

# Source Water Assessment for Vernon Water Company (PWS#3126315) Cambrian-Ordovician Aquifer



## Source Water Protection

The purpose this Source Water Protection (SWP) "Phase I" assessment is to:

- Define your source water area and susceptibility;
- locate, inventory, and rank potential contaminant sources within your source water area;
- provide the results to the public for improved protection of your drinking water.

## Introduction

This Source Water Protection (SWP) "Phase I" assessment is meant to provide information and be used as a tool to help protect the quality and quantity of your drinking water. Within it you will find an inventory of your wells, tables showing potential contamination sources within your source water area, and maps showing your system's source water information.

The source water area defined in this report is the region directly linked to your water supply, and where land use changes have the greatest influence on your drinking water quality. Your source water area was defined based on scientific information available to the Iowa Department of Natural Resources - Iowa Geological and Water Survey (IDNR-IGWS).

This "Phase 1" source water assessment by no means protects your drinking water. To protect your drinking water your system should develop

and implement a source water protection plan. Protection measures are different for each system, but commonly include reserving areas for future wells, cleaning up contaminants, and converting portions of your source water area to native vegetation. Further information on how to protect your drinking water, including guidebooks and online resources, can be found at [www.iowasourcewater.org](http://www.iowasourcewater.org).

**This SWP assessment includes the following sections:**

1. Defining Your Source Water Area
2. Susceptibility of Your Source Water Area
3. Contaminant Sources within Your Source Water Area
4. Ranking Contaminant Sources
5. How to Protect Your Drinking Water
6. Consumer Confidence Report

## Section 1: Defining Your Source Water Area

Accurate well, aquifer, and pumping information is critical to providing the best estimate of your source water area. According to our records, Vernon Water Company has one active public well open in the sandstone and dolomite of the Cambrian-Ordovician aquifer. The table below shows your well and aquifer information. If you believe the table is wrong, please contact the Source Water Protection program at [www.iowasourcewater.org](http://www.iowasourcewater.org) or 319-335-1575.

W#	Local Name	Depth (ft.)	Const. date	Status	Aquifer	Aquifer thick. (ft.)	SWL (ft.)	PWL (ft.)	Rate (gpm)
<a href="#">58711</a>	#1	800	<Null>	Active	Cambrian-Ordovician	0	0	0	0

**Source Water Glossary**

**Aquifer:** An underground water-bearing layer that provides a usable quantity of water.

**Source Water Area:** An estimation of the area contributing water to your public wells.

**Capture zone:** A computer modeled source water area, typically using 2-5-and 10 year time of travel periods.

**Time of travel:** A duration of time specified to determine the distance and area that water will travel.

**Susceptibility:** A measure of an aquifer's potential to become contaminated. Does not imply either good or poor water quality.

**Confining layer:** A layer of material which slows the movement of water.

Due to a lack of information, a 2,500-foot radius circle was defined around each of your active wells. This distance is the minimum required by Iowa's Source Water Protection Plan for community systems with inadequate information for a more detailed evaluation. The 2,500-foot circle assumes that groundwater and contaminants located within this radius can potentially migrate to your wells.

**Section 2: Susceptibility of Your Source Water Area**

Research by IDNR-IGWS has determined that thickness of confining layers such as till, clay, and shale between the aquifer and the land surface provide a good measure of aquifer susceptibility. Aquifers overlain by thicker confining beds are less susceptible to contamination than aquifers overlain by thin confining beds. The table below summarizes susceptibility by confining layer thickness.

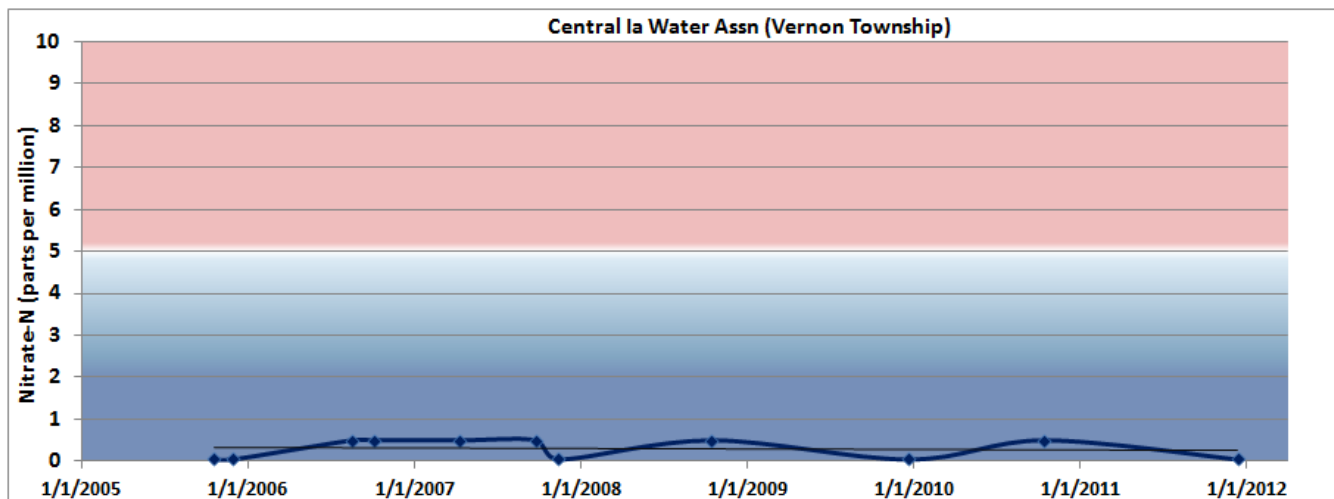
Confining layer thickness	Susceptibility designation
<25 feet	Highly susceptible
25 to 50 feet	Susceptible
50 to 100 feet	Slightly susceptible
>100 feet	Low susceptibility

Based on our data, your wells have a cumulative confining layer thickness of over 100 feet. Your aquifer was therefore determined to have low susceptibility to surface contamination.

Another method for determining the susceptibility of your aquifer is by using nitrate concentrations to evaluate the risk of surface contamination. Wells with higher nitrates typically have less protection from contamination at the land surface and are more at risk than wells with low nitrates. Based on our records, finished water at Vernon Water Company has a six-year average nitrate-N concentration of 0.0 parts per million (ppm), based on seven total samples.

Nitrate concentrations in your public water supply are generally low. The concentrations measured much lower than the EPA maximum contamination level (MCL) of 10 ppm, indicating little contamination from nonpoint, fertilizer, or septic sources. Elevated nitrate concentrations can disrupt the electron transport system and cause methemoglobinemia, or blue baby syndrome, in infants.

The chart on the next page shows historic nitrate trends in Vernon Water Company through time. Your public water supply's nitrate-N concentrations show a relatively stagnant trend of -0.01 ppm per year during the past six years (2005-2011). Your trend indicates little change over the past few years. Make sure to keep track of results to detect issues as they arise.



### Section 3: Contaminant Sources within Your Source Water Area

To identify potential contaminant sources we searched electronic databases for facilities and land uses that fell inside your source water area. The databases used for the inventory are described in Table 1 of the *Iowa Source Water Protection plan*. The contaminant source inventory includes facilities and land uses that have been known to contaminate groundwater.

Table 1 lists the potential contaminant sources we found in your source water area. The map numbers correspond to the contaminant source list in Table 1. The potential contaminant sources are derived from databases that have varying degrees of locational accuracy, and therefore could be mapped in the wrong area or omitted from the map entirely. For this reason, locational accuracy is noted at the end of the table. You or other residents may be aware of additional contaminant sources that should be included, feel free to modify this report to reflect your knowledge.

For many aquifers, particularly those overlain by thick confining layers, the greatest threat of contamination to the aquifer is through existing wells that penetrate the confining layers. For this reason, Table 2 lists all known wells, owners, and locations identified in your source water area. A numbered symbol shown on the map at the end of this report identifies well locations. Well locations are derived from databases that have varying degrees of accuracy, and therefore could be mapped in the wrong area or omitted from the map entirely. For this reason, locational accuracy is noted at the end of the table 2.

In addition to the specific “point” sources listed in Table 1, nonpoint sources of contamination also exist in your source water area. In Iowa, a potentially significant nonpoint source of contamination is row crop agriculture. Land use percentages and acreages are presented in Table 3.

### Section 4: Ranking Contaminant Sources

We have attempted to prioritize the relative risk based on a three component ranking system; 1) the location of the potential contaminant source in the source water area, 2) the susceptibility ranking of the aquifer to contamination, and 3) the type of contaminant source. Points are assigned for each category and a cumulative score calculated for each potential contaminant source using the scores for each of the three components. Higher numbers always correspond to higher risk in this report.

#### 1) Location of potential contaminant sources

Your potential contaminant sources are ranked from 1-3 based on the capture zone they are located in, with greater weight given based on proximity to the well. Fixed radius capture zones also received greater risk as they represent unknown or poorly known hydrogeologic conditions. The table below shows the risk score assigned to each source water area.

Source Water Area	Risk score
2-year time of travel, hydrologic boundary, fixed radius, 1-mile, modified karst - high	3
5-year time of travel, modified karst – medium	2
10-year time of travel, aquifer retrieval area, surface runoff area	1

## 2) Aquifer susceptibility to contamination

Susceptibility rankings were given scores to give more priority to aquifers with less confining layers. Aquifer susceptibilities were given ranks of 1-4, from low susceptibility to highly susceptible. If your well depth or confining layer thickness is unknown, the source water area was automatically designated “highly susceptible” and ranked 4.

## 3) Land-use type

The land-use type combines the potential for different facility classes or land uses to release contaminants with an estimate of the toxicity of the contaminants that may be released. Land-use risks are assigned values from 1 to 5 (least to greatest risk).

The final “Risk Score” for the source water area is the result of summing the three components of relative risk. For a list of land-use types and additional information regarding the ranking classification, please refer to the *Iowa Source Water Protection plan*.

The goal for ranking potential contaminants is to provide your system with a list to help prioritize potential risks. These risks can only be addressed through local initiatives and strategies started by your community. To begin a SWP plan, it is up to your local community to decide which potential contaminant sources carry the most risk, and to proactively engage problems you might find to your drinking water. The risk rankings provided in this report are only a guide; the final decision on the priority of potential contaminant sources rests with your local source water protection team.

## Section 5: How to Protect Your Drinking Water

This Source Water Phase I assessment only provides information on your source water area and contaminants. Your community is responsible for taking the necessary action to ensure you have clean drinking water for future generations. To do this the Iowa Source Water Program strongly encourages you to start a Source Water Protection Plan. A SWP plan is different for each community, but the steps needed to complete one are the same for every system. Most steps have already been outlined and partially completed in the SWP “Phase 1” assessment:

### Steps for completing a Source Water Protection plan

- Step 1:** Organize a source water team
- Step 2:** Identify your source water areas
- Step 3:** Inventory well and contaminant sources
- Step 4:** Assess and rank contaminant sources
- Step 5:** Develop an action plan
- Step 6:** Construct or update your emergency response plan
- Step 7:** Submit and Implement your SWP Plan

If your community is interested in protecting your drinking water, there are plenty of free resources available to help guide you through this process, [www.iowasourcewater.org](http://www.iowasourcewater.org) has many online resources available, including a detailed [Guidebook](#) and [Workbook](#) catered for Iowa community water supplies. Please contact Chad Fields (319-335-2083) of the Source Water Program for further information.

### Section 6: Consumer Confidence Report

As the agency responsible for conducting drinking water programs in the state of Iowa, IDNR must provide each public water supply with language to be included in their Consumer Confidence Report regarding source water protection. The following language, at a minimum, must be included in each Consumer Confidence Report you produce from now on:

“The Vernon Water Company obtains its water from the sandstone and dolomite of the Cambrian-Ordovician aquifer. The Cambrian-Ordovician aquifer was determined to have low susceptibility to contamination because the characteristics of the aquifer and overlying materials provide natural protection from contaminants at the land surface. Vernon Water Company’s Cambrian-Ordovician well will have low susceptibility to surface contaminants such as leaking underground storage tanks, contaminant spills, and excess fertilizer application. A detailed evaluation of your source water was completed by the Iowa Department of Natural Resources, and is available from the Water Operator at 641-792-7011.”

You may modify this language or include additional information if you so desire, but you must identify the source of your system’s drinking water and identify known sources of potential contamination.

Table 1. Inventory and ranking of potential contaminant sources.

**Vernon Water Company Public Water Supply (3126315)****Phase I - Contaminant Source Inventory and Assessment****Aquifer: Cambrian-Ordovician Low Susceptibility (risk factor = 1)**

Map No.	Site Name	Site Type	Site Link <sup>1</sup>	Program ID	Site Address	Loc'n Acc <sup>2</sup>	Land Use Risk <sup>3</sup>	Risk Score <sup>4</sup>
<b>Capture zone: 2500-foot (risk factor = 3)</b>								
1	Handling And Storage Spill	Hazardous Materials Spill	<a href="#">311693195</a>	030705-SJM-1809	no address available	poor	0	4

<sup>1</sup>ID's are hyperlinked to detailed contaminant source information where available. Click once to open the spreadsheet, then click again to follow the link.<sup>2</sup>Estimated horizontal accuracy: < 25m. = good; 25m. to 50m. = fair; >50m. = poor<sup>3</sup>Score range: 1 to 5, see Table 3 of the Iowa Source Water Protection and Assessment plan<sup>4</sup>Sum of land use, capture zone, and aquifer susceptibility risk factors

Table 2. Inventory of water wells not used in source water area.

**Vernon Water Company Public Water Supply (3126315)****Phase I - Inventory of Wells****Aquifer: Cambrian-Ordovician Low Susceptibility (risk factor = )**

Map No.	Well ID <sup>1</sup>	Well Owner	Well ID Source	Depth (ft.)	Date Drilled/ permitted	Well Location	Locational Accuracy <sup>2</sup>
<b>Capture zone: 2500-foot (risk factor = 3)</b>							
1	<a href="#">2087266</a>	Stecher, Mike	Private well tracking system	144	1/1/1950	T. 88 N., R. 1E., Sec. 13, NW, SE, SW, SE, SW	good
2	<a href="#">12515</a>	Unkn	Permitted private wells	unkn	9/10/1990	T. 88 N., R. 1 E., Sec. 13, SW, NW	poor
3	<a href="#">2108044</a>	,	Private well tracking system	-99	<Null>	T. 88 N., R. 1E., Sec. 13, NW, SW, NW, SW, NW	good
4	<a href="#">7574</a>	Vernon Water Company	Water Use Permit Wells	1150	<Null>	T88N, R1E, Sec. 13, NW, SE, NW	good
5	<a href="#">7578</a>	Hawkeye Renewables (iowa Falls)	Water Use Permit Wells	1940	<Null>	T88N, R1E, Sec. 13, NW, SE, NW	good
6	<a href="#">73932</a>	Conrad, Daniel	IGS well database	548	1/1/1986	T. 88N., R. 1E., Sec. 12, SW, SE, SE	poor
7	<a href="#">57877</a>	Vernon Water	IGS well database	1206	9/30/2003	T. 88N., R. 1E., Sec. 13, NE, NW, NW	poor

<sup>1</sup>Well id's are hyperlinked to detailed well information where available.

Click once to open the spreadsheet, then click again to follow the link.

<sup>2</sup>Estimated horizontal accuracy: < 25m. = good; 25m. to 50m. = fair; >50m. = poor

Table 3. Land cover within your source water area.

**Vernon Water Company - Cambrian-Ordovician aquifer Low Susceptibility****Summary of land cover types (2010) by percentage of total**

Capture zone	Row Crop	Small Grains	Alfalfa	Grassland	Developed Areas	Barren Areas	Forested Areas	Total Acres
2500-foot	22.2	0.2	9.0	46.7	14.2	1.4	6.3	453



# Vernon Water Company 3126315

## Cambrian-Ordovician Aquifer - Source Water Protection Area



### Public Wells

- Active
- Not Used
- Standby

### Source Water Areas

- 2500-Foot Radius

### Contaminant Sources

- Hazardous Materials Spill

### Other Wells

- IGS well database
- Permitted private wells
- Private well tracking system
- Water Use Permit Wells

0 0.24 Miles

