Sheffield Water Supply

Source Water Protection Plan
PWS #3570037
Prepared For
Sheffield Water Supply

Prepared by
Brent Beste, Iowa Rural Water Association, Source Water Protection Specialist

Assistance Provided by
City of Sheffield
Iowa Department of Natural Resources, Field Office #2

Completed
9/18/2014
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Note: Any blue underlined words will link to the online database location if one is available when using an electronically formatted version of the Source Water Protection Plan.
Introduction

Background of Source Water Protection
In 1974 the United States Congress enacted the Safe Drinking Water Act (SDWA) with the goal of providing safe drinking water for public water supplies and their users. The SDWA gave the United States Environmental Protection Agency (EPA) the authority to develop a uniform national drinking water protection program, and to establish standards for known or suspected drinking water contaminants. In 1996, Congress amended the SDWA to reflect a growing awareness of potential biological and chemical threats to drinking water. The amendment to the SDWA outlines a plan for communities to protect their own source and keep program effectiveness at the local level.

During 1998-1999, the Iowa Department of Natural Resources (IDNR) and the Iowa Geological Survey Bureau (IGSB) started developing a Source Water Protection Program for the State of Iowa. In October 1999, EPA approved the IDNR Source Water Protection Program, including the already active program of Wellhead Protection.

At this time, legislators in the State of Iowa indicated that Iowa will maintain a voluntary approach to Source Water Protection planning. A voluntary implementation (as opposed to regulatory) is appropriate for Iowa due to the uniqueness of each public water supply system. The voluntary approach also conveys a positive image of the Source Water Protection Program.

Iowa Rural Water Association (IRWA) has taken an active role in developing Source Water Protection Plans for small communities. IRWA’s mission in this regard is to provide technical assistance to small communities in developing Source Water Protection Plans to protect their drinking water supplies.

Currently, IRWA’s Source Water Protection Program is serviced by two grants. One supplies a program through a USDA-FSA grant and another through the Iowa Department of Natural Resources (IDNR). The Sheffield Water Supply Source Water Protection Plan has been developed through Iowa Rural Water Association’s IDNR Source Water Protection Program.
Purpose
The purpose of the Source Water Protection (SWP) plan is to provide an organized approach to effectively protect public water supplies from contamination. There are many important reasons for protecting the Sheffield Water Supply drinking water.

- Safeguard the health of community residents
- Prevent and reduce financial burdens caused by contaminated drinking water should it occur
- Educate and promote community awareness on drinking water contamination
- Safe drinking water is the life line of the community in the present and in the future
- Develop a contingency plan in the unlikely event that your drinking water supply would happen to become contaminated
Sheffield Water Supply #3570037

Location
Sheffield is located in northern Franklin County in north central Iowa. Sheffield is accessed on the east by US Highway 65 and on the west by Interstate 35. Sheffield is nestled along Bailey Creek in an area of sand and gravel deposits that provide large quantities of water. Due to water quality issues at the surface, Sheffield uses the deep Devonian limestone to provide safe, quality drinking water to its customers.

Water Supply Information
Source:
Sheffield Water Supply obtains water from the Devonian limestone aquifer to supply the residents of Sheffield with safe drinking water. The utility also draws water from shallow sand and gravel aquifer for bulk load out for various uses that are not related to drinking water. Sheffield currently has two active drinking water wells that are drilled to a depth of ~450ft. Each well can provide up to 300 gallons of water per minute (gpm). The wells are typically not used at the same time, and are run on an alternating monthly cycle. The monthly cycle is used due to possible well interference when the wells are run at the same time. The bulk load out well currently used is drilled to a depth of 27ft and has issues with surface contamination from nitrate.
Customers
Sheffield currently supplies 1150 residents with water on 475 connections. Sheffield averages 80,000-85,000 gallons of water used per day (gpd) year round. During the summer, there is typically a slight bump in usage when the City pool is in operation. The utility has storage capacities of 250,000 gallons in an elevated storage tank located near the next to well #2 south of the high school athletic fields. Sheffield has an auto-start generator located at well #5 that will run in the event of power loss.

Treatment
Currently, water treatment by the Sheffield Water Supply is minimal. The Utility currently adds chlorine for disinfection to ensure that the water is safe to drink. The Utility also adds polyphosphate to sequester iron in the water distribution system. This is added to ensure that the water utility meets the EPA secondary water standards related to aesthetics (i.e. taste/odor).

Known Water Quality Issues
There are no contaminants of concern that are currently impacting the drinking water source. Naturally occurring fluoride is currently found in the drinking water source that boarders the secondary standard for drinking water of two parts per million (ppm). The maximum allowable amount of fluoride in drinking water is 4ppm. Previously, nitrate had been found in the drinking water source in quantities over 13ppm. In 2012, Well #2 was disconnected from the drinking water system. This well is a shallow well. In the time since this well was disconnected from the drinking water system, nitrate has fallen below one part per million in the drinking water that is supplied to Sheffield.

Hydrogeology
Over 80% of Iowan’s obtain their drinking water from groundwater. Groundwater is found in aquifers that vary in depth, size and water quality. Many different aquifers are found and used in Iowa to supply quality drinking water to municipalities and private residences.

Along many of Iowa’s Rivers we find surficial or unconfined aquifers. Surficial aquifers are generally made up of sand and gravel with little material overlying them. These are found in the modern river valleys, and are generally referred to as alluvial, drift, or buried channel aquifers. Alluvial aquifers are generally exposed to the surface and located next to modern day rivers. Drift aquifers are small rogue areas of sand and gravel that are generally small in nature and for the most part are only used for local or private wells, not community water supplies. Buried
channel aquifers are very good sources of drinking water for all uses and mark out former river channels.

In most of Iowa we find confined aquifers located in the bedrock beneath the glacial till that makes Iowa well suited for farming activities. These aquifers provide a reliable source of good quality water in much of central and northeastern Iowa. From central Iowa southward, the bedrock aquifers are rarely used. These aquifers are deeper as you move southwest across the state and the water generally contains higher amounts of dissolved minerals. We like to see water stay in contact with the ground for extended periods of time because it tends to “clean” the water of harmful chemicals. If water stays in contact too long, it will dissolve minerals from the surrounding rock. This creates a very poor quality of water. These aquifers are still used in industries such as ethanol production because the wells produce plenty of water, and require little treatment to be used in these industries.

In Iowa, we are looking for aquifers that have good water quality, are easily recharged, and also have confining layers that are thick. Confining layers are layers of soil or rock that do not easily transmit water. These are generally made up of clay or shale and act as a confining unit depending on its thickness. This is very important when classifying a well as deep or shallow. Iowa’s Administrative Code (IAC, Chapter 40.2) defines shallow and deep wells. If an aquifer has a continuous layer of low permeable rock at least 25 feet below the ground surface and is a minimum of 5 feet thick, a well is considered a deep well. If a well does not meet these criteria, the well is considered shallow. Deep wells are less susceptible to contamination, thus they are given lower susceptibility designations. Sheffield Water Supply wells meet these criteria. Sheffield Water Supply wells were assigned a ranking of Susceptible due to the thickness of the confining layer. The confining layer in Sheffield is only 25-50 feet thick. This indicates that the drinking water source has the potential to be impacted by surface contamination sources. Contaminants such as underground storage tanks or agricultural chemicals are just a few things that can impair water quality.

Sheffield’s wells are drilled into the Devonian aquifer, specifically the Juniper Hill formation. The Devonian aquifer is the bedrock surface in much of far eastern and northeast Iowa. Seepage to the depth of the aquifer in Sheffield is slow, but does occur with primary recharge being where the bedrock is exposed and close to the surface. The Devonian aquifer is protected by the overlying glacial till. This considerably slows the downward movement of water from the surface and acts as a natural filter. The aquifer slopes downward from the northeast, and as it gets
deeper, the water quality begins to degrade due to mineralization. This is the source of the natural fluoride in the aquifer. Mineralization occurs as the naturally acidic water dissolves the minerals in the rock creating a chemical reaction making the minerals water soluble.

Sheffield is found on the edge of the Iowa Surface landform formation. The environment of the Iowan Surface was much different when it was created 16,000-21,000 years ago. This landform was created when wind blew off of the glacial formations that existed northeast of Iowa. These winds and glacial streams moved much of the till that made up the surface and deposited it elsewhere. (Source: Geologic Guide Book Series #28, Page 15). This feature today is identified by
generally rolling terrain and southeast trending ridges that are capped by loess materials (Landforms of Iowa, 2000).

Sheffield is located along Bailey Creek. This small creek appears to be located near a shallow alluvial aquifer based on the data from the shallow wells. There are also a number of closed sand and gravel pits near by and former brick making facilities that require sand and gravel for brick manufacturing. The impact of this shallow sand and gravel on the deeper Devonian is unknown. The depth of the wells make it unlikely that the shallow aquifer and the river are impacting the drinking water source. Bailey Creek is a subwatershed of the larger West Fork Cedar watershed. Water that flows near Bailey Creek past Sheffield from upstream may impact the shallow aquifer.
Sheffield Water Supply Source Water Protection Plan

Capture Zone
Sheffield Water Utility has a delineated capture zone. This capture zone was modeled using an element analytical model by the Iowa Geological and Water Survey. This model defined a 2-year, 5-year, and 10-year time of travel capture zone. This area is made of concentric circles with time of travel increasing as the distance from each of the active water supply wells increases.

The capture zone is only delineated for the Devonian aquifer. This capture zone was modeled in 2009, focusing on only the deep aquifer. The alluvial wells are no longer used, but they are not yet plugged. The utility anticipates plugging well #1 in the near future due to the age and quality of the well. Well #2 will be used for bulk load out only, and water use from this well likely will not impact the deep well and should not change the water supplies capture zone due to the confining layer.

Potential Contaminant Inventory
There are very few sources of potential contamination in Sheffield. The aquifer is well protected according to treated water quality data. Due to minimal treatment, chemical threats would be visible in treated water. Nitrate is near 0 in the Devonian aquifer in Sheffield, and there are few point source contaminants in the capture zone.

Nitrate/Non-Point Source
Nitrate and other non-point source pollution do not currently appear to be impacting the deep aquifer. Nitrate levels have been below .5ppm since mid-2011. This is the time frame that well #2 was taken off-line due to nitrate issues in the well. Prior to that, nitrate levels for the utility
spiked to over 13ppm in early an early 2009 sample. The assumption is that the nitrate impact is from well #2. Prior to this spike, nitrates were below 2ppm.

Prior to well #2 being taken off of the public water supply system, it was used with the deep wells to blend fluoride below 2ppm in the finished water. The deeper wells were used to blend the nitrate out of the finished water. It is not known what caused the spike or the continued readings above 3ppm before #2 was taken off line. Based on this information, the utility choose to take well #2 off the public water system.

**Potential Point-Source Contaminant Sites**

There are very few point sources of contamination that threaten the water quality in Sheffield. The closest sites are small quantity chemical storage by the City and County in the joint shed located near the wells. Chemicals such as oil (new and used) in sealed barrels and weed killer are stored indoors.

The other site is a coop located northwest of the wells. The facility operates anhydrous ammonia bulk tanks and large above ground fuel storage tanks. These tanks are either doubled walled or in containment basin. They are a significant distance from the wells. Based on the ranking criteria, they pose only minimal threats.

**Ranking Criteria**

The potential contaminants are listed below alphabetically. The FieldID# links to the table of potential contaminants and numbers on the potential contaminant maps (Appendix B, page B-8). The potential contaminants were ranked on four scales. The first was a 1-5 scale based on the chemical type and storage threat with 5 being the highest. The second was on the basis of the aquifer susceptibility. In Sheffield Water Supply, the aquifer being taken into consideration is a **Devonian aquifer** that is **susceptible** to contamination. All potential contaminants were given a ranking of 3 for aquifer susceptibility. The third scale was the proximity to the well. If the contaminant was in the 2-year it was given a 3, 5-year was given a 2 and 10-year was assigned a value of 1. The fourth scale was based on the Iowa DNR mandatory setback distances. If a potential contaminant was in the 200ft radius, it received a risk of 4, if it was in the 400ft radius a value of 3 was given and if it was in the 1000ft radius, it was assigned a one. The assigned risk assessment was developed using the total risk number. If a potential contaminant had a total risk value of 12 or larger, it was ranked as a High threat of contamination, 8-12 were ranked as a Moderate threat of contamination and 7 or lower is a Low threat of contamination. If the facility had closed, or was extremely well maintained, it may have received a slight or minimal risk classification.

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<table>
<thead>
<tr>
<th>Field ID</th>
<th>Facility Name</th>
<th>Site Type</th>
<th>Program ID</th>
<th>Address</th>
<th>Status</th>
<th>Total Risk</th>
<th>Risk Rank</th>
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<tbody>
<tr>
<td>1</td>
<td>Agvantage FS</td>
<td>Tier II Chemical Storage</td>
<td>FAIDSIT2A000001</td>
<td>307 West St</td>
<td>Active</td>
<td>7</td>
<td>Moderate</td>
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<tr>
<td>2</td>
<td>Five Star Cooperative -</td>
<td>Above Ground Storage</td>
<td>311983989</td>
<td></td>
<td>Active</td>
<td>9</td>
<td>Low</td>
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### Sheffield Water Supply Potential Point Sources of Contamination

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<th>Field ID</th>
<th>Facility Name</th>
<th>Site Type</th>
<th>Program ID</th>
<th>Address</th>
<th>Status</th>
<th>Total Risk</th>
<th>Risk Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Five Star Cooperative - Sheffield</td>
<td>Air Permit - Group 1 Grain Elevators</td>
<td>35-02-004-01</td>
<td>308 West Rd</td>
<td>Active</td>
<td>5</td>
<td>Low</td>
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<tr>
<td>4</td>
<td>Franklin County Shed</td>
<td>Mixed Small Quantity Chemical Storage</td>
<td></td>
<td></td>
<td>Active</td>
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<td>High</td>
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<tr>
<td>5</td>
<td>Sheffield Maintenance Shed</td>
<td>Mixed Small Quantity Chemical Storage</td>
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<td></td>
<td>Active</td>
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<td>High</td>
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### Sheffield Water Supply Known Private Wells

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<tr>
<th>ID#</th>
<th>Well ID</th>
<th>Owner</th>
<th>Source</th>
<th>Capture Zone</th>
<th>Depth of Well</th>
<th>Drill Date</th>
<th>Status</th>
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</table>

No known private wells are located in the capture zone.

### Sheffield Water Supply Potential Non-Point Sources of Contamination

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Location</th>
<th>Type</th>
<th>Size/Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Crop Agriculture</td>
<td>North of the wells</td>
<td>Agriculture</td>
<td>~18% of the Capture Zone</td>
<td>Row crop agriculture land use threatens the water source through the use of widespread fertilizer and other chemical application. Much of the capture zone is covered by this land use.</td>
</tr>
<tr>
<td>High School Athletic Fields</td>
<td>2-year and 5-year capture zone north of the wells</td>
<td>Turf Grass</td>
<td>~30% of the Capture Zone</td>
<td>Turf grass threatens water supplies through the threat from land applied fertilizer and chemicals. These chemicals, especially on athletic fields that tend to be precisely manicured, are a threat to the water quality.</td>
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### Sheffield Water Supply Source Water Protection Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Email</th>
<th>Phone</th>
<th>Mailing Address</th>
<th>City</th>
<th>State</th>
<th>Zip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brent Beste</td>
<td>IRWA</td>
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<td>IA</td>
<td>50208</td>
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<tr>
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<td>(641) 430-4491</td>
<td>110 S. 3rd St</td>
<td>Sheffield</td>
<td>IA</td>
<td>50475</td>
</tr>
<tr>
<td>City Clerk</td>
<td>City of Sheffield</td>
<td><a href="mailto:sheffield@frontiernet.net">sheffield@frontiernet.net</a></td>
<td>(641) 892-4718</td>
<td>110 S. 3rd St</td>
<td>Sheffield</td>
<td>IA</td>
<td>50475</td>
</tr>
<tr>
<td>Scott Wilson</td>
<td>Iowa DNR Field Office #2</td>
<td><a href="mailto:Scott.wilson@dnr.iowa.gov">Scott.wilson@dnr.iowa.gov</a></td>
<td>(641) 424-4073</td>
<td>2300 15th St SW</td>
<td>Mason City</td>
<td>IA</td>
<td>50401</td>
</tr>
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</table>

*The former City Clerk was involved with the source water protection committee, but abruptly resigned at the end of July.

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**Focus Area**

Sheffield plans to focus on the entire capture zone. The goal is to enact ordinances and complete general maintenance to protect the water source through regulatory measures. Since contamination from nitrate has not been found in the deep water supply wells (shallow wells had nitrate but have been removed from operation), land use is going to be managed by developing relationships with local agricultural operators and the school district maintenance crew.

**Management Strategies**

Committee Discussed: 7/15/2014; Updated: 7/16/2014  
Project List Finalized by the Committee: 8/25/2014

1. **Education Campaign**
   a. Cost: Staff Time, Promotional Materials  
   b. Goal: Distribute to promotional materials to the customers of the water supply  
   c. Timeline: Begin initiatives in Fall 2014  
   d. Contact:  
      i. City of Sheffield
ii. Brent Beste, Source Water Specialist, Iowa Rural Water Assn.

e. Implementation Status: Committee Discussed

**Project Description**

Educational initiatives are integral to implementing any project and plan development. Explaining why you are doing something, especially when it relates to tax dollars, is important to building trust in any project along with explaining why a project needs to be completed. If you do not promote what you are doing when it is a good thing, the customers may think the only time news comes out of the water department, it will be bad.

Education programs vary from utility to utility. Some communities utilize department or community newsletters to tell the community about the progressiveness of source water protection planning. Others will mail brochures about the project and where the source of water is actually coming from. Others utilize the internet to promote source water efforts and demonstrate why projects are being done and dollars are being spent.

If a community sells a program before something happens, when the time comes to spend the money the understanding of the why is there. The pathways to implement this project are plentiful. IRWA can assist the community in developing brochures for distribution, including some of the printing. IRWA can also do community presentations to show where the drinking water comes from and how it travels underground using aquifer models.

IRWA is also available to do educational events for the local school district. There have been many events held in schools to show how water moves underground and how it can become contaminated. This service is provided as part of the source water protection program to communities that have been involved with source water protection projects.

**Goal**

- Brochures (sample)
  - Source Water Protection – What is it and where does my water come from
  - Water Conservation
  - At home activities
- Newsletter articles
- In class presentations for students

**Results**

This project has been discussed by the committee. There is strong interest in the classroom events.

2. **Storm water management/outdoor conservation**
   a. Cost: Staff Time, promotional material
   b. Goal:
      i. Promote projects to residents of Sheffield, specifically those in the capture zone
      ii. Encourage a community organization to install a sample project location
c. Timeline: Fall 2015

d. Contact:
   i. City of Sheffield

e. Implementation Status: Committee Discussed

Project Description
The interaction between surface water and groundwater is very important. Water at the surface at some point was in the ground or will be underground. Chemicals that are easily picked up at the surface and carried to surface waters are also carried in to the groundwater system. This not only focus’ on agricultural areas, but on home lawns and gardens as well. These areas may be even more significant than first thought. The unintended over application at home is more likely than over application in other areas due to precision equipment.

Working with homeowners to install native short grasses similar to Kentucky blue grass (i.e. buffalo grass), the use of rain barrels, or the installation of rain gardens are great ways to alter the property landscape and improve the look of the landscape at the same time. These practices will also help slow down the movement of water, improve infiltration, and decrease chemical use. This helps protect and improve water quality and improve infiltration of water into groundwater storage.

These projects can be promoted in many ways. Working with the local urban conservation and local youth groups to install these projects in public places to promote their use can lead to other members of the community installing them. An intensive education campaign promoting the benefits is an excellent starting point to explain the why and the how. The biggest thing is educating the residents and groups that want to install these strategies is that it takes time for these projects to take hold and grow on their own. A rain garden and native grasses do not take hold overnight, and at first they look a little unsightly. Once they are established (two to three years), they look like manicured spaces that provide flowering plants.

Goal
- Public education about the practices and implementation times
- Convert low impact public areas to native turf
- Work with a community service organization to install and care for a rain garden project
- Encourage the use of more practices over time
- Promote proper lawn care techniques
- Promote proper lawn watering

Results
This project has been discussed by the committee.

3. **Install well protection/security barriers near well #5**
   a. Cost: Barriers, staff time for installation
   b. Goal: Barriers around well #5
   c. Timeline: Fall 2014
d. Contact:
   i. Pat Neuhring, Water Superintendent, City of Sheffield

e. Implementation Status: Complete – Summer 2014

Project Description
Well #5 is located in an area that is used for parking near the athletic fields. Upon observation during a site visit, it was observed that vehicles use this area for parking during athletic events (football, baseball, softball games). These are high school events, and the potential for somebody accidentally damaging the well is higher than in other locations. It should also be considered that the grassy area along the wells be roped off from all parking to prevent leaking automobile fluids from impacting the well.

Goal
- Concrete barriers or fencing to protect the well from damage
- Roped/fenced off grassy area to prevent parking anywhere near the well

Results
After discussing the initial project ideas and benefits during a preliminary meeting, the utility decided to install barriers around well #5. Currently, the barriers are wooden to alert drivers they are approaching a well, but other options are under consideration for long term protection.

4. Install native short grasses around the wellhead and install fencing/barrier around the plantings to prevent parking during athletic events
   a. Cost: Staff Time, Native Grass seed/plugs/sod
   b. Goal: Around wells #2, #5, #6
   c. Timeline: Spring 2016
   d. Contact:
      i. Pat Neuhring, Water Superintendent, City of Sheffield
   e. Implementation Status: Complete

Project Description
The public wells are located in areas that are used for parking lots for high school athletic events. Discussion by the committee led to replanting grasses around the wells due to construction near well #2. The City is installing a new pad around well #2 and US Cellular is installing a new cell facility on the water tower, requiring replanting of grasses. The discussion then led to installing native short grasses that require little maintenance and little water. The possibility of replacing existing grasses around all wells was discussed.

The benefits of native turf grasses are removing the parking threat around the wells by placing a fenced area round the native plantings. The root system will also use excess nutrients in the top
8-10ft of the soil profile (length of buffalo grass root systems). This can help filter some of the water that is moving downward in the soil profile and mitigate the threat of nitrate contamination.

**Goal**
- Plant native short grasses such as buffalo grass around the public wells
- Install a fence/barrier to prevent parking around the wells

**Results**
This project has been discussed by the source water protection committee.

5. **Develop a 200ft zone of control ordinance with IDNR mandatory setback distances**
   a. Cost: Ordinance Change Costs
   b. Goal: Ordinance amendment
   c. Timeline: Fall 2015
   d. Contact:
      i. City Clerk, City of Sheffield
   e. Implementation Status:

**Project Description**
The IAC requires that all wells drilled after 1979 are required to have 200ft of control. This can be established through land purchases, ordinances or easements. Sheffield’s public wells were drilled in 1980 (Well #4) and 2001 (Well #5). The wells do not appear to have this in place according to discussions with the utility management. Both wells are required to have this setback requirement. Investigation of records indicate the City owns a majority of the 200ft radius. Historical aerial photos also show that when the well was constructed and approved, the combination county-city shop was not in its current location. Working to ensure that chemicals are stored properly and securely on surfaces that are impenetrable should be completed.

Reference: Iowa Administrative Code, Environmental Protection Committee, 567, Chap. 43.3(7) Water Supplies - Design and Operation
Goal
Implement the new ordinance within one year of the completion of the Source Water Protection Plan (Fall 2014).

Results
The committee has discussed this management strategy.

6. Work with homeowners to ensure that all wells that are not in use are plugged
   a. Cost: Homeowner with County Cost Share
   b. Goal: All wells in Sheffield
   c. Timeline: As the wells are located
   d. Contact:
      i. Pat Neuhring, City of Sheffield
   e. Implementation Status: Committee Discussed

Project Description
Plugging private wells will eliminate the potential pathways of contamination to the aquifer from wells that are no longer in use. These wells can act as conduits for contamination through failing casing, vandalism, or neglect in maintenance (i.e. missing or degraded well cap).

In most counties, the County Sanitarian’s office has discretionary funds to assist private homeowners with the plugging of these wells. This is likely a cost share initiative with the county covering a portion of the materials and/or labor.

The Iowa Administrative Code, Section 567, Chapter 39 contains the following regarding private wells:

"Abandoned well" - means a water well which is no longer in use or which is in such a state of disrepair that continued use for the purpose of accessing water is unsafe or impractical.

39.5(4) - Wells abandoned after April 25, 1990. All classes of wells which are abandoned on or after April 25, 1990, must be properly plugged within 90 days of the date of abandonment.

This requires owners of wells that are no longer in use or in disrepair to plug them within 90 days of abandoning.

Goal
- Locate private wells during normal water supply activities (i.e. meter reads/checks)
Conduct an inspection of the home to ensure that there are no cross connections between the well and the public water supply

- Recommend that wells that are found be plugged
- If the well is found to be in a deteriorating condition, a cross connection is found, or the well is not used require the well owner to plug the well and provide the contact information for the Franklin County Sanitarians office
  - Follow up in 30 days to check progress
  - Follow up within 90 days to ensure the well has been plugged (require City notification)
- If the well is in good condition, in use, and no cross connections are found, recommend that the well be plugged
  - Follow up in 6 months to check progress
  - Follow up in one year to complete a status check on the well
- Require copies of the well plugging record be sent to the City/Water Department

Results
The committee has discussed this management practice. There have not been any wells located in Sheffield, but that doesn’t mean that they do not exist.

7. Develop and institute a backflow prevention program for larger water users in Sheffield
   a. Cost: Ordinance development, enforcement
   b. Goal:
      i. Ordinance requiring a backflow prevention device with annual testing for large water users
      ii. Encourage residents to swap out older hose bibs for new ones with anti-siphon devices
   c. Timeline: Fall 2015
   d. Contact:
      i. City Clerk, City of Sheffield
      ii. Pat Nuehring, Water Superintendent, City of Sheffield
   e. Implementation Status: Committee Discussed

Project Description
Backflow prevention is becoming more and more important for community water supplies. Homeowners are now required to install outdoor faucets with self-contained backflow devices when they are replaced/upgraded. Many large users, such as the coop, already have air gaps on overhead filling stations. The goal of this is to prevent water that may be contaminated in some way (chemical fill tank/wash bucket with dirty water and hose in it) from being sucked back into the distribution system if negative pressure is created.

The simplest way to do this is to require large water users (schools, fertilizer mixing facilities, etc.) to install backflow prevention devices to ensure that water does not enter the distribution
system. Negative pressure, which can draw water back into the system, occurs more often than we realize. This occurs during firefighting, hydrant flushing, or other large withdraws as water normally moves through the distribution system. For community health, it is necessary to ensure that water containing chemicals does not re-enter the distribution system.

Backflow prevention programs are already required in large communities. To ensure compliance, the backflow devices must be tested annually with a report sent to the city and kept on file.

**Goal**
- The goal is to develop an ordinance and guidance for a backflow prevention program for the City of Sheffield with mandatory reporting. These reports must be sent to the Water Department to ensure compliance with the ordinance.
- Encouraging homeowners to replace hose bib connections newer ones with anti-siphon devices will protect the distribution system from accidental backflow during negative pressures

**Results**
This project has been discussed by the committee.

8. **Install Water Supply Protection Area Signs in a visible area**
   a. Cost: Staff Time – IRWA Will Supply the Signs
   b. Goal: 2 or 3 signs in the capture zone
   c. Timeline: Fall 2014
   d. Contact:
      i. Brent Beste, Source Water Specialist, Iowa Rural Water Association
      ii. Pat Neuhring, Water Superintendent, City of Sheffield
   e. Implementation Status: Committee Discussed

**Project Description**
Alerting residents and those passing by of the sensitive areas may reduce the chance of illegal dumping, vandalism, and raise awareness of the water source. IRWA Provides these signs at no cost to community’s that are completing source water protection plans and will assist with locating them.

**Goal**
- Two or three signs in visible locations in the capture zone.

**Results**
This project has been discussed by the committee.

9. **Complete Sewer Smoke Blowing for I & I to attempt to locate failure points in the sanitary sewer collection system**
   a. Cost: Staff Time, Liquid Smoke (~$50/gallon)
   b. Goal: Source Water Capture Zone
c. Timeline: Late Summer/Early Fall 2014

d. Contact:
   i. Pat Nuehring, Water Superintendent, City of Sheffield
   ii. Equipment and Assistance from: Iowa Rural Water Association

e. Implementation Status: Committee Discussed

**Project Description**
Completing regular maintenance and inspections on the sanitary sewer system is good practice to ensure the system meets regulatory requirements. This also helps determine sources of I&I (infiltration and inflow). Any location where water can get into the system, water can also get out. Ensuring that water is not getting into the system will help make sure that the drinking water system is not compromised.

Sanitary sewers are also a source of one of the emerging contaminants in groundwater. Groundwater investigations in Ames, IA and Madison, WI have found traces of short living viruses, pharmaceuticals, and other traces of human activity in deep wells. The wells where these contaminants were found were thought to be well protected from surface activities. There currently is no guidance or confirmation to verify the source of the contaminants found. However, studies are leaning towards leaking sanitary sewers and other sources of raw sewage as the source of contamination.

Smoke blowing is a great starting point. When it is dry, it is possible that smoke will come out of the ground near locations where the sewer system is leaking. Iowa Rural Water Associations Wastewater Technicians are available to assist the City with this project at no cost to the city, with the exception of consumables such as the liquid smoke.

If areas of concern are found, it might be wise to use a sewer camera to complete a visual inspection of the area of concern. This could save time and money by determining how extensive the damage is, and what course of action will be needed. It could be as simple as lining the sewer main, or as complicated as line replacement. Each bring their own challenges, but conducting the visual inspection can save time and money vs. digging first.

**Goal**
- Smoke blow the sanitary sewer in the capture zone

**Results**
This project has been discussed by the committee.
10. Work with the School system to eliminate application of chemicals within 200ft of the public wells and reduce chemical use on all athletic fields
   a. Cost: Staff Time
   b. Goal: All athletic fields
   c. Timeline: Fall 2014
   d. Contact:
      i. Pat Nuehring, Water Superintendent, City of Sheffield
   e. Implementation Status: Committee Discussed

Project Description
Eliminating application within 200ft of the public wells will put the City in compliance with IDNR and IAC requirements. Limiting application on property outside of this radius will mitigate the threat of contamination of groundwater resources.

Goal
• Work with the school district to eliminate application within 200ft of the well
• Work with the school district to limit application on all athletic fields in the capture zone.

Results
This project has been discussed by the committee.

11. Develop a relationship with local landowners to reduce nutrient impacts on the shallow well to ensure the deeper aquifer is not impacted
   a. Cost: Staff Time
   b. Goal: Agricultural property to the north of the wells
   c. Timeline: Begin by Fall 2015
   d. Contact:
      i. Pat Nuehring, Water Superintendent, City of Sheffield
   e. Implementation Status: Committee Discussed

Project Description
There are many benefits to developing a working relationship with the local landowners and operators. This will make the landowner/operator aware that they are farming in a community drinking water source. If a relationship exists, and a contaminant is found, the utility will then know who to call for more information. It is also beneficial if agricultural chemical concentrations start to slowly increase. This allows the utility time to work with the landowners/operators to improve management in conjunction with the utility instead of on their own. The utility can also promote practices such as those listed below to protect the drinking water source before something happens.

Row Crop Soil and Water Conservation Practices
• Conservation Reserve Program (CRP): Wellhead and General Sign Up Programs
Benefits
- Guaranteed income
- Long term contracts (10-15yrs)
- Increased wildlife habitat
- Increased infiltration
- Increased nutrient up take

Downfalls
- Annual Maintenance
- Loss of Crop Land

Nutrient Management: Fertilizer Timing (side dress nitrogen when needed), Spring Only Application, Follow IA State Application Recommendations

Benefits
- Decreased application (lower fertilizer costs)
- Decreased fertilizer loss

Downfalls
- Proper timing is necessary

Cover Crops

Cover Crop Benefits
- Decrease soil loss
- Increase soil organic matter
- Increase wildlife
- Increase infiltration
- Sequester and scavenge residual nitrogen

Cover Crop Downfalls
- Cost – Yearly seed and planting costs
- Crop insurance timing issues
- Initial increase in nutrient needs
- Herbicide used to kill crop in the spring

Install Buffers near streams and wellheads

Benefits
- Increased infiltration
- Decreased sediment loss to streams
- Increased wildlife habitat
- Increased infiltration at edge of field

Downfalls
- Loss of crop ground
- Cost of installation

Prairie Strips (Newer Program)
Benefits

- Only requires strategic placement of prairie strips in 10% of a field/watershed
  - Removes significant quantities of nitrogen and phosphorus
- Eligible for General and Continuous CRP
- Relatively low costs

Downfalls

- Loss of Farmland
- Costs
- Maintenance – ensure not damaging during planting/harvest

Other soil and water conservation practices that improve surface water/groundwater quality

- Grassed Waterways
- Conservation Crop Rotations
- Terraces
- Bioreactors/edge of field improvements

Funding Sources

- USDA
  - EQUIP (Federal Cost Share)
  - CRP Programs (Federal Rental Payments, possible city incentives)
  - Cost Share Programs (City, County, State, Watershed)
- WIRB (Watershed Improvement Review Board)
  - Dedicated project funding (land purchase, structures, wetlands)

Sources

- 2014 Continuous CRP Fact Sheet, June 2014 – USDA-FSA
- 2014 EQUIP Key Iowa Practices for General Funding, June 2014 – USDA-NRCS
- Cover Crops to Improve Soil Iowa Fact Sheet, June 2013, USDA-NRCS
- Small Changes, Big Impacts: Prairie Conservation Strips, March 2014 – STRIPS Program

Goal

- Develop relationship
- Raise awareness
- Encourage nutrient and chemical application adjustments within 200ft of the well
- Promote agricultural management practices
  - Eliminate fall fertilizer application
  - Decrease amounts of fertilizer needed
  - Wellhead CRP
  - Cover Crops
  - Enhanced buffers and for nutrient management and increased wildlife

Results

This project has been discussed by the committee.
12. Develop Geothermal Well installation guidance, especially within the capture zone
   a. Cost: Ordinance development
   b. Goal: Ordinance guiding development and placement
   c. Timeline: Fall 2016
   d. Contact:
      i. City Clerk, City of Sheffield
      ii. Pat Nuehring, Water Superintendent, City of Sheffield
   e. Implementation Status: Committee Discussed

Project Description
Develop an ordinance guiding the development, placement, and installation of geothermal wells in the City of Sheffield. Geothermal systems, specifically large deep systems, can impact the drinking water source. These generally require numerous wells to supply the necessary heating/cooling of the facility where they are installed. The more wells that are installed, the more pathways to the aquifer that are created, and the higher the chance of well failure.

The ordinance should be a guide to the maximum depth and establish separation distances from the public water supply wells. Guidance could ensure that deep systems are not placed in areas near the well (still allowing horizontal systems), and that no systems are allowed within a certain distance. It might also be advantageous to enact a permit fee to locate all systems using a GIS Database containing pertinent information including GPS coordinates of the system. This ensures that the location is known to prevent accidental damage of the system.

Goal
Develop a geothermal ordinance to guide the placement location and depth of geothermal systems in Sheffield.

- Sample ordinance provided by Iowa Rural Water Association
  o The sample provided will need to be altered to meet the needs of Sheffield. Since the geologic setting is different, local geothermal installers should be consulted to meet the needs of Sheffield.

- Ordinance Inclusions
  o Eliminate vertical systems within so many feet of a well
  o Eliminate all systems within so many feet of a well
  o Maximum well depth based on Geology (well doesn’t completely penetrate geologic protection layer) in the capture zone
  o Permit system with nominal fee to ensure City ordinances are met and that the system is in the proper location and GPS located

Results
The committee has discussed this management strategy.
13. Develop a monitoring plan and inspections of Well #2 to determine feasibility of bringing the well back online.
   a. Cost: Staff time, samples, downhole camera contract
   b. Goal: Develop a sample plan and well inspection plan for reopening well #2
   c. Timeline: Spring 2015
   d. Contact:
      i. Pat Nuehring, Water Superintendent, City of Sheffield
   e. Implementation Status: Committee Discussed

Project Description
The City is currently contracting with an engineer to complete a water study. One of the recommendations as part of the plan is exploring options for a new water supply well, or reopening well #2. Well #2 is a shallow well that has a history of nitrate problems, and was shut down in 2011 for that reason. In the past, the City blended water from well #2 with that of either well #4 or well #5 to reduce fluoride in the finished water. After a set of bad nitrate results, the operator at the time shut the well down. The local field office then recommended removing the well from public water supply operation due to the significant changes in water sampling, which included daily nitrate sampling.

The benefits of reopening the well would be that the city would not have to go through the process of drilling a new water supply well. There are a number of steps to take to determine if the well can be used, and starting with source water planning is a start.

Knowing nitrate issues are present, complete project #10 to begin reducing the source nitrate. The second is to develop a sampling plan to determine what the background nitrate is for the well, and if there are any annual spikes due to fertilizer applications. Another project would be to inspect the well to determine if the well casing is damaged due to corrosion or failure. Working with DNR field office #2 to determine the feasibility of this is a starting point.

Goal
- Develop a monitoring plan such as biweekly or monthly special nitrate samples to determine the extent of the nitrate issues from all wells (#2, #4, and #5)
- Complete a visual inspection of the well
  o Downhole video camera of the well (well contractors can complete this)

Results
The committee has discussed this management strategy.
References

City of Nashville.  Rain Barrel Initiative.  


Iowa Administrative Code, Water Supply Codes, Chapter 41.  
http://search.legis.state.ia.us/NXT/gateway.dll/ar/iac/5670_environmental%20protection%20commission%20_5b567_5d/0410__chapter%2041%20water%20supplies/c_5670_0410.xml?f=templates$fn=default.htm. 7/29/2013


Iowa DNR.  Phase 1 Assessment for Sheffield Water Supply (PWS #3570037) Devonian.  8/6/2012


IDNR Natural Resources Geographic Information System Library. Various Map Layers.  


