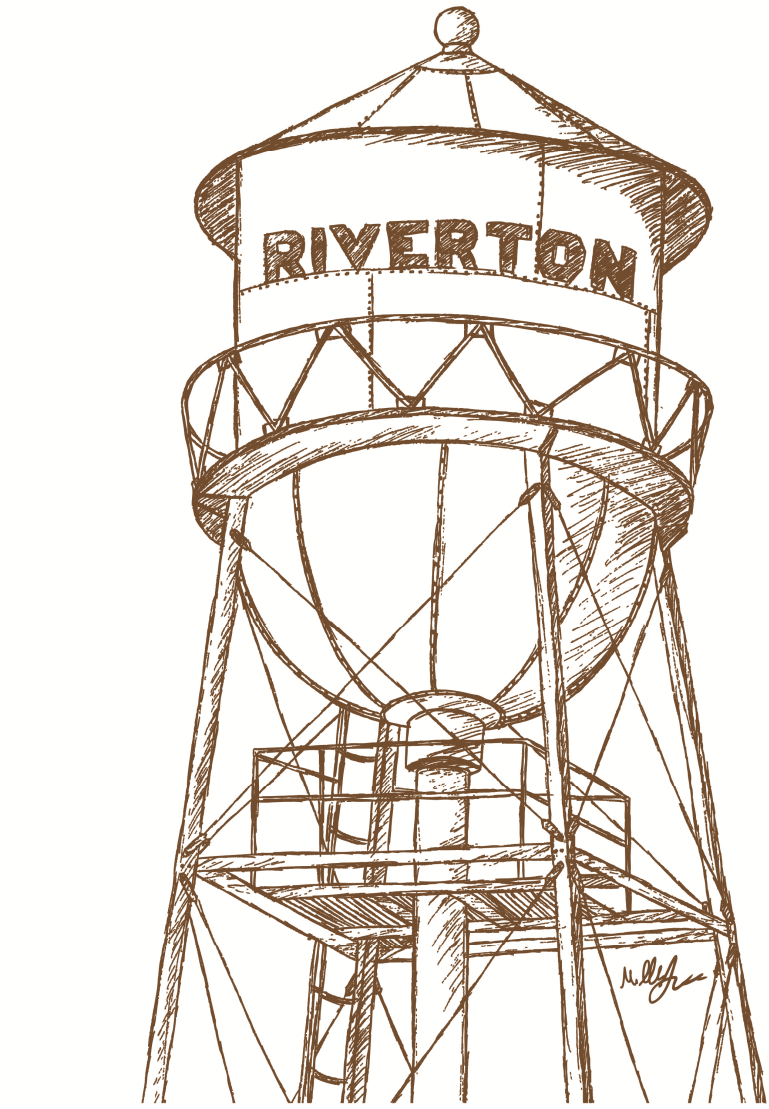
WELLHEAD PROTECTION PLAN
FOR THE

City of Riverton, MN



This plan is in effect from:
(To be completed upon final Plan approval)

FINAL DRAFT February 2014

Forward

This document presents the wellhead protection (WHP) plan for the City of Riverton which will help provide for an adequate and safe drinking water supply for community residents. It contains the following components:

- Assessment of the data elements used to prepare the plan;
- Delineation of the wellhead protection area;
- Delineation of the drinking water supply management area;
- Assessments of well and drinking water supply management area vulnerability;
- Impact of land and water use changes on the public water supply well(s) used by the water supplier;
- Issues, problems, and opportunities affecting the well(s), well water, and the drinking water supply management area;
- Wellhead protection goals for this plan;
- Objectives and plan of action for achieving the wellhead protection goals;
- Evaluation program for assessing the effectiveness of this plan; and
- Contingency strategy to address an interruption of the water supply.

Water Supply Wells Included in This Plan

Unique Number	Well Name or Number	Use/Status[1]
241291	**Well #1**	**E**
135004	**Well #2**	**P**
130547	**Well #3**	**P**

[1]P = Primary Water Supply Well, E = Emergency Backup Well, S = Seasonal Well

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Crow Wing County
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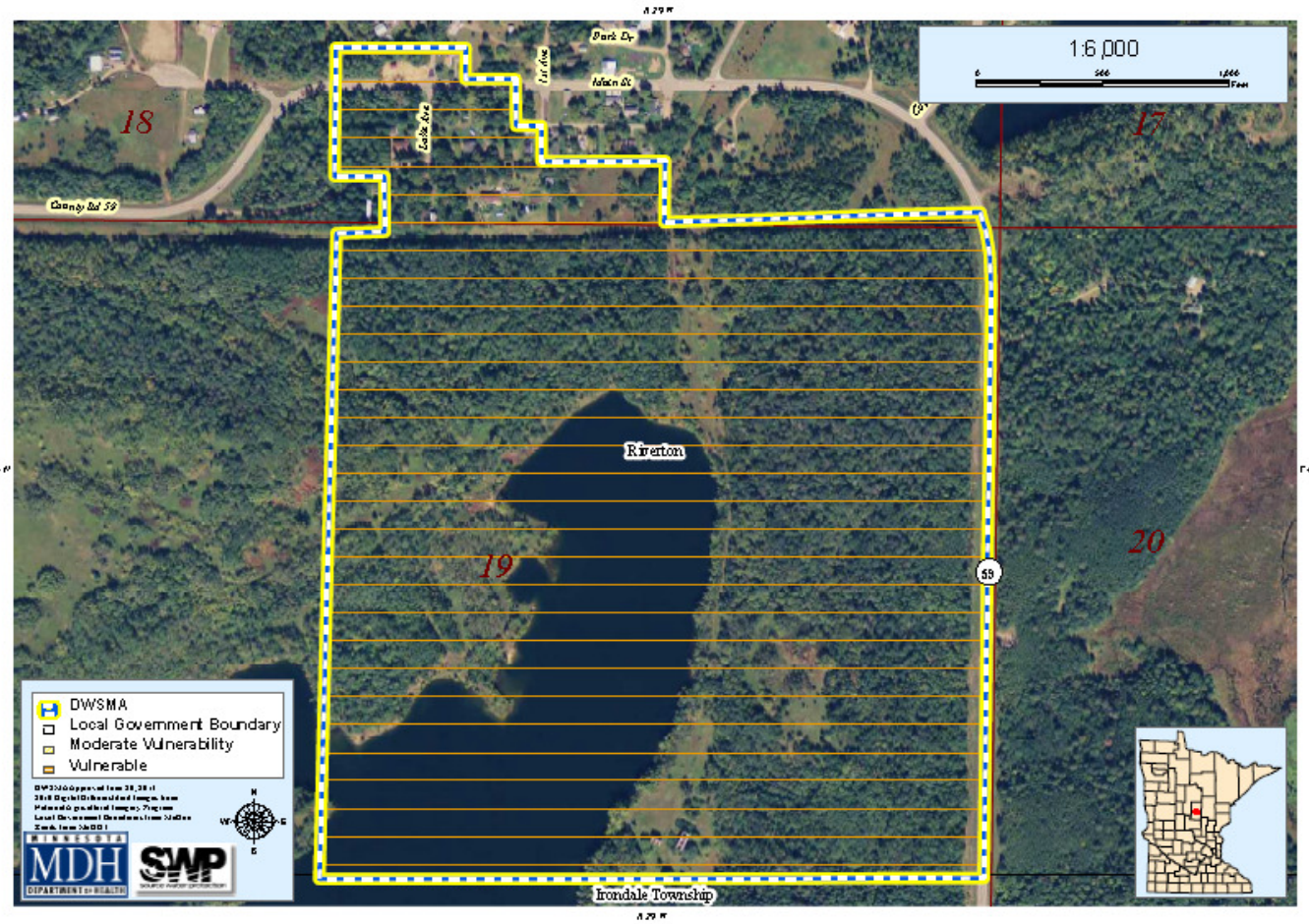
Minnesota Department of Health
Environmental Health
Source Water Protection Unit



Chapter 1 - Introduction

1.1 Background

The wellhead protection (WHP) plan for the City of Riverton was prepared in cooperation with the Minnesota Department of Health (MDH), and the Minnesota Rural Water Association. It contains specific actions the city will take to fulfill WHP requirements that are specified under Minnesota Rules, part 4720.5510 to 4720.5590. The Plan also identifies the support that Minnesota state agencies, federal agencies, Crow Wing County, and others will provide, and is presented to identify their roles in protecting the city's drinking water supply. The plan is effective for 10 years after the approval date specified by MDH and the city is responsible for implementing its WHP plan of action, as described in Table 9 of this report. Furthermore, the city will evaluate the status of plan implementation at least every two-and-one-half years to identify whether its WHP plan is being implemented on schedule.

1.2 Plan Appendices

Much of the technical information that was used to prepare this plan is contained in the appendices but is summarized in the main body of this plan. In particular:

- Appendix I contains the first part of the plan, consisting of the delineation of the wellhead protection area (WHPA), the drinking water supply management area (DWSMA), and the vulnerability assessments for the public water supply well(s) and the DWSMA. This part of the plan is summarized in Chapter 3.
- Appendix II contains the inventory of potential contamination sources. This inventory is discussed in Chapter 4 in terms of assigning risk to the city's water supply and is also discussed in Chapter 6, relating to issues, problems or opportunities.
- Appendix III contains the contingency strategy to provide for an alternate water supply if there is a disruption caused by contamination or mechanical failure. This information is discussed in Chapter 11.
- Appendix IV contains copies of maps, figures and other supporting information utilized in the preparation of this WHP Plan.

Chapter 2 - Identification and Assessment of the Data Elements Used to Prepare the Plan

The data elements that are included in this plan were used to 1) delineate the WHPA and the DWSMA and to assess DWSMA and well vulnerability and 2) document the need for the WHP measures that will be implemented to help protect the city's water supply from potential sources of contamination. The city met with representatives from MDH on two occasions to discuss data elements that are specified in Minnesota Rules, part 4720.5400, for preparing a WHP plan.

The first scoping meeting, held on November 16, 2010, addressed the data elements that were needed to support the delineation of the WHPA, the DWSMA, and the well(s) and DWSMA vulnerability assessments. The second scoping meeting, held on August 6, 2013, discussed the data elements required to 1) identify potential risks to the public water supply and 2) develop effective management strategies to protect the public water supply in relation to well and DWSMA vulnerability. The results

of each meeting were communicated to the city by MDH through a formal scoping decision notice, and are presented in Appendix IV. Not all of the data elements listed in the WHP rule had to be addressed in the WHP plan because of the moderately vulnerable nature of the city's source of drinking water.

The following table presents the data element assessment results relative to the overall impact that each data element has on the four items listed in the column headed: **Present and Future Implications**.

Table 1 is the assessment of the present and future implications of the data elements on the four planning activities. The data elements that are shaded are not required or needed, as previously stated, because of the moderately vulnerable setting. These data elements are included in the table for information purposes only. The data elements that are marked high (H) are considered to have a direct implication or impact on the activity. Data elements that have an indirect or marginal impact on an activity are shown as moderate (M). A data element that has little if any impact is shown as low (L). The source of the data is shown under "Data Source."

Table 1 - Assessment Results for the Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation					
Geology					
Maps and geologic descriptions	M	H	M	H	MGS, DNR
Subsurface data	H	H	H	H	MGS, MDH, CWI, DNR
Borehole geophysics	H	H	L	H	None Available
Surface geophysics	M	M	L	M	None Available
Maps and soil descriptions					
Eroding lands					
Water Resources					
Watershed units	L	L	L	L	DNR, USGS
List of public waters	L	L	L	L	DNR
Shoreland classifications					
Wetlands map					
Floodplain map					
Land Use					
Parcel boundaries map	L	H	L	H	Crow Wing County
Political boundaries map	L	H	L	L	City, MnGEO
PLS map	L	H	L	L	MDH, MnGEO
Land use map and inventory	H	L	H	H	Sanborn Fire Maps, Historical Society, City Records, County
Comprehensive land use map	M	L	H	H	City, County
Zoning map	M	L	H	H	City, County
Public Utility Services					
Transportation routes and corridors	L	M	L	L	MnGEO, MnDOT

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Storm/sanitary sewers and PWS system map	L	M	L	L	SEH (City's Engineer)
Oil and gas pipelines map	L	L	L	L	None in DWSMA
Public drainage systems map or list	L	M	L	L	None in DWSMA
Records of well construction, maintenance, and use	H	H	H	H	City, CWI, MDH files
Surface Water Quantity					
Stream flow data	L	L	L	L	DNR, USGS
Ordinary high water mark data	L	M	L	L	DNR, USGS
Permitted withdrawals					
Protected levels/flows					
Water use conflicts	L	L	L	L	None Known
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR, City
Groundwater use conflicts	M	M	H	H	None Known
Water levels	H	H	H	M	CWI, MDH, City
Surface Water Quality					
Stream and lake water quality management classification					
Monitoring data summary					
Groundwater Quality					
Monitoring data	H	H	H	H	MDH
Isotopic data	M	M	M	M	MDH
Tracer studies	M	M	M	M	Not Available
Contamination site data	M	M	M	M	Not Available
Property audit data from contamination sites					
MPCA and MDA spills/release reports	M	M	M	M	City, MPCA, MDA

Chapter 3 - Delineation of the Wellhead Protection Area, Drinking Water Supply Management Area and Vulnerability Assessments

A detailed description of the process used for 1) delineating the WHPA and the DWSMA, and 2) preparing the vulnerability assessments of the city water supply well(s) and DWSMA is presented in Appendix I. The City of Riverton requested that MDH do this work and it was performed by Gail Haglund, who is licensed as a geoscientist by the State of Minnesota.

3.1 WHPA and DWSMA Delineation

Figure 1 (Page v) shows the boundaries of the DWSMA. The WHPA (See Appendix I) was delineated using computer simulations of groundwater movement to generate the underground capture zones for city Well #2 (Unique No. 135004), and Well #3 (Unique No. 130547).

The WHPA for Well 1 (241291) is defined by a using a circular area with a 200-foot radius that is called the inner wellhead management zone (IWMZ). This well does not have a formal capture zone because it is pumped for emergency use only. However, the IWMZ is used to protect the well from potential contamination sources that may cause an acute health impact should the well become operational.

The DWSMA boundaries were designated using the following criteria:

- Center-lines of highways, streets, or roads;
- Public Land Survey coordinates;
- Property parcel boundaries.

3.2 Well Vulnerability Assessment

The construction and water quality obtained from each primary and emergency backup well used by the City of Riverton is included in the assessment of well vulnerability. Wells #2 and #3 meet current State Well Code construction specifications, and the wells themselves do not provide a pathway for contaminants to enter the aquifer. However, water quality and isotope sampling of the drinking water supply aquifer indicates the presence of tritium, chloride, and bromide, which indicate that the aquifer is impacted by human activities at the land surface. Therefore, the vulnerability of the city wells is considered VULNERABLE.

3.3 DWSMA Vulnerability Assessment

The MODERATE vulnerability assigned to the DWSMA (Figure 1) was determined using geologic, soils, and groundwater chemistry information, which indicates that at least 10 feet of clay-rich geological material covers the source water aquifer. However, water chemistry and isotope data from the city wells indicate the aquifer contains young water which has been impacted by human activities at the land surface. Assigning a MODERATE vulnerability rating to the DWSMA is conservative and prudent.

Chapter 4 - Establishing Priorities and Assigning Risk to Potential Contamination Sources

The types of potential contamination sources that may exist within the DWSMA were derived from the information collected to satisfy the data element requirements (Chapter 2). The impact assigned to each data element as part of the assessment process (Table 1) was used to assess the types of potential contamination sources that may present a risk to the city's drinking water supply. The moderate vulnerability assessment for the DWSMA indicates that, generally, wells, other types of boreholes, excavations that may reach the aquifer, certain types of Environmental Protection Agency Class V Wells, storage tanks, and hazardous material spills are likely to impact the city wells.

4.1 Contaminants of Concern

None of the human-caused contaminants regulated under the federal Safe Drinking Water Act have been detected at levels indicating that any well itself serves to draw contaminants into the aquifer as a result of pumping. The following vulnerability indicators have been detected in the city wells: Tritium, and an elevated chloride/bromide ratio. Their presence indicates that the aquifer receives recharge over a relatively short (decades) time period and is likely to be directly impacted by human activities occurring at the land surface.

4.2 Inventory Results and Risk Assessment

A description of the locations of potential contamination sources is presented in Appendix II. A summary of the results for the IWMZ is listed in Table 2 and Table 3 presents these results for the remainder of the DWSMA. The priority assigned to each type of potential contamination source addresses 1) the number inventoried, 2) its proximity to a city well, 3) the capability of local geologic conditions to absorb a contaminant, 4) the effectiveness of existing regulatory controls, 5) the time required for the City of Riverton to obtain cooperation from governmental agencies that regulate it, and 6) the administrative, legal, technical, and financial resources needed. A **high (H)** risk potential implies that the potential source type has the greatest likelihood to negatively impact the city's water supply and should receive highest priority for management. A **low (L)** risk potential implies that a lower priority for implementing management measures is assigned.

Table 2 - Potential Contamination Sources and Assigned Risk for the IWMZ

Source Type	Total	Level of Risk
Domestic Well > 25 feet deep	0	H
High-Capacity Well (not a city well)	0	H
Unused-unsealed Well	0	H
Class V Injection Well	0	H
Monitoring Well	0	H
Transportation Corridor – County Road #59	1	H
Storage Tank	0	H

Table 3 - Potential Contamination Sources and Assigned Risk for the Rest of the DWSMA

Potential Source Type	Total Number	Number Within Emergency Response Area and Level of Risk		Number Within Remainder of the DWSMA and Level of Risk	
Monitoring Well	0	0	H	0	L
Domestic Well <25 feet deep	0	0	H	0	L
Domestic Well >25 feet deep	0	0	H	0	H
High-Capacity Well (not city well)	0	0	H	0	H
Unused-unsealed Well	0	0	H	0	H
Class V Well	0	0	H	0	H
Storage Tank	5	1	H	4	H
Transportation Corridor	1	1	H	0	H
Old Municipal Well (Outside of DWSMA)	1	0	H	1	H

Chapter 5 - Impact of Land and Water Use Changes on the Public Water Supply Well(s)

The city estimates that the following changes to the physical environment, land use, surface water, and groundwater-may occur over the 10-year period that the WHP plan is in effect (Table 4). This is needed to determine whether new potential sources of contamination may be introduced in the future and to identify future actions for addressing these anticipated sources. Land and water use changes may introduce new contamination sources or result in changes to groundwater use and quality. The anticipated changes may occur within the jurisdictional authority of the city, although some may not. Table 4 describes the anticipated changes to the physical environment, land use, and surface water or groundwater in relationship to the 1) influence that existing governmental land and water programs and regulations may have on the anticipated change, and 2) administrative, technical, and financial considerations of the City of Riverton and property owners within the DWSMA.

Table 4 - Expected Land and Water Use Changes

Expected Change (Physical Environment, Land Use, Surface Water, Groundwater)	Impact of the Expected Change On the Source Water Aquifer	Influence of Existing Government Programs and Regulations on the Expected Change	Administrative, Technical, and Financial Considerations Due to the Expected Change
Physical Environment: Resurgence in iron ore mining activities, or reclamation of existing waste ore materials stockpiles.	Iron ore pit mining activities have the potential to change the land surface configuration and may potentially intersect and impact the aquifer itself.	DNR - Division of Lands & Minerals. Controls the permitting, leasing of state-owned lands for mineral mining, oversees mining activities, and mine safety. MPCA – Issues air, emission, water discharge, solid & hazardous waste and noise environmental permits. EQB – Coordinates environmental review of proposed mining and related activities.	The City will need to maintain a close working relationship with the DNR, MPCA, and the EQB, in order to have input into the permitting and operation for any mining activities which have the potential to impact the drinking water aquifer utilized by the City.

Land Use: Current Residential land use has not changed significantly, however the entire area is becoming a tourist attraction.	Mountain biking, camping, horse trails, fishing and boating create a potential for an increase in water use.	The MN DNR Water Appropriation Permit process controls the amount of groundwater that may be pumped from public water supply wells.	The City should continue to monitor water usage and work with DNR to adjust the City's Water Appropriation Permit if water use exceeds permit current limits.
Surface Water: Recreational use of the Sagamore Mine Pit Lake	Increased motor boat use of the lake presents the potential for a spill of fuel on the lake surface.	MPCA - Spill Response. Crow Wing County Emergency Management. Local First responders.	Develop a local spill response plan with First Responders and Crow Wing County.
Ground Water Additional ground water use from new or existing high-capacity wells within one mile of the DWSMA could result in increased pumping of the source water aquifer	Additional groundwater use within the DWSMA presents concerns over water availability and potential contaminant loading to the City's water supply aquifer	The City will have to rely on the MDH well approval process and the DNR Water Appropriation Permit process to assure high capacity wells would not have a negative impact on the City water supply	An adequate water supply is vital to public health, safety and the economy of the City. Therefore, the City would need to determine technically and financially if City water could be supplied to a new, high-water-use customer

Chapter 6 - Issues, Problems, and Opportunities

6.1 Identification of Issues, Problems and Opportunities

The City of Riverton has identified water and land use issues and problems and opportunities related to 1) the aquifer used by the city water supply wells, 2) the quality of the well water, or 3) land or water use within the DWSMA. The city assessed 1) input from public meetings and written comments it received, 2) the data elements identified by MDH during the scoping meetings, and 3) the status and adequacy of the city's official controls and plans on land and water uses, in addition to those of local, state, and federal government programs. The results of this effort are presented in the following table, which defines the nature and magnitude of contaminant source management issues in the city's DWSMA. Identifying issues, problems and opportunities, including resource needs, enables the city to 1) take advantage of opportunities that may be available to make effective use of existing resources, 2) set meaningful priorities for source management and 3) solicit support for implementing specific source management strategies.

6.2 Comments Received

There have been several occasions for local governments, state agencies, and the general public to identify issues and comment on the city's WHP plan. At the beginning of the planning process, local units of government were notified that the city was going to develop its WHP plan and were given the opportunity to identify issues and comment. A public information meeting was held on August 7, 2013, to review the results of the delineation of the wellhead protection area, DWSMA, and the vulnerability assessments. The meetings of the city's wellhead protection team were open to the public. Also, a public hearing was held before the completed WHP plan was sent to MDH for state agency review and approval. The following issues were identified during comment periods:

- Increased recreational use of the Sagamore Mine Pit Lake presents an opportunity for surface water contamination from fuel spills or leaks.
- Tim LaPara expressed concerns that the entire Sagamore Mine Pit Lake was not included in the delineated DWSMA.

Table 5 – Issues, Problems, and Opportunities

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
No unused – unsealed wells on residential properties have been identified, however, the possibility exists there may be some.	Aquifer Well water quality DWSMA	The city needs to continue an inventory to identify any unused wells, and assess which wells present a threat to the aquifer based upon their depth, construction, and state of repair.	The city can partner with Crow Wing County, or the Crow Wing SWCD, to help property owners pay for the costs of properly sealing unused wells. The city can apply for a MDH SWP grant to help defray the cost of sealing unused wells.	The city does not have authority to require that unused wells be properly sealed. The MDH has authority to require well sealing.
The City recognizes this is a 10-year plan and that issues, problems, and opportunities can change, from current status, which can impact the implementation strategies.	Public Health, Aquifer, DWSMA and Well Water Quality	The City must have the flexibility to address changing situations.	The City has the opportunity to address those issues, problems and opportunities that may change over the next 10 years.	The City, local and state governments have existing controls in place to address most issues as they occur. The City, local and state governments are continually updating land use controls as new issues, new problems and new opportunities occur.
The City has limited resources to implement all of the management strategies contained within this WHP Plan.	DWSMA	With limited resources the implementation of the WHP Plan will be a challenge to the City.	Form working partnerships with local units of government, state agencies and cooperators that have regulatory authority and/or programs to help with implementation.	City has limited time and resources for implementation. Apply for MDH SWP Implementation Grants to help with financial issues.
Sampling of the aquifer, at Wells #2 & #3 conducted in 2011, showed an elevated Tritium level.	Aquifer DWSMA	Potential exists regarding the integrity of the casing on Wells #2 & #3.	If the opportunity presents during well maintenance or rehabilitation, video log both wells to determine any potential casing defects.	Apply for MDH SWP Implementation Grants to help with financial issues.
Surface water impact on the aquifer from area mine pit lakes.	Aquifer DWSMA	Need to better define the understanding of the surface-groundwater interaction in the area.	With assistance from the MDH hydrologist, and subject to the availability of funding, prepare and implement a groundwater and surface water monitoring plan.	Apply for MDH SWP Implementation Grants to help with financial issues.
Vehicular transportation routes through the DWSMA.	Aquifer DWSMA Well Water Quality	Potential spills and leaks from vehicles and accidents.	The City will work with local first-responders and Crow wing County to develop an emergency response plan for contaminant releases.	Crow Wing County Emergency Management Department is responsible for coordinating County emergency preparedness
Unprotected Above-Ground storage tanks.	Aquifer, Well water quality, public health	Above-ground storage tanks without secondary containment can leak and contribute to GW contamination.	Work with landowners to have secondary containment placed around all above-ground storage tanks where practical.	MPCA Tanks unit. MDH SWP Implementation Grant Program

Historic mining company operations in the NW 1/4 of the NE 1/4 of Section 19-46-29	Aquifer DWSMA Well Water Quality	Office complex, shops, maintenance, storage facilities, and fuel/fuel oil storage tanks were removed in the early 1960's.	Contact the MPCA, citizens, and local mining historians, to determine status of any removed storage tanks or history of spills at the site	MPCA Tanks Unit. MDH SWP Implementation Grant Program
Elevated chlorides in the city wells (Sampling in 2011).	Aquifer DWSMA	Need to identify the source of the chlorides, which indicate a strong connection between the aquifer, wells, and local land use activities.	With assistance from the MDH hydrologist, and subject to the availability of funding, investigate whether the occurrence of elevated chlorides is seasonal, and assess the impact of local land use activities.	Apply for MDH SWP Implementation Grants to help with financial issues.
Improve future delineation and vulnerability assessments.	Aquifer DWSMA	Lack of local subsurface information.	Work with MDH to accurately locate any new wells constructed in an area defined by the hydrologist.	Well log information from well drillers. Apply for a MDH SWP Implementation Grant to help with financial issues.
Old City Well #1	Public Health Safety	The original dug city well presents a public health and safety hazard.	With the assistance of MDH Well Management, explore options for sealing this well.	Apply for MDH SWP Implementation Grants to help with financial issues to seal the well, if practical.

Chapter 7 - Existing Authority and Support Provided by Local, State, and Federal Governments

In addition to its own controls, the City of Riverton will rely upon partnerships formed with local units of government, state agencies, and federal agencies with regulatory controls or resource management programs in place to help implement its WHP plan. The level of support that a local, state, and federal agency can provide depends on its legal authority, as well as the resources available to local governments.

7.1 Existing Controls and Programs of the City of Riverton

Table 6 shows the legal controls and/or programs that the city has identified to support the management of potential contamination sources within the DWSMA.

Table 6 - Controls and Programs of the City of Riverton

Government Unit	Type of Program	Program Description
City Council	Land-use Ordinances Subdivision Ordinance	The City Council should be encouraged to develop adequate local ordinances with which to identify goals and priorities impacting current and future land uses, water quality, and overall community development.
City Council	Building Setback Ordinance.	Controls structure setbacks from property lines and the road ROW.

Public Works	1. Construction, repair and maintenance of City roads & streets 2. Construction, repair, and maintenance of City water and sewer utilities 3. Water use 4. Parks and Recreation	1. Specifies the design, construction, and maintenance of City roads & streets, and storm water related to them. 2. Governs the design, construction and maintenance of City water and sewer utilities. 3. Property owners within the City limits are required to connect to City water and sewer. 4. The City staff operates and maintains all city parks, R.O.W., open areas and green space.
Emergency Management	Oversight and management of all public emergencies	The city staff coordinates all emergency activities with the City Council, Fire Department, Crow Wing County Sherriff, and the County emergency management department.

7.2 Local Government Controls and Programs

The following departments or programs within Crow Wing County may be able to assist the city with issues relating to potential contamination sources that 1) have been inventoried or 2) may result from changes in land and water use within the DWSMA:

Table 7 - Local Agency Controls and Programs

Government Unit	Name of Control/Program	Program Description
Crow Wing County Environmental Services Department	1. Land Use Permits 2. CUP 3. Water Planning 4. SSTS	1. Regulates land-uses to comply with zoning ordinances. 2. Specifies performance standards needed to offset environmental risk presented by a proposed land use. 3. Establishes countywide goals and priorities towards protecting water resources. 4. Sets standards for construction and maintenance of on-site sewage treatment systems.
Crow Wing County SWCD	Well Sealing	Provides a cost share to seal unused wells.

7.3 State Agency and Federal Agency Support

MDH will serve as the contact for enlisting the support of other state agencies on a case-by-case basis regarding technical or regulatory support that may be applied to the management of potential contamination sources. Participation by other state agencies and the federal government is based on legal authority granted to them and resource availability. Furthermore, MDH 1) administers state regulations that affect specific potential sources of contamination and 2) can provide technical assistance to property owners to comply with these regulations.

The following table identifies the specific regulatory programs or technical assistance that state and federal agencies may provide to the City of Riverton to support implementation of the WHP plan. It is likely that other opportunities for assistance may be available over the 10-year period that the plan is in effect due to changes in legal authority or increases in funding granted to state and federal agencies. Therefore, the table references opportunities available when the city's WHP plan was first approved by MDH.

Table 8 - State and Federal Agency Controls and Programs

Government Unit	Type of Program	Program Description
MDH	State Well Code (Minnesota Rules, Chapter 4725)	MDH has authority over the construction of new wells and the sealing of wells. MDH staff in the Well Management Program offer technical assistance for enforcing well construction codes, maintaining setback distances for certain contamination sources, and well sealing.
MDH	WHP	MDH has staff that will help the city identify technical or financial support that other governmental agencies can provide to assist with managing potential contamination sources.
DNR	Water appropriation permitting (Minnesota Rules, Chapter 6115)	DNR can require that anyone requesting an increase in existing permitted appropriations, or to pump groundwater, must address concerns regarding the impacts to drinking water if these concerns are included in a WHP plan.
DNR	Division of Lands & Minerals – Mining Activity Permits & Regulation	Leases state-owned lands and mineral rights for iron ore and/or taconite exploration and mining. Issues permits for exploration and mining activities. Oversees the reclamation of closed mine operations.
MPCA	Air emission, water discharge, solid/ hazardous waste, and noise environmental permits	Has authority for the issuance of air emission permits, water discharge permits, solid & hazardous waste permits, and noise permits.
MN EQB	Environmental Review	Coordinates the environmental review process for mining activities.
US EPA	Class V Injection Wells	Class V Injection Wells are not allowed within a Wellhead Protection Area. US EPA Region V has primacy over Class V wells in Minnesota, and will work with the landowner to have the Class V well sealed.

7.4 Support Provided by Nonprofit Organizations

The Minnesota Rural Water Association (MRWA) has provided technical assistance to the City of Riverton throughout the development of this WHP Plan and will assist the City with implementing its WHP Plan by providing: 1) referenced educational and outreach materials for land owners, 2) technical assistance for implementing individual WHP action items listed in this Plan, and 3) support to the City for assessing the results of Plan implementation.

Chapter 8 - Goals

Goals define the overall purpose for the WHP plan, as well as the end points for implementing objectives and their corresponding actions. The WHP team identified the following goals after considering the impacts that 1) changing land and water uses have presented to drinking water quality over time and 2) future changes that need to be addressed to protect the community's drinking water:

- Maintain a safe and adequate drinking water supply for residents, visitors and neighbors;
- Prevent contaminants from reaching levels that present a risk to people's health;
- Provide area residents with educational materials and other resources to assist with drinking water protection issues:
    - Private well use, maintenance and sealing assistance;
    - Maintenance and operation of above and below-ground storage tanks;
    - Transportation corridor and spill emergency preparedness plan;
    - Continuing data collection;
    - Scheduled WHP Plan evaluation

Chapter 9 - Objectives and Plan of Action

Objectives provide the focus for ensuring that the goals of the WHP plan are met and that priority is given to specific actions that support multiple outcomes of plan implementation.

Both the objectives and the wellhead protection measures (actions) that support them are based on assessing 1) the data elements (Chapter 2), 2) the potential contaminant source inventory (Chapter 4), 3) the impacts that changes in land and water use present (Chapter 5) and 4) issues, problems, and opportunities referenced to administrative, financial, and technical considerations (Chapter 6).

9.1 Objectives

The following objectives have been identified to support the goals of the WHP plan for the City of Riverton:

1. Create public awareness and general knowledge about the importance of WHP for maintaining an adequate and safe drinking water supply.
2. Collect additional data to substantiate information contained within this Plan, and to provide more detail for future Plan amendments.
3. Provide landowners with best management practices and other information to assist with management of private property located within the DWSMA.
4. Provide direction to City and local planning bodies regarding future land use and development of property within the DWSMA.
5. Address issues associated with past and potential spills and leaks of hazardous materials on, or near, private storage tanks and vehicular routes through the DWSMA.
6. Provide emergency response coordination for any impact to, or endangerment of, the water supply system.
7. Carry out regular assessment and evaluation of the effectiveness of the various management strategies which have been implemented.

9.2 WHP Measures and Action Plan

Based upon the factors, the WHP team has identified WHP measures that will be implemented by the city over the 10-year period that its WHP plan is in effect. The objective that each measure supports is noted as well as 1) the lead party and any cooperators, 2) the anticipated cost for implementing the measure and 3) the year or years in which it will be implemented.

The following categories are used to further clarify the focus that each WHP measure provides, in addition to helping organize the measures listed in the action plan:

- Data Collection
- IWMZ Management
- Land Use Management
- Potential Contamination Source Management
- Public Education and Outreach
- Reporting and Evaluation
- Water Use and Contingency Strategy

9.3 Establishing Priorities

WHP measures reflect the administrative, financial, and technical requirements needed to address the risk to water quality or quantity presented by each type of potential contamination source. Not all of these measures can be implemented at the same time, so the WHP team assigned a priority to each. A number of factors must be considered when WHP action items are selected and prioritized (part 4720.5250, subpart 3):

- Contamination of the public water supply wells by substances that exceed federal drinking water standards.
- Quantifiable levels of contamination resulting from human activity.
- The location of potential contaminant sources relative to the wells.
- The number of each potential contaminant source identified and the nature of the potential contaminant associated with each source.
- The capability of the geologic material to absorb a contaminant.
- The effectiveness of existing controls.
- The time needed to acquire cooperation from other agencies and cooperators.
- The resources needed, i.e., staff, money, time, legal, and technical resources.

The City of Riverton WHP Team defines priority for implementing a WHP measure as starting with those potential contaminant sources that pose the most significant risk to the water supply. The following table lists each measure that it will implement over the ten year period the city's WHP plan is in effect as well as the priority that it has assigned to each measure.

Table 9 - WHP Plan of Action

Monitoring, Data Collection and Assessment																			
Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame													
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023				
1	H	With partners, verify the locations of new wells constructed within Section 19, the remainder of the city limits, and approximately 70+ acres to the west of the city limits. Send a letter to listed cooperators requesting to be notified of well construction activities in the DWSMA, including irrigation and high capacity wells.	2	MDH, DNR, Well Drillers		*	*	*	*	*	*	*	*	*	*				
2	H	During any planned well maintenance, and if possible, pull the pump from Well #2 and #3, and televise the casing for leaks. Assist the MGS to gamma log the well bore hole. Contact the MDH-SWP staff, to assist with analyzing the information gained from the down-hole work in order to improve on the delineation approach for future amendments of the WHP Plan. Pursue MDH SWP Grant funds to assist with this effort.	2	MDH, MGS	$10,000		*												
3	H	Contact the MDH SWP Program staff, to plan the city's help in gathering and submitting samples of the raw well water to determine if there are changes in the amount of the tritium isotope in the aquifer. MDH will pay for the laboratory costs.	2	MDH								*							
4	H	Contact Gail Haglund, MDH, to: (1) prepare a groundwater and surface water monitoring plan, and (2) coordinate staff and partners for the collection of water samples from the city wells, Little Rabbit Lake, and Sagamore Mine Lake, for stable isotope analysis, in order to confirm previous results that indicate limited surface water influence on the aquifer and city well. MDH will pay for the analytical work done at the MDH laboratory.	2	MDH						*									
5	H	Meet with MDH staff and partners to evaluate sampling data collected under items #3 & 4, and any new well information available, to enhance ground water flow modeling used for delineation of the WHPA for the city well for future Plan amendments.	2	MDH									*						
6	H	The City Council should carefully review and comment on any proposed land use changes being considered in the DWSMA, for potential impact on groundwater quality or quantity, and use land-use control options to minimize potential impact to the aquifer used by the city (require hookup to city utilities).	2,4	MDH, MRWA, County		*	*												
7	H	As a part of the monitoring conducted in measures 4 & 5, include a second goal of gaining a better understanding of the nature of the elevated chlorides in the city wells. This will include additional sampling of the chloride levels.	2,4	MDH, MRWA					*	*									

Inner Wellhead Management Zone (IWMZ)

Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame									
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
8	H	Assist MDH with updating the IWMZ Survey and address identified measures.	2	MDH, MRWA		*					*				
9	H	Implement measures that are specified in the Sanitary Survey, found in the Public Water Supply Routine Inspection Report received from MDH.	3	MDH, MRWA			*					*			
10	H	Monitor and maintain the 200' radius around the wells to insure that setback distances for new potential contaminant sources are met.	3			*	*	*	*	*	*	*	*	*	*
11	H	Arrange meetings with residents and identify resource needs of adjoining property owners to meet setback distances and/or manage potential contaminate sources.	3					*			*			*	

Land Use Planning

Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame									
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
12	H	Explore the feasibility of updating the City Comprehensive Land Use Plan, to identify water quality issues and control future development or growth within the City and DWSMA.	4	CWC Land Services				*	*						
13	H	Work with the County, DNR, EQB, MPCA, and MDH to stay abreast of the development of future mining activities within the DWSMA. Provide input into the environmental review and permitting processes in order to protect local aquifer water quantity and quality.	4	CWC, DNR, EQB, MPCA, MDH, MRWA		*	*	*	*	*	*	*	*	*	*
14	H	Update current City Land Use Controls, Zoning Ordinances and Subdivision Ordinance to include references to the DWSMA and groundwater water quality concerns.	4						*						
15	H	Meet with local planning staff(s), when they are updating comprehensive plans, to reflect existing WHP issues and identify changes in local controls that can be made to protect the community water supply wells and aquifer.	4	CWC Land Services					*						

16	H	In cooperation with MDH, League of Minnesota Cities and city planning staff, the City Council will consider the development of an ordinance that specifies the circumstances which control the placement of new private wells within the City's jurisdiction, and potential for hookup to city utilities.	4	MDH, League of MN Cities					*							

Potential Contaminant Source Management																		
Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame												
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023			
17	H	The location and status of the original dug city well have been verified. With the assistance of MDH Well Management, explore options for sealing this well located on the shore of Little Rabbit Lake. Apply for a MDH SWP Implementation Grant to defray any sealing costs	2	MDH MRWA	$5000		*											
18	H	Provide best management practices information to landowners where storage tanks are located. Explore the feasibility of installing secondary confinement for above-ground tanks.	2	MDH, MPCA	$2500		*											
19	H	Contact the MPCA, citizens, and local mining historians, to determine status of any removed storage tanks or the history of spills at the site of the old mine operations in Section 19.	2,5	MDH, Citizens	$750		*											
20	H	Notify MDH and/or DNR about any new or proposed High-Capacity wells located within two (2) miles of the DWSMA boundaries.	2	MDH, DNR			*			*			*					
21	H	Send a letter to request that MDH & DNR inform the City of Riverton when permits are granted for new wells, maintenance of existing wells, when existing wells are disclosed during property transfer, or when private wells are sealed.	2	MDH, DNR			*											
22	H	Arrange meetings with the local fire department, DNR Waters, the Crow Wing County Highway Dept., and Crow Wing County Emergency Management office to develop and implement a coordinated spill response plan for Co. Rd 59 and Sagamore Lake.	5,6	FD, CWC Highway & Emergency Management				*										
23	H	Continue to search for unused-unsealed wells within the DWSMA. If any are located, apply for MDH SWP Implementation Grant to assist landowners with sealing of identified wells.		MDH					*									

Education and Outreach

Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame									
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
24	M	Prepare an annual summary of wellhead protection activities for release to the public in a City newsletter, and post in public locations.	1,3			*	*	*	*	*	*	*	*	*	*
25	M	Prepare and distribute a handout, describing WHP activities and the status of Plan implementation, at community events.	1,3	MRWA	$150	*	*	*	*	*	*	*	*	*	*
26	M	Erect & maintain SWP informational signs at the entrances to the city.	1,3		$150		*								

Reporting & Evaluation

Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame									
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
27	M	Complete an Evaluation Report every 2.5 years that evaluates the progress of plan of action and the impact of any contaminant release on the aquifer supplying the water supply wells.	7	MDH, MRWA				*			*		*		
28	M	Summarize all WHP Plan implementation efforts in a report to MDH in the 8th year.	7	MDH, MRWA									*		
20	M	Hold meetings, as needed, with the WHP Team, local resource partners, and City Management, to discuss WHP Plan implementation activities, budget needs and pursue MDH SWP Grant funds to help with implementation efforts.	1,4	CWC Land Services		*	*	*	*	*	*	*	*	*	*
30	H	Maintain a WHP FOLDER or binder that contains records and documentation of all WHP activities the City has completed.	7			*	*	*	*	*	*	*	*	*	*

Water Use and Contingency Planning																
Measure	Priority	Description	Objective Addressed	City Action Alone Unless Cooperator is Noted	Cost	Implementation time frame										
						2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
31	H	Meet with City Fire Department to make them aware of drinking water vulnerability issues, so they can consider the DWSMA vulnerability when responding to fires or contaminant spills; specifically identify the impacts that firefighting or cleanup procedures may have on contaminant movement to city wells or the aquifer.	5	Fire Department		*					*				
32	H	Distribute the City's WHP Contingency Strategy Plan to identified cooperators. Review every 5 years and update if necessary. Coordinate emergency response initiatives with Crow Wing County.	5	CWC Emergency Management		*					*				

9.4 Commitments From Cooperators

The agencies listed in Table 10 have been requested to support the City of Riverton with implementing the WHP measure(s) in which they are identified. (See example letter to cooperating Agencies in Appendix IV).

Table 10 - Cooperating Agencies List

Agency	Measure
Minnesota Department of Health	1,2,3,4,5,6,7,8,9,13,17,18,19,20,21,23,27,28
Minnesota Department of Natural Resources	1,13,20,21
Minnesota Rural Water Association	6,7,8,9,13,17,25,27,28
Minnesota Geologic Survey	2
Crow Wing County Land Services	6,12,13,15,29
Crow Wing County Highway Department	22
Crow Wing County Emergency Management	22,32
Fire Department	22,31
League of Minnesota Cities	16
Well Driller(s)	1
DNR Lands & Minerals	13
MN EQB	13
MPCA	13

Chapter 10 - Evaluation Program

Evaluation is used to support plan implementation and is required under Minnesota Rules, part 4720.5270, and prior to amending the city's WHP plan. Plan evaluation is specified under Objective 7 and provides the mechanism for determining whether WHP action items are achieving the intended result or whether they need to be modified to address changing administrative, technical, or financial resource conditions within the DWSMA. The city has identified the following procedures that it will use to evaluate the success with implementing its WHP plan:

1. An annual briefing to the city council will provide the basis for documenting whether each action step for that year was implemented.
2. The WHP team will meet, at a minimum, every two-and-one-half years to assess the status of plan implementation and to identify issues that impact the implementation of action steps throughout the DWSMA;
3. The city will assess the results of each action item that has been taken annually to determine whether the action item has accomplished its purpose or whether modification is needed. Assessment results will be presented in the annual report to the city council.
4. The city will prepare a written report that documents how it has assessed plan implementation and the action items that were carried out. The report will be presented to MDH at the first scoping meeting held with the city to begin amending the WHP plan.

Chapter 11 - Contingency Strategy

The WHP plan includes a contingency strategy that addresses disruption of the water supply caused by either contamination or mechanical failure. The city prepared this strategy using a template provided by MDH and presented in Appendix III of this plan. A copy of this plan is available for public review during regular business hours at the city offices and is referenced in this section.

Chapter 12 - Glossary of Terms

Data Element. A specific type of information required by the Minnesota Department of Health to prepare a wellhead protection plan.

Drinking Water Supply Management Area (DWSMA). The surface and subsurface areas surrounding a public water supply well, including the wellhead protection area, that must be managed by the entity identified in the wellhead protection plan. (Minnesota Rules, part 4720.5100, subpart 13). This area is delineated using identifiable landmarks that reflect the scientifically calculated wellhead protection area boundaries as closely as possible.

Emergency Response Area (ERA). The part of the wellhead protection area that is defined by a one-year time of travel within the aquifer that is used by the public water supply well (Minnesota Rules part 4720.5250, subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA.

Emergency Standby Well. A well that is pumped by a public water supply system only during emergencies, such as when an adequate water supply cannot be achieved because one or more primary or seasonal water supply wells cannot be used.

Inner Wellhead Management Zone (IWMZ). The land that is within 200 feet of a public water supply well (Minnesota Rules, part 4720.5100, subpart 19). The City of Riverton must manage the IWMZ to help protect it from sources of pathogen or chemical contamination that may cause an acute health effect.

Nonpoint Source Contamination. Refers to contamination of the drinking water aquifer that is caused by polluted runoff or pollution sources that cannot be attributed to a specifically defined origin, e.g., runoff from agricultural fields, feedlots, or urban areas.

Point Source Contamination. Refers to contamination of the drinking water aquifer that is attributed to pollution arising from a specifically defined origin, such as discharge from a leaking fuel tank, a solid waste disposal site, or an improperly constructed or sealed well.

Primary Water Supply Well. A well that is regularly pumped by a public water supply system to provide drinking water.

Seasonal Water Supply Well. A well that is only used to provide drinking water during certain times of the year, either when pumping demand cannot be met by the primary water supply well(s) or for a facility, such as a resort, that is closed to the public on a seasonal basis.

Vulnerability. Refers to the likelihood that one or more contaminants of human origin may enter either 1) a water supply well that is used by the City of Riverton or 2) an aquifer that is a source of public drinking water.

WHP Area (WHPA). The surface and subsurface area surrounding a well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field (Minnesota Statutes, part 103I.005, subdivision 24).

WHP Plan Goal. An overall outcome of implementing the WHP plan, e.g., providing for a safe and adequate drinking water supply.

WHP Measure. A method adopted and implemented by a City of Riverton to prevent contamination of a public water supply, and approved by the Minnesota Department of Health under Minnesota Rules, parts 4720.5110 to 4720.5590.

WHP Plan Objective. A capability needed to achieve one or more WHP goals, e.g., implementing WHP measures to address high priority potential contamination sources within 5 years.

Chapter 13 - List of Acronyms

List of Acronyms

DNR	**-**	**Department of Natural Resources**
DWSMA	**-**	**Drinking Water Supply Management Area**
EQB	**-**	**Minnesota Environmental Quality Board**
ERA	**-**	**Emergency Response Area**
IWMZ	**-**	**Inner Wellhead Management Zone**
LUG	**-**	**Local Unit of Government**
MDH	**-**	**Minnesota Department of Health**
MGS	**-**	**Minnesota Geological Survey**
MnGEO	**-**	**Minnesota Geospatial Information Office**
MPCA	**-**	**Minnesota Pollution Control Agency**
MRWA	**-**	**Minnesota Rural Water Association**
SWCD	**-**	**Soil and Water Conservation District**
SWPA	**-**	**Source Water Protection Area**
WHP	**-**	**Wellhead Protection**
WHPA	**-**	**Wellhead Protection Area**

APPENDICIES:

APPENDIX I - PART 1 - Delineation and Vulnerability Report
APPENDIX II - Potential Contaminant Source Inventory
APPENDIX III - Water Supply Contingency Plan
APPENDIX IV - Maps, Figures & Supporting Documents

APPENDIX I - PART 1 - Delineation and Vulnerability Report

Wellhead Protection Plan

Part I

Delineation of Wellhead Protection Area
Drinking Water Supply Management Area Delineation
Well and Drinking Water Supply Management Area Vulnerability Assessments

Prepared for

City of Riverton

April, 2013

Gail Haglund, P.G., Hydrologist
Source Water Protection Unit

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Glossary of Terms

Data Element. A specific type of information required by the Minnesota Department of Health to prepare a wellhead protection plan.

Drinking Water Supply Management Area (DWSMA). The area delineated using identifiable land marks that reflects the scientifically calculated wellhead protection area boundaries as closely as possible (Minnesota Rules, part 4720.5100, subpart 13).

Drinking Water Supply Management Area Vulnerability. An assessment of the likelihood that the aquifer within the DWSMA is subject to impact from land and water uses within the wellhead protection area. It is based upon criteria that are specified under Minnesota Rules, part 4720.5210, subpart 3.

Emergency Response Area (ERA). The part of the wellhead protection area that is defined by a one-year time of travel within the aquifer that is used by the public water supply well (Minnesota Rules, part 4720.5250, subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA.

Inner Wellhead Management Zone (IWMZ). The land that is within 200 feet of a public water supply well (Minnesota Rules, part 4720.5100, subpart 19). The public water supplier must manage the IWMZ to help protect it from sources of pathogen or chemical contamination that may cause an acute health effect.

Wellhead Protection (WHP). A method of preventing well contamination by effectively managing potential contamination sources in all or a portion of the well's recharge area.

Wellhead Protection Area (WHPA). The surface and subsurface area surrounding a well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field (Minnesota Statutes, part 103I.005, subdivision 24).

Well Vulnerability. An assessment of the likelihood that a well is at risk to human-caused contamination, either due to its construction or indicated by criteria that are specified under Minnesota Rules, part 4720.5550, subpart 2.

Acronyms

CWI - County Well Index

DNR - Minnesota Department of Natural Resources

EPA - United States Environmental Protection Agency

FSA - Farm Security Administration

MDA - Minnesota Department of Agriculture

MDH - Minnesota Department of Health

MGS - Minnesota Geological Survey

MnDOT - Minnesota Department of Transportation

MnGEO - Minnesota Geospatial Information Office

MPCA - Minnesota Pollution Control Agency

NRCS - Natural Resource Conservation Service

SWCD - Soil and Water Conservation District

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

Introduction

The Minnesota Department of Health (MDH) developed Part I of the wellhead protection (WHP) plan at the request of the city of Riverton (public water supply identification number 1180025). The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590.

This report presents delineations of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA), and the vulnerability assessments for the public water supply wells and DWSMA. Figure 1 shows the boundaries for the WHPA and DWSMA. The WHPA is defined by a 10-year time of travel. Figure 1 also shows the emergency response area (ERA), which is defined by a one-year time of travel. An inner wellhead management zone (IWMZ), which is the area within a 200-foot radius around the well, serves as the wellhead protection area for emergency wells and is not displayed in this report. Definitions of rule-specific terms that are used are provided in the "Glossary of Terms."

This report also documents the technical information that was required to prepare this portion of the WHP plan in accordance with the Minnesota Wellhead Protection Rule. Additional technical information is available from MDH.

The wells included in the WHP plan are listed in Table 1.

Table 1 - Water Supply Well Information
City of Riverton

Local Well Name	Unique Number	Use/ Status [1]	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Well Vulnerability	Aquifer
1	241291	E	6	55	67	1973	Vulnerable	Glacial Deposits
2	135004	P	6	48	78	1977/2010	Vulnerable	Glacial Deposits
3	130547	P	6	53	64	1977/2010	Vulnerable	Glacial Deposits

Note: 1. Primary (P) or Emergency Backup (E) Well.

Assessment of the Data Elements

MDH staff met with representatives of the public water supplier on November 16, 2010, for a scoping meeting that identified the data elements required to prepare Part I of the WHP plan. Table 2 presents the assessment of these data elements relative to the present and future implications of planning items that are specified in Minnesota Rules, part 4720.5210.

Table 2 - Assessment of Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation					
Geology					
Maps and geologic descriptions	M	H	H	H	MGS, DNR
Subsurface data	M	H	H	H	MGS, MDH, CWI, DNR
Borehole geophysics	M	H	H	H	Not Available
Surface geophysics	L	L	L	L	Not Available
Maps and soil descriptions					
Eroding lands					
Water Resources					
Watershed units	L	L	L	L	DNR, USGS
List of public waters	L	L	L	L	DNR
Shoreland classifications					
Wetlands map					
Floodplain map					
Land Use					
Parcel boundaries map	L	H	L	L	Crow Wing County
Political boundaries map	L	L	L	L	City, MnGEO
PLS map	L	H	L	M	MnGEO, MDH
Land use map and inventory					
Comprehensive land use map					
Zoning map					
Public Utility Services					
Transportation routes and corridors	L	M	L	L	MnGEO, MnDOT
Storm/sanitary sewers and PWS system map	L	M	L	L	City
Oil and gas pipelines map					
Public drainage systems map/list	L	M	L	L	City, SWCD
Records of well construction, maintenance, and use	H	H	H	H	City, CWI, MDH Files
Surface Water Quantity					
Stream flow data	L	M	L	L	DNR, USGS
Ordinary high water mark data	L	M	L	L	DNR, USGS
Permitted withdrawals					
Protected levels/flows					
Water use conflicts	L	L	L	L	DNR
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR, City
Groundwater use conflicts	L	L	L	L	DNR
Water levels	H	H	H	H	CWI, MDH, City

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Surface Water Quality					
Stream and lake water quality management classification					
Monitoring data summary	`				
Groundwater Quality					
Monitoring data	H	H	H	H	MDH
Isotopic data	H	H	H	H	MDH
Tracer studies	H	H	H	H	Not Available
Contamination site data	M	M	M	M	Not Available
Property audit data from contamination sites					
MPCA and MDA spills/release reports	M	M	M	L	MPCA, MDA

Definitions Used for Assessing Data Elements:

High (H) - the data element has a direct impact

Moderate (M) - the data element has an indirect or marginal impact

Low (L) - the data element has little if any impact

Shaded - the data element was not required by MDH for preparing the WHP plan

Acronyms used in this report are listed on page ii, after the "Glossary of Terms."

General Descriptions

o Description of the Water Supply System

The city of Riverton obtains its drinking water supply from two primary wells. Table 1 summarizes information regarding them.

o Description of the Hydrogeologic Setting

The description of the hydrogeologic setting for the aquifer used to supply drinking water is presented in Table 3.

Figures 3, 4a, and 4b show the distribution of the aquifer and its stratigraphic relationships with adjacent geologic materials. They were prepared using well record data that is contained in the County Well Index (CWI) database. The geological maps and studies that were used to further define local hydrogeologic conditions are provided in the "Selected References" section of this report.

Table 3 - Description of the Hydrogeologic Setting at the Riverton Wells

Aquifer	Attribute	Descriptor	Data Source
Quaternary Buried Artesian Aquifer (QBAA)	Aquifer Material	Sand and Gravel	Well logs.
	Primary Porosity	0.30	Estimated porosity value using literature reference (Fetter, 1988).
	Aquifer Thickness	25 feet	Riverton Well 3 (130547) log.
	Stratigraphic Top Elevation	1170 feet MSL	Riverton municipal wells and County Well Index.
	Stratigraphic Bottom Elevation	1145 feet MSL	Riverton municipal wells and County Well Index.
	Hydraulic Confinement	Confined	Riverton municipal wells and County Well Index.
	Transmissivity (T)	Reference Value and Range: 2,450 ft^2/day (1,625- 3,675 ft^2/day)	The aquifer test plan was approved on February 19, 2013. A range of transmissivity values was used to reflect changes in aquifer composition and thickness as well as uncertainties related to the quality of existing aquifer test data.
	Hydraulic Conductivity (K)	Reference Value and Range: 98 feet/day (65 - 147 ft/day)	The hydraulic conductivity of the QBAA was calculated from the transmissivity and the representative thickness of the formation at the city wells.
	Groundwater Flow Field	See Figure 2 - Ambient Groundwater Flow Field	Defined by using static water level elevations from well records in the CWI database and the *Geologic atlas of Crow Wing County*, Part B (Petersen, T.A., and Solstad, J. A., 2007).

Delineation of the Wellhead Protection Area

o Delineation Criteria

The boundaries of the WHPA for the city of Riverton are shown in Figure 1. Table 4 describes how the delineation criteria that are specified under Minnesota Rules, part 4720.5510, were addressed.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Descriptor	How the Criterion was Addressed
Hydrologic Flow Boundary	Surface Water Features	The major features of local and regional discharge were included in the groundwater flow model. The Mississippi River was represented using varel elements near Riverton and with linesinks in the far-field. Lakes were represented using resistance varel elements. Vertical recharge to the confined aquifer was represented using given varel elements.
Hydraulic Flow Boundary	Other High-Capacity Wells	There are no other high capacity wells within a three--mile radius of the Riverton public wells.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from Department of Natural Resources (DNR) Groundwater Appropriations Permit No. 1975-3238 and the city. The annual pumped volumes were converted to a daily volume pumped by a well.
Groundwater Flow Field	See Figure 2	The model calibration process addressed the relationship between the calculated versus observed groundwater flow field.
Aquifer Transmissivity	Reference Value (QBAA): 2,450 ft^2/day	The aquifer test plan was approved on February 19, 2013, and the reference value for the transmissivity of the QBAA was determined from specific capacity tests conducted at Riverton Well 2 (135004) and Riverton Well 3 (130547).
Time of Travel	10 years	The public water supplier selected a 10-year time of travel.

Information provided by the DNR and the city's consulting engineer was used to identify the maximum volume of water pumped annually by each well over the previous five-year period and the estimated volume for the next five years, as shown in Table 5. Previous pumping values have also been reported to the DNR, as required by the public water supply's Groundwater Appropriation Permit No. 1975-3238. The maximum daily volume of discharge used as an input parameter in the model was calculated by dividing the 2009 annual pumping volumes by 365 days.

Table 5 - Annual Volume of Water Pumped from Riverton Wells
(Gallons)

Well Name	Unique No.	2007	2008	2009	2010	2011	5-Year Projection	Daily Volume (cubic meters)
Well 1	241291	0	0	0	0	0	0	0
Well 2	135004	2,624,000	2,624,000	**2,624,000**	2,344,500	1,393,700	1,460,000	27.2
Well 3	130547	2,624,000	2,624,000	**2,624,000**	2,337,200	1,472,200	1,460,000	27.2

Sources: Riverton consulting engineer and the DNR State Water Use Database System (SWUDS), DNR Groundwater Appropriations Permit No. 1975-3238.

Bolded values indicate the annual volume used for the wellhead protection area delineation.

Note: Prior to 2010, the Riverton wells were not metered and annual use was estimated; meters were installed on the wells in 2010.

o Method Used to Delineate the Wellhead Protection Area

The WHPA for the city of Riverton's public wells was determined using an analytic element computer model called MLAEM (Version 5.1.08). The MLAEM Code was selected because it is a quantitative method capable of simulating both simple and complex groundwater flow processes, including the influence of vertical infiltration and the pumping influence of multiple high-capacity wells, if necessary.

The aquifer serving the Riverton wells is a buried sand and gravel unit that is overlain by a thickness of till. Beneath the aquifer is a second till unit and a thickness of weathered bedrock materials. For the purposes of the delineation, the aquifer was assumed to be 25 feet thick, which is the thickness interpreted from the record of Well 3 (130547). Glacial deposits of this nature, however, are often variable in both thickness and composition; the variable nature of the outwash aquifer was addressed as part of the uncertainty analysis.

The single-layer groundwater model that was used to delineate the WHPA for the cities of Ironton (Walsh, 2010) and Deerwood (Haglund, 2013) served as a beginning framework for the model developed for this delineation project. Detail was added to the groundwater flow model to refine it for the hydrogeologic setting in the Riverton area. The model was then calibrated using information specific to the aquifer serving the Riverton public wells. Many local lakes were added, and Lidar data was used to assign surface water elevations. Rabbit Lake, and the lakes at the former Sagamore and Snowshoe Mines, were important surface water features for this delineation and were modeled using resistance varel elements. Other lakes, such as Little Blackhoof Lake, Blackhoof Lake, and Hay Lake were also included in the model. Shallower lakes were assumed to be less connected to the buried drift aquifer and were initially assigned higher resistances compared to deeper lakes, such as Rabbit Lake. Table 6 summarizes the model input parameters.

The topography of the bedrock surface is variable in the Riverton area, ranging between 1,000 feet to 1,200 feet above mean sea level. The Precambrian bedrock consists of iron formations of the North Range Group, including the Trommald and Mahnomen Formations. At the location of the city wells, records indicate that bedrock is more than 85 feet below the land surface. However, at the location of the former Sagamore and Snowshoe mine areas, the bedrock surface is encountered at a higher elevation and the depth to bedrock is relatively shallow. At these locations, it is assumed the buried drift aquifer is absent and that the bedrock materials comprise a low- or no-flow boundary. In the groundwater flow model, these formations were simulated using a low permeability inhomogeneity element. Additional information regarding the model parameters and element layout are available from MDH.

Table 6 - MLAEM Model Input Parameters

MLAEM: Initial Model Parameters	Initial Value	Source
Base Elevation	349 meters	Estimated from local well records.
Aquifer Permeability	30 meters/day --- Range 19.8 to 44.8 meters/day	Base case. --- Low and high range estimates using specific capacity data from the city wells.
Aquifer Thickness	7.6 meters	Estimated from city well records.
Mississippi River: Head specified line sinks.	Head = River Elevation	River elevations derived from USGS topographic quadrangles and LiDar data (DNR, 2012).
Rabbit Lake; Sagamore Mine and Snowshoe Mine Lakes; Blackhoof and Hay Lakes; and the Mississippi River near Riverton: Varel elements with specified head and resistance.	Head = Water Level Elevation Resistance = 50-200 days	Water level elevations derived from USGS topographic quadrangles and LiDar data (DNR, 2012). Resistance values derived from professional judgment.
Aquifer inhomogeneity and doublet elements	K= 3 meters/day	An aquifer inhomogeneity was used to simulate the location where the aquifer is absent; the inhomogeneity represents low permeability bedrock materials (i.e., non-aquifer).
Vertical Infiltration	Surficial materials are comprised predominately of mixed outwash- 3.5 inches/year (.0002436 m/d) Predominately till area; eastern half of model- 1.5 inches/year (.0001044 m/d)	Rates from the calibrated Ironton and Deerwood groundwater flow models. Original recharge estimated from Delin, et al (2007).
Porosity	0.30	Conservative estimate for outwash sand (Fetter, 1988).

o Calibration and Sensitivity

Model quality is commonly evaluated by three different measures: calibration, sensitivity, and uncertainty analyses. Model calibration is a procedure that compares the results of a model based on estimated input values to measured or "known" values. This procedure is used to define model validity over a range of input values. The result of calibration is an assessment of the general quality of the model and the confidence that may be placed in the model results. As a matter of practice, groundwater flow models usually are calibrated using groundwater elevation and flow (if available). Sensitivity analysis quantifies the differences in model results produced by the natural variability of a particular parameter. Uncertainty analysis addresses the effects of poor data quality (lack of local detailed information or deficiencies in the data) on the model results. Together, sensitivity and uncertainty analyses are commonly used to evaluate the effects that natural variability and uncertainties in the hydrogeologic data have on the size and shape of the capture zones. In regards to the WHPA delineation, these analyses are used to document that the delineation is optimal, conservative, and protective of public health based on existing information.

▪ Calibration

The Riverton groundwater flow model was calibrated to static water levels from 37 wells obtained from the CWI database. The wells were selected based on their construction information and the likelihood that they were screened in the same buried sand aquifer serving the Riverton municipal wells. The calibration was performed using a manual trial-and-error procedure by changing hydraulic conductivity, varel resistance values, and recharge values and then comparing modeled versus measured water levels.

A quantitative measure by which to evaluate the success obtained during calibration is to compare the root mean square of the residuals (RMSE) and the maximum observed head difference across the model. With the base case scenario using a global hydraulic conductivity value of 30 m/d, the RMSE was 2.3 m. This RMSE result represents about 10 percent of the observed range in head values of the lower buried drift aquifer in the refined model. The RMSE improved slightly (=2.0 m) when the higher hydraulic conductivity value of 44.8 m/d was used. In contrast, when the lower hydraulic conductivity value of 19.8 m/d was used, the RMSE was about 60 % higher (=3.7 m) compared to the base case and high hydraulic conductivity scenarios.

The best calibration was achieved using the base case and higher hydraulic conductivity values. However, in all three cases, the configuration of the potentiometric surface was fairly well simulated, matching the flow direction and gradient interpreted from observed values.

In all three model scenarios, the 10-year well capture zones extend to the location of the northeast portion of Sagamore Mine Lake, ultimately terminating within the low-permeability inhomogeneity. Several particle tracking scenarios were run with the model. In most cases, the model indicated that the time for groundwater within the buried drift aquifer to travel from the low-permeability inhomogeneity to the city wells ranged between four to six years. This is strictly a horizontal travel time calculation and does not take into account the time to travel vertically from the land surface to the buried drift aquifer. The model also confirms that the radius of influence of the city wells is relatively

minimal, largely because of the low daily pumping volumes. In these types of settings, where the pumping influence is small, the length and location of the upgradient capture zones (i.e. travel times longer than one or two years) is predominately influenced by the existing ambient groundwater flow field.

- Sensitivity Analysis

Sensitivity is the amount of change in model results caused by the variation of a particular input parameter. Because of the relative simplicity of the groundwater model, the direction and extent of the modeled capture zone may be very sensitive to any of the input parameters.

The **pumping rate** directly affects the volume of the aquifer that contributes water to the well. An increase in pumping rate leads to an equivalent increase in the volume of aquifer and an expanded capture zone, proportional to the porosity of the aquifer materials.

Results - The pumping rate defined by WHP rule requirements is the highest rate that can be expected under normal water demand. Therefore, with respect to the delineation of the WHPA, the sensitivity of the capture zone to variations in the pumping rate is minimized.

The **direction of groundwater flow** determines the orientation of the capture zone. Variations in the direction of groundwater flow will not affect the size of the capture zone but are important for defining the areas that are contributing water to the well.

Results - The ambient groundwater flow field that is defined in Figure 2, provides the basis for determining the extent to which each model run reflects the conceptual understanding of the orientation of the capture area for a well. In this delineation, the sensitivity of the WHPA to the ambient groundwater flow was significant because of the small radius of influence of the city wells. It was found that the groundwater flow field upgradient of the wellfield was influenced by the location and geometry of the low conductivity inhomogeneity and Sagamore Mine Lake. These features influenced orientation of the capture zones with respect to the longer times of travel.

The **hydraulic gradient** (along with aquifer transmissivity) determines the rate at which water moves through the aquifer materials.

Results - The groundwater flow field that is defined in Figure 2 provides the basis for determining the extent to which each model run reflects the conceptual understanding of the orientation of the capture area for a well. For this delineation, the sensitivity of the WHPA to the hydraulic gradient is significant, especially with respect to the low permeability inhomogeneity. Where the aquifer is present, the gradient is relatively flat. However, where the aquifer is absent, the low permeability of the bedrock causes the gradient to be relatively steep.

The **horizontal hydraulic conductivity** influences the size and shape of the capture zone. In the base-case scenario, the horizontal hydraulic conductivity was computed from the transmissivities estimated from specific capacity tests conducted at Riverton Well 2 (135004) and Riverton Well 3 (130547). The horizontal hydraulic conductivity value obtained from these two specific capacity tests was used in the groundwater model to delineate the 10-year time of travel capture zones for the base case scenario. Because a pumping test was not conducted at the public water supply wells, the

uncertainty of the hydraulic conductivity can be great. Therefore, two additional model runs were performed for the range of horizontal hydraulic conductivities derived from the specific capacity tests. The ranges of transmissivity considered in the sensitivity analysis runs are given in Table 3.

Results - A high horizontal hydraulic conductivity value elongates the capture zone while reducing its width (Figure 5). A low horizontal hydraulic conductivity value shortens the capture zone while increasing its width.

The aquifer **porosity** influences the size and shape of the capture zone.

Results - Decreasing the porosity causes a linear, proportional increase in the areal extent of the capture zone.

The WHPA for the Riverton wells in Figure 1 consists of a composite of the capture zones calculated using the range of hydraulic conductivity values. The input files for all models are available upon request at MDH.

o Addressing Model Uncertainty

Using computer models to simulate groundwater flow necessarily involves representing a complicated natural system in a simplified manner. Local geologic conditions may vary within the capture areas of the Riverton wells, but existing information is not sufficiently detailed to define this degree of variability. In addition, the available groundwater flow modeling techniques may not represent the natural flow system exactly, but the results are valid within a range defined by the reasonable variation of input parameters.

For this delineation, several model scenarios were assessed as part of the uncertainty analysis. The steps employed for this delineation to address model uncertainty were:

- Pumping Rate - For each well, a maximum historical (five-year) pumping rate or an engineering estimate of future pumping was used, whichever is greater (Minnesota Rules, part 4720.5510, subpart 4).
- Transmissivity - Uncertainty with respect to transmissivity was addressed by calculating 10-year capture zones for the three different transmissivity values assessed as part of the analysis of model sensitivity. Specifically, capture zones were delineated for the base case (representative) transmissivity, and both the lower and higher transmissivity estimates as determined from specific capacity data. These three scenarios were composited together and incorporated into the final wellhead protection area boundaries.

- The Influence of Sagamore Mine Lake - Sagamore Mine Lake is located upgradient of the city's wells. The lake represents the location of previous mining activity, and is reported to have a maximum depth of 210 feet. The extent and thickness of the buried drift aquifer in the vicinity of the lake and the former Sagamore Mine operations are not known. At this time, there are no other known borings or wells in the area from which to estimate aquifer boundaries. In lieu of local data, conservative assumptions were made from the generalized subsurface geologic information provided in the County Geologic Atlas. For the delineation, it was assumed that the buried drift aquifer extends beneath the northeast quadrant of the lake. Several model scenarios were run to simulate various degrees of influence the lake could

potentially have on the groundwater flow field and the well capture zones. Three capture scenarios representing the maximum shifts in capture zone shape and location were composited and incorporated into the final wellhead protection area boundaries.

- Varel Resistance Values - Local lakes and portions of the Mississippi River were simulated using resistance varel elements in the model. Resistance values are assigned to each surface water feature; in general, the resistance parameter reflects the degree of hydrologic influence or 'connection' that a particular surface water feature has with respect to the aquifer. For this delineation, resistance values of surface water features in the Riverton area were varied between 50 days and 200 days. In this setting, changing the resistance values had little overall impact on the length or location of the well capture zones; therefore, the results were not incorporated into the final wellhead protection area.

Ten-year capture zones were developed for the base case scenario and the range of transmissivity values determined from the specific capacity data. In addition, 10- year capture zones were developed to address uncertainty with respect to the possible influence Sagamore Mine Lake may have on the ambient groundwater flow field and the well capture areas. As the model code uses constant input values for each run, several runs were required to include all variations in input parameters. **Table** 7 documents the variables used to address MLAEM model uncertainty. The capture zones for each of the scenarios were composited to form the WHPA boundaries (Figure 5). This provides a conservative approach to addressing model uncertainty and produces a WHPA that will likely be most protective of public health.

Table 7 - Model Parameters Used in MLAEM Uncertainty Runs

File Name	Well Discharge (m^3/day) (both city wells)	Hydraulic Conductivity (m/day)	Aquifer Thickness (meters)	Sagamore Mine Lake	Remarks
basecase	27.2	30	7.6	Resistance 100 days (200 days over bedrock inhomogeneity)	
base_lowK	27.2	19.8	7.6	same	Longer times of travel shift to the north.
base_highK	27.2	44.8	7.6	same	Narrower captures zones; longer times of travel shift to the south.
SA1_capzone	27.2	30	7.6	Moved northeast quadrant resistance node several hundred feet southwest.	Slight offset to the south of longer times of travel zones.
SA2_capzone	27.2	30	7.6	Moved northeast quadrant resistance node further to the southwest and within inhomogeneity	Affects ambient flowfield; wider capture zones.
SA3_capzone	27.2	30	7.6	Moved resistance node further in inhomogeneity.	Affects ambient flowfield; wider capture zones.

o Assessing Conjunctive Delineation

The need for a conjunctive delineation was also assessed as part of this project. Water samples were collected in May 2011 from the Riverton wells and Little Rabbit Lake. The samples were analyzed for the stable isotopes of oxygen and hydrogen, chloride, bromide, total nitrate, and sulfate. The lake was also sampled for total organic carbon (TOC). The city's wells were not initially sampled for TOC, however, water samples were collected a few months later in August 2011 by the MDH District Engineer and analyzed for TOC. The results are provided in Appendix A.

The stable isotope results for the public wells fall on the meteoric water line, indicating that there was little or no surface water contribution at the time of monitoring. The lack of TOC in the water samples from the public wells also supports the lack of a surface water contribution, especially as would be expected from the lakes during the summer months. In addition, the contrast of the chloride and sulfate results between the public wells and water sampled from the lake also indicates the lack of direct contribution from surface water.

In hindsight, water samples should also have been collected from Sagamore Mine Lake at the time of monitoring because the capture zones extend to the location of the lake. However, it is expected that the stable isotope signature of Sagamore Mine Lake would be similar to Little Rabbit Lake; if there were a contribution from Sagamore Mine Lake, an evaporative signature should have been seen in water sampled from the city's wells. This was not the case. However, it is recommended that MDH collect a second round of monitoring of both lakes and the city wells to confirm the initial findings and allow for a more accurate assessment of the relationship between the aquifer used by the wells and the surface water features. If a stronger connection is suggested by the additional data, then the wellhead protection area boundaries will be refined to include contribution of the surface water feature.

Delineation of the Drinking Water Supply Management Area

The boundaries of the DWSMA were defined by the public water supplier using the following features (Figure 1):

- Public Land Survey coordinates,
- Center-lines of highways, streets, or roads, and
- Property parcel boundaries (Crow Wing County, 2009).

Vulnerability Assessments

The Part I wellhead protection plan includes the vulnerability assessments for the public water supply wells and DWSMA. These vulnerability assessments are used to help define potential contamination sources within the DWSMA and to select appropriate measures for reducing the risk that they present to the public water supply.

o Assessment of Well Vulnerability

The vulnerability assessment for each well used by the public water supplier is listed in Table 1 and is based upon the following conditions:

1) Riverton Wells 2 and 3 (135004 and 130547) meet current State Well Code construction specifications (Minnesota Rules, part 4725) and the wells themselves do not provide a pathway for contaminants to enter the aquifer used by the public water supplier.
2) The geologic conditions at Riverton Wells 2 and 3 (135004 and 130547) include 31 and 51 feet, respectively, of sandy and/or gravelly clay till materials over the aquifer. The aquifer is assigned a moderate geologic sensitivity because this thickness of till is sufficient to retard the vertical movement of contaminants.
3) Water samples were collected from Riverton Wells 2 and 3 (135004 and 130547) in April 2011 and were analyzed for tritium. Tritium was found at 6.1 and 10 tritium units, respectively. The tritium results indicate that the aquifer contains a measurable component of post-1953 water. The results support the vulnerable rating for the wells, indicating that they have the potential to be impacted by human activities occurring at the land surface.

4) The elevated chloride/bromide ratio results from water samples collected in April 2011 indicate that the aquifer is impacted by human activities occurring at the land surface. These may include road salt runoff, septic waste, or leaky sewers.

A summary of the isotope and water quality results for samples collected as part of this project is also provided in Appendix A.

o Assessment of the Drinking Water Supply Management Area Vulnerability

The vulnerability of the DWSMA is moderate and is based upon the following information:

1) Water chemistry and isotopic data from the city's wells located within the DWSMA indicate that the aquifer contains young water that has been impacted by chloride from human activity; and
2) Review of the geologic logs contained in the CWI database indicates that the aquifer exhibits a moderate geologic sensitivity at the location of the city's wells (Figure 6). At this time, there are no other wells within the boundaries of the DWSMA to estimate aquifer vulnerability. Beyond the DWSMA in the upgradient direction (toward the southeast), the geologic sensitivities of existing wells range between very low to moderate. However, a large portion of the DWSMA landsurface has been disturbed by historic mining activities. At this time, the thickness or nature of the materials used to backfill is not predictable or known. Assigning a moderate vulnerability rating to the DWSMA is conservative and prudent.

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Minnesota Department of Natural Resources (2012), Crow Wing County LiDar data, acquired in October, 2012.

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Strack, O.D.L. (1999), A *multi-layer analytic element model*, Version 5.1.08.

Figures

Primary Well
Emergency Response Area
Wellhead Protection Area
Drinking Water Supply Management Area

N

0 360 720 1,440 Feet

1:8,000

MINNESOTA MDH DEPARTMENT of HEALTH

Figure 1
Wellhead Protection and
Drinking Water Supply Management Area
City of Riverton

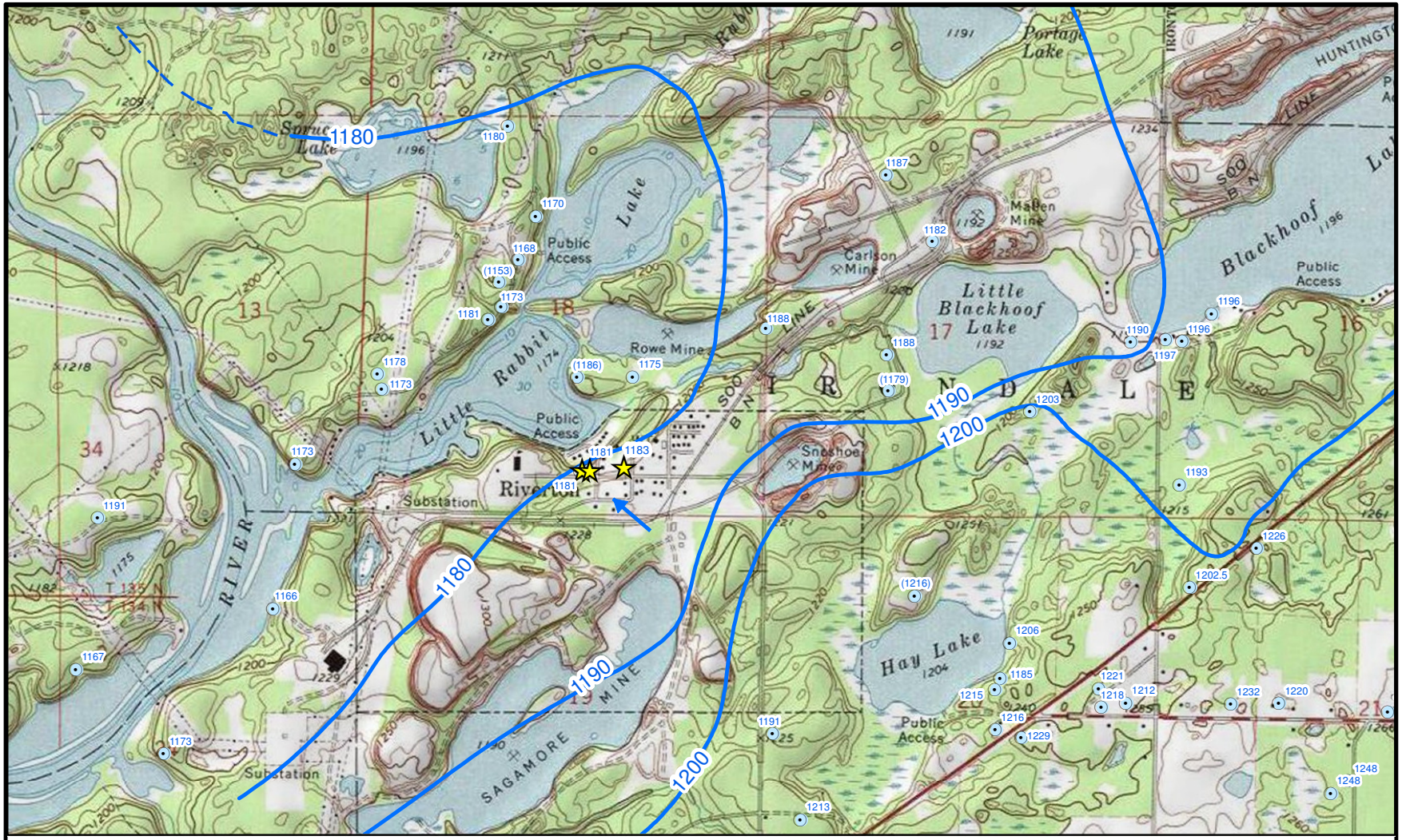


Figure 2
Ambient Groundwater Flow Field of the Buried Drift Aquifer

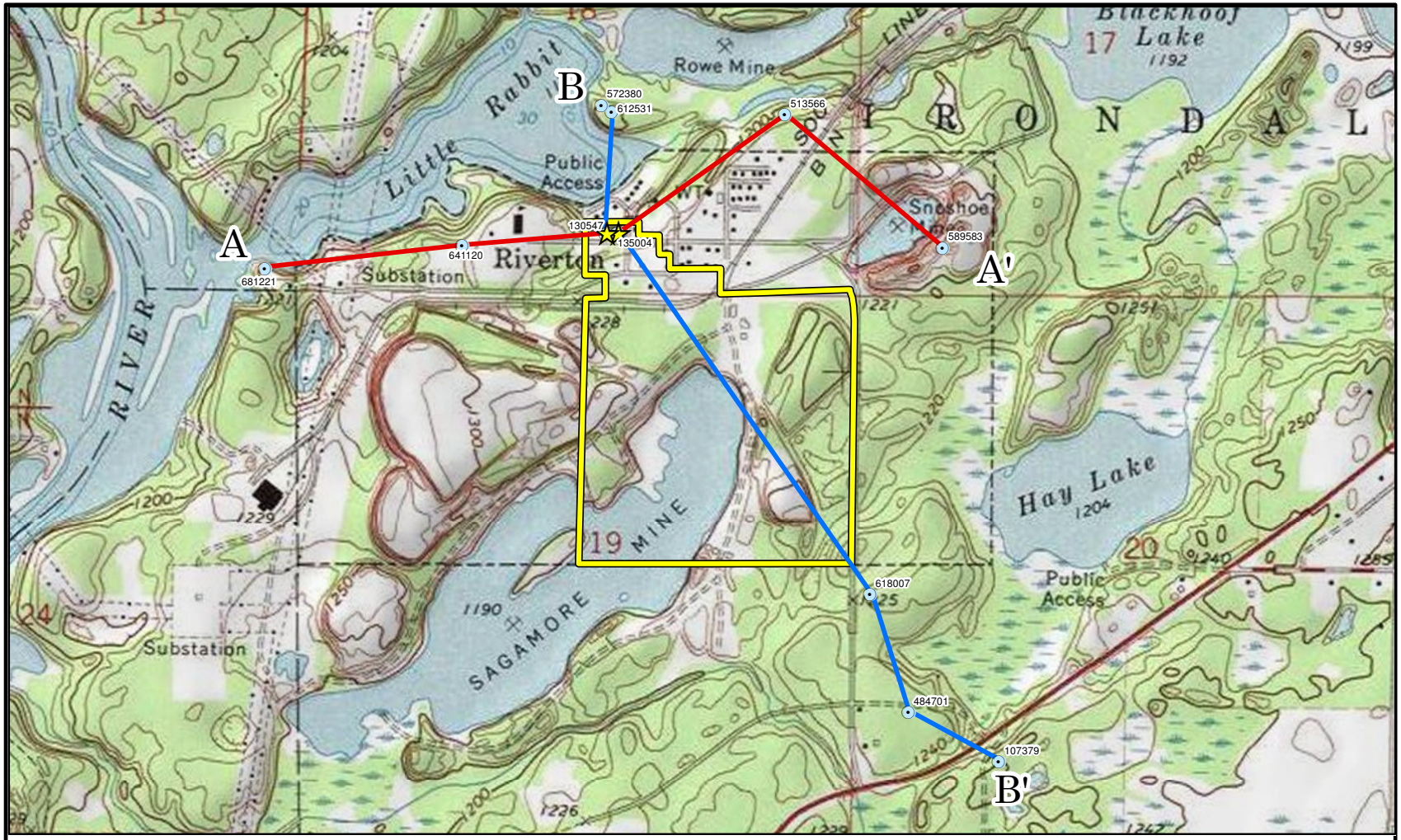
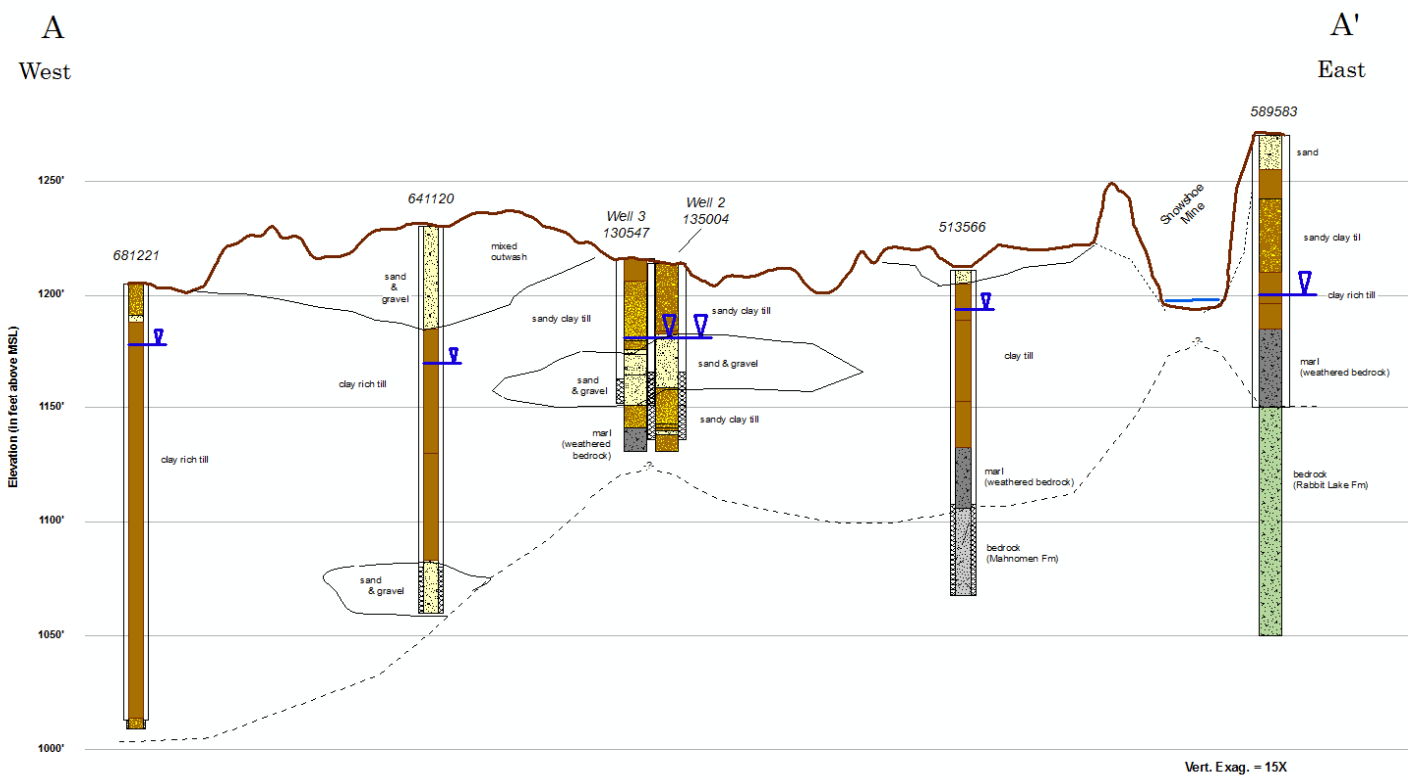
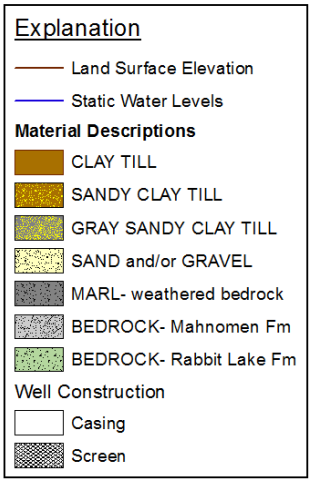


Figure 3
Geologic Cross-Section Locations
Riverton Water Supply





MINNESOTA DEPARTMENT OF HEALTH

Figure 4A
Geologic Cross-Section A-A'

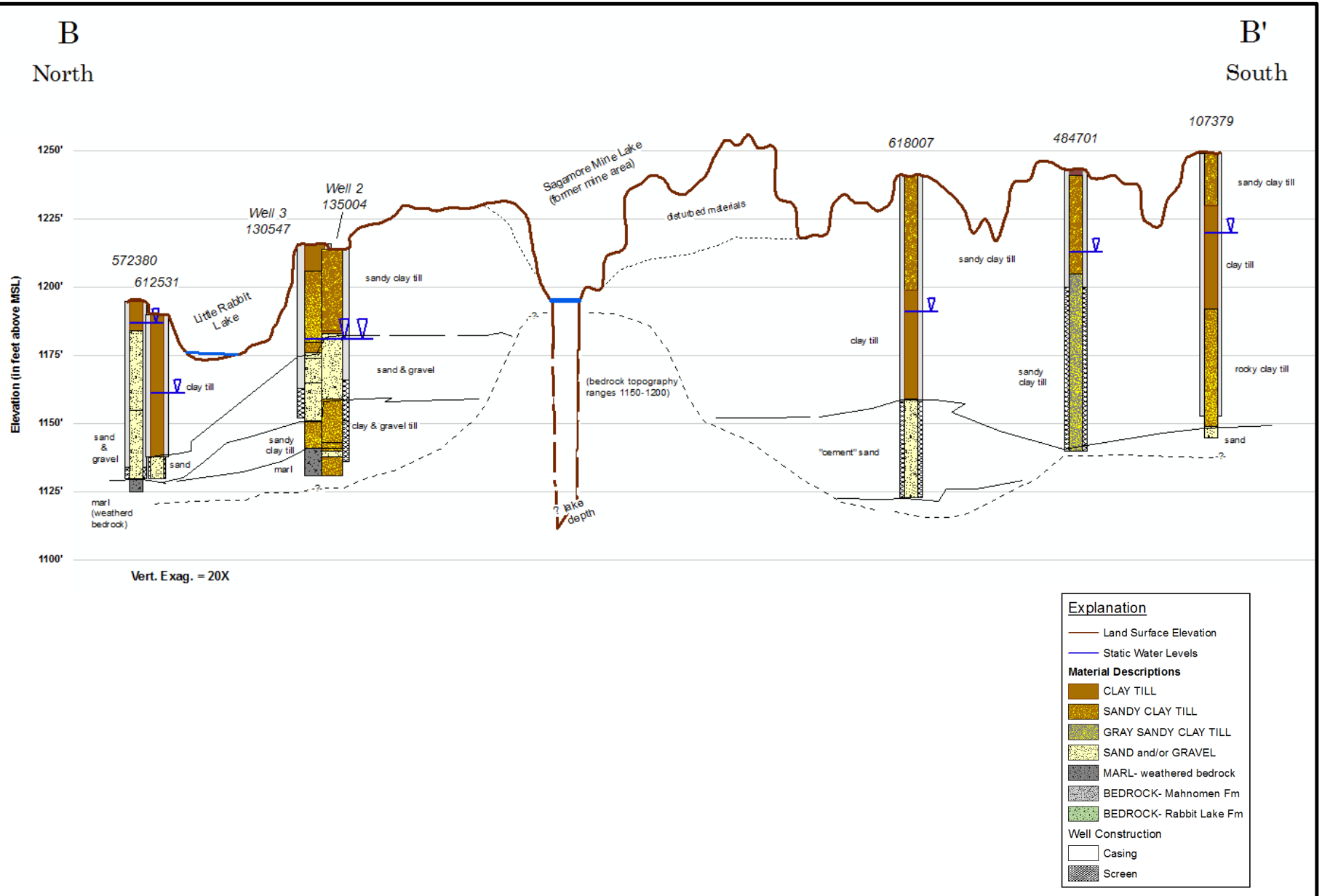
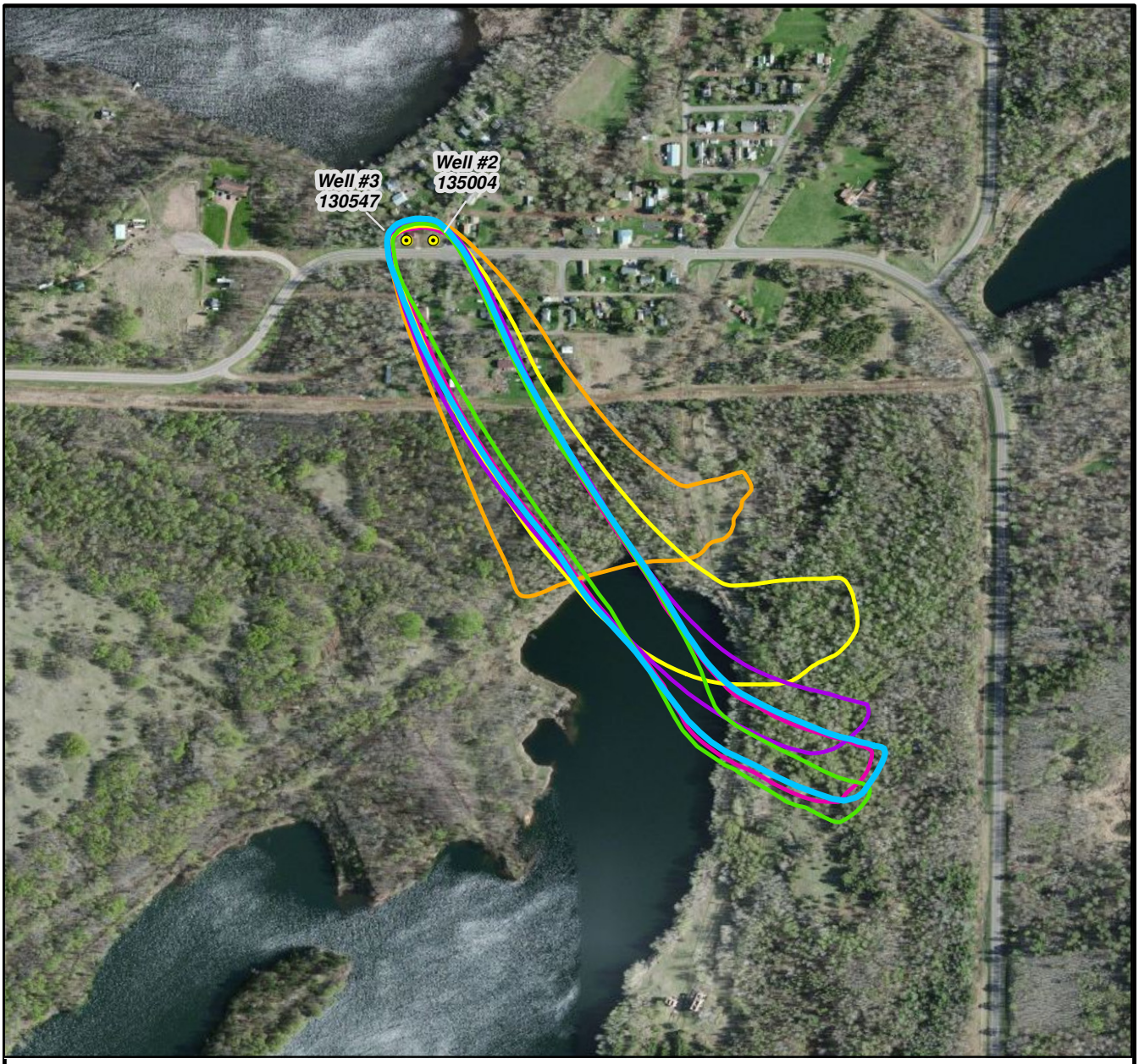


Figure 4B
Geologic Cross-Section B-B'



Primary Well
Basecase Hydraulic Conductivity (K)
Base High K
Base Low K
SA1 Capture Zone
SA2 Capture zone
SA3 Capture Zone

N

0 350 700 1,400 Feet

1:7,000

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 5
Uncertainty Analysis: 10-Year Capture Zone Results
City of Riverton

Wells with Geologic Sensitivities

L - geologic sensitivity (ranging very low, low, moderate, high & very high)

Drinking Water Supply Management Area

N

0 650 1,300 2,600 Feet

1:15,000

Figure 6
Drinking Water Supply Management Area Vulnerability
City of Riverton

Appendix A

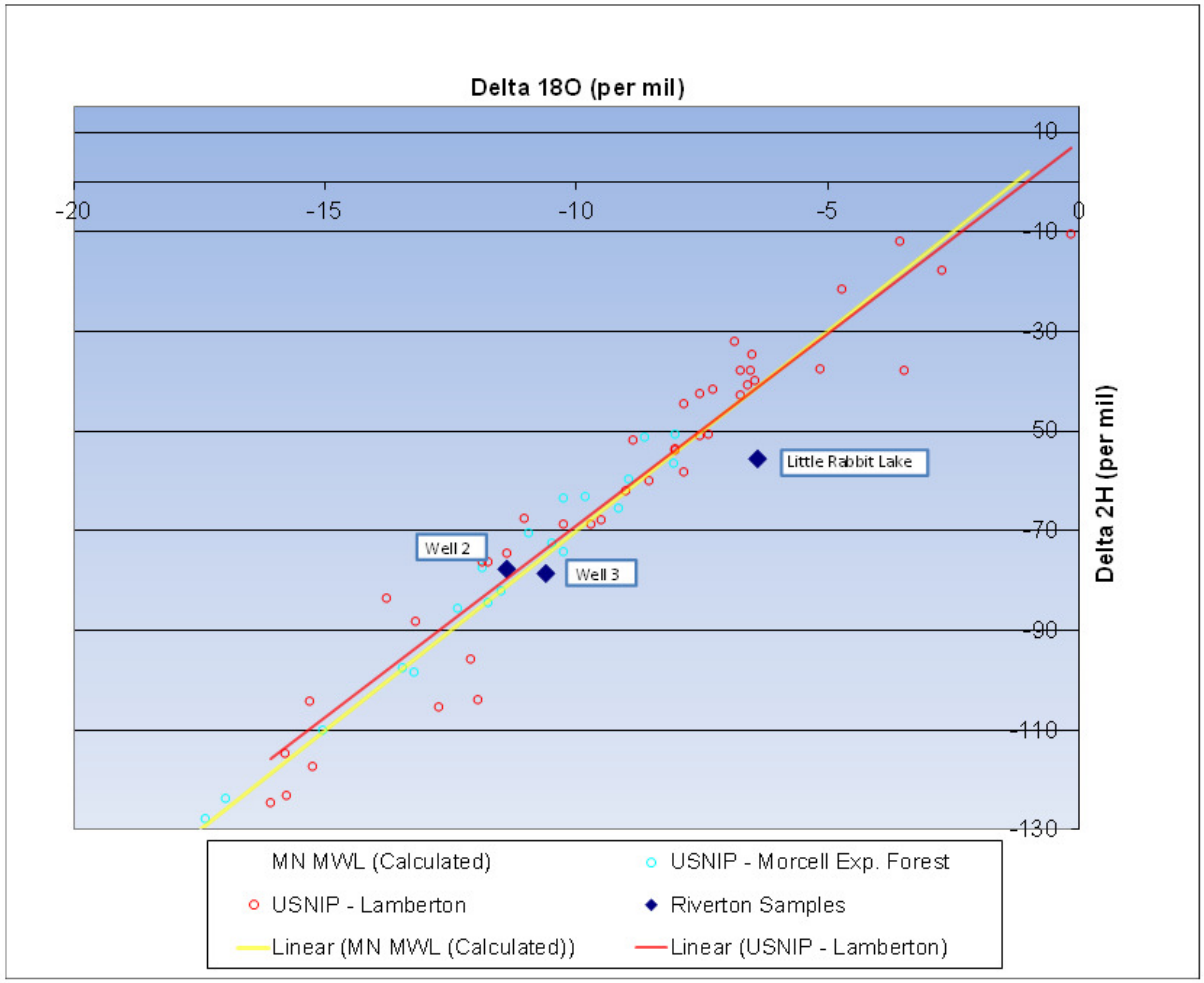
Water Quality Results

City of Riverton
Cl/Br, TOC and Isotope Results
May 11, 2011

Name	Chloride (mg/l)	Bromide (mg/l)	Chloride/ Bromide (Cl/Br) Ratio	Total Organic Carbon (TOC) (mg/l)	Nitrate (mg/l)	Sulfate (mg/l)	Stable Isotopes (per mil) **Delta 18O**	**Delta 2H**	Tritium (TU)
Well 2 (135004)	8.37	0.0145	577	<1.0 [08/05/11]	<0.05	40.9	-11.39	-77.82	6.1
Well 3 (130547)	29.5	0.017	1735	<1.0 [08/05/11]	1.6	117	-10.59	-78.51	10
Little Rabbit Lake (SWS 287)	11.3	0.0118	958	4.9 [05/11/111]	<0.05	23.9	-6.39	-55.46	NS

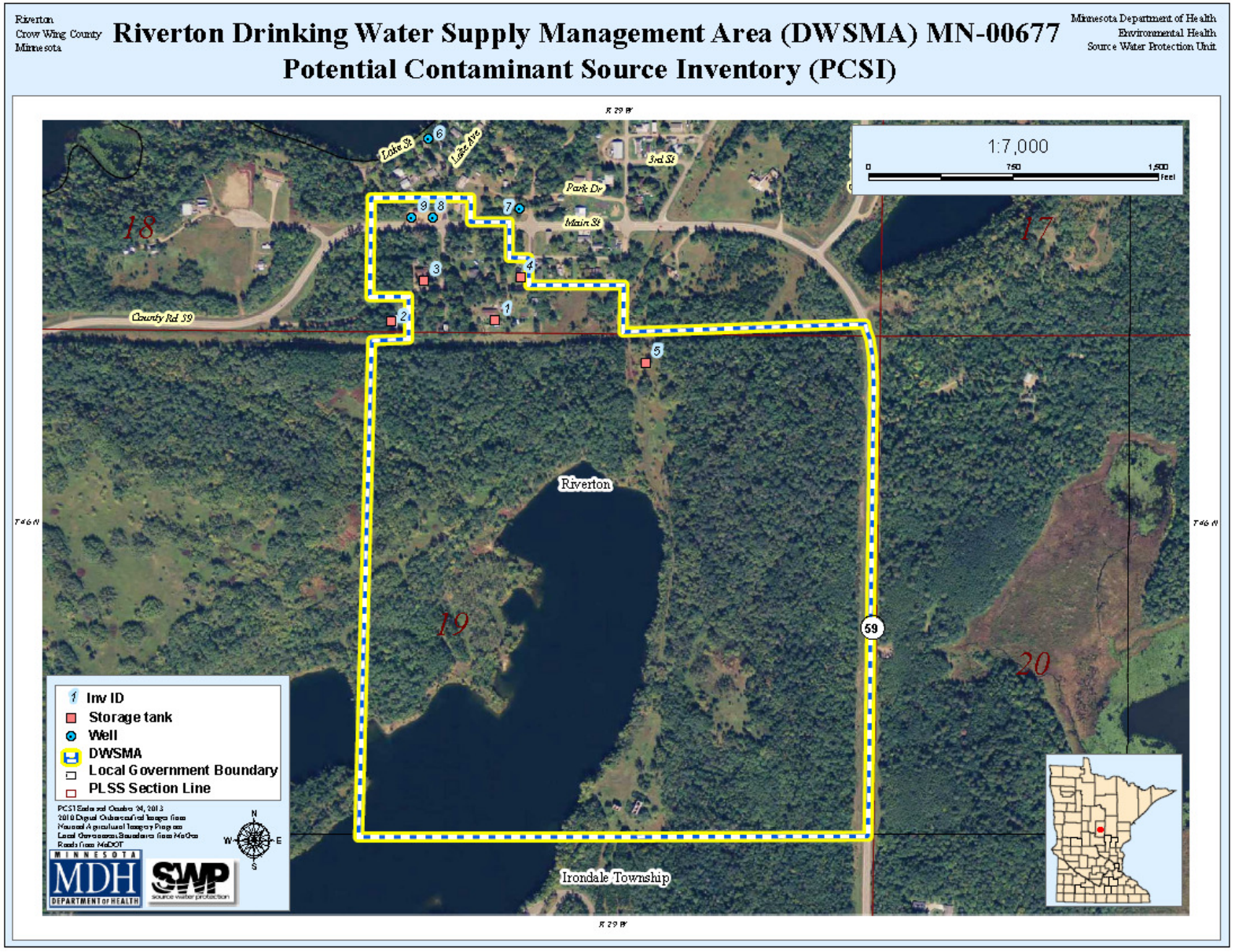
Stable Isotope Results

Riverton Water System
May 11, 2011



Notes: The stable isotope results for the public wells fall on the meteoric water line; in contrast, the stable isotope results for Little Rabbit Lake fall off the meteoric water line. These results indicate that there was little or no surface water contribution at the time of monitoring. It is recommended that another round of monitoring should be collected from the city's wells, Little Rabbit Lake, and Sagamore Mine Lake to confirm these results.

APPENDIX II - Potential Contaminant Source Inventory



Riverton DWSMA (MN-00677)

PCSI Report

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
1	Brian & Pamela Dobson	1100 - Private household	16621 1st St	Riverton	56455	30101000900		

Inv Id	Pcsi	Status	Material	Value	Program	ProgramID	Inv Comments
1	ST - Storage tank	Active	F240 - Fuel oil	300 G			Home heating oil storage tank (200-300 Gal.)

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
2	Dean & Sheryl Sjoketh	1100 - Private household		Riverton	56455	30101000900		

Inv Id	Pcsi	Status	Material	Value	Program	ProgramID	Inv Comments
2	ST - Storage tank	Active	F240 - Fuel oil	300 G			Home heating oil storage tank (200-300 Gal.)

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
3	Harold & Darlene Hawks	1100 - Private household	16556 1st St	Riverton	56455	30101005020		

Inv Id	Pcsi	Status	Material	Value	Program	ProgramID	Inv Comments
3	ST - Storage tank	Active	F240 - Fuel oil	300 G			Home heating oil storage tank (200-300 Gal.)

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
4	David & Mary Ann Peterson	1100 - Private household	21047 1st Ave	Riverton	56455	30101006030		

Inv Id	Pcsi	Status	Material	Value	Program	ProgramID	Inv Comments
4	ST - Storage tank	Active	F240 - Fuel oil	300 G			Home heating oil storage tank (200-300 Gal.)

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
5	State of Minnesota - DNR Resources	8000 - Mining and extraction establishments		Riverton	56455	30019119990		

Inv Id	Pcsi	Status	Material	Value	Program	ProgramID	Inv Comments
5	ST - Storage tank	Removed	F240 - Fuel oil	0			Historic mining company shops, removed the 1 storage tanks (1960)

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
6	Terry & Ila Marth	4334 - Public water supplier	21159 Lake Ave	Riverton	56455	30101000900		

Inv Id	Pcsi	Status	Material	Value	Program	ProgramID	Inv Comments
6	WEL - Well	Abandoned	-	25FT			Old City Well #1 (dug well)

Riverton DWSMA (MN-00677)

PCSI Report

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
7	City of Riverton	4334 - Public water supplier		Riverton	56455	3010100302		

Inv Id	Posi	Status	Material	Value		Program	ProgramID	Inv Comments
7	WEL - Well	Active	-	67	FT	CWI	241291	Riverton #1

FID	NAME	TYPE	ADDRESS	CITY	ZIP	PIN	COMMENTS	ACRES
8	City of Riverton	4334 - Public water supplier	16544 Main St	Riverton	56455	3010100400		

Inv Id	Posi	Status	Material	Value		Program	ProgramID	Inv Comments
8	WEL - Well	Active	-	83	FT	CWI	135004	Riverton #2
9	WEL - Well	Active	-	85	FT	CWI	130547	Riverton #3

APPENDIX III - Water Supply Contingency Plan

WATER SUPPLY CONTINGENCY PLAN
CITY OF RIVERTON, MN

Table of Contents

Annual Plan Review

Date Reviewed	*Reviewer*	*Comments*

Plan Distribution

Person	*Organization*	*Plan Location*

Prepared By: Riverton Wellhead Protection Team

A. PURPOSE

The purpose of this Contingency Plan is to establish, provide and keep updated, certain emergency response procedures and information for the public water supply system which may become vital in the event of a partial or total loss of public water supply services.

B. PUBLIC WATER SUPPLY CHARACTERISTICS

1. Current Supply Source -

	Well Number 1 (Emergency Only)	Well Number 2	Well Number 3
PWS ID	241291	135004	130547
Well Depth (ft.)	67	78	64
Well Diameter (in.)	6	6	6
Well Capacity (gpm)	140	140	140
Well Production (gpm)	140	140	140

2. Treatment – Fluorides are added, via metering, in the well house.

3. Storage and Distribution - 1,500 gallon hydro pneumatic storage tank located in the well house. All city mains are 4“& 6“diameter. System is valved at major piping junctures.

4. Maps/Plans - Copies of maps of the water system are located in City Hall, the well house, and at SEH, Brainerd, MN.

C. PRIORITY OF WATER USERS DURING WATER SUPPLY EMERGENCY

Table C-1 - Water Use Priority Grouping

Priority Group and Rank	Maximum Daily Use (gpd)	Minimum Daily Use (gpd)
Residential--#1	15,000	5,000

Triggers for implementing water supply reduction/allocation procedures: Water-use restrictions may be implemented by determination of the City Council, following natural or manmade disasters, contamination of the water supply, water supply shortages, or major mechanical failure.

D. ALTERNATIVE WATER SUPPLY OPTIONS

1. Surface water sources and treatment needs.

MN National Guard Protocol for Emergency Water Supply Assistance & Equipment
1/9/2013

1. Requests for Assistance from the MN National Guard: All requests for National Guard equipment and/or staff must be initiated at the local law enforcement level. Police and sheriff departments have process and procedures to request support.

   A. MN National Guard Emergency Surface Water Treatment Option: The MN National Guard has the ability to provide emergency treatment of surface waters for human consumption. The MN National Guard has the ability to provide Reverse Osmosis Water Purification Units capable of supplying up to 1500 gallons-per-hour, or 25 gallons-per-minute of potable water. The ROWPU units may not be housed at Camp Ripley and are available, through a call-up of the National Guard, to any city in the state.

   B. MN National Guard Emergency Transportation of Potable Water: The Minnesota National Guard can furnish equipment capable of hauling up to 2,000 gallons of potable water from another water supply to a city distribution point or facility in an emergency (see above for the notification process).

2. Bottled water supplies, delivery and distribution.

   Wal-Mart, Brainerd, MN
   On-duty Manager
   Telephone: 218-829-3848

5. Emergency or backup wells.

   The City has Well #1 that can be utilized in an emergency.

E. INVENTORY OF AVAILABLE EMERGENCY EQUIPMENT AND MATERIALS

Table E-1 contains a list of services, equipment and supplies that are available to the public water supply system to respond to a disruption in the water system. It is believed that the items contained in Table E-1 would be adequate to respond to most (if not all) water system emergencies.

Table E-1

Description	Owner	Telephone	Location	Acquisition Time
Well Repair	Traut Well	800-728-5091	St. Cloud MN	1 day
Pump Repair	Traut Well	800-728-5091	St. Cloud MN	1 day
Electrician	Holden Electric	218-829-4759	Baxter, MN	4 hours
Plumber	Holmvig Excavating	218-820-2447	Crosby MN	1 day
Backhoe	Holmvig Excavating	218-820-2447	Crosby MN	1 day
Chemical Feed	Hawkins Inc	715-392-5152	Superior WI	2 day
Meter Repair	Hawkins Inc	715-392-5152	Superior WI	2 day
Generator	City	218-546-5225	Riverton MN	30 minutes
Valves	USA Bluebook City of Crosby	800-548-1234 218-546-5021	Midwest Crosby, MN	2 day 1 day
Pipe & Fittings	USA Bluebook City of Crosby	800-548-1234 218-546-5021	Midwest Crosby, MN	2 day 1 day

F. EMERGENCY IDENTIFICATION PROCEDURES

Table F-1 Procedural Operations

Emergency Response Coordinator:

Name: Norm Hullinger, Operator
Address: 16575 1st Street
Riverton, MN 56455
Cell Phone: 218-251-6943
Home Phone: 218-546-9749

Alternate:

Name: Cari Johnson, Clerk
Address: 16760 3rd Street
Riverton, MN 56455
Cell Phone: 218-330-0346
Home Phone: 218-546-2891
E-mail contact: riverton@centurylink.net

The duties of the response coordinator or the alternate are listed in the following table.

Duties of the Emergency Response Coordinator or the Alternate

Incident	Response Procedure & Comments
Identify Disruption (Mechanical Failure or Contamination)	Identifies the nature of the water supply disruption and communicates this information to the city government, the alternate response coordinator, and members of the emergency oversight committee.
Notify Response Personnel	Notifies city staff and others who will be responding to the water supply emergency about the disruption and coordinates their efforts to correct it.
Incident Direction and Control	Identifies the actions that are needed to correct the water supply emergency and directs responders to implement corrective actions.
Internal Communication	Communicates the status of response efforts to the primary spokesperson and the emergency oversight committee as needed to keep these parties informed of progress.
Assess Incident Response on Continual Basis	Assesses the efforts to correct the water supply disruption on a continual basis so that the emergency oversight committee can take additional corrective actions and the city government and public are updated on issues and progress.
Define the Extent of a Contamination Disruption	Coordinates efforts to define the extent and level of the contamination with local, state, and federal agencies. This may continue after initial corrective actions have been implemented.
Define the Extent of a Mechanical Disruption	Coordinates efforts to define the cause(s) of the mechanical failure and the equipment, data, and expertise that are needed to correct it. Identifies measures for reducing the likelihood that a similar mechanical failure will not occur in the future.
Identify Need for an Alternate Water Supply	Evaluates the need to obtain an alternate water supply, the time period it is needed before the water supply emergency is corrected, and the actions that are needed to achieve it.

G. NOTIFICATION PROCEDURES

1. Agency Notification

Table G-1 contains the names and telephone numbers for contacts at various local and state agencies that may be notified in the event of a public water supply system emergency. Based on the nature of the emergency and the information available, various representatives from this listing will be selected by the response coordinator to be part of the ***emergency oversight committee,*** which will then meet throughout the duration of the emergency to aid in decision-making and positive outcomes.

Table G-1. Agency Emergency Contact Listing

Personnel	Name	Home Telephone	Work Telephone
Mayor/Board Chair	David C. Peterson	218-546-6929	218-546-5225
Council Members	Pamela Dobson	218-546-8006	218-546-5225
Council Members	Lana Schmidt	218-546-5501	218-546-5225
Council Members	Warren Turnbloom	218-838-7725	218-546-5225
Council Members			
Response Coordinator	Norm Hullinger	218-546-9749	218-251-6943 Cell
Alt. Response Coordinator	Cari Johnson	218-546-2891	218-330-0346 Cell
State Incident Duty Officer			800-442-0798
County Emergency Director	John Bowen		218-825-3445
Fire Chief	Al Woods, Crosby FD		218-546-5135
Sheriff	Todd Dahl, Crow Wing Co.		218-829-4749
System Operator	Norm Hullinger	218-546-9749	218-251-6943 Cell
Alt. System Operator	Jim Wessin		218-866-0428
School Superintendent	James Skjeveland		218-545-8801
Ambulance	Cuyuna Regional Medical Ctr.		218-546-7000
Hospital	Cuyuna Regional Medical Ctr.		218-546-7000
Doctor or Medical Facility	Cuyuna Regional Medical Ctr.		218-546-7000
Power Company	Minnesota Power		800-228-4966
Highway Department	Crow Wing County		218-824-1110
Telephone Company	Century Link		800-603-6000
Neighboring Water System	City of Ironton		218-545-5611
MRWA Technical Services	Dave Neiman		218-820-0595
MDH District Engineer	Dave Schultz		320-223-7328
MDH Source Water Protection	George Minerich		320-223-7314

2. Critical Response Personnel

Table G-2

Title	Name	Address	Telephone
Response Coordinator	Norm Hullinger	Riverton, MN 56455	218-251-6943 Cell
Alternate Response Coordinator	Cari Johnson	Riverton, MN 56455	218-330-0346 Cell
Water Operator	Norm Hullinger	Riverton, MN 56455	218-251-6943
Alternate Water Operator	Jim Wessin	Riverton, MN 56455	218-866-0428
Public Relations	David C. Peterson	Riverton, MN 56455	218-546-6929
Alternate Public Relations	Warren Turnbloom	Riverton, MN 56455	218-838-7725
Public Health/Medical	Cuyuna Regional Medical Center	Crosby, MN	218-546-7000
Alternate Public Health/Medical	Essentia Health	Brainerd, MN	800-277-8262

3. Public Information Plan

a) Public relations center: City Offices, City Hall

Public Relations Spokesperson: David Peterson

Public information center location during emergency: City Hall, or City Garage

Times available: As needed

b) Information checklist to be conveyed to the public and media:
(to be determined at time of emergency)

Contaminant of concern and date:

Source of contamination:

Public health hazard:

Steps the public can take:

Steps the water system is taking:

Other information:

c) Media contacts

Media	Name	Telephone	Address
Newspaper	Crosby-Ironton Courier	218-546-5029	Crosby, MN
Television			
Radio			
Shopper			
Other	Brainerd Dispatch	218-829-4705	Brainerd, MN

H. MITIGATION AND CONSERVATION PLAN

1. Mitigation

   a. Infrastructure maintenance/upgrades/maps:

      Upgrades scheduled regularly on an as-needed basis.

   b. Regular inspection of tower, well(s), pump house:

      Daily inspections.

   c. System valving to isolate problems:

      Entire water distribution system is valved so that problem areas can be isolated.

   d. Sanitation procedures for construction/repairs:

      Standard chlorination procedures are utilized when the distribution system is repaired.

2. Conservation

   a. Water meters:
      No meters are utilized at this time. Water use is billed at a flat rate to all customers.

   b. Public education:
      The city distributes occasional educational updates in the newsletter, and through the use of brochures.

APPENDIX IV - Maps, Figures & Supporting Documents

September 6, 2013

Mr. Norm Hullinger, Water Superintendent
Ms. Cari Johnson, City Clerk
City of Riverton
16663 Main Street
Riverton, Minnesota 56455

Dear Mr. Hullinger and Ms. Johnson:

Subject: **Second Scoping Decision Notice – City of Riverton – PWSID 1180025**

This letter provides notice of the results of the second scoping meeting held with both of you, David Peterson, Mayor; Pam Dobson, Terry Martin, Lana Schmidt and Warren Turnbloom, Riverton City Council, Dave Neiman, Minnesota Rural Water Association, and I on August 6, 2013, at Riverton City Hall regarding Part II of your wellhead protection (WHP) plan. During the meeting, we discussed data elements that must be included and used to prepare the part of the WHP plan related to the management of potential contaminants in the approved drinking water supply management area. The enclosed Scoping 2 Decision Notice lists the data elements that were discussed at the meeting.

The city of Riverton has met the requirements to distribute copies of the first part of the WHP plan to local units of government and hold an informational meeting for the public.

If a data element is marked on the enclosed notice as a data element that must be used and it does not exist, it is helpful if your plan notes this. Dave Neiman, Minnesota Rural Water Association will be working with you to develop a draft of the remainder of the WHP plan. I will be contacting you to review the progress of the development of Part II of your plan. If you have any questions regarding the enclosed notice, contact me by email at mark.wettlaufer@state.mn.us or by phone at (320) 223-7342.

Sincerely,

Mark Wettlaufer

Mark Wettlaufer, Planner
Source Water Protection Unit
Environmental Health Division
3333 West Division Street
St. Cloud, Minnesota 56301-4557

MW:ds-b
Enclosures
cc: David Schultz, MDH Engineer, St. Cloud District Office
Ron Struss, Minnesota Department of Agriculture

SCOPING 2 DECISION NOTICE
(Moderate Vulnerability)

Remainder of the Wellhead Protection Plan

Name of Public Water Supply:		Date:
City of Riverton	**PWSID 1180025**	September 5, 2013
Name of the Wellhead Protection Manager:		
Mr. Norm Hullinger, Water Superintendent Ms. Cari Johnson, City Clerk		
Address:	**City and State:**	**Zip:**
16663 Main Street	Riverton, Minnesota	56455
Unique Well Numbers:		**Phone:**
135004 (Well 2), 130547 (Well 3) 241291 (Well 1 - Emergency)*		(218) 546-5225

*Emergency wells only use the IWMZ Form for data collection.

Instructions for Completing the Scoping 2 Form

N	R	S	
X			**N = Not required.** If this box is checked, this data element is **NOT** necessary for your wellhead protection plan because it is not needed or it has been included in the first scoping decision notice. **Please go to the next data element.**

N	R	S	
	X		**R = Required for the remainder of the plan.** If this box is checked, this data **MUST** be used for the **"remainder of the plan."**

N	R	S	
		X	**S = Submit to MDH.** If this box is checked, this data element **MUST** be included in your **wellhead protection plan and submitted to MDH.** If there is **NO** check mark in the **"S"** box but there is an **"X"** in the **"R"** box, this data element **MUST** be included in your plan, but should **NOT be submitted to MDH**. This box will only be checked if MDH does not have access to this data element. This will help to reduce the cost by reducing the amount of paper and time to reproduce the data element.

Note: Any data elements required in the first scoping decision notice must also be used to complete the remainder of the wellhead protection plan.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

PRECIPITATION

N	R	S	
X			An existing map or list of local precipitation gauging stations.

Technical Assistance Comments:

N	R	S	
X			An existing table showing the average monthly and annual precipitation in inches for the preceding five years.

Technical Assistance Comments:

GEOLOGY

N	R	S	
	X		An existing geologic map and a description of the geology, including aquifers, confining layers, recharge areas, discharge areas, sensitive areas as defined in Minnesota Statutes, section 103H.005, subdivision 13, and groundwater flow characteristics.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

N	R	S	
	X		Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

N	R	S	
	X		Existing borehole geophysical records from wells, borings, and exploration test holes.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the area(s).

N	R	S	
	X		Existing surface geophysical studies.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the area(s).

SOILS

N	R	S	
X			Existing maps of the soils and a description of soil infiltration characteristics.

Technical Assistance Comments:

N	R	S	
X			A description or an existing map of known eroding lands that are causing sedimentation problems.

Technical Assistance Comments:

WATER RESOURCES			
N	R	S	An existing map of the boundaries and flow directions of major watershed units and minor watershed units.
X			
Technical Assistance Comments:			

N	R	S	An existing map and a list of public waters as defined in Minnesota Statutes, section 103G.005, subdivision 15, and public drainage ditches
	X		
Technical Assistance Comments: Include public waters identification of Sagamore Mine Pit.			

N	R	S	The shoreland classifications of the public waters listed under subitem (2), pursuant to part 6120.3000 and Minnesota Statutes, sections 103F.201 to 103F.221. Include classification of Sagamore Mine Pit.
X			
Technical Assistance Comments:			

N	R	S	An existing map of wetlands regulated under Chapter 8420 and Minnesota Statutes, section 103G.221 to 103G.2373.
X			
Technical Assistance Comments:			

N	R	S	An existing map showing those areas delineated as floodplain by existing local ordinances.
X			
Technical Assistance Comments:			

DATA ELEMENTS ABOUT THE LAND USE

LAND USE			
N	R	S	An existing map of parcel boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	An existing map of political boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	An existing map of public land surveys including township, range, and section.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.
	X	X	

Technical Assistance Comments: The inventory, mapping and management of land uses and potential sources of contamination for all the Drinking Water Supply Management Areas(s) must reflect what is known about these data elements, as follows:

Moderate Vulnerability - 1) All potential contaminant sources and facility designations as listed on the attachment, 2) a land use/land cover map and table, and 3) an inventory of the Inner Wellhead Management Zone (IWMZ).

Wells: Priority wells to be inventoried include wells greater than 25 feet in depth.

As a starting point, MDH will provide a 1992 or 2001 land cover map and table from federal data bases. This data set must be used unless an alternative electronic data set that is more current and detailed is available.

Management strategies must be developed for all land uses and potential sources of contamination.

N	R	S	An existing comprehensive land-use map.
	X	X	

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	Existing zoning map.
	X	X	

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

PUBLIC UTILITY SERVICES

N	R	S	An existing map of transportation routes or corridors.
	X		

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	An existing map of storm sewers, sanitary sewers, and public water supply systems.
	X		

Technical Assistance Comments: It is not necessary to include a map of your public water supply system in your plan if you feel it would pose a threat to the security of your system. An existing map of the storm sewers and sanitary sewers in the Drinking Water Supply Management Area(s) must be included in the wellhead protection plan and must also be submitted to MDH as part of the approval.

N	R	S	An existing map of the gas and oil pipelines used by gas and oil suppliers.
	X	X	

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	An existing map or list of public drainage systems.
	X		

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing record of construction, maintenance, and use of the public water supply well and other wells within the drinking water supply management area.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

DATA ELEMENTS ABOUT WATER QUANTITY

SURFACE WATER QUANTITY

N	R	S	
X			An existing description of high, mean, and low flows on streams.

Technical Assistance Comments:

N	R	S	
X			An existing list of lakes where the state has established ordinary high water marks.

Technical Assistance Comments:

N	R	S	
X			An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.

Technical Assistance Comments:

N	R	S	
X			An existing list of lakes and streams for which state protected levels or flows have been established.

Technical Assistance Comments:

N	R	S	
X			An existing description of known water-use conflicts, including those caused by groundwater pumping.

Technical Assistance Comments:

GROUNDWATER QUANTITY

N	R	S	
	X		An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X	X	An existing description of known well interference problems and water use conflicts.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

DATA ELEMENTS ABOUT WATER QUALITY

SURFACE WATER QUALITY

N	R	S	
X			An existing map or list of the state water quality management classification for each stream and lake.

Technical Assistance Comments:

N	R	S	
	X		An existing summary of lake and stream water quality monitoring data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; 3. organic chemicals; 4. sedimentation; 5. dissolved oxygen; and 6. excessive growth or deficiency of aquatic plants.

Technical Assistance Comments: MDH will assist in sampling the city wells and Sagamore Mine Pit to further assess any relationship between the aquifer used by the city wells and surface water.

GROUNDWATER QUALITY

N	R	S	
	X		An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; and 3. organic chemicals.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing report of groundwater tracer studies.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing site study and well water analysis of known areas of groundwater contamination.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

N	R	S	
	X		An existing property audit identifying contamination.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) - POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1180025	**COMMUNITY**
NAME	Riverton	
ADDRESS	Riverton Water Superintendent, c/o Ms. Cari Johnson, Clerk, 16663 Main Street, Riverton, MN 56455	

FACILITY (WELL) INFORMATION

NAME	Well #1
FACILITY ID	S01
UNIQUE WELL NO.	241291
COUNTY	Crow Wing

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ YES (Please attach a copy)
☐ NO ☐ UNDETERMINED

PWS ID / FACILITY ID	1180025 S01	UNIQUE WELL NO.	241291

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		

PWS ID / FACILITY ID	1180025 S01	UNIQUE WELL NO.	241291

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
MWW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		

PWS ID / FACILITY ID	1180025 S01	UNIQUE WELL NO.	241291

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

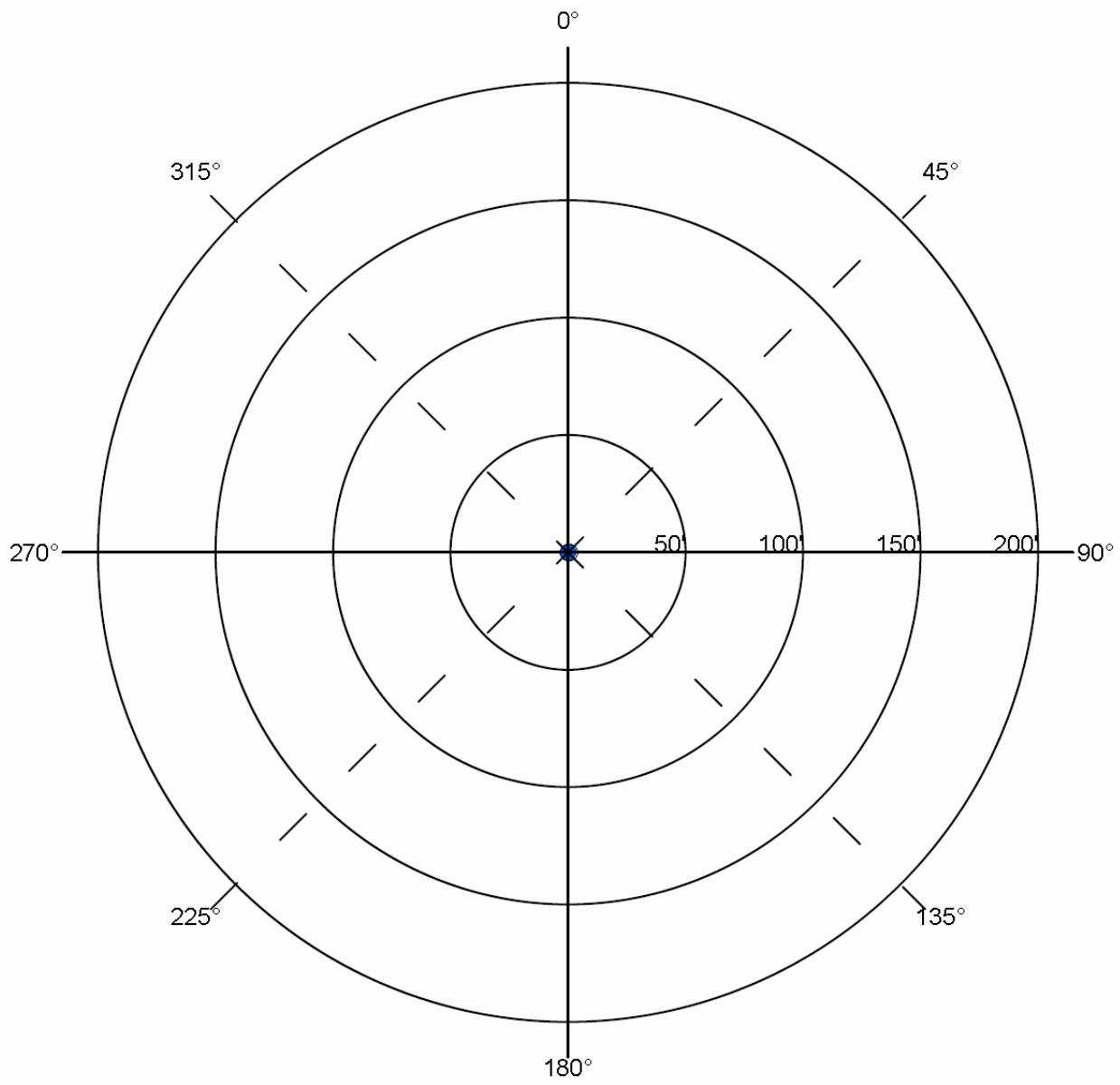
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1180025 S01	UNIQUE WELL NO.	241291

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



Were the isolation distances maintained for the new sources of contamination?	Y	N	N/A
Is the system monitoring existing nonconforming sources of contamination?	Y	N	N/A

Reminder Question: Were the wellhead protection measure(s) implemented?			
INSPECTOR	Neiman, Dave	DATE	10 - 1 - 2013

PWS ID / FACILITY ID	1180025 S01	UNIQUE WELL NO.	241291

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

COMMENTS

For further information, please contact:

Minnesota Department of Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Section Receptionist: 651-201-4700
Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) - POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1180025 **COMMUNITY**
NAME	Riverton
ADDRESS	Riverton Water Superintendent, c/o Ms. Cari Johnson, Clerk, 16663 Main Street, Riverton, MN 56455

FACILITY (WELL) INFORMATION

NAME	Well #2
FACILITY ID	S02
UNIQUE WELL NO.	135004
COUNTY	Crow Wing

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ YES (Please attach a copy)
☐ NO ☐ UNDETERMINED

PWS ID / FACILITY ID	1180025 S02	UNIQUE WELL NO.	135004

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		

PWS ID / FACILITY ID	1180025 S02	UNIQUE WELL NO.	135004

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	35	N
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	109	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		

PWS ID / FACILITY ID	1180025 S02	UNIQUE WELL NO.	135004

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[6]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

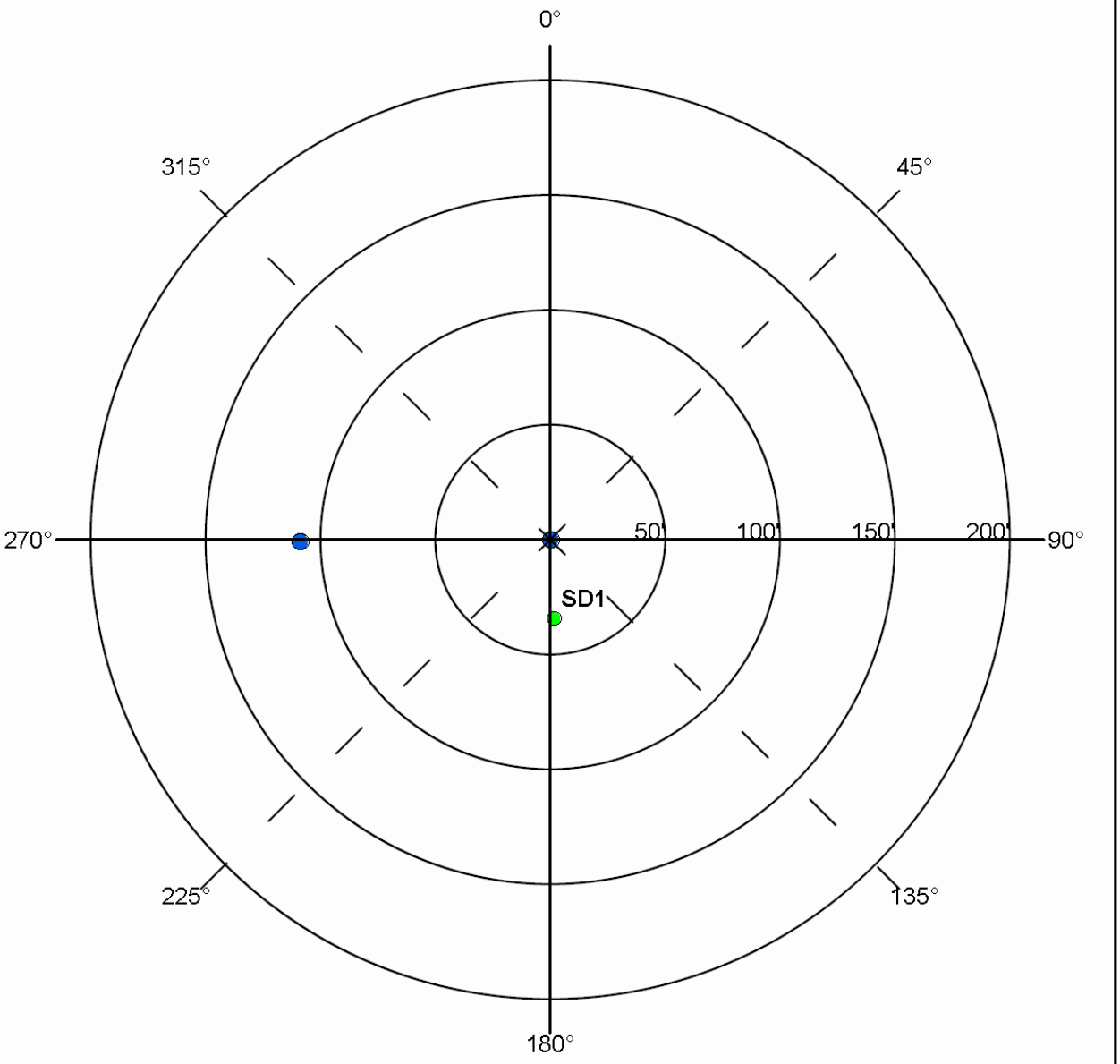
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1180025 S02	UNIQUE WELL NO.	135004

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



Were the isolation distances maintained for the new sources of contamination?	Y	N	N/A
Is the system monitoring existing nonconforming sources of contamination?	Y	N	N/A

Reminder Question: Were the wellhead protection measure(s) implemented?			
INSPECTOR	Neiman, Dave	DATE	10 - 1 - 2013

PWS ID / FACILITY ID	1180025 S02	UNIQUE WELL NO.	135004

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

COMMENTS

9/7/2003 - Location for PCSI Type SET (bearing = 0, distance = 0 , inventory date: 10/12/1998) could not be determined.
9/7/2003 - Location for PCSI Type DRA (bearing = 0, distance = 0 , inventory date: 10/12/1998) could not be determined.

For further information, please contact:

Minnesota Department of Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Section Receptionist: 651-201-4700
Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) - POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1180025 **COMMUNITY**
NAME	Riverton
ADDRESS	Riverton Water Superintendent, c/o Ms. Cari Johnson, Clerk, 16663 Main Street, Riverton, MN 56455

FACILITY (WELL) INFORMATION

NAME	Well #3
FACILITY ID	S03
UNIQUE WELL NO.	130547
COUNTY	Crow Wing

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?
☐ YES (Please attach a copy)
☐ NO ☐ UNDETERMINED

PWS ID / FACILITY ID	1180025 S03	UNIQUE WELL NO.	130547

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		

PWS ID / FACILITY ID	1180025 S03	UNIQUE WELL NO.	130547

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	115	N**
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	109	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		

PWS ID / FACILITY ID	1180025 S03	UNIQUE WELL NO.	130547

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

** This number is the estimated distance that this potential source is from this well even though it was identified during an inventory for an adjacent well.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

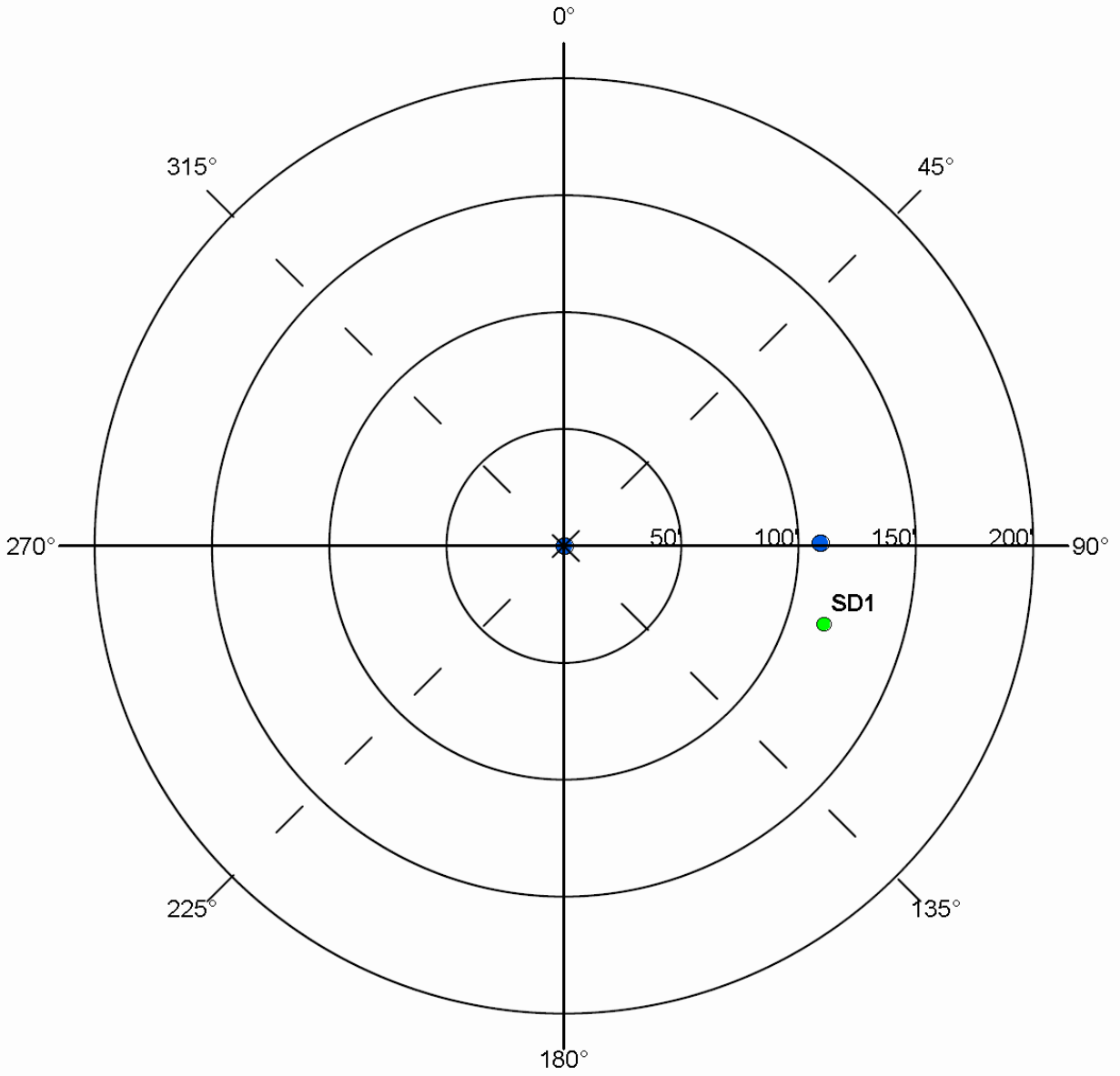
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1180025 S03	UNIQUE WELL NO.	130547

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



Were the isolation distances maintained for the new sources of contamination?	Y	N	N/A
Is the system monitoring existing nonconforming sources of contamination?	Y	N	N/A

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR	Neiman, Dave	DATE	10 - 1 - 2013

PWS ID / FACILITY ID	1180025 S03	UNIQUE WELL NO.	130547

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

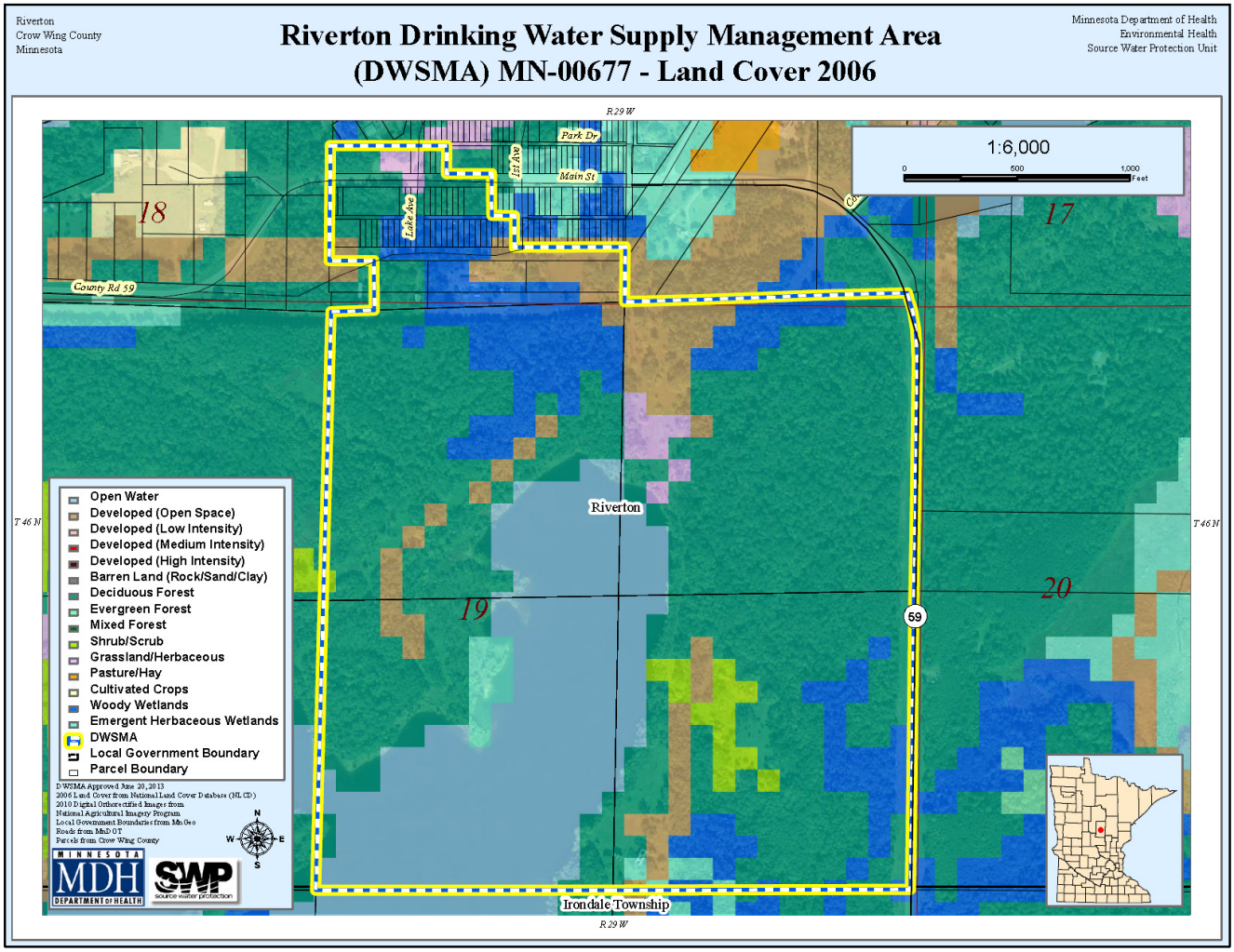
COMMENTS

9/7/2003 - Location for PCSI Type SET (bearing = 0, distance = 0 , inventory date: 10/12/1998) could not be determined.
9/7/2003 - Location for PCSI Type DRA (bearing = 0, distance = 0 , inventory date: 10/12/1998) could not be determined.

For further information, please contact:

Minnesota Department of Health
Drinking Water Protection Section
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Section Receptionist: 651-201-4700
Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000

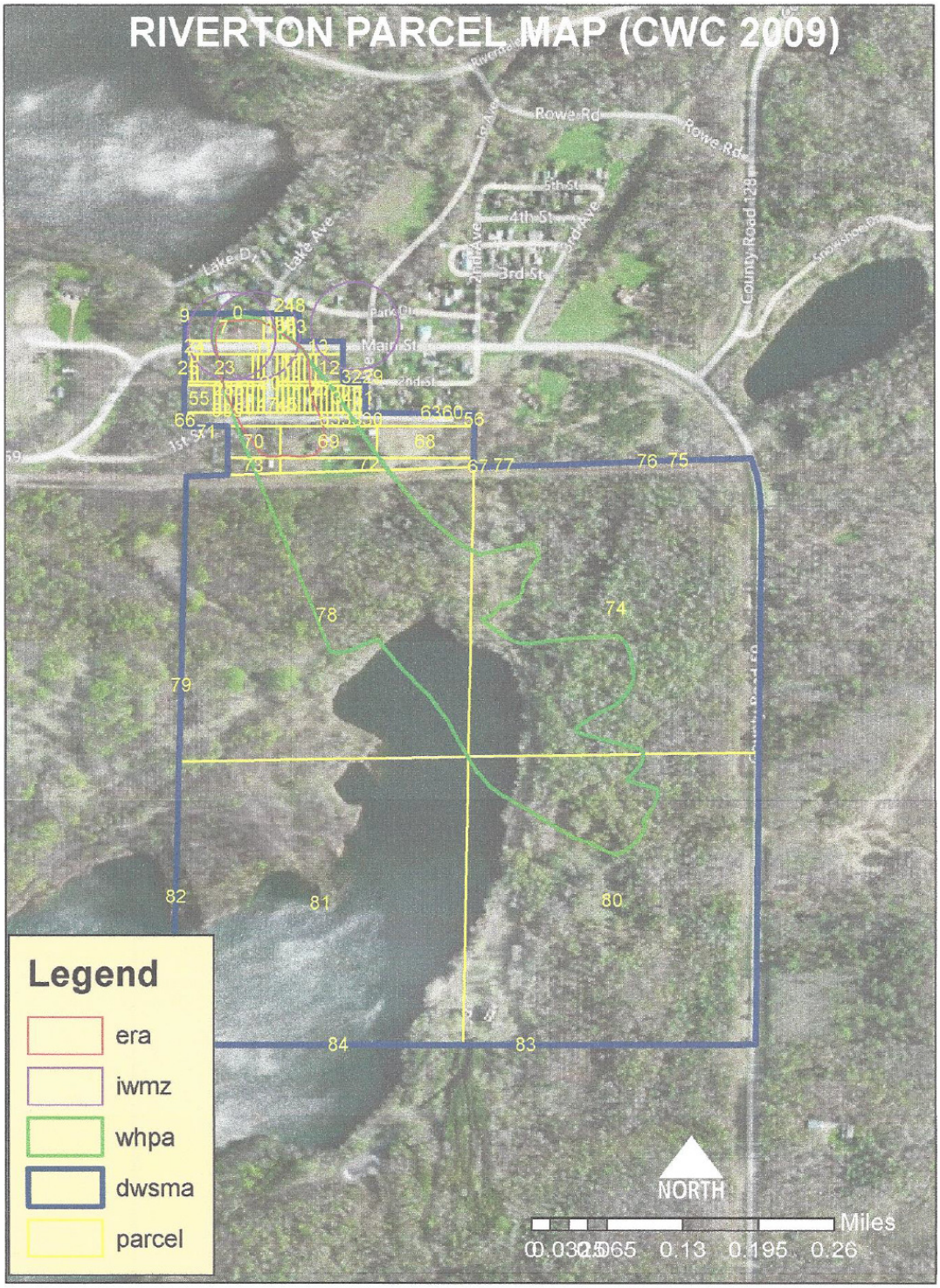


Wellhead Protection Program
Minnesota Department of Health

Riverton DWSMA (MN-00677) 2006 Land Cover Statistics

LAND COVER	ACRES	PERCENT	YEAR
Open Water	34.46	20.13	2006
Developed, Open Space	14.58	8.52	2006
Deciduous Forest	92.12	53.81	2006
Shrub/Scrub	3.09	1.80	2006
Grassland/Herbaceous	2.65	1.55	2006
Woody Wetlands	21.87	12.77	2006
Emergent Herbaceous Wetlands	2.43	1.42	2006
Total	171.21	100.00	2006

These statistics are geographically derived from the 2006 National Land Use/Land Cover dataset. They may not reflect current conditions and are only an approximation of land cover.


RIVERTON PARCEL MAP (CWC 2009)
Rowe Rd
Rowe Rd
4th St
3rd St
Lake Ave
Lake Ave
Park Dr
Main St
2nd St
1st St
County Road 128
Legend
era
iwmz
whpa
dwsma
parcel
NORTH
Miles
0 0.03 0.065 0.13 0.195 0.26


RIVERTON PARCEL MAP (CWC 2009)
(Enlarged for clarity)
Legend
era
iwmz
whpa
dwsma
parcel
NORTH
Miles
0 0.0125 0.025 0.05 0.075 0.1

parcel

FID	AREA	APPRCL	OWNAME	PHYSADDR	PHYSCITY
0	19.49867	30101000901A009	TAX FORFEITED		IRONTON
1	701.64294				
2	3.11659				
3	289.17098	301010030200009	WELLS FARGO BANK NA		RIVERTON
4	290.10299	301010030190009	WELLS FARGO BANK NA		RIVERTON
5	290.10383	301010030180009	WELLS FARGO BANK NA	16580 MAIN ST	IRONTON, MN
6	290.10453	301010030170009	WELLS FARGO BANK NA		RIVERTON
7	4136.73004	30101004001Z009	TAX FORFEITED		IRONTON
8	3.46672	30101003021Z009	TAX FORFEITED		IRONTON
9	0.55187	300183411ABA009	SWANSON, RUSSELL O & DOLORES		RIVERTON
10	2.73452	30101003021Z009	TAX FORFEITED		IRONTON
11	3987.22261				
12	1445.51426	30101006005Z009	CITY OF RIVERTON		IRONTON
13	290.07901	301010060100009	BACKBERG, PHILIP C & MYRNA		IRONTON
14	290.07867	301010060110009	BACKBERG, PHILIP C & MYRNA		IRONTON
15	290.07677	301010060120009	BACKBERG, PHILIP C & MYRNA		IRONTON
16	290.07902	301010060130009	BACKBERG, PHILIP C & MYRNA		IRONTON
17	290.07903	301010060140009	TAX FORFEITED		IRONTON
18	290.07869	301010060150009	TAX FORFEITED		IRONTON
19	290.0787	301010060160009	TAX FORFEITED		IRONTON

FID	AREA	APPRCL	OWNAME	PHYSADDR	PHYSCITY
20	1481.52283				
21	290.07873	301010050010009	HAWKS, HAROLD R & DARLENE		RIVERTON
22	290.07909	301010050020009	HAWKS, HAROLD R & DARLENE		RIVERTON
23	2900.78972	30101005003Z009	HAWKS, HAROLD R & DARLENE		RIVERTON
24	290.0792	301010050130009	HAWKS, HAROLD R & DARLENE		RIVERTON
25	388.11969	301010050140009	HAWKS, HAROLD R & DARLENE		RIVERTON
26	0.09304	301010060040009	PETERSON, DAVID C & MARY ANN		RIVERTON
27	589.68459				
28	533.44259				
29	2.04695				
30	290.08618	301010060320009	PETERSON, DAVID C & MARY ANN		RIVERTON
31	290.08619	301010060310009	PETERSON, DAVID C & MARY ANN	21047 1ST AVE	RIVERTON
32	290.08696	301010060300009	PETERSON, DAVID C & MARY ANN		RIVERTON
33	290.08773	301010060290009	PETERSON, DAVID C & MARY ANN		RIVERTON
34	290.08815	301010060280009	PETERSON, DAVID C & MARY ANN		RIVERTON
35	290.08809	301010060270009	PETERSON, DAVID C & MARY ANN		RIVERTON
36	290.08662	301010060260009	PETERSON, DAVID C & MARY ANN		RIVERTON
37	290.08896	301010060250009	FORE, PAMELA L		IRONTON
38	290.08931	301010060240009	FORE, PAMELA L		IRONTON

FID	AREA	APPRCL	OWNAME	PHYSADDR	PHYSCITY
39	290.09008	301010060230009	FORE, PAMELA L		IRONTON
40	290.09009	301010060220009	FORE, PAMELA L		IRONTON
41	290.0901	301010060210009	FORE, PAMELA L	16610 1ST ST	IRONTON
42	290.09087	301010060200009	FORE, PAMELA L		IRONTON
43	290.09164	301010060190009	FORE, PAMELA L		IRONTON
44	290.09165	301010060180009	FORE, PAMELA L		IRONTON
45	290.09166	301010060170009	FORE, PAMELA L		IRONTON
46	290.09319	301010050300009	HAWKS, HAROLD R & DARLENE		RIVERTON
47	290.09355	301010050290009	HAWKS, HAROLD R & DARLENE	16556 1ST ST	RIVERTON
48	290.09397	301010050280009	HAWKS, HAROLD R & DARLENE		RIVERTON
49	290.0944	301010050270009	HAWKS, HAROLD R & DARLENE		RIVERTON
50	290.09475	301010050260009	HAWKS, HAROLD R & DARLENE		RIVERTON
51	290.09552	301010050250009	HAWKS, HAROLD R & DARLENE		RIVERTON
52	290.09553	301010050240009	HAWKS, HAROLD R & DARLENE		RIVERTON
53	290.09554	301010050230009	HAWKS, HAROLD R & DARLENE		RIVERTON
54	290.09441	301010050220009	HAWKS, HAROLD R & DARLENE		RIVERTON
55	1565.31336	30101005015Z009	HAWKS, HAROLD R & DARLENE		RIVERTON
56	1.78591	300184400E00009	STATE OF MINNESOTA DNR		
57	0.21977	301010070360009	BONSELL, TINA		IRONTON
58	0.68071	301010070350009	BONSELL, TINA		IRONTON
59	0.56041	301010070340009	BONSELL, TINA		IRONTON
60	0.44049	301010070330009	BONSELL, TINA	16705 2ND ST	IRONTON
61	0.32057				
62	0.20066				
63	0.08036	301010070300009	FORSETH, ALLAN M	16695 2ND ST	IRONTON, MN

FID	AREA	APPRCL	OWNAME	PHYSADDR	PHYSCITY
64	0.00167				
65	7243.40003				
66	57.44475				
67	14.58798	300184400AEA009	CLARK, DIANNE M	16791 MAIN ST	IRONTON, MN
68	5732.67735	30101000902A009	DOBSON, BRIAN F & PAMELA L		IRONTON
69	5720.11705	30101000902B009	DOBSON, BRIAN F & PAMELA L	16621 1ST ST	RIVERTON
70	3111.70094	30101000902F009	HULLINGER, NORMAN D & JOYCE L	16575 1ST ST	IRONTON
71	26.32589	30101000902G009	SJOLSETH, DEAN & SHERYL	16529 1ST ST	IRONTON, MN
72	4656.5588	300184310B00009	DOBSON, BRIAN F & PAMELA L		
73	1659.60607				
74	159235.67518	30019110000XAB0	STATE OF MINNESOTA DEPT OF NATURAL		IRONTON
75	9.54587	300184400AAF009	PAUL, JOSEPH & VIRGINIA		IRONTON
76	9.16822	300184400ABA009	CLARK, DIANNE M		RIVERTON
77	0.39	300184400ABA009	CLARK, DIANNE M		RIVERTON
78	157004.08691	30019120000XAD0	STATE OF MINNESOTA DEPT OF NATURAL		IRONTON
79	43.69764	300192100000AC0	STATE OF MINNESOTA DNR-		IRONTON
80	160939.56399	300191400000AE0	STATE OF MINNESOTA DEPT OF NATURAL		IRONTON
81	158012.23291	30019130000XAC0	STATE OF MINNESOTA DEPT OF		IRONTON

FID	AREA	APPRCL	OWNAME	PHYSADDR	PHYSCITY
82	94.91229	300192400000AA0	NATURAL STATE OF MINNESOTA DEPT OF NATURAL		IRONTON
83	62.72103	690194100000AE0	STATE OF MINNESOTA DNR-		IRONTON
84	137.40182	69019420000X009	STATE OF MINNESOTA DEPT OF NATURAL	20141 SAGAMORE RD	IRONTON, MN
85	0.04023	690193100000AB0	STATE OF MINNESOTA DEPT OF NATURAL		IRONTON

City of Riverton (PWSID 1180025, Crow Wing County)

Well Sequence Number (in record)	Well Name	Unique #	Casing Diameter	Well Depth	Depth Cased	Year Constructed	Well Type	Year Out of Service	Sealing Record	Location
1	Dug 1	NA	NA	20-25 feet	NA - Curbed with concrete.	Near 1921	Dug	Abandoned by 01/1979	None found	From shore of Little Rabbit Lake about 50 feet; ground rises rapidly after shore.
2	**Well 1** in 1980 and on. Well 2 in 1974 & 1976 microfiche	241291	12 inches	60 feet	55 feet	1973	Drilled	Still in use as emergency.		Township 46, Range 29, Section 18 (Subsection DCDBAB)
3	**Well 2** in 1980 and on. Well 3 1979 microfiche	135004	6 inches	83 feet	53 feet	1977	Drilled	Still in use.		Township 46, Range 29, Section 18 (Subsection DCC)
4	**Well 3** in 1980 and on. Well 4 1979 microfiche	130547	6 inches	68 feet	53 feet	1977	Drilled	Still in use.		Township 46, Randy 29, Section 18 (Subsection DCC)
Data Bases Searched: CWI MDH DWP Microfiche MDH DWP MNDWIS					**1)** It's unclear if old dug well was ever sealed. **2)** Per January 21, 1947, microfiche, several test wells were drilled; no mention then or later of sealing them. **3)** Continuing problem of water and sewer services laid in the same trench with inadequate protection.					

OLD MUNICIPAL WELL INVENTORY

CITY OF RIVERTON ZONING MAP