking the water containing atrazine found in the drainage way at the levels detected, would not adversely impact the health of children playing in the drainage way.

Exposure to Nitrite

The concentration of nitrite in the water within the drainage way is greater than the comparison value shown in Table 2. The nitrite concentration in the water within the drainage way, and corresponding comparison value is as follows:

- Nitrite at 1,500 µg/l (comparison value of 1,000 µg/l for chronic exposure to a child)

Since the level of nitrite in the water within the drainage way is above the comparison value, it is important to look more closely at the toxicological information that has been developed for nitrite. The comparison value of 1,000 µg/l for nitrite is the maximum contaminant level for drinking water that has been set by the EPA. According to toxicological information that the EPA has used in the development of this maximum contaminant level, a dose of 1 mg/kg/day of nitrite has been observed to have no effect on human health, even to an infant (4).

To equal a dose of 1 mg/kg/day nitrite, an average sized child would have to drink 10 liters of water from the drainage way, as calculated below:

$$\frac{1 \text{ mg}}{\text{kg} \times \text{day}} \times 15 \text{ kg} \times \frac{\text{liter}}{1,500 \text{ } \mu\text{g}} \times \frac{1000 \text{ } \mu\text{g}}{\text{mg}} = 10 \frac{\text{liters}}{\text{day}}$$

Since it would be very unlikely that a child could ingest 10 liters, or just over 2 ½ gallons, of water from the drainage way per day, it can be assumed that exposure to nitrite in the drainage way, at the levels detected, would not adversely impact the health of children playing in the drainage way.

Dermal Exposure to Water in Drainage Way

The potential of absorption of any contaminants through the skin is much less than the potential of absorption of any contaminants through eating or drinking. According to the EPA, 10 percent of contaminants placed on the surface of skin, at most, are absorbed into the body (4). Therefore, if the levels of chemicals found in water within the drainage way would not adversely impact children if the water was ingested, then it can be assumed that getting water from the drainage way on the skin would not adversely impact the health of children playing in the drainage way.

Discussion – Exposure to Water within the Basement Sump

You have also expressed concerns about skin contact and breathing in chemicals from water found within the basement sump. There is a small potential for exposure to chemicals in the water within the basement sump. The following is a discussion of the potential for exposure to chemicals in the water within the basement sump.

If backup, or a failure, of the sump pump in the basement would occur, children getting into the sump pump water could be exposed to the chemicals either by touching the sump water or by breathing in any airborne chemicals found in the sump water droplets. The following table is a summary of the maximum

concentration of chemicals found in the water within the basement sump during the two visits to your property by the Iowa Department of Natural Resources.

Table 2 – Maximum Concentration of Chemicals Found in Water within Basement Sump (1)

Chemical Parameter	Concentration	Units
Atrazine	ND	µg/l
Acetochlor	0.9	µg/l
Metolachlor	0.44	µg/l
Ammonia	800	µg/l
Nitrites	ND	µg/l
Nitrates	16,000	µg/l

ND means not detected

µg/l is micrograms per liter or parts per billion

NA means not analyzed

These levels of chemicals detected in the water within the basement sump can be compared to the comparison values previously listed in Table 1. The levels of atrazine, acetachlor, metolachlor, ammonia, and nitrites in the water within the basement sump are below comparison values. Since comparison values are set well below levels that are known, or anticipated, to result in adverse health effects, it is concluded that exposure to these contaminants in the water within the basement sump will not adversely effect the health of any person or child who may be exposed to water within the basement sump.

Exposure to Nitrate

The concentration of nitrate in the water within the basement sump is above the comparison value for nitrate as shown in Table 2. The nitrate concentration in the water within the basement sump, and the corresponding comparison value are as follows:

- Nitrate at 16,000 µg/l (comparison value of 10,000 µg/l for chronic exposure to a child)

Since the level of nitrate in the water within the basement sump is above its comparison value, it is important to look more closely at how the comparison value of 10,000 µg/l has been calculated and how toxicological information for nitrate has been developed. The comparison value for nitrate is 10,000 µg/l. This value is the maximum contaminant level set by the U.S. Environmental Protection Agency (EPA) for drinking water. According to toxicological information that the EPA has used in developing this maximum contaminant level, a dose of 1.6 mg/kg/day of nitrate has been observed to have no effect on human health, even to an infant (6).

As similarly calculated for atrazine and nitrite, an average sized child would have to drink about 1.5 liters of water from the basement sump to equal a dose of 1.6 mg/kg/day nitrate. That is calculated by the following:

$$\frac{1.6 \text{ mg}}{\text{kg} \times \text{day}} \times 15 \text{ kg} \times \frac{\text{liter}}{16,000 \text{ } \mu\text{g}} \times \frac{1000 \text{ } \mu\text{g}}{\text{mg}} = 1.5 \frac{\text{liters}}{\text{day}}$$

Since it would be very unlikely that a child would ingest about 1.5 liter or just over 1.5 quarts of water from the basement sump each day, it can be assumed that oral exposure to nitrate, in the basement sump at levels detected, would not adversely impact the health of anyone within your home.

Dermal Exposure or Inhalation Exposure to Water in Basement Sump

The amount of chemicals that can be absorbed through the skin or by breathing in water vapor or chemicals within the basement sump is less than the amount of chemicals that could be absorbed by drinking significant amounts of water from within the sump. Considering that levels of chemicals found in water within the basement sump would not adversely impact children drinking up to 1.5 quarts a day, it can be assumed that exposure to water from within the basement sump on the skin and within the indoor air would not adversely impact the health of children in your home.

Conclusions

Exposure to Water in the Drainage Way

The Iowa Department of Public Health concludes that exposure to water within the drainage way by accidentally swallowing the water, or getting water on the skin will not harm people's health. The level of exposure to chemicals found within the water is below the level that has been shown to impact human health.

Exposure to Water in the Basement Sump

The Iowa Department of Public Health concludes that exposure to water in the basement sump by either getting water on the skin or breathing in water or volatile amounts of chemicals from within the sump will not harm people's health. The level of exposure to chemicals found within the sump water is below the level that has been shown to impact human health.

Recommendations

At this time the Iowa Department of Public Health does not feel that any further sampling or analysis of water within the drainage way or sump or collection and analysis of sediment samples within the drainage way would be needed at this time.

References

1. Laboratory Analytical Results and Field Testing Results, Iowa Department of Natural Resources – Field Office 5, July 2009.
2. Agency for Toxic Substances and Disease Registry. Comparison Values. Atlanta: US Department of Health and Human Services; May 2009.
3. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Atrazine. Atlanta: US Department of Health and Human Services; September 2003.
4. U.S. Environmental Protection Agency. Integrated Risk Information System – Summary for Nitrite. EPA web link: <http://www.epa.gov/ncea/iris/subst/0078.htm>
5. U.S. Environmental Protection Agency. Technical Guidance Manual – Mid-Atlantic Risk Assessment, EPA web link: <http://www.epa.gov/reg3hscd/risk/human/info/solabsg2.htm>
6. U.S. Environmental Protection Agency. Integrated Risk Information System – Summary for Nitrate. EPA web link: <http://www.epa.gov/ncea/iris/subst/0076.htm>

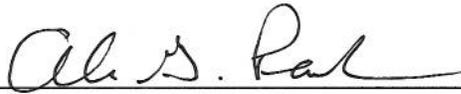
If you have any questions regarding the information in this letter please contact me at (515) 281-8707 or by email at sschmitz@idph.state.ia.us.

Sincerely,

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

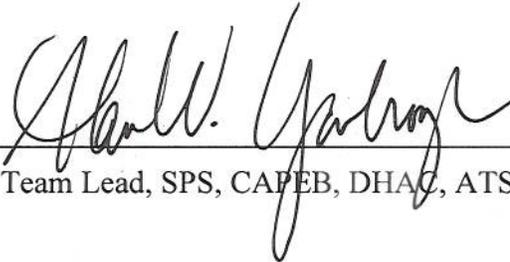
CERTIFICATION

The Iowa Department of Public Health, Hazardous Waste Site Health Assessment Program, has prepared this letter health consultation evaluating human health impacts from runoff from a farm field adjacent to a residential property in the Prairie Vista Development of Altoona, 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. The editorial review of this document was completed by the cooperative agreement partner.



Technical Project Officer, SPS, CAPEB, DHAC, ATSDR

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



Team Lead, SPS, CAPEB, DHAC, ATSDR