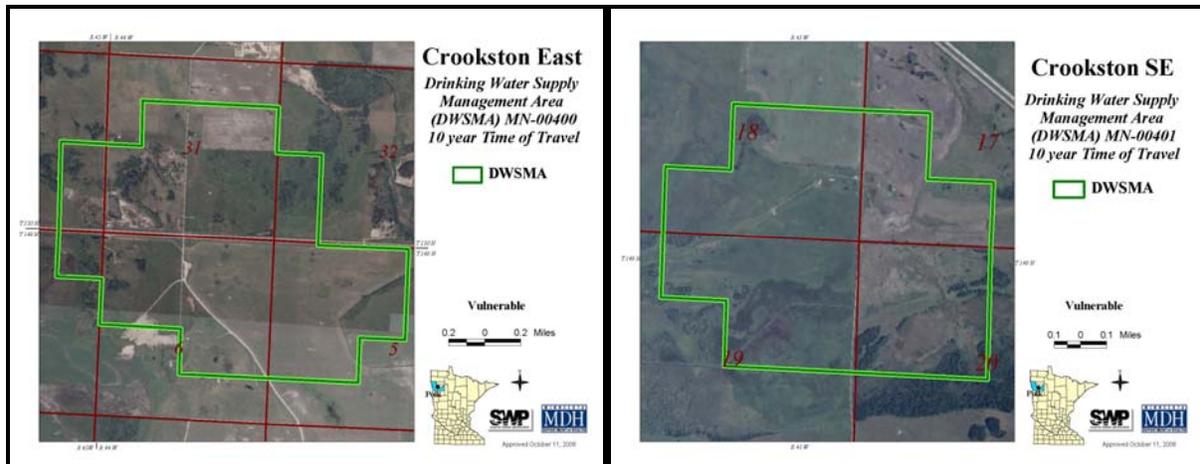


City of Crookston, Minnesota

WELLHEAD PROTECTION PLAN PART 2:



- **Potential Contaminant Source Inventory**
- **Impacts of expected changes to Land and Water Resource**
- **Issues, Problems and Opportunities**
- **Wellhead Protection Plan goals**
- **Management Strategies**
- **Evaluation Plan**
- **Water Emergency and Conservation Plan**

TABLE OF CONTENTS

Page Number

I. PUBLIC WATER SUPPLY PROFILE	3
II. DOCUMENTATION LIST	4
III. EXECUTIVE SUMMARY	5
IV. CHAPTER 1 - Data Elements and Assessment	7
V. CHAPTER 2 - Impact of Changes on Public Water Supply Well	13
VI. CHAPTER 3 - Issues, Problems and Opportunities	15
VII. CHAPTER 4 - Wellhead Protection Goals	17
IIIX. CHAPTER 5 - Objectives and Plans of Action	18
IX. CHAPTER 6 - Evaluation Program	25
X. CHAPTER 7 - Alternative Water Supply; Contingency Strategy	26
XI. APPENDIX A – Data Elements for Part 2	
XII. APPENDIX B - Potential Contaminant Source Inventory	
XIV. APPENDIX C – Water Emergency and Conservation Plan DNR Approval Letter Water Emergency and Conservation Plan MDH Scoping II Letter City of Crookston Public Hearing Notice and City Council Meeting Minutes	

PUBLIC WATER SUPPLY PROFILE

PUBLIC WATER SUPPLY

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WELLHEAD PROTECTION MANAGER

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GENERAL INFORMATION

UNIQUE WELL NUMBER(S) 147243 (Well No. 1), 191552 (Well No. 2),
191553 (Well No. 3), 191554 (Well No. 4), 685465 (Well No. 5), 685466 (Well No. 6)
SIZE OF POPULATION SERVED 8,192 population; service connections = ~1700
COUNTY Polk County, 2000 census population = 31,369

DOCUMENTATION LIST

<u>STEP</u>	<u>DATE PERFORMED</u>
Scoping Meeting 2 Held (4720.5340, subp. 1)	<u>December 20, 2006</u>
Scoping 2 Decision Notice Received (4720.5340, subp. 2)	<u>January 17, 2007</u>
Remaining Portion of Plan Submitted to Local Units of Government (LUGs) (4720.5350)	<u>May 14, 2009</u>
Review Received From Local Units of Government (4720.5350, subp. 2)	<u>July 14, 2009</u>
Review Comments Considered (4720.5350, subp. 3)	<u>July 14, 2009</u>
Public Hearing Conducted (4720.5350, subp.4)	<u>July 14, 2009</u>
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	<u>July 20, 2009</u>
Final WHP Plan Review Received (4720.5360, subp. 4)	<u></u>

EXECUTIVE SUMMARY

Part 2 of the Crookston Wellhead Protection Plan addresses Minnesota Rules 4720.5220- 4720.5280, 4720.5400 and includes:

- Data elements and assessment
- Impact of changes on Public Water Supply
- Issues, problems and opportunities including the potential contaminant source inventory
- Wellhead protection goals
- Objectives and plans of action
- Evaluation program
- Alternative water supply; Contingency strategy
- Referenced data

Part 1 of the Wellhead Protection Plan (WHP Plan) determined the extent of the Drinking Water Supply Management Area (DWSMA; Appendix A) and that the aquifer which supplies water to the City of Crookston is vulnerable to potential contaminant sources. Part 1 of the WHP Plan describes 1) how the wellhead protection area (WHPA) was delineated, 2) the boundaries of the drinking water supply management area (DWSMA), 3) the assessment of well vulnerability, and 4) the assessment of aquifer vulnerability throughout the DWSMA. Part 1 of this plan was approved by the Minnesota Dept. of Health (MDH) on October 11, 2006, and is on file for review at the City of Crookston Office or at the MDH Bemidji Field Office and will be the focus for part 2 of the WHP Plan.

The City is located in Polk County along the Red Lake River (Figure 1). The City of Crookston's groundwater supply is obtained from six wells in two well fields. The old well field (Wells No. 1 through 4) is located approximately 12 miles east of the City, at the southwest corner of Red Lake County. The DWSMA for the old well field contains portions of Polk and Red Lake Counties. The new well field (Wells No. 5 and 6) is located approximately 19 miles east-southeast of the City. The city water supply wells are completed in a surficial unconfined/semiconfined aquifer and a shallow, confined, sand aquifer contained within a glacial till. It has been determined that the Crookston water supply wells are considered vulnerable. The vulnerability rating is based on the Department of Natural Resources (DNR) geologic sensitivity rating of the aquifers in which the city water supply wells are set and the results of tritium analysis. The Crookston DWSMA is divided into two vulnerability ratings. The vulnerability of the surficial unconfined/semiconfined aquifer was determined to be high to moderate and the shallow confined aquifer was determined to be moderate. For the areas of the Crookston DWSMA which have a moderate vulnerability rating, the minimum potential contaminant source inventory (PCSI) must include all classes of wells, underground automotive waste disposal systems, sewer systems serving more than 20 people or 2 or more facilities, cesspools, and tanks. For the areas of the Crookston DWSMA which are considered to have a high vulnerability rating, an inventory of all land uses and potential sources of contaminants for the PCSI must be completed. Management strategies, therefore, will be focused on management of the municipal wells and inner well management zone (IWMZ), all potential contaminants within the high DWSMA, all classes of wells, sewer systems, cesspools, and tanks within the moderate DWSMA, public education, zoning and administrative controls, and continued data collection to develop additional and more accurate information for future revisions to this plan.

The information and data contained in Chapters 1 - 4 of this WHP plan provide support and a basis for approaches taken in addressing the potential contaminant sources identified within the DWSMA. The reader is encouraged to concentrate attention on Chapters 1 - 4 in order to better understand why a particular management strategy is included or not included in Chapter 5.

It is the hope of the Wellhead Protection Team that members of the public will be better informed by the information contained in this plan and that they will be moved to take action in their daily lives to minimize potential impacts on the quality of water currently enjoyed by residents of the Crookston community.

CHAPTER ONE

DATA ELEMENTS; ASSESSMENT (4720.5200)

I. REQUIRED DATA ELEMENTS

A. PHYSICAL ENVIRONMENT DATA ELEMENTS

1. Precipitation - The average annual precipitation observed in Polk County was 23.8 inches over the 5 year period from 2003 to 2007. The majority of this precipitation normally falls in the seven month period from April through October. Groundwater recharge is greatest where the surficial aquifer is present. Annual reports of monthly precipitation rates for Polk and Red Lake Counties (2003 - 2007) are included in Appendix A.
2. Geology - The surface elevation of the City well fields and surrounding area of interest ranges from approximately 850 to 1150 feet above mean sea level (ft-amsl). The geology in the vicinity of the City consists of surficial beach deposits that are made up primarily of wave-washed till and sandy beach ridges. These are underlain by glacial drift that consists of layers of sand and gravel, and till. Precambrian-aged bedrock ranges from 120 to 392 feet below ground surface (bgs).

Sustainable ground-water yields are obtained from the sand and gravel layers, which are referred to as the surficial unconfined/semiconfined aquifer and the shallow confined aquifer (Cowdery and Walsh, pers. comm., 2006; Lindgren, 1996). These supply water to the City wells. A deep confined aquifer is also present, but is beyond the scope of this study. Ground-water flows in the glacial drift in a general southeast to northwest direction toward the Red Lake River, which serves as the local and regional hydrologic discharge point for the flow system. A detailed description of the geologic and hydrogeologic characteristics which dictate the delineation of the WHPA and the vulnerability of the DWSMA can be found in Part I of the Crookston Wellhead Protection Plan. Obtaining a better understanding of the hydrogeology within the DWSMA will help protect the city's drinking water supply.

3. Soils - Soils in the Crookston DWSMA are divided into three general soil types. Soils in the majority of the DWSMA are sandy loams and loams on flats or rises on lake plains and moraines. The parent material of these soils consists of till or glaciolacustrine deposits over till. The second most occurring soil type within the DWSMA consists of loamy sands and sandy loams on flats and hill slopes of beach ridges and beach plains. The parent material of these soils consists of beach deposits. The third soil type occurring within the DWSMA consists of poorly drained soils and muck on lake plains, outwash plains, moraines, and depressions. The parent material of these soils consists of organic mater and organic matter over glaciolacustrine deposits. A large percent of the soils within the DWSMA have relatively high saturated hydraulic conductivities. These high hydraulic conductivity sandy soils are considered to have high vulnerability to groundwater contamination. Based on the high vulnerability of these soils to groundwater contamination, the WHP plan should consider the connection between soils, contaminant sources, land

use, and water quality. Refer to the Polk and Red Lake County Soil Surveys for a detailed description of soil series that occur within the DWSMA. The Polk and Red Lake County Soil Survey map units, descriptions, and saturated hydraulic conductivity values for the Crookston DWSMA are included in Appendix A.

4. Water resources - The Crookston East WHPA and DWSMA are within the Kripple Creek and Gentilly River minor watersheds and the Red Lake River major watershed. The Crookston Southeast WHPA and DWSMA are within the County Ditch #64 minor watershed and the Clearwater River major watershed. Surficial water features and watersheds were assessed based on existing maps and publications, and discussions with MDH and USGS staff. Isotopic water data from the City wells plots on or near the meteoric water line and is isotopically different from water collected from Judicial Ditch #66 (Figure 8). Data for the City wells is from April 11, 2005 and the ditch sample is from Station #5078770 collected on July 14, 2004 (data provided by MDH and USGS staff). If these data represent the general conditions of the site, then it seems unlikely that water from this ditch, or other surface water bodies, influences groundwater recharge. Therefore, surface waters were not considered a significant source of recharge to the subject aquifers within the WHPA and a conjunctive delineation was not considered. Many wetlands exist in the DWSMA. Much of these wetland areas are preserved through the Wetland Reserve Program. These wetlands are likely a source of groundwater recharge within the watershed but the connection of the wetlands to the underlying aquifers is unknown. There are no lakes located within the DWSMA.

B. LAND USE DATA ELEMENTS

1. Land use - Land use within the DWSMA is primarily conservation lands (grassland), with some acreage in gravel mining, and cultivated land. The Nature Conservancy is the majority land owner within the DWSMA and has most of the land enrolled in the Wetland Reserve Program. The fact that a majority of the land with the DWSMA is enrolled in conservation easements significantly reduces the threat of land use adversely affecting the resource aquifers in the area. The gravel mining leases are located in the east DWSMA. The north lease runs through 2050 and the south lease runs through 2040. Gravel mining and agricultural activities comprise a small portion of the DWSMA but will have the greatest affect on groundwater quality. Impacts associated with these land uses include agricultural chemical and nutrient application, runoff/sediment accumulation, transportation/utility corridor spills and leaks. Maps of existing land use, political boundaries, and zoning within the DWSMA are included in Appendix A.

The IWMZ Potential Contaminant Source Inventory Form identified a gravel pocket approximately 25 feet from Crookston Well 1 (unique no. 147243) and a gravel pocket approximately 49 feet from Crookston Well 2 (unique no. 191552). The IWMZ Potential Contaminant Source Inventory Form also recommended posting “No Dumping” signs near any floor drains, determining the status and location of TW #147234, TW #267671, and Well #191551, continuing to maintain and monitor TW #105665, TW #147238, and TW #267670, and explore options to minimize impacts from spills along US Highway 2 in the East DWSMA. The IWMZ Potential Contaminant Source Inventory Form recommended continuing to maintain and monitor TW #685472, Well #620680, and Well #654760 in the SE DWSMA. The IWMZ Potential Contaminant Source Inventory Form is included in Appendix B.

2. Public utility services - Transportation corridors are potential contaminant sources within the DWSMA and need to be considered when developing a management

strategy for the DWSMA. Transportation corridors are sources of potential leaks and spills. Transportation corridors within the DWSMA are included in the PCSI Maps in Appendix B.

C. WATER QUANTITY DATA ELEMENTS

1. Surface water quantity - Surface water features used in the modeling process include the Red Lake River, which is the local and regional discharge point of the flow system of interest. Therefore, the Red Lake River affects the direction of ground-water flow and was included in the flow model as a constant-head boundary. The area near Maple Lake is also included in the model as a constant head boundary forming the upgradient head for the aquifers. Surface runoff is directed toward local streams and ditches and eventually the River, which is the only surface water feature of interest since it is the primary discharge point for the regional aquifers. Surface water within the DWSMA is limited to wetlands. Many wetlands exist in the DWSMA and a majority of them are preserved through the Wetland Reserve Program. There are no lakes located within the DWSMA.
2. Groundwater quantity – Sustainable ground-water yields within the watersheds are obtained from the sand and gravel layers, which are referred to as the surficial unconfined/semiconfined aquifer and the shallow confined aquifer (Cowdery and Walsh, pers. comm., 2006; Lindgren, 1996). These supply water to the City wells. These wells provide all the water for the City’s distribution system. Review of the Minnesota Department of Natural Resources (DNR), Water Appropriations Permit Program database identified five other high-capacity wells/discharge points within the model domain. Three of these locations are for surface dewatering of gravel mining operations. The addition of high capacity wells should still be considered as a strategy for WHPA management within the DWSMA to ensure availability of the public water supply. A deep confined aquifer is also present, but is beyond the scope of this study. Ground-water flows in the glacial drift in a general southeast to northwest direction toward the Red Lake River, which serves as the local and regional hydrologic discharge point for the flow system.

D. WATER QUALITY DATA ELEMENTS

1. Surface water quality – Surface water quality data was collected by the USGS. Water samples collected from ditches within the study area were aggregated and analyzed together for nutrient concentration, suspended-sediment concentration, major-ions, and one herbicide. The ditch-water samples were dominated by calcium, magnesium, and bicarbonate ions. Dissolved ammonia plus organic nitrogen, dissolved nitrite, and dissolved phosphorus were detected in the ditch-water samples and are comparable to those found in the Snake River. The Snake River drains land with similar characteristics as the study area and is considered typical of streams in the Red River Valley Lake Plain.
2. Groundwater quality - Tests for tritium, which is an indicator as to the age of groundwater, determined that the source aquifers are being recharged by relatively young water Nitrate-nitrogen detections also indicate that at least one of the City wells may be impacted by low levels of nitrate contamination; however, the analytical result is from treatment plant effluent and cannot be associated with a particular well. In addition, the USGS provided data from the Glacial Ridge Project indicating there were several sample locations within the domain from the shallow

unconfined/semiconfined aquifer that had nitrate-nitrogen detections in ground water that exceeded the criteria of 10 mg/L. There were detections of lead and copper in several domestic wells in the vicinity of the City; however, it is presumed that these detections are the result of individual domestic well service lines and not representative of impacts in the aquifer. There were no significant detections of volatile organic compounds. No contaminants were detected at levels that violated federal drinking water standards. The *City of Crookston 2007 Drinking Water Report* conducted by the Minn. Dept. of Health is included in Appendix A.

II. ASSESSMENT OF DATA ELEMENTS

A. USE OF THE WELL

The City of Crookston obtains its water supply from six wells. Crookston wells 1 (unique no. 147243), 2 (unique no. 191552), 3 (unique no. 191553), and 4 (unique no. 191554) are located approximately 12 miles east of the City, at the southwest corner of Red Lake County. Crookston wells 5 (unique no. 685466) and 6 (unique no. 685465) are located approximately 19 miles east-southeast of the City. The City does not anticipate significant water usage increases over the next 5 years. The City's historical pumping records from 2000 to 2004 indicate the maximum annual usage of the total system was 325.2 million gallons per year (mgy) (approximately 1.2 million cubic meters per year [m3/yr]) based on the maximum rates for each well over the 5-year period, or approximately 0.89 million gallons per day (mgd) (approximately 3,370 cubic meters per day [m3/day]).

Well Information:

Well Number	Unique Number	Casing Depth (feet)	Well Depth (feet)	Casing type	Casing Diameter (inches)
1	147243	138	164	Steel	12
2	191552	41	56	Steel	12
3	191553	50	70	Steel	12
4	191554	127	156	Steel	12
5	685466	93	123	Steel	12
6	685465	88	118	Steel	12

B. QUALITY AND QUANTITY OF WATER SUPPLYING THE PUBLIC WATER SUPPLY WELL

No contaminants were detected at levels that violated federal drinking water standards. The *City of Crookston 2007 Drinking Water Report* conducted by the Minn. Dept. of Health is included in Appendix A. Water quantity was an issue during the drought years of the 1980's. Although the city had sufficient water, as a precautionary step the city instituted odd-even watering schedules. Since the two new wells (685466 and 685465) come on line the city has not had any water quantity issues.

C. THE LAND AND GROUNDWATER USES IN THE DRINKING WATER SUPPLY MANAGEMENT AREA

Land use within the DWSMA is primarily conservation lands (grassland), with some acreage in gravel mining, and cultivated land (Land Use Map in Appendix A). The Nature Conservancy is the majority land owner within the DWSMA and has most of the land enrolled in the Wetland Reserve Program. The gravel mining leases are located in the east DWSMA. The north lease runs through 2050 and the south lease runs through 2040. According to Richard Normandin, City of Crookston Water Department Superintendent, the high capacity wells associated with the gravel mining operations have

not been pumped in several years. When they were pumped, the city did not notice any water use conflicts with the water supply wells.

The Potential Contaminant Source Inventory (PCSI) identified twenty-two (22) wells and two (2) Individual Sewage Treatment Systems (ISTS). Twenty-two (22) wells were identified and are the primary use of groundwater within the DWSMA. Six (6) Community Supply (Municipal), four (4) Test, two (2) Domestic, two (2) Commercial, two (2) Monitor, one (1) Observation, one (1) Piezometer, and four (4) Unknown wells were identified within the DWSMA (See the PCSI maps, tables, and MDH well records in Appendix B). The management strategies selected will focus on the wells and activities that have the most potential to impact the water supply resource aquifer.

CHAPTER TWO

IMPACT OF CHANGES ON PUBLIC WATER SUPPLY WELL (4720.5220)

I. CHANGES IDENTIFIED IN:

- A. PHYSICAL ENVIRONMENT - No significant changes are expected in the physical environment of the DWSMA.
- B. LAND USE - No significant changes are expected in land use within the DWSMA. The land use within the Inner Wellhead Management Zone (IWMZ) is dominated by grassland with the exception of the transportation corridors of U.S. Highway 2 and County Rd 50. Accidents and/or spills of contaminants along these transportation corridors pose the greatest threat to the IWMZ. The majority of the land within the DWSMA is enrolled or is in the process of being enrolled in the Wetland Reserve Program. The potential for any remaining agricultural land within the DWSMA to change from cropland/grazing to less intensive agriculture such as the Wetland Reserve Program or Conservation Reserve Program is possible and will be encouraged. Some portion of the east DWSMA is leased for gravel mining. The potential for converting the gravel mining lands to less intensive land use once the leases are up is possible. Any revisions to the land use management plans for the land within the DWSMA will be included in updates of the Wellhead Protection Plan.
- C. SURFACE WATER - No significant changes in surface water is expected in the DWSMA. Surface waters within the DWSMA consist of wetlands which are enrolled in the Wetlands Reserve Program. The Nature Conservancy and the U.S. Fish and Wildlife Service, recently restored a wetland in the northeast quarter of Section 12 in Tilden Township. This wetland outlet is to the northeast along Judicial Ditch 66. The restoration of this wetland will create of a native buffer along the upper reach of Judicial Ditch 66. This buffer will help to protect water quality within Crookston's southeast municipal well field. Judicial Ditch 66 flows within the 10-year capture zone and across the city's southeast DWSMA. The native buffer will help slow runoff, store flow, and remove dissolved nutrients, agricultural chemicals, and sediment before waters enter the channel.
- D. GROUNDWATER - No significant changes in groundwater is expected in the DWSMA. Any changes to the municipal water supply system or other wells within the DWSMA will be evaluated as part of the Evaluation Strategy Plan as discussed in Chapter 6.

II. IMPACT OF CHANGES

- A. EXPECTED CHANGES IN WATER USE - According to 2000 census data, the population of the City of Crookston increased from 8,119 to 8,192 from 1990 to 2000 (0.90% change). The City does not anticipate significant water usage increases over the next 5 years.
- B. INFLUENCE OF EXISTING WATER AND LAND GOVERNMENT PROGRAMS AND REGULATION - The Polk and Red lake Counties Local Water Management Plans have identified strategies that could be beneficial to the protection of the drinking water

management supply area. Surface and groundwater quality monitoring completed throughout the watersheds will identify impacted waters which can be managed to improve water quality. Existing programs such as the Wetland Reserve Program, the Conservation Reserve Program and the Wildlife Habitat Incentive Program can be utilized within the DWSMA to convert remaining marginal lands from production to a natural landscape that provides protection to surface water and groundwater. Documenting the abandonment of old wells, as well as taking inventory of new wells constructed within the DWSMA and surrounding areas, would be beneficial to the management of the wellhead protection area. The WHPA/DWSMA should be recognized and considered in future zoning changes and any actions on land use permits.

C. ADMINISTRATIVE, TECHNICAL, AND FINANCIAL CONSIDERATIONS - The City of Crookston has been supportive of developing a wellhead protection plan, and will continue with policy and financial support throughout the plan implementation. The wellhead protection manager will maintain an active WHP team that will assist and guide the successful implementation of this plan. The WHP team consists of the City Public Works Director, City Water Department Superintendent, Polk County Highway Department, Polk County Environmental Services, Nature Conservancy, Red Lake Watershed District, and MDH. The wellhead protection team will meet on an as-needed basis, with a minimum of one annual meeting, to review and evaluate plan implementation.

CHAPTER THREE

ISSUES, PROBLEMS, AND OPPORTUNITIES (4720.5230)

I. LAND USE ISSUES, PROBLEMS, AND OPPORTUNITIES RELATED TO:

- A. **THE AQUIFER** - The vulnerability rating of the surficial unconfined/semiconfined aquifer (Wells No. 2 and 3) is high with isolated areas of moderate, and the rating of the shallow confined aquifer (Wells No. 1, 4, 5, and 6) is moderate. Based on this data, the WHP plan identifies the need to manage land use practices and surface water contaminants in the identified high and moderate vulnerability areas.

- B. **THE WELL WATER** – Based on the WHP Part I Well Vulnerability Assessment, the City of Crookston water supply wells were determined to be vulnerable to contamination from activities at the land surface. These potential contaminant sources, if used or maintained improperly, could convey pollutants to the aquifer. The WHP Team plans to utilize public education opportunities, both existing and proposed to address potential contamination of the aquifer. The WHP Committee also plans to continue identification of existing and potential contaminant sources in the future.

- C. **THE DRINKING WATER SUPPLY MANAGEMENT AREA** - The dominant land use within the DWSMA is conservation lands (grassland). The majority of the land within the DWSMA is currently owned by The Nature Conservancy and is enrolled in the Wetland Reserve Program (Appendix A, Glacial Ridge Project Land Use Map). Lands owned by the City of Crookston within the DWSMA are also primarily grassland. Minor acreage within the DWSMA that is privately owned is also grasslands. Some acreage in the east DWSMA is in gravel mining leases. The land owned by the Nature Conservancy will be transferred to and managed by the U.S. Fish and Wildlife Service. A large portion of the adjacent lands and watersheds are included in the Glacial Ridge National Wildlife Refuge. The Glacial Ridge National Wildlife Refuge will comprise a 30,000 acre continuous area including a majority of the DWSMA. The restoration of wetlands and prairies and the reduction of agriculture will likely improve water quality. The existing land uses have not appeared to impact the aquifer in a negative fashion. Based on the aquifer vulnerability assessment, the potential contaminant source inventory (PCSI) is to include all potential contaminants within the high DWSMA, all classes of wells, sewer systems, cesspools, and tanks within the moderate DWSMA. The PCSI is included in Appendix B, and is summarized in Chapter 5.

II. IDENTIFICATION OF:

- A. **PROBLEMS AND OPPORTUNITIES DISCLOSED AT PUBLIC MEETINGS AND IN WRITTEN COMMENT-** No concerns have been expressed by the public or in written comment. A public hearing will be held after the review from local units of government is complete.

- B. **DATA ELEMENTS** - Obtaining a better understanding of the hydrogeology within the DWSMA will help protect the city's drinking water supply. Some suggestions for improvement mentioned in Part 1 of the WHP Plan include the following: 1) Conduct additional aquifer pumping tests to spatially refine transmissivity values across the model

domain. 2) Collect or incorporate groundwater level measurements from many wells across the domain from a similar time. Groundwater levels used in the model were from the CWI and range over many years. 3) Collect annual groundwater samples from Wells No. 5 and 6 for tritium analysis to evaluate whether pumping from these wells is drawing near surface water through the confining unit. The time it takes for “young” water to travel to the confined aquifer may be used to refine hydraulic conductivity estimates of the confining till for future delineations. 4) Collect groundwater samples for nitrate analysis to determine the potential impacts to the aquifer systems. This will aid in any future revisions or amendments to the WHP Plan.

- C. STATUS AND ADEQUACY OF OFFICIAL CONTROLS, PLANS, AND OTHER LOCAL, STATE, AND FEDERAL PROGRAMS ON WATER USE AND LAND USE - The protection of groundwater resources as identified in the Polk and Red Lake Counties Comprehensive Local Water Plans provides strategies for protecting the aquifer used by the City of Crookston. Recognition of the Drinking Water Supply Management Area (DWSMA) during county water plan updates should consider strategies specifically directed at the DWSMA. Polk and Red Lake Counties have the land use control authority in the majority of the DWSMA and should recognize the DWSMA in any zoning ordinance revision or comprehensive planning. The conservation lands currently enrolled in the Wetland Reserve Program and owned by the Nature Conservancy will be transferred to the control of the U.S. Fish and Wildlife Service over the next few years. According to Keith R. Mykleseth, The Nature Conservancy, 3,300 acres were transferred at the end of 2008, 5,000 acres will be transferred in 2009, 7,000 acres will be transferred in 2010 and the balance will be transferred in 2012. Other opportunities exist to coordinate with other local, state and federal agencies such as the Polk and Red Lake Counties Soil and Water Conservation Districts, Polk and Red Lake Counties Environmental Services, Polk and Red Lake Counties Planning Commissions, the Nature Conservancy, Minn. Dept. of Health, Minn. Dept. of Agriculture, the Minn. Pollution Control Agency and the U.S. Fish and Wildlife Service. The city also recognizes the Red Lake Watershed Association as a potentially valuable asset to protection of the aquifer and supports efforts by the project to improve water quality in the watershed.

CHAPTER FOUR

WELLHEAD PROTECTION GOALS (4720.5240)

I. GOALS:

A. PRESENT AND FUTURE WATER USE -

Maintain the public water supply of Crookston at its current quantity and level of good water quality or better.

B. PRESENT AND FUTURE LAND USE -

Educate public officials, landowners, and the general public about the importance of wellhead protection to protect the public drinking water supply. Through implementation of the WHP Plan, reduce the potential of contaminating the public drinking water supply.

CHAPTER FIVE

OBJECTIVES AND PLANS OF ACTION (4720.5250)

I. ESTABLISHING PRIORITIES

The aquifer supplying groundwater to the Crookston public water supply has been determined to be vulnerable to potential contaminant sources. Based on the vulnerable determination, the primary concerns regarding aquifer contamination are from all potential contaminants within the high DWSMA, all classes of wells, sewer systems, cesspools, and tanks within the moderate DWSMA.

The Crookston WHP team considered the following issues in determining the priority of potential contaminant sources:

- Any substance that exceeds the maximum contaminant level specified in the code of Federal Regulations
- Any substance with quantifiable levels of contamination resulting from human activity
- The frequency of each source category of PCSI
- The location of potential contaminant sources relative to the public water supply wells
- The capacity of the geologic material to absorb or reduce potential contaminants
- The effectiveness of existing controls
- The time required to get cooperation from other agencies and cooperators
- The resources needed: staff, money, time, legal, technical

The WHP Team listed wellhead management issues in the following order of priority:

- A. Municipal well & Inner Well Management Zone (IWMZ) strategies
- B. All potential contaminants within the high DWSMA
- C. All classes of wells, sewer systems, cesspools, and tanks within the entire DWSMA
- E. Zoning and administrative controls
- F. Public education
- G. Data collection

Based on the vulnerable determination, the potential contaminant source inventory (PCSI) includes all potential contaminants within the high DWSMA and all classes of wells, sewer systems, cesspools, and tanks within the moderate DWSMA. The PCSI is summarized in the following table. Maps and tables detailing the PCSI are included in Appendix B. The PCSI includes twenty-two (22) wells, and two (2) Individual Sewage Treatment Systems (ISTS). The wells identified within the DWSMA include, six (6) Community Supply (Municipal), four (4) Test, two (2) Domestic, two (2) Commercial, two (2) Monitor, one (1) Observation, one (1) Piezometer, and four (4) Unknown wells. The well records are included in Appendix B.

Summary of the Potential Contaminant Source Inventory

Well Use	# of wells	Management Priority	Other Contaminant Sources	# of facility locations	Management Priority
Municipal	6	High	Individual Storage Treatment Systems	1	Low
Test	5	High	Gravel Mining Operation	1	Low
Domestic	3	High			
Commercial	2	High			
Monitor	1	High			
Observation	7	High			
Totals	24			2	

A. MUNICIPAL WELL & INNER WELL MANAGEMENT ZONE STRATEGIES

OBJECTIVE A: Manage the 200' radius Inner Wellhead Management Zone (IWMZ) to prevent contaminants from entering the area immediately adjacent to the wells.

WHP Measure A1: City staff will review and update the IWMZ survey form for all wells in the system.

Source of Action: **Wellhead Protection Manager**

Cooperator(s): **MDH & MRWA Planners**

Time Frame: **Years 3 and 5 (2012 and 2014)**

Estimated Cost: **Staff time**

Goal Achieved: **Staff and WHP Team remain informed and up-to-date on activities within the IWMZ**

WHP Measure A2: The WHP Team will continue to monitor setbacks for all new potential sources of contamination located within the IWMZ.

Source of Action: **WHP Manager, WHP Team**

Cooperators: **MDH**

Time Frame: **Summarize in Year 8 (2017)**

Estimated Cost: **Staff time**

Goal Achieved: **Any new regulated activities will meet required well setbacks.**

WHP Measure A3: Implement Wellhead Protection Measures for all potential contaminant sources that have been identified in the IWMZ Potential Contaminant Source Inventory Form.

Source of Action: **WHP Manager, WHP Team**

Cooperators: **MDH**

Time Frame: **Implementation in Years 2 and 4 (2011 and 2013) with annual monitoring and maintenance and summarized in Year 8 (2017)**

Estimated Cost: **Staff time**

Goal Achieved: **Prevent contaminants from entering the area immediately adjacent to the wells.**

B. POTENTIAL CONTAMINANT INVENTORY STRATEGIES

OBJECTIVE B - Inventory and manage all potential contaminant sources within the high vulnerability DWSMA for protection of the aquifer.

WHP Measure B1: Coordinate with the MDH Source Water Protection Unit and the DNR Water Appropriations Program to identify new high-capacity wells that are proposed for construction within the high vulnerability DWSMA. Impacts to the delineations of the WHPA or DWSMA will be evaluated by the MDH or DNR on a case by case basis.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **Well Drillers, Well Owners, MDH, DNR**

Time Frame: **As needed, and summarized in Year 8 (2017)**

Estimated Cost: **Staff Time**

Goal Achieved: **Identification of high capacity wells and impacts or changes on the WHPA and DWSMA.**

WHP Measure B2: Observe and document any changes in land use within the high vulnerability DWSMA that may affect the drinking water supply. This may include the addition of fuel or chemical storage tanks, industrial development, enrollment in the Federal Conservation Reserve Program, etc.

Source of Action: **WHP Manager, WHP Team, Zoning and Permitting Officials**

Cooperator(s): **Landowners, Natural Resources Conservation Service, MPCA**

Time Frame: **Years 5 and 10 (2014 and 2019)**

Estimated Cost: **Staff Time**

Goal Achieved: **Effective management of land use practices within the DWSMA to reduce and document potential contaminant sources.**

WHP Measure B3: Contact Landowners within the DWSMA and encourage the application of best management practices for all agricultural operations within the DWSMA.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **Landowners**

Time Frame: **Years 5 and 10 (2014 and 2019)**

Estimated Cost: **Staff Time**

Goal Achieved: **Effective best management of agricultural practices within the DWSMA to reduce potential contaminant sources.**

WHP Measure B4: Contact gravel mining operators within the DWSMA and encourage the application of best management practices for all gravel mining operations within the DWSMA. Consider recommending using procedures outlined in the MDH Gravel Mining White Paper.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **Landowners**

Time Frame: **Years 3 and 6 (2012 and 2015)**

Estimated Cost: **Staff Time**

Goal Achieved: **Effective best management of gravel mining practices within the DWSMA to reduce potential contaminant sources.**

WHP Measure B5: Reduce the impact of contamination within the DWSMA from potential spills and chemicals which are hauled through the DWSMA on U.S. Hwy 2. Send a letter

with maps of the DWSMA to the regional Fire Departments, County Sheriffs, and other local emergency responders to identify the DWSMA as high priority for emergency responses.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **Local Emergency Responders**

Time Frame: **Years 3, 6 and 9 (2012, 2015 and 2018)**

Estimated Cost: **Staff Time**

Goal Achieved: **Rapid response to contaminant spills along U.S. Hwy 2 within the DWSMA.**

WHP Measure B6: Contact the MN Department of Transportation and advise them of the highly vulnerable DWSMA along U.S. Hwy 2 and request that in the event of any regrade of the highway, that appropriate consideration be made of the DWSMA for the construction equipment, and that consideration be made to provide a clay liner for the road ditches to facilitate cleanup in the event of spills.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **MNDOT**

Time Frame: **Years 4 and 8 (2013 and 2017)**

Estimated Cost: **Staff Time/ potential construction costs**

Goal Achieved: **Reduce the impact of contaminant spills within the ditch of U.S. Hwy 2 by reducing the infiltration rate of soils within the ditch.**

WHP Measure B7: Contact the MN Department of Transportation and evaluate existing data pertaining to the construction of the road grades along U.S. Hwy 2 to determine if existing construction materials are sufficient to provide protection from potential spills within the road right-of-way.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **MNDOT**

Time Frame: **Years 4 and 8 (2013 and 2017)**

Estimated Cost: **Staff Time/**

Goal Achieved: **Evaluate the impact of contaminant spills within the ditch of U.S. Hwy 2 by identifying the infiltration rate of soils within the ditch.**

C. WELL MANAGEMENT

OBJECTIVE C – Continue to inventory and manage all classes of wells located throughout the entire DWSMA for maximum protection of the aquifer.

WHP Measure C1: Seal unused or abandoned wells. Promote local abandonment and sealing of unused wells within the DWSMA. Of particular concern are sandpoint wells that may exist within the DWSMA. Implement this by contacting land owners within the DWSMA and inform them of the opportunity for free well abandonment.

Source of Action: **WHP Manager**

Cooperator(s): **Well owners, Land owners, County water planning**

Time Frame: **Years 3, 6 and 9 (2012, 2015 and 2018)**

Estimated Cost: **Staff Time, cost of well abandonment (approx. \$ 400-500/well)**

Goal Achieved: **Private well owners become aware of the dangers of unused wells. Abandoned or unused wells posing a threat to aquifer contamination are sealed to prevent contamination.**

WHP Measure C2: Evaluate wells that are set in the aquifer used by the city within the DWSMA on a periodic basis. At least one time during the ten-year implementation period, evaluate the status of the wells to determine if there are any that may pose a greater potential risk to the aquifer. Utilize the MDH and the MDNR to provide an objective evaluation of the wells.

Source of Action: WHP Manager, WHP Team

Cooperator(s): MDH, MDNR

Time Frame: Years 3, 6 and 9 (2012, 2015 and 2018)

Estimated Cost: Staff Time

Goal Achieved: Protect groundwater resources by identifying and managing wells which are most susceptible to contamination.

WHP Measure C3: Continually update the existing inventory of wells (included in the PCSI) located within the DWSMA using area well drillers, Minnesota Department of Health Well Management, Department of Natural Resources water appropriations, and the Minnesota County Well Index as resources. The inventory will include well owner, depth, use, MDH well record, etc. Send a letter and map of the DWSMA to appropriate parties requesting this information when it becomes available.

Source of Action: WHP Manager, City Clerk, WHP Team

Cooperator(s): Minn. Dept. of Health, Minn. Dept. of Natural Resources, citizens, and well contractors.

Time Frame: Years 5 and 10 (2014 and 2019)

Estimated Cost: Staff Time

Goal Achieved: Reduce the impact of contamination to the buried resource aquifer through knowledge of well locations and status.

WHP Measure C4: Contact well owners listed in the PCSI to collect additional data regarding their wells including well depth, date drilled, casing type, static water levels, geologic information, etc.

Source of Action: WHP Manager, WHP Team

Cooperator(s): Well owner/operators

Time Frame: Year 4 (2013)

Estimated Cost: Staff time

Goal Achieved: Reduce the impact of contamination to the buried resource aquifer through knowledge of wells that penetrate the resource aquifer.

D. ZONING AND ADMINITRATIVE CONTROLS

OBJECTIVE D - Work towards incorporation of wellhead protection recognition and concerns thereof in local plans and ordinances.

WHP Measure D1: Work with Polk and Red Lake Counties to incorporate language and overlay maps in County Water Plan and in County Comprehensive Land Use Plans, ordinances, and/or administrative controls that attach significance to the DWSMA and the need to protect drinking water.

Source of Action: WHP Manager, WHP Team

Cooperator(s): County environmental services, zoning administrator

Time Frame: Year 5 (2014)

Estimated Cost: Staff time

Goal Achieved: **Protect the buried resource aquifer by controlling land use practices within the DWSMA.**

E. PUBLIC EDUCATION

OBJECTIVE E - Establish a public education and information program that creates awareness and a general knowledge of the importance of wellhead protection within the DWSMA.

WHP Measure E1: Develop and release periodic items to the local news media (newspaper, radio, TV, etc.) regarding WHP efforts. Topics include describing WHP and DWSMA boundary, abandoned-well sealing program, educational efforts, etc.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **MDH, County Water Plan, Media, MRWA website**

Time Frame: **Annually, summarized in Year 8 (2017)**

Estimated Cost: **Staff time**

Goal Achieved: **Inform area citizens and residents served by the City of Crookston about the wellhead protection program.**

WHP Measure E2: Explore installing informational signs at the perimeter of the wellhead protection area along U.S. Highway 2 to compliment signs to be located at the treatment plant and municipal well locations.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **City Council, Highway Departments**

Time Frame: **Year 3 (2012)**

Estimated Cost: **Approx. 4 signs at current market value**

Goal Achieved: **Remind the public of the source of their drinking water supply and the importance of protecting it.**

WHP Measure E3: Participate in local water planning efforts to protect and promote groundwater protection in Polk and Red Lake Counties.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **Polk and Red Lake County Water Planning**

Time Frame: **Annually, summarized in Year 8 (2017)**

Estimated Cost: **Staff and Board member time**

Goal Achieved: **Improve collaboration on groundwater issues between the WHP Team and County Water Planning.**

WHP Measure E4: Obtain copies of wellhead protection and drinking water protection educational video tapes. Play several times on local cable-access video channel as public service announcement, public education, etc.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **MDH, County water planner, MPCA, MNDNR, MDA, local cable-access channel manager**

Time Frame: **Annually, summarized in Year 8 (2017)**

Estimated Cost: **\$100.00 to purchase educational video tapes**

Goal Achieved: **Inform area citizens and residents served by the City of Crookston about the wellhead protection program.**

F. DATA COLLECTION

OBJECTIVE F - Collect additional data to properly manage the Wellhead Protection Plan throughout the implementation period and in the future. This data will include changes in land use, addition of wells and potential contaminant sources, and hydrologic data pertaining to the relationship between the groundwater resource aquifers and the surface water.

WHP Measure F1: Continually update the existing PCSI within the DWSMA. Inventory will include all classes of wells, sewer systems, cesspools, and tanks in the moderate vulnerability DWSMA and all potential contaminants in the high vulnerability DWSMA. Send a letter to appropriate parties requesting this information when it becomes available.

Source of Action: **WHP Manager, WHP Team, Crookston Public Utilities**

Cooperator(s): **County Assessor, City Assessor, Tank Owners, Minn. Dept. of Health, Minn. Dept. of Agriculture, Minn. Pollution Control Agency**

Time Frame: **Annually, summarized in Year 8 (2017)**

Estimated Cost: **Staff time**

Goal Achieved: **Reduce the impact of contamination to the buried resource aquifer through knowledge of well and PCSI locations and status.**

WHP Measure F2: If spills/leaks occur within DWSMA, follow-up by contact with responsible parties, agency contacts, consultants working on spill/leak sites that occur within the DWSMA to A) Determine extent of remediation program and of any potential impact upon public water supply aquifer; and B) Advise of the existence of wellhead protection program, DWSMA boundaries, aquifer concerns, etc.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **MDA, MPCA, responsible parties, consultants**

Time Frame: **Annually, summarized in Year 8 (2017)**

Estimated Cost: **Staff time**

Goal Achieved: **All parties involved in this action become more knowledgeable about wellhead protection issues.**

WHP Measure F3: Gather additional data to further define the connection between the groundwater resource aquifer and surface water. Utilize data collected from scientific investigations of the Glacial Ridge National Wildlife Refuge, well installations, etc.

Source of Action: **WHP Manager, WHP Team**

Cooperator(s): **USGS, Nature Conservancy, Watershed Districts, Well Drillers, MDH**

Time Frame: **Years 5 and 10 (2014 and 2019). Prior to amendments or revision of the WHP plan.**

Estimated Cost: **Staff Time**

Goal Achieved: **Gain greater knowledge of the hydraulic connection between the resource aquifer and surface water. This will aid in any future revisions or amendments to the WHP Plan.**

CHAPTER SIX

EVALUATION PROGRAM (4720.5270)

A successful Wellhead Protection Plan must identify a strategy for evaluating the progress of the measures and the impact of a contaminant release on the aquifer supplying the public water supply well. The evaluation strategy will be conducted throughout the drinking water supply management area, will be based on the health risk the specific potential contaminant source presents to the public water supply well, and will specify the evaluation approach used for specific potential contaminant sources. The evaluation strategy will include the following activities:

- sampling the quality of the groundwater throughout the drinking water supply management area
- documenting inventory control of all potential contaminant sources in the high vulnerability areas and all classes of wells, sewer systems, cesspools, and tanks within the moderate vulnerability areas
- documenting the implementation of wellhead protection measures using monitoring data already required by existing laws and rules in effect at the time of plan adoption.

The wellhead protection team will meet on an as-needed basis, with a minimum of one annual meeting, to review the results of each strategy and identify whether modifications are required. The wellhead protection plan manager will complete an annual evaluation report regarding the progress in implementing the wellhead management evaluation strategies. The annual reports will be used to evaluate the progress of the wellhead protection management strategies when the WHP Plan is updated after 10 years. A copy of the annual report will be submitted to the city council, MDH and local units of government. In addition, an evaluation conducted when a wellhead protection plan is amended will be submitted to the MDH at the first scoping meeting held to amend the existing plan.

CHAPTER SEVEN

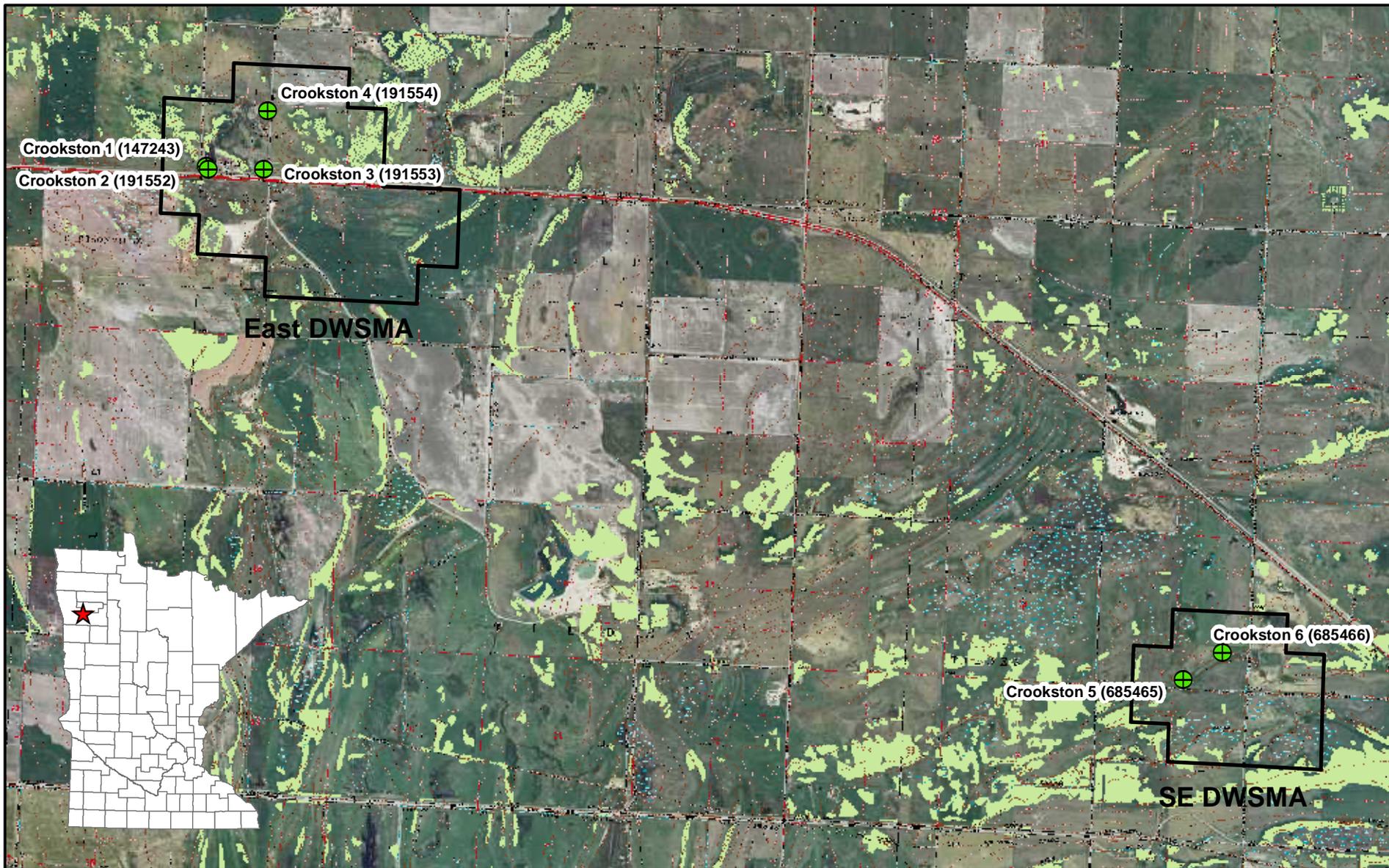
ALTERNATIVE WATER SUPPLY; CONTINGENCY STRATEGY. (4720.5280)

The city of Crookston *Water Emergency and Conservation Plan* has been submitted and approved by the Minnesota DNR, Division of Waters, Appropriation Permit Program. A copy of the DNR approval letter and the plan is included in Appendix C. The city of Crookston will be adopting and implementing the Plan with the aid of local emergency management agencies.

FIGURES

- Figure 1: Site Location Map
- Figure 2a: MDH East DWSMA Map
- Figure 2b: MDH SE DWSMA Map

Figure 1: Site Location Map



**City of Crookston
Wellhead Protection Plan: Part 2
Crookston, Minnesota**

Prepared By:
West Central Environmental Consultants, Inc.
Project No. 07-5865-30, May 2009

Base Map Source: 2008 color FSA orthophoto: LMIC WMS server
U.S.G.S. Scanned 24k DRG: LMIC WMS server

-  Crookston Water Supply Wells
-  Drinking Water Supply Management Areas

0 1 2 Miles



Figure 1: Site Location Map

Figure 2a: MDH East DWSMA Map

R 45 W | R 44 W

Crookston East

*Drinking Water Supply
Management Area
(DWSMA) MN-00400
10 year Time of Travel*

 DWSMA

T 150 N
T 149 N

T 150 N
T 149 N

Vulnerable

0.2 0 0.2 Miles




Approved October 11, 2006

R 45 W | R 44 W

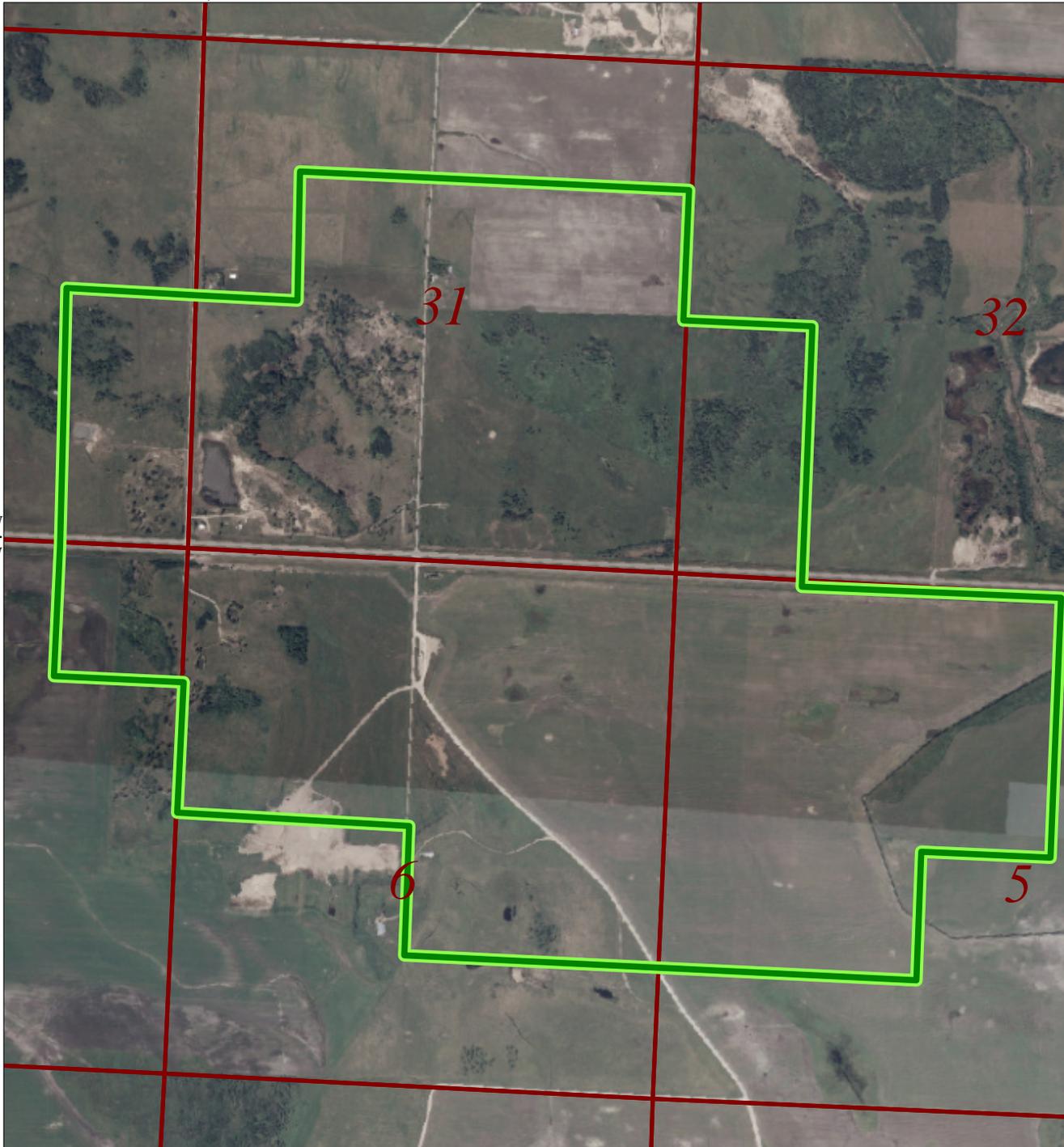


Figure 2b: MDH SE DWSMA Map

R 43 W

Crookston SE

*Drinking Water Supply
Management Area
(DWSMA) MN-00401
10 year Time of Travel*

 DWSMA

T 149 N

T 149 N

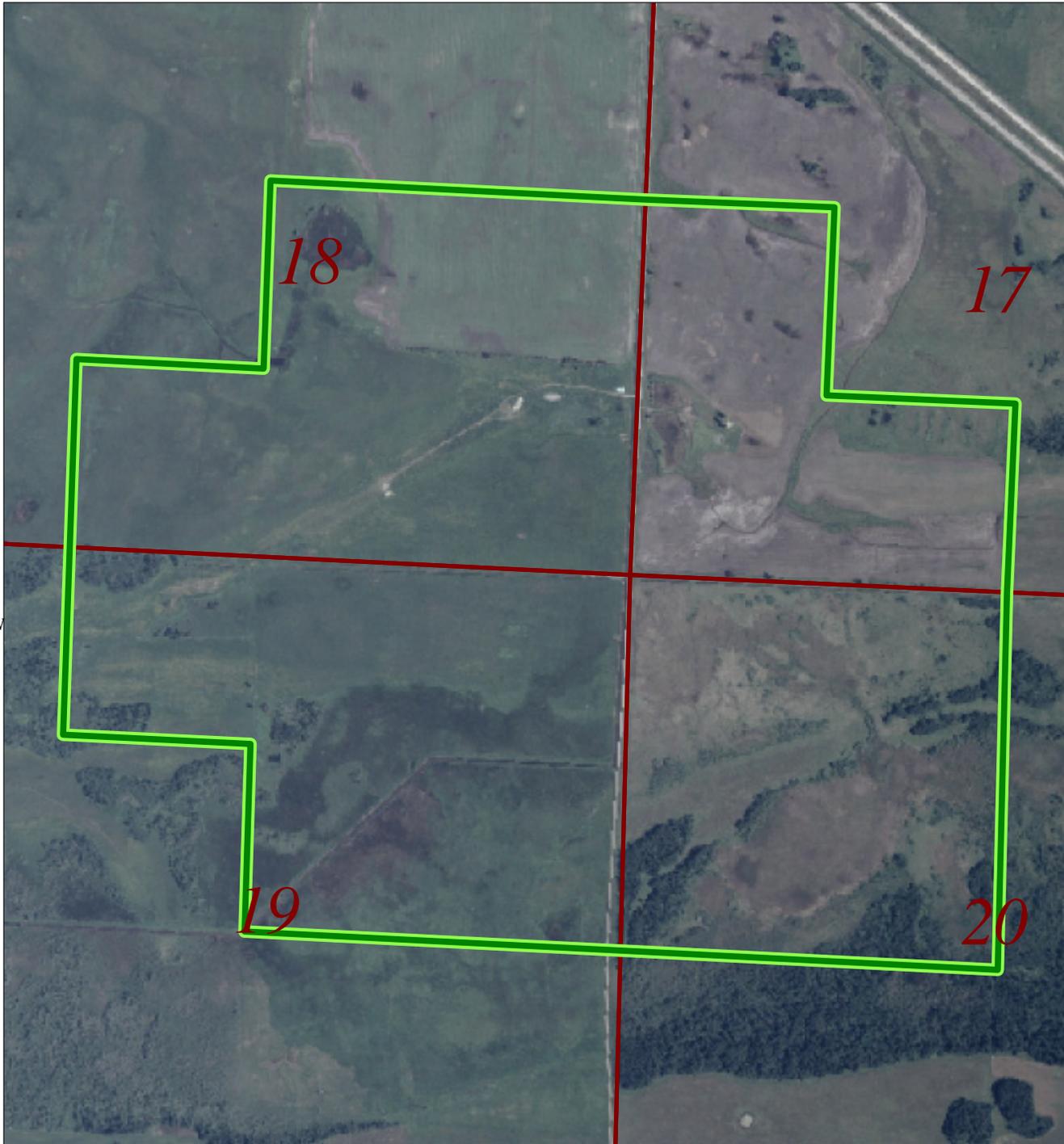
Vulnerable

0.1 0 0.1 Miles



Approved October 11, 2006

R 43 W



APPENDIX A

DATA ELEMENTS FOR PART 2

- Precipitation Data (average monthly and annual precipitation for the preceding five years)
- Soil Map units within the DWSMA with infiltration characteristics
 - Soil Map-Polk and Red Lake Counties (East DWSMA)
 - Soil Map-Polk County (SE DWSMA)
 - Saturated Hydraulic Conductivity Values - Polk County Soils
 - Saturated Hydraulic Conductivity Values - Red Lake County Soils
- Land Use/Land Cover within the DWSMA
 - Land Use/Land Cover East DWSMA
 - Land Use/Land Cover Southeast DWSMA
 - Glacial Ridge Project Land Use Map
 - Political Boundaries Map
 - Existing Zoning Map
- MDH 2007 Drinking Water Report for the City of Crookston

Precipitation Data (average monthly and annual precipitation for the preceding five years)

Annual Reports of Monthly Precipitation Totals

This application creates annual summaries of precipitation data gathered by [volunteer-based observation networks throughout Minnesota](#). The data presented are monthly totals and the data are grouped by county. Observer locations are described using township, range, and section numbers.

Choose a county and year, then click on "**Annual report**".

POLK

2004 POLK Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO			
60	147N	40W	4	FOSSTON	NWS	*	.40	1.25	*	4.60	1.05	4.78	1.41	4.58	6.17	.25	.95					16.42		
60	147N	40W	11		SWCD					4.64	1.19	4.62	2.07	4.92	5.15								17.44	
60	147N	41W	1		SWCD	1.39	.83	1.56	.29	5.78	1.30	4.80	2.44	3.76	5.87	.41	1.23	26.28	26.65	29.66		18.08		
60	147N	44W	29		SWCD	1.90	.80	1.86	.15	5.02	1.01	3.49	4.25	3.46	5.05	.25	1.50	24.07	24.81	28.74		17.23		
60	147N	46W	5		SWCD	1.07	.71	2.22	.26	6.70	.95	3.63	3.65	5.47	5.11	.10	.97	24.85	28.28	30.84		20.40		
60	148N	39W	15		SWCD				.03	3.84	.84	5.00	2.24	4.25	6.09								16.17	
60	148N	40W	14		SWCD				.32	4.94	1.06	5.81	2.28	4.75	5.97								18.84	
60	148N	41W	24		SWCD				.23	5.10	1.21	4.51	2.58	3.79	4.82								17.19	
60	148N	42W	24		SWCD				.15	5.32	1.78	4.67	2.86	4.08	4.70								18.71	
60	148N	42W	29		SWCD			*	.19	4.89	1.49	4.50	2.71	4.11	5.46		.23						17.70	
60	148N	43W	14		SWCD				.24	5.70	1.26	4.16	3.47	4.38	6.44								18.97	
60	148N	45W	4		SWCD	.58	.25	1.05	.24	6.07	.76	3.55	3.29	3.70	4.22	.11	.80	20.87	22.65	24.62			17.37	
60	148N	49W	23		SWCD	1.52	.22	1.41	.27	6.29	1.15	2.62	2.51	4.54	2.91	.06	.89	22.52	23.29	24.39			17.11	
60	149N	39W	3		SWCD	.83	.65	.79	.33	5.48	1.08	4.79	2.20	4.31	5.43	.17	1.68	21.96	22.70	27.74			17.86	
60	149N	41W	11		SWCD	.82	.20	.91	.17	5.47	1.43	4.29	3.04	4.06	5.43	.19	.74	22.19	23.02	26.75			18.29	
60	149N	43W	7		SWCD					5.38	.66	4.58	3.03	3.72									17.37	
60	149N	45W	3		SWCD	.38	.12	1.02	.26	7.64	.84	4.34	4.35	3.48	3.47	.12	.58	24.22	25.17	26.60			20.65	
60	149N	47W	7		SWCD						*	5.12	3.51	3.19										
60	149N	47W	14		SWCD	1.03	.43	1.47	.44	7.10	.64	4.10	5.26	3.97	3.45	.16	1.25	26.43	27.76	29.30			21.07	
60	150N	39W	32		SWCD				.26	5.28	1.14	5.05	2.11	4.46	5.45									18.04
60	150N	40W	18		SWCD				.39	4.39	.52	3.43	3.28	3.60	4.90									15.22
60	150N	45W	20		SWCD	.84	.43	.85	.28	8.41	.63	4.27	5.27	3.94	3.52	.08	.75	26.18	27.97	29.27			22.52	
60	150N	46W	19	CROOK NW	NWS	.31	.13	.76	.43	7.96	1.45	3.87	4.82	4.13	3.23	.15	.88	25.83	26.29	28.12			22.23	
60	150N	47W	36		SWCD	.55	.46	.80	.11	7.03	1.18	2.92	4.91	3.96	1.81									20.00
60	151N	39W	20		SWCD				.43	4.66	1.19	3.28	3.46	4.39	3.58									16.98
60	152N	49W	5		SWCD	.49	.06	1.70	.25	5.29	.69	3.18	1.73	5.13	1.75		.88	17.12	20.16	21.15			16.02	
60	153N	48W	30		SWCD				.64	5.91	.62	2.30	2.50	4.70	2.71	.03								16.03
60	153N	50W	14		SWCD	1.10	.18	1.70	.39	5.89	1.02	2.31	2.12	4.75	2.09	.08	1.01	19.45	21.59	22.64			16.09	
60	154N	46W	32		SWCD					6.02	.75	3.02	2.10	3.28										15.17
county averages						.92	.39	1.29	.28	5.74	1.03	4.00	3.14	4.18	4.37	.15	1.01	23.23	24.64	26.91			18.04	
# of obs						14	15	15	24	28	28	28	29	29	27	16	14	13	13	13			28	

- Data as received and digitized on or before 2/10/2009. **All values are in inches.**
- 'cc ttt rr ss' is county-township-range-section number, 'oooooooo' is community name (where applicable), 'nnnn' is network type.
- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2003, Oct 2003, and Jan 2004, respectively. 'GRO' is growing season (May 2004 thru Sep 2004) precipitation total.
- '*' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

For some purposes, **daily** precipitation data are required. The precipitation data archive allows a user to [interactively retrieve](#) daily precipitation data from the site nearest to a target.

[Obtaining Data for Legal Purposes](#)

Annual Reports of Monthly Precipitation Totals

This application creates annual summaries of precipitation data gathered by [volunteer-based observation networks throughout Minnesota](#). The data presented are monthly totals and the data are grouped by county. Observer locations are described using township, range, and section numbers.

Choose a county and year, then click on "Annual report".

POLK 2005 Annual report

2005 POLK Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nynn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO	
60	147N	40W	4	FOSSTON	NWS	1.78	0	0	.14	4.13	5.81	.58	3.47	2.55	2.53	2.23	.58	27.86	25.83	23.80	16.54	
60	147N	40W	11		SWCD				.80	4.19	5.04	.50	3.81	1.93								15.47
60	147N	41W	1		SWCD	2.15	.72	.56	.93	4.76	6.10	.64	5.10	1.87	2.52	1.83	1.50	32.23	30.34	28.68	18.47	
60	147N	44W	29		SWCD	2.00	.41	.20	.94	2.79	5.16	1.24	7.00	2.45	1.58	2.26	1.30	30.00	28.99	27.33	18.64	
60	147N	46W	5		SWCD	1.50	.32	.20	.80	3.46	6.55	1.91	4.57	3.16	2.07	2.14	.98	30.96	28.65	27.66	19.65	
60	148N	39W	15		SWCD				1.00	4.30	6.23	.71	4.13	1.62	2.41							16.99
60	148N	40W	14		SWCD				.95	5.02	5.05	.49	5.10	1.78	2.30							17.44
60	148N	41W	24		SWCD				.89	4.31	5.80	.50	5.50	1.85	2.19							17.96
60	148N	42W	24		SWCD				1.47	3.31	6.43	1.16	6.58	2.48	2.30							19.96
60	148N	42W	29		SWCD				1.07	3.26	5.79	1.39	6.15	2.21	1.87	2.18						18.80
60	148N	43W	14		SWCD				1.27	2.62	5.30	1.28	5.58	2.03	2.16							16.81
60	148N	45W	4		SWCD	.90	.20	.19	.89	2.62	6.17	.87	6.43	2.96	2.07	2.24	.79	27.10	26.36	26.33	19.05	
60	148N	49W	23		SWCD	1.29	.16	.04	1.52	2.47	5.31	1.78	5.68	4.43	2.19	1.05	1.06	26.65	26.54	26.98	19.67	
60	149N	39W	3		SWCD	1.42	.31	.17	.87	2.43	4.95	.59	4.96	2.26	2.08	2.05		27.29	25.24		15.19	
60	149N	40W	16		SWCD					5.78		.49	4.43	2.05	1.87	1.15	1.80					
60	149N	41W	11		SWCD	1.56	.31	.12	.96	2.76	5.79	.50	5.02	2.54	2.33	1.50	1.12	27.44	25.92	24.51	16.61	
60	149N	42W	16		SWCD					*	4.12	2.13	4.63	1.98	2.12							
60	149N	43W	7		SWCD				.98	2.52	4.99	1.53	4.95	2.59								16.58
60	149N	45W	3		SWCD	.89	.11	.08	.74		6.51	.60	5.65	2.72	1.31							
60	149N	47W	7		SWCD				.45	3.11	7.03	.97	4.80	3.34	2.37							19.25
60	149N	47W	14		SWCD	1.48	.25	.19	.52	3.18	6.84	.77	6.10	3.25	2.21	1.70	.96	28.16	27.44	27.45	20.14	
60	149N	47W	31		SWCD		*	.21	.55	3.21	6.22	.41	6.11	3.65	2.40	1.52	1.50					19.60
60	150N	39W	32		SWCD				.94	3.99	5.62	.61	4.56	2.32	2.21							17.10
60	150N	40W	18		SWCD				.96	2.78	5.57	1.64	3.52	1.98	1.60							15.49
60	150N	45W	15		SWCD		.20	.16	.75	1.94	5.84	.39	4.07	1.75								13.99
60	150N	45W	20		SWCD	1.00	.15	.06	.73	2.76	7.01	.86	4.50	2.70	3.18	1.52	.73	25.36	24.12	25.20	17.83	
60	150N	46W	19	CROOK NW	NWS	.80	.11	.22	.41	3.30	5.43	1.01	5.66	2.15	1.95	2.03	.82	25.33	23.35	23.89	17.55	
60	150N	47W	36		SWCD			*	.52	3.36	5.61	.93	4.57	3.04			.50					17.51
60	151N	39W	20		SWCD				.86	2.71	6.26	.60	3.18	2.15	1.92							14.90
60	152N	49W	5		SWCD	*	.15	.48	.32	3.57	6.31	1.55	4.95	1.24	2.15	1.10	.60					17.62
60	153N	48W	30		SWCD				3.47	6.16	1.08	5.75	1.43	2.97	*							17.89
60	153N	50W	14		SWCD	1.06	.24	.21	.36	3.45	7.28	1.14	7.53	1.34	2.44	1.64	.86	29.20	25.79	27.55	20.74	
60	154N	46W	32		SWCD				.30	2.83	5.58	3.25	4.48	1.58	2.30							17.72
county averages						1.37	.24	.19	.80	3.29	5.87	1.03	5.11	2.34	2.19	1.76	1.01	28.13	26.55	26.31	17.71	
# of obs						13	15	16	30	30	33	33	33	33	29	16	15	12	12	11	30	

- Data as received and digitized on or before 2/10/2009. **All values are in inches.**
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- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2004, Oct 2004, and Jan 2005, respectively. 'GRO' is growing season (May 2005 thru Sep 2005) precipitation total.
- '*' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

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POLK

2006 POLK Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO	
60	147N	40W	4	FOSSTON	NWS	.30	1.45	1.18	1.03	2.99	.27	.85	2.35	2.70	1.62	.12	1.55	18.31	18.46	16.41	9.16	
60	147N	40W	11		SWCD				1.13	2.83	.40	.72	1.62	2.16	1.57							7.73
60	147N	41W	1		SWCD	.65	1.98	1.10	1.11	3.02	1.19	.96	2.02	3.67	1.72	.33	1.44	19.75	21.55	19.19	10.86	
60	147N	44W	29		SWCD	.40	2.00	1.80	.94	2.67	1.00	.65	4.19	2.59	1.98	.45	1.50	21.24	21.38	20.17	11.10	
60	147N	46W	5		SWCD	.90	1.13	2.40	1.07	3.38	2.05	.44	3.62	3.31	2.65	.42	1.30	23.34	23.49	22.67	12.80	
60	148N	39W	15		SWCD				.82	3.76	.33	.83	1.07	2.42	1.67							8.41
60	148N	40W	14		SWCD				1.02	3.06	.60	.82	2.06	3.47	1.74							10.01
60	148N	41W	24		SWCD				.87	2.50	1.18	.70	3.90	3.70	1.88							11.98
60	148N	42W	24		SWCD				1.51	2.52	.56	.94	3.34	4.48	2.53							11.84
60	148N	42W	29		SWCD				.83	2.80	.76	1.32	4.05	3.24	1.93	.27						12.17
60	148N	43W	14		SWCD				1.59	3.06	1.23	1.69	5.77	3.29	2.16							15.04
60	148N	45W	4		SWCD	.35	.52	1.56	1.18	2.38	1.77	.81	3.48	1.92	2.29	.39	.96	20.11	19.07	17.61	10.36	
60	148N	49W	23		SWCD	.26	.47	.75	1.03	1.43	1.89	.52	3.56	2.27	1.78	.54	.87	18.64	16.48	15.37	9.67	
60	149N	39W	3		SWCD	.27	.61	1.44	.68	2.71	.65	1.16	2.08	2.59	2.22	.43	.99					15.83
60	149N	40W	16		SWCD	.19	.53	1.03	1.43	2.14	.47	1.20	2.94	3.34	2.67	.38	.90	16.80	18.09	17.22	10.09	
60	149N	41W	11		SWCD	.26	.49	1.73	.87	2.13	1.08	1.41	3.72	3.77	1.49	.28	1.00	19.18	20.41	18.23	12.11	
60	149N	42W	16		SWCD			*	.89	2.37	.61	.81	4.63	2.74	2.57							11.16
60	149N	43W	7		SWCD				1.72	2.65	1.08	1.62	4.33	2.12								11.80
60	149N	45W	3		SWCD			1.48	1.43	2.30	.69	.97	4.37	1.88	2.17							10.21
60	149N	46W	14		SWCD			.84	1.03	2.97	.94	1.38	4.27	1.85	2.07	.40	1.07					11.41
60	149N	47W	7		SWCD				1.28	2.78	.58	.42	3.03	2.22	1.72							9.03
60	149N	47W	14		SWCD	.61	.76	1.72	.86	2.64	.58	1.37	3.87	2.82	2.00	.40	1.10	20.53	20.10	18.73	11.28	
60	149N	47W	31		SWCD	.98	2.48	1.94	1.50	2.49	.22	.90	5.22	2.93	2.09	.25	1.00	24.80	24.08	22.00	11.76	
60	150N	39W	32		SWCD				.93	2.66	.79	1.01	2.50									
60	150N	40W	18		SWCD				.73	1.97	.95	1.05	4.43	2.83	2.55							11.23
60	150N	45W	15		SWCD	.27	.76	1.61	.91	1.50	.71	.48	4.13	1.76	1.76	.29	.70					14.88
60	150N	45W	20		SWCD	.19	1.90	1.50	.92	1.62	.65	.63	4.41	2.03	1.57	.12	.77	19.95	19.28	16.31	9.34	
60	150N	46W	19	CROOK NW	NWS	.37	.56	1.50	.98	2.73	1.10	1.03	3.50	2.66	1.74	.35	.94	18.72	19.23	17.46	11.02	
60	150N	47W	36		SWCD	.53	.43	1.70	.98	* 2.26	.45	3.37	2.90	1.65			1.04					
60	151N	39W	20		SWCD				1.01	1.88	.92	1.78	2.18	3.01	1.61							9.77
60	152N	49W	5		SWCD	.59	.45	2.11	.87	2.71	.60	.46	4.64	2.48	.96	.34		17.52	18.76			10.89
60	153N	48W	30		SWCD				* 2.48	.66	2.37	3.57	2.59	1.34								11.67
60	153N	50W	14		SWCD	1.07	.98	1.74	.54	1.97	.88	.97	4.11	2.06	1.38	.38	.96	18.54	19.26	17.04	9.99	
60	154N	46W	32		SWCD				2.88	.41	.59	3.68	1.57	1.52								9.13
county averages						.48	1.03	1.53	1.05	2.54	.88	.98	3.53	2.71	1.89	.34	1.06	19.82	19.97	17.94	10.65	
# of obs						17	17	19	32	33	34	34	34	33	32	18	17	14	14	15	32	

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- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2005, Oct 2005, and Jan 2006, respectively. 'GRO' is growing season (May 2006 thru Sep 2006) precipitation total.
- '*' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

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Choose a county and year, then click on "Annual report".

POLK

2007 POLK Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nynn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO	
60	147N	40W	4	FOSSTON	NWS	.16		2.27	1.80	3.71	7.68	2.64	1.13	2.90	3.83	.02	.87					18.06
60	147N	40W	11		SWCD					1.91	7.99	1.94	1.19	2.78	3.82							15.81
60	147N	41W	1		SWCD	.56	.96	1.83	3.34	4.04	8.88	2.37	1.26	3.11	4.26	.66	1.53	30.40	29.84	32.80	19.66	
60	147N	44W	29		SWCD	.45	1.03	1.80	3.36	4.14	5.63	2.70	1.60	3.54	3.24	.30	2.00	27.23	28.18	29.79	17.61	
60	147N	46W	5		SWCD	.16	.61	1.73	2.62	5.03	6.13	2.32	3.18	2.15	3.14	.22	1.57	29.46	28.30	28.86	18.81	
60	148N	39W	15		SWCD				2.86	2.77	9.09	1.94	1.71	3.23	3.86	.40					18.74	
60	148N	40W	14		SWCD				2.58	3.94	9.55	3.32	1.80	3.62	4.75						22.23	
60	148N	41W	24		SWCD				*	3.61	7.95	2.49	1.39	3.53	4.54						18.97	
60	148N	42W	24		SWCD				.96	3.96	7.80	2.07	1.44	2.98	4.09						18.25	
60	148N	42W	29		SWCD				3.31	2.60	6.19	2.21	1.17	2.76	3.93	.40					14.93	
60	148N	43W	14		SWCD				*	3.14	6.05	2.31	1.48	2.60	3.96						15.58	
60	148N	44W	23		SWCD			.77			4.81											
60	148N	45W	4		SWCD	.17	.39	1.05	2.71	3.01	5.37	2.01	2.66	2.27	3.61	.30	.81	22.93	23.28	24.36	15.32	
60	148N	49W	23		SWCD	.50	.51	2.01	1.45	3.61	4.79	1.51	2.62	2.07	2.43	.32	1.20	22.46	22.26	23.02	14.60	
60	149N	39W	3		SWCD	.28	.73	1.37	2.62	2.38	10.11	2.93	3.20	2.42	4.09	.44	1.24	29.85	29.68	31.81	21.04	
60	149N	40W	16		SWCD				*	2.77	5.81	2.42			*							
60	149N	41W	11		SWCD	.05	.70	2.43	1.36	2.88	7.22	2.70	3.37	2.53	4.91	.54	1.23	27.25	26.01	29.92	18.70	
60	149N	42W	16		SWCD			.45	2.26	3.49	7.47	1.79	2.53	1.71	4.34						16.99	
60	149N	43W	7		SWCD					1.95	5.08	1.31	2.57	2.18	3.39						13.09	
60	149N	45W	3		SWCD	.17	.38	1.19	1.69	3.22	7.10	2.09	2.87	2.33	3.19	.30	.88			25.41	17.61	
60	149N	45W	19		SWCD				1.20	3.41	6.55	1.95	2.35	1.99	3.09						16.25	
60	149N	46W	14		SWCD	.60	1.50	1.74	2.33	3.90	5.73	2.11	3.35	2.02	3.00	.29	2.60	26.65	26.82	29.17	17.11	
60	149N	47W	7		SWCD				2.42	4.23	3.38	1.91	2.85	2.16	2.70						14.53	
60	149N	47W	14		SWCD	.48	.63	1.66	1.70	3.77	4.97	1.91	4.21	2.06	2.85	.30	1.32	25.65	24.89	25.86	16.92	
60	149N	47W	31		SWCD	.53	2.58	2.90	1.72	4.53	6.36	1.49	3.37	2.00				29.75	28.82		17.75	
60	150N	39W	32		SWCD				2.91	3.96	9.34	2.89	3.33	1.46	4.02						20.98	
60	150N	40W	18		SWCD					2.52	6.96	1.94	1.59	1.76	4.39						14.77	
60	150N	45W	15		SWCD			1.85	1.63	3.82	4.92	1.55	2.01	2.15	2.42	.33	.81				14.45	
60	150N	45W	20		SWCD			.56	1.73	1.06	4.00	6.80	2.14	2.94	2.00	2.68	.37	1.10			17.88	
60	150N	46W	19	CROOK NW	NWS	.26	.52	1.27	1.77	3.72	4.86	1.88	3.05	2.56	3.07	.49	.64	23.02	22.92	24.09	16.07	
60	150N	47W	36		SWCD			1.25	1.15	2.47	3.60	4.63	1.00	2.46	3.74						15.43	
60	151N	39W	20		SWCD				1.13	2.98	6.59	1.30	1.01	2.07	5.38						13.95	
60	152N	49W	5		SWCD	.37	.48	1.28	.13	3.84	5.16	1.56	2.48	.89	2.32	.22	.67			19.40	13.93	
60	153N	50W	14		SWCD	.15	.91	1.38	.85	4.39	5.94	2.94	1.65	1.11	3.56	.37	.94	22.99	22.04	24.19	16.03	
60	154N	46W	32		SWCD					3.14	5.28											
county averages						.33	.86	1.59	2.01	3.47	6.52	2.11	2.31	2.40	3.63	.35	1.21	26.47	26.09	26.82	16.94	
# of obs						15	16	20	27	34	35	33	32	32	30	18	16	12	12	13	32	

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POLK

2008 POLK Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO	
60	147N	40W	4	FOSSTON	NWS	0	0	.30	2.55	1.46	4.57	3.24	3.67	7.10				23.41	27.61		20.04	
60	147N	40W	11		SWCD					*	4.61	2.35	1.48	4.26	2.55							
60	147N	41W	1		SWCD	.47	1.11	.62	2.22	1.13	5.12	2.31	2.65	7.06		1.50	2.19	25.19	29.14		18.27	
60	147N	44W	29		SWCD	.20	.65	.60	2.52	1.06	4.94	2.97	1.46	5.18	3.74	.92	.75	23.48	25.12	24.99	15.61	
60	147N	46W	5		SWCD		.66	.55	2.45	1.01	4.21	2.99	2.79	5.67	4.33						16.67	
60	148N	39W	15		SWCD				1.86	1.93	3.78	2.22	1.75	6.54	4.27						16.22	
60	148N	40W	14		SWCD				2.00	2.04	5.67	2.54	2.30	6.91	4.95						19.46	
60	148N	41W	24		SWCD				.62	2.13	4.10	2.28	2.24	6.45	4.82						17.20	
60	148N	42W	24		SWCD				1.81	2.09	4.94	3.41	2.08	5.67	4.43						18.19	
60	148N	42W	29		SWCD				2.40	1.66	3.57	3.60	2.19	5.59	3.98	1.35					16.61	
60	148N	43W	14		SWCD				1.52	1.75	4.17	3.13	1.22	4.99	4.44						15.26	
60	148N	45W	4		SWCD		.32	.23	1.64	1.29	4.62	1.61		4.99	4.23	.91						
60	148N	49W	23		SWCD	0	.41	.90	1.06	1.01	3.81	1.84	1.55	4.51	4.00	1.81	1.26	16.60	19.04	22.16	12.72	
60	149N	39W	3		SWCD	.09	.27	.52	1.55	1.75	4.15	1.91	2.34	5.45	4.11	1.50	1.11	20.77	23.80	24.75	15.60	
60	149N	41W	11		SWCD	.03	.28	.32	2.01	2.46	3.55	3.99	2.90	5.81	4.36	1.26	1.03	24.75	28.03	28.00	18.71	
60	149N	42W	16		SWCD				1.30	1.14	2.14											
60	149N	43W	7		SWCD						4.06	2.16	.53	4.97								
60	149N	45W	3		SWCD	.07	.26	.23	1.11	1.39	3.80	2.81	3.16	5.80	3.42	.91	.48	19.53	23.00	23.44	16.96	
60	149N	45W	19		SWCD			.15	.66	1.50	3.35	3.26	2.11	6.13	4.14	.99					16.35	
60	149N	47W	7		SWCD				.53	.78	3.86	2.66	2.99	4.41	3.90	1.62					14.70	
60	149N	47W	14		SWCD		.59	.56	1.18	1.05	3.76	2.34										
60	150N	39W	32		SWCD					1.69	3.72	2.05	1.87	5.10	4.19						14.43	
60	150N	40W	18		SWCD					1.58	3.15	2.46	2.63									
60	150N	45W	15		SWCD	.05	.44	.17	.92	1.25	2.92	2.10	1.41	4.92	3.11	1.27	2.85	14.97	17.74	21.41	12.60	
60	150N	45W	20		SWCD	0	.59	.15	1.23	1.42	3.97	2.83	1.81	5.28	4.64	.35	.82	18.15	21.43	23.09	15.31	
60	150N	46W	19	CROOK NW	NWS	.09	.43	.22	1.00	.91	4.08	2.15	3.60	4.54	4.13	1.71		19.24	21.22		15.28	
60	150N	47W	36		SWCD							3.83	4.67									
60	151N	39W	20		SWCD				3.81	1.72	3.79	1.99	1.85	6.06	3.64						15.41	
60	152N	49W	5		SWCD	0	.44	.50	.52	1.43	2.95	2.33	3.14	2.25	4.25			15.41	16.77		12.10	
60	153N	50W	14		SWCD		.56	.49	.36	1.36	3.53	2.16	5.66	5.38	4.39	2.85					18.09	
county averages						.09	.47	.41	1.55	1.48	3.96	2.56	2.42	5.40	4.09	1.35	1.31	20.14	22.99	23.98	16.16	
# of obs						11	15	16	25	27	29	28	27	27	23	14	8	11	11	7	23	

- Data as received and digitized on or before 2/10/2009. All values are in inches.
- 'cc ttt rr ss' is county-township-range-section number, 'oooooooo' is community name (where applicable), 'nnnn' is network type.
- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2007, Oct 2007, and Jan 2008, respectively. 'GRO' is growing season (May 2008 thru Sep 2008) precipitation total.
- '*' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>

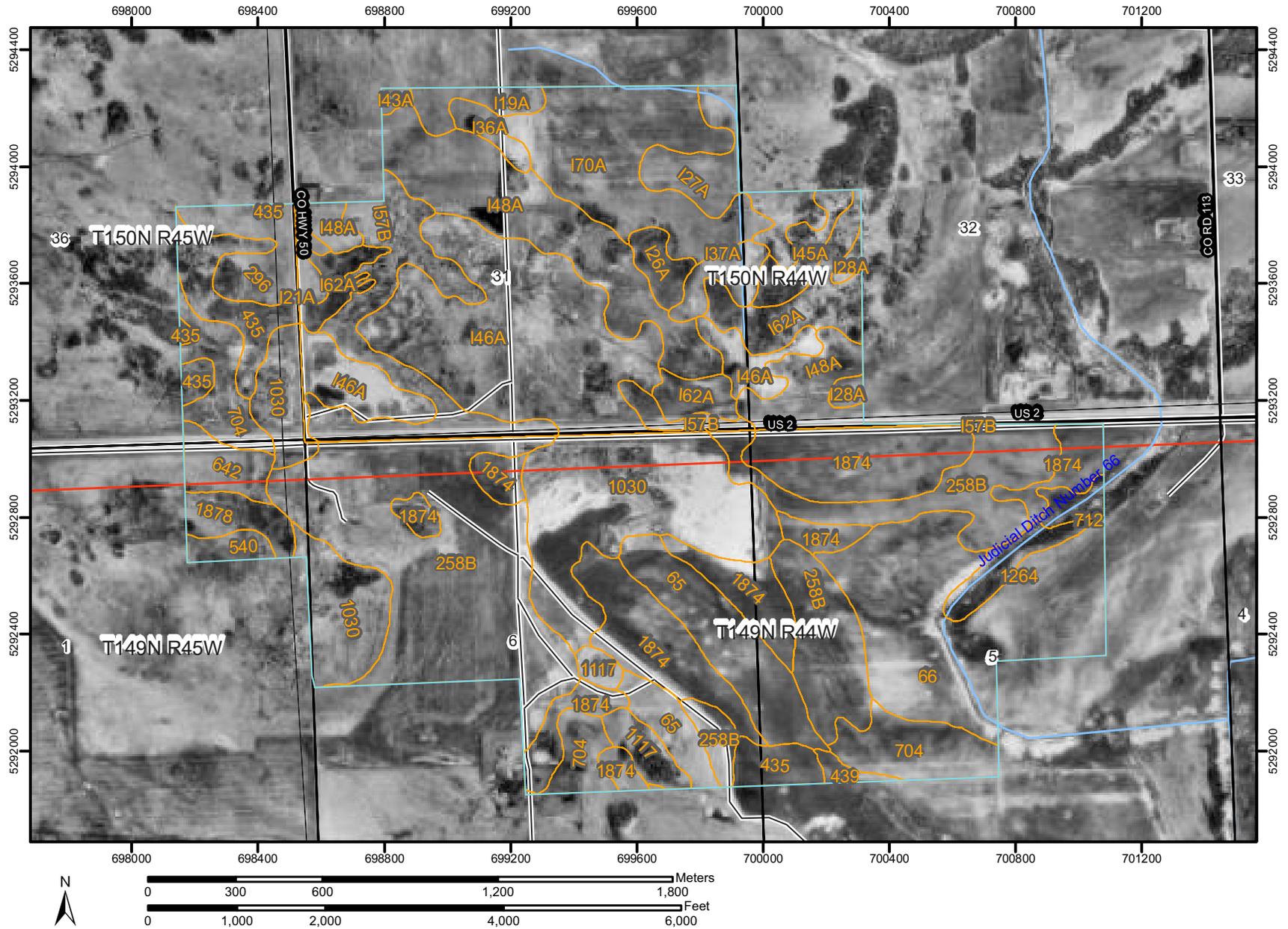
For some purposes, **daily** precipitation data are required. The precipitation data archive allows a user to [interactively retrieve](#) daily precipitation data from the site nearest to a target.

[Obtaining Data for Legal Purposes](#)

Soil Map units within the DWSMA with infiltration characteristics

Soil Map-Polk and Red Lake Counties (East DWSMA)

Soil Map—Polk County, Minnesota, and Red Lake County, Minnesota
(Crookston East - DWSMA)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

-  Very Stony Spot
-  Wet Spot
-  Other

Special Line Features

-  Gully
-  Short Steep Slope
-  Other

Political Features

Public Land Survey

-  Township and Range
-  Section

Municipalities

-  Cities
-  Urban Areas

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails

Roads

-  Interstate Highways
-  US Routes
-  State Highways
-  Local Roads
-  Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 14N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Polk County, Minnesota
Survey Area Data: Version 4, Nov 2, 2006

Soil Survey Area: Red Lake County, Minnesota
Survey Area Data: Version 5, Dec 11, 2006

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 4/19/1991

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

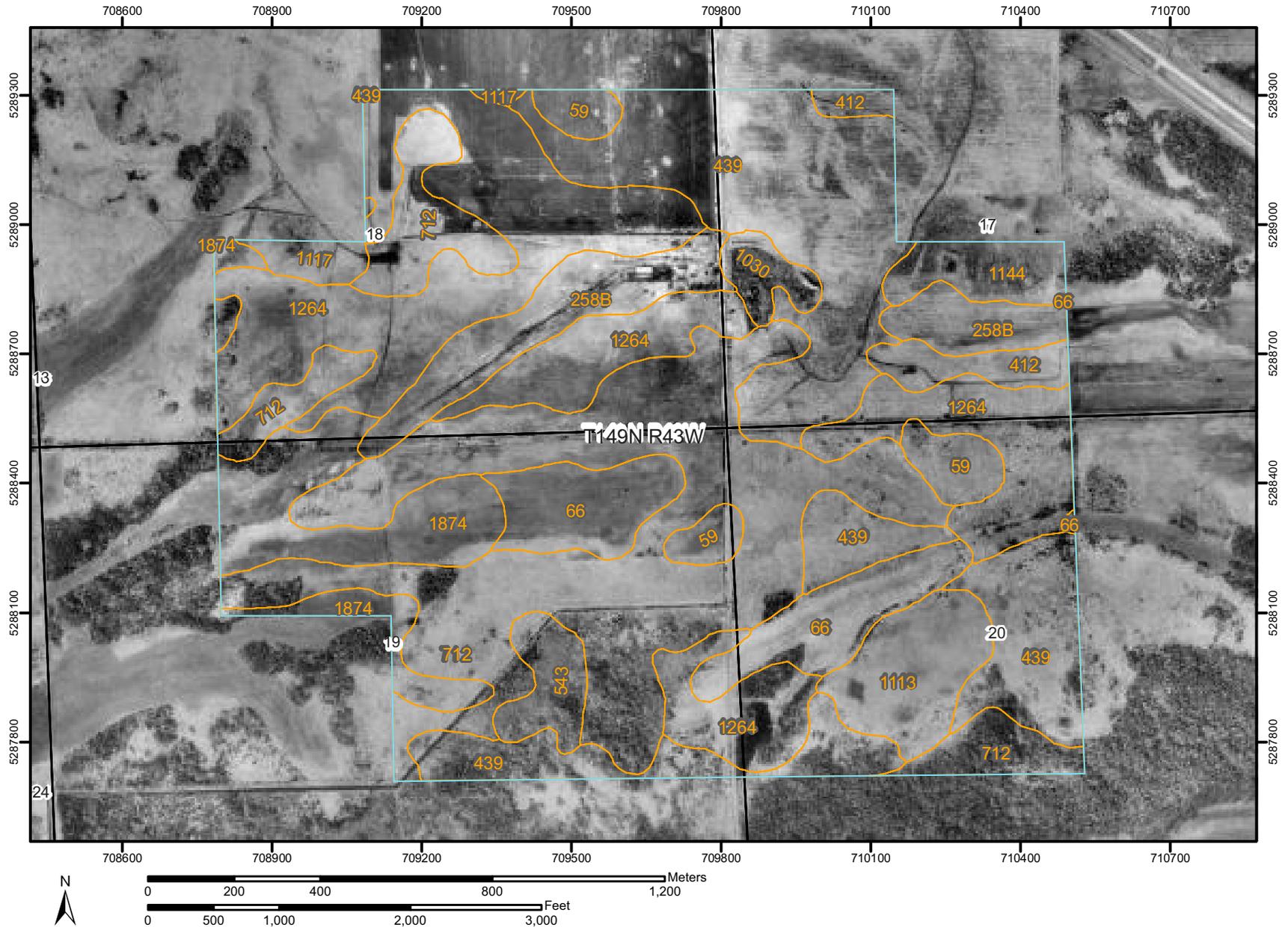
Polk County, Minnesota (MN119)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
65	Foxhome sandy loam	52.8	3.9%
66	Flaming loamy fine sand	110.0	8.2%
258B	Sandberg loamy sand, 1 to 6 percent slopes	220.9	16.5%
296	Fram loam	22.0	1.6%
435	Syrene sandy loam	37.4	2.8%
439	Strathcona fine sandy loam	3.4	0.2%
540	Seelyeville muck	6.5	0.5%
642	Clearwater loam	13.5	1.0%
704	Wyrene sandy loam	55.3	4.1%
712	Rosewood fine sandy loam	6.3	0.5%
1030	Pits, gravel-udipsamments complex	134.4	10.0%
1117	Hedman loam	13.9	1.0%
1264	Ulen loamy fine sand	12.3	0.9%
1874	Radium loamy sand	136.7	10.2%
1878	Hamre muck	12.7	0.9%

Red Lake County, Minnesota (MN125)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
I19A	Foxhome sandy loam, 0 to 3 percent slopes	10.5	0.8%
I21A	Fram loam, 1 to 3 percent slopes	5.3	0.4%
I26A	Hamerly loam, 0 to 2 percent slopes	8.7	0.7%
I27A	Hamre muck, 0 to 1 percent slopes	28.1	2.1%
I28A	Hangaard sandy loam, 0 to 2 percent slopes	4.8	0.4%
I36A	Kittson loam, 0 to 3 percent slopes	6.7	0.5%
I37A	Kratka and Strathcona soils, depressional, 0 to 1 percent slopes.	11.0	0.8%
I43A	Mavie fine sandy loam, 0 to 2 percent slopes	1.9	0.1%
I45A	Northwood muck, 0 to 1 percent slopes	12.1	0.9%
I46A	Pits, gravel and sand	144.1	10.7%

Red Lake County, Minnesota (MN125)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
I48A	Radium loamy sand, 0 to 3 percent slopes	96.2	7.2%
I57B	Sandberg-Radium complex, 1 to 6 percent slopes	57.5	4.3%
I62A	Syrene sandy loam, 0 to 2 percent slopes	44.8	3.3%
I70A	Strathcona fine sandy loam, 0 to 2 percent slopes	71.5	5.3%
Totals for Area of Interest (AOI)		1,341.2	100.0%

Soil Map-Polk County (SE DWSMA)

Soil Map—Polk County, Minnesota
(Crookston SE - DWSMA)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

 Very Stony Spot

 Wet Spot

 Other

Special Line Features

-  Gully
-  Short Steep Slope
-  Other

Political Features

Public Land Survey

-  Township and Range
-  Section

Municipalities

-  Cities
-  Urban Areas

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 14N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Polk County, Minnesota
Survey Area Data: Version 4, Nov 2, 2006

Date(s) aerial images were photographed: 4/19/1991

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Polk County, Minnesota (MN119)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
59	Grimstad fine sandy loam	16.9	2.5%
66	Flaming loamy fine sand	40.1	5.9%
258B	Sandberg loamy sand, 1 to 6 percent slopes	38.7	5.7%
412	Mavie fine sandy loam	12.2	1.8%
439	Strathcona fine sandy loam	137.0	20.1%
543	Markey muck	11.3	1.7%
712	Rosewood fine sandy loam	184.4	27.1%
1030	Pits, gravel-udipsamments complex	7.4	1.1%
1113	Haslie, Seelyeville, and Cathro soils, ponded	23.6	3.5%
1117	Hedman loam	6.5	1.0%
1144	Strathcona and Kratka soils, depressional	12.8	1.9%
1264	Ulen loamy fine sand	146.4	21.5%
1874	Radium loamy sand	43.4	6.4%
Totals for Area of Interest (AOI)		680.6	100.0%

Saturated Hydraulic Conductivity Values - Polk County Soils

Saturated Hydraulic Conductivity (Ksat)

Layer Option: All Layers
Units of Measure: micrometers per second
Aggregation Method: Dominant Component
Tie-break Rule: Fastest
Interpret Nulls as Zero: No

Polk County, Minnesota
Survey Area Version and Date: 4 - 11/02/2006

Map symbol	Map unit name	Rating
59	Grimstad fine sandy loam	28.4760
65	Foxhome sandy loam	24.0364
66	Flaming loamy fine sand	91.7400
258B	Sandberg loamy sand, 1 to 6 percent slopes	174.0855
296	Fram loam	9.1700
412	Mavie fine sandy loam	25.2840
435	Syrene sandy loam	74.7196
439	Strathcona fine sandy loam	26.6300
540	Seelyeville muck	21.8800
543	Markey muck	63.8648
642	Clearwater loam	3.6749
704	Wyrene sandy loam	75.1586
712	Rosewood fine sandy loam	78.2871
1030	Pits, gravel-udipsamments complex	
1113	Haslie, Seelyeville, and Cathro soils, ponded	21.8800
1117	Hedman loam	9.1700
1144	Strathcona and Kratka soils, depressional	40.8355
1264	Ulen loamy fine sand	83.6051
1874	Radium loamy sand	113.2442
1878	Hamre muck	10.6245

Saturated Hydraulic Conductivity Values - Red Lake County Soils

Saturated Hydraulic Conductivity (Ksat)

Layer Option: All Layers
Units of Measure: micrometers per second
Aggregation Method: Dominant Component
Tie-break Rule: Fastest
Interpret Nulls as Zero: No

Red Lake County, Minnesota
Survey Area Version and Date: 5 - 12/11/2006

Map symbol	Map unit name	Rating
I19A	Foxhome sandy loam, 0 to 3 percent slopes	24.9400
I21A	Fram loam, 1 to 3 percent slopes	9.1700
I26A	Hamerly loam, 0 to 2 percent slopes	9.1700
I27A	Hamre muck, 0 to 1 percent slopes	11.1459
I28A	Hangaard sandy loam, 0 to 2 percent slopes	141.2866
I36A	Kittson loam, 0 to 3 percent slopes	9.1700
I37A	Kratka and Strathcona soils, depressiona, 0 to 1 percent slopes.	30.6800
I43A	Mavie fine sandy loam, 0 to 2 percent slopes	33.5444
I45A	Northwood muck, 0 to 1 percent slopes	25.1629
I46A	Pits, gravel and sand	
I48A	Radium loamy sand, 0 to 3 percent slopes	106.5159
I57B	Sandberg-Radium complex, 1 to 6 percent slopes	183.5641
I62A	Syrene sandy loam, 0 to 2 percent slopes	70.8893
I70A	Strathcona fine sandy loam, 0 to 2 percent slopes	30.6800

Saturated Hydraulic Conductivity (Ksat)

Rating Options

Attribute Name: Saturated Hydraulic Conductivity (Ksat)

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Layer Option: All Layers

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not. The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie.

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Tie-break Rule: Fastest

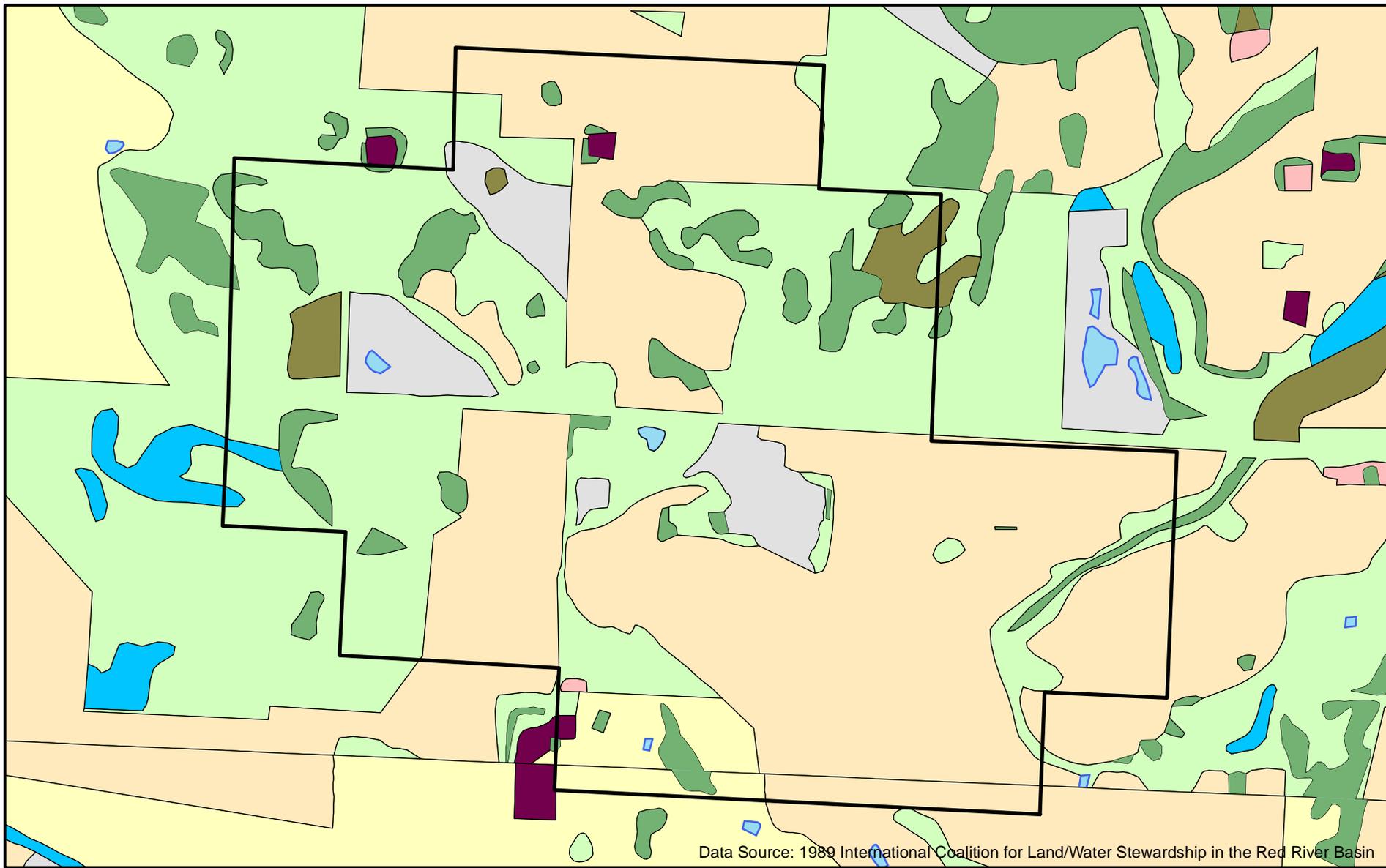
The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates that a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Land Use/Land Cover Map within the DWSMA

Land Use/Land Cover East DWSMA

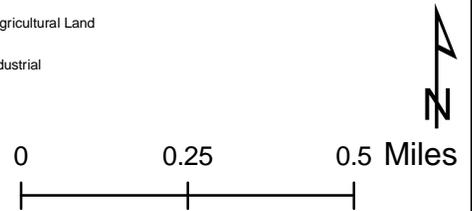


Data Source: 1989 International Coalition for Land/Water Stewardship in the Red River Basin

**City of Crookston
Wellhead Protection Plan: Part 2
Crookston, Minnesota**

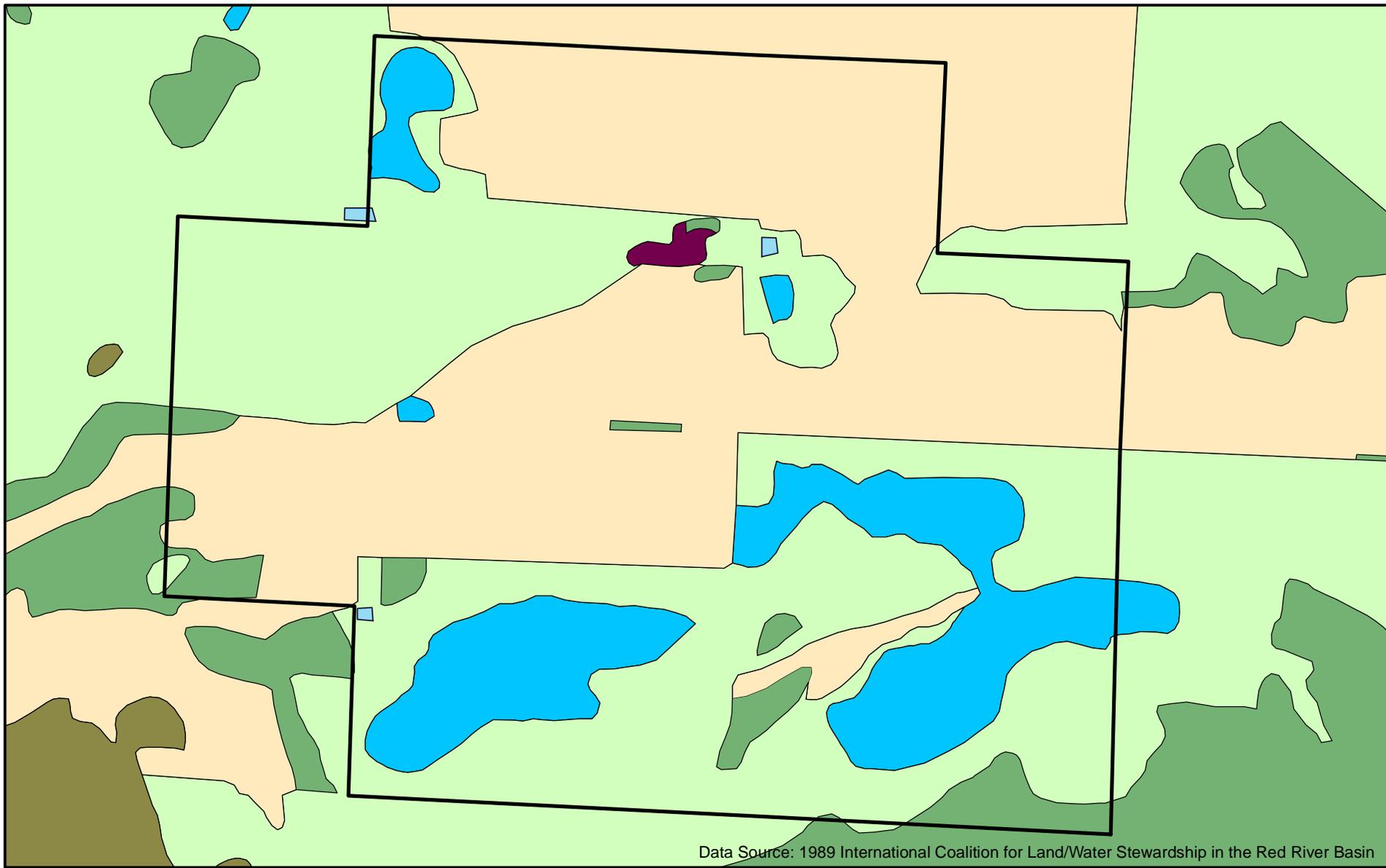
**Prepared By:
West Central Environmental Consultants, Inc.
Project No. 07-5865-30, October 2008**

dwsma	Grassland	Transitional Agricultural Land
Land Use/Land Cover	Grassland-Shrub-Tree (deciduous)	Urban and Industrial
Cultivated Land	Gravel Pits and Open Mines	Water
Deciduous Forest	Other Rural Developments	Wetlands
Farmsteads and Rural Residences	Rural Residential Development Complex	



Land Use/Land Cover within the East DWSMA

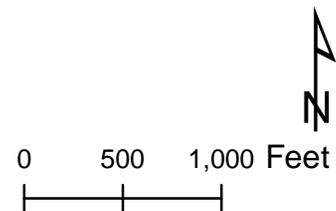
Land Use/Land Cover SE DWSMA



**City of Crookston
Wellhead Protection Plan: Part 2
Crookston, Minnesota**

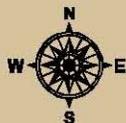
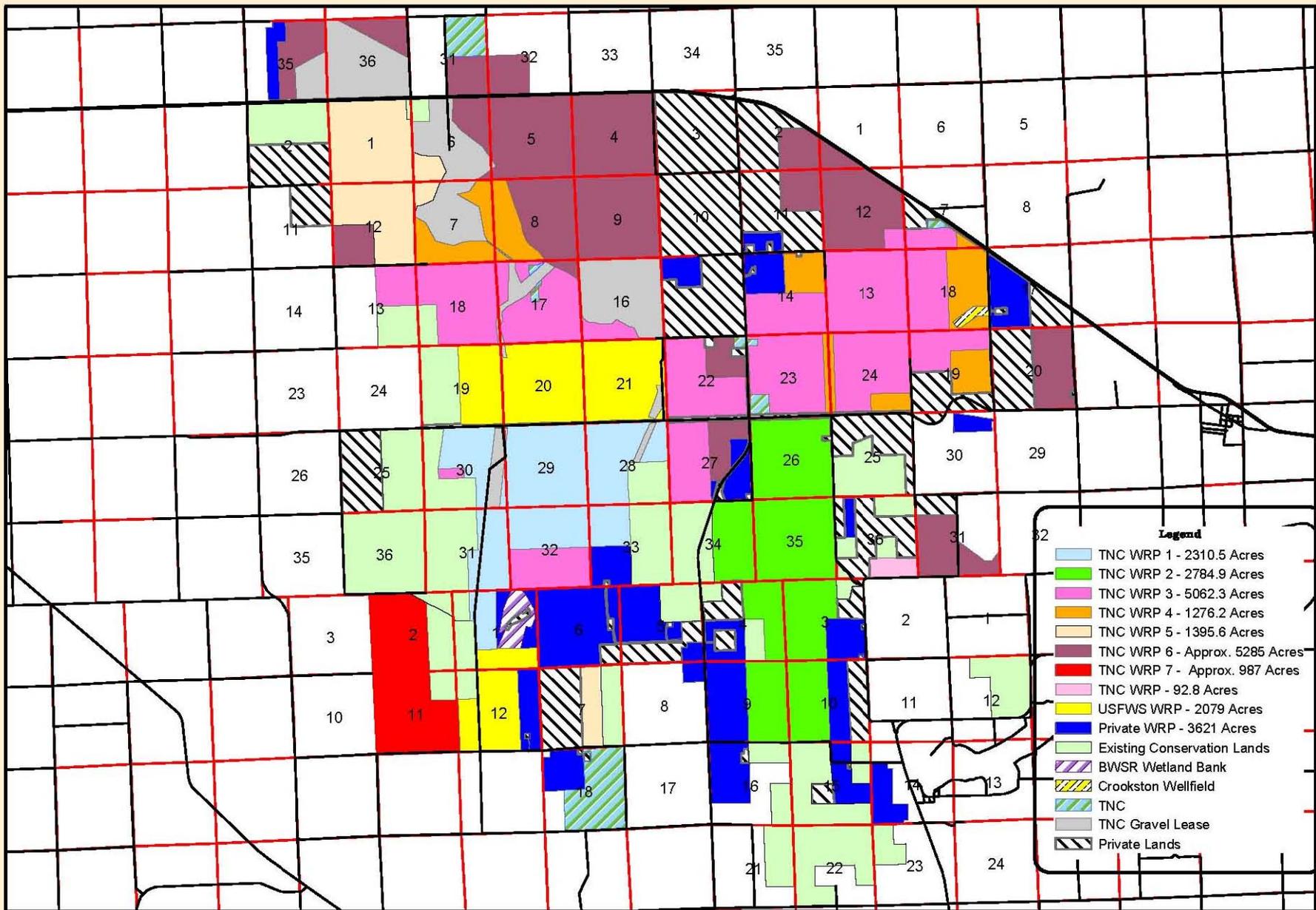
**Prepared By:
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Cultivated Land	Gravel Pits and Open Mines	Water
Deciduous Forest	Other Rural Developments	Wetlands
Farmsteads and Rural Residences	Rural Residential Development Complex	



Land Use/Land Cover within the SE DWSMA

Glacial Ridge Project Land Use Map



Glacial Ridge Project 2007

Map in UTM Zone 14N NAD 83



Map By Glacial Ridge Office on 3-6-07

Maps are for graphical purposes only. They do not represent a legal survey. While every effort has been made to ensure that these data are accurate and reliable within limits of current state of the art, NRCS cannot assume liability for any damages caused by any errors or omissions in the data, nor as a result of the failure of the data to function on a particular system. NRCS makes no warranty, expressed or implied, nor does the act of distribution constitute such a warranty.

Political Boundaries Map

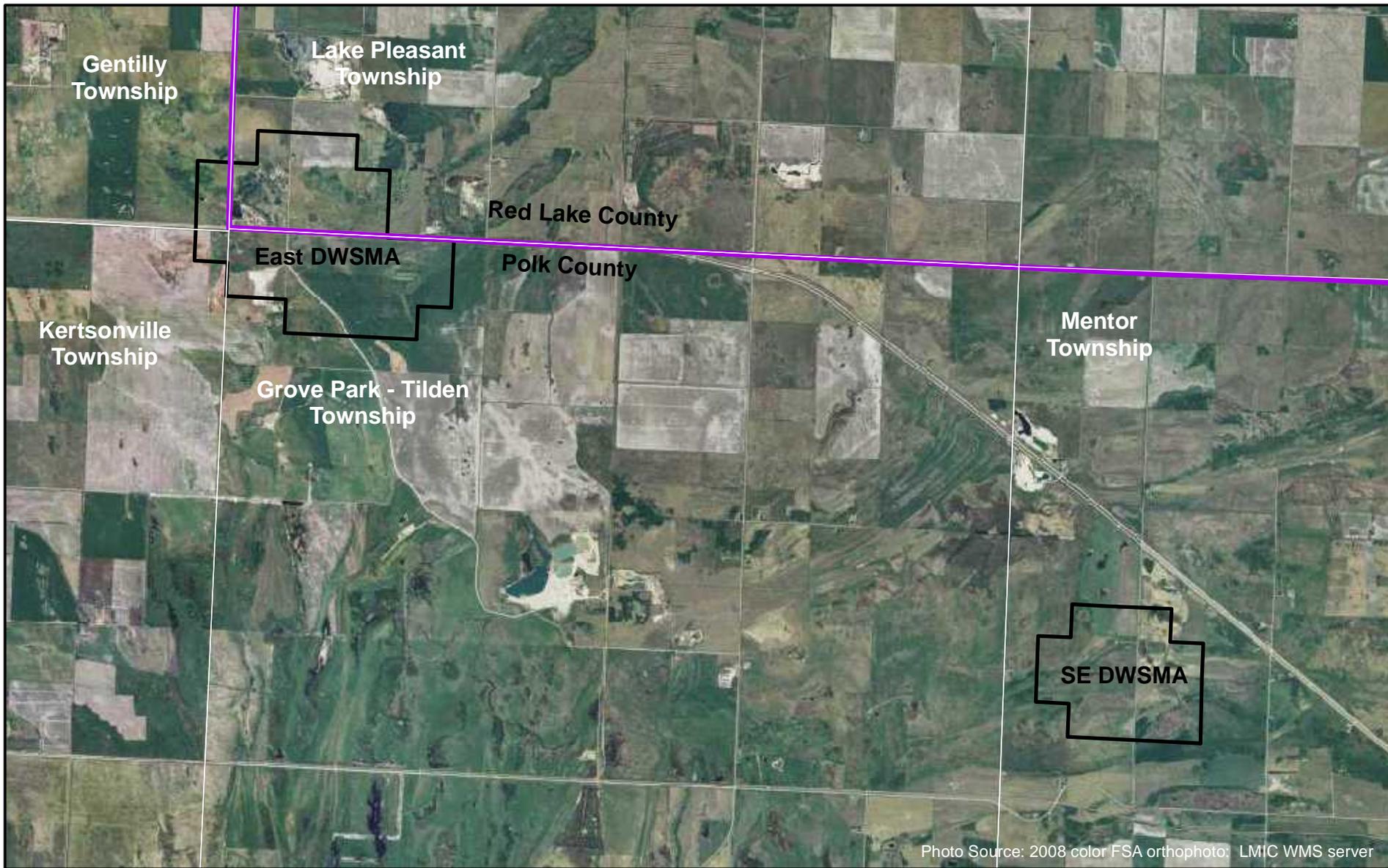
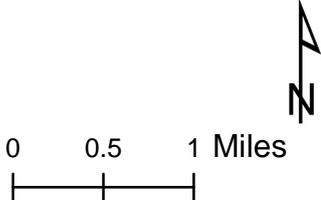
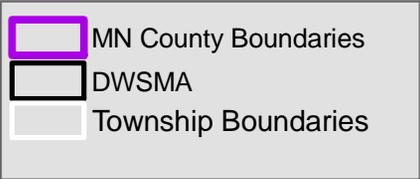


Photo Source: 2008 color FSA orthophoto: LMIC WMS server

**City of Crookston
Wellhead Protection Plan: Part 2
Crookston, Minnesota**

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Project No. 07-5865-30, May 2009



Map of Political Boundaries

Existing Zoning Map

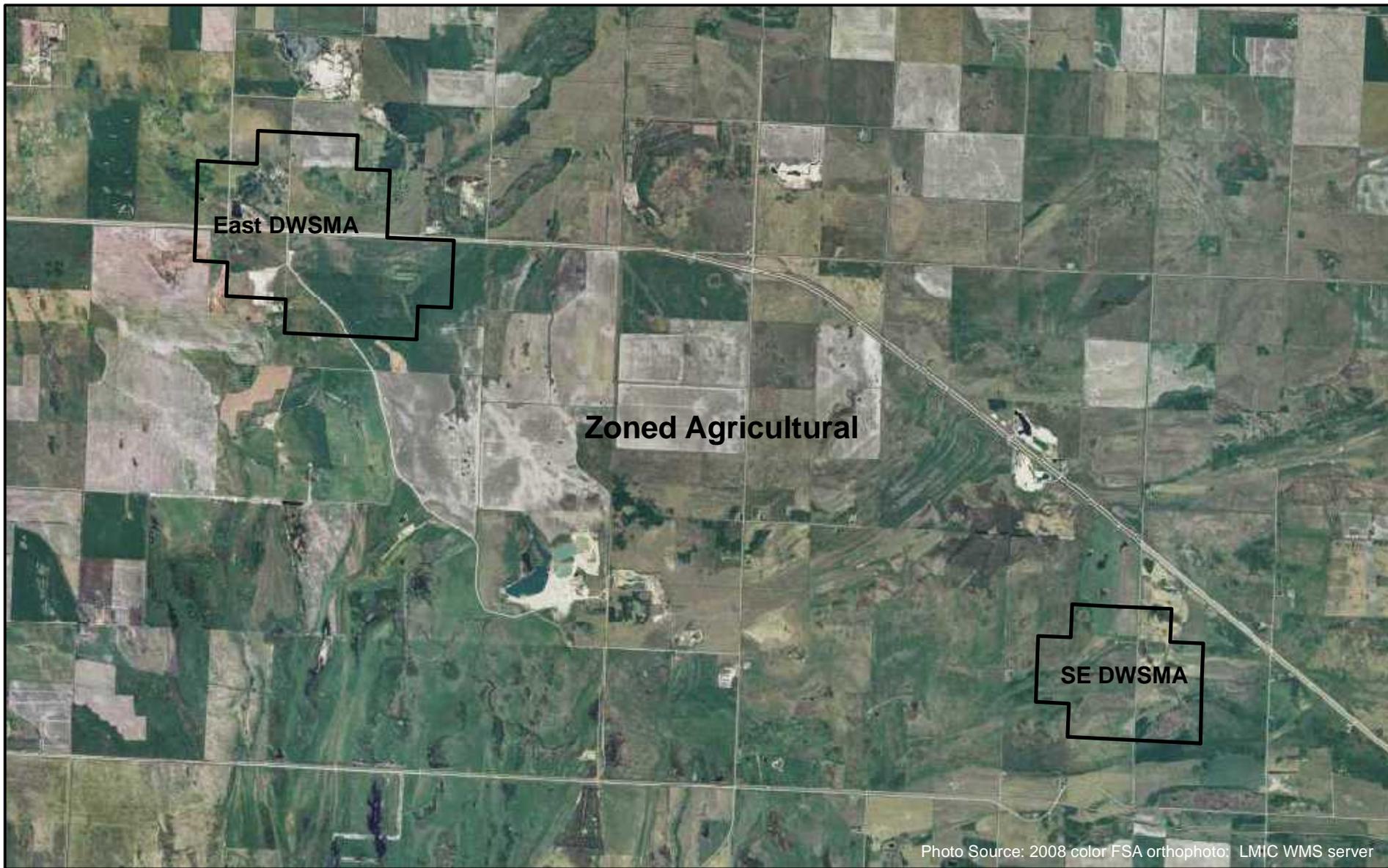


Photo Source: 2008 color FSA orthophoto: LMIC WMS server

**City of Crookston
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Crookston, Minnesota**

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West Central Environmental Consultants, Inc.
Project No. 07-5865-30, May 2009

 DWSMA

0 0.5 1 Miles



Map of Existing Zoning

APPENDIX B

POTENTIAL CONTAMINANT SOURCE INVENTORY

- Potential Contaminant Source Inventory Map (East DWSMA)
- Potential Contaminant Source Inventory Map (SE DWSMA)
- Potential Contaminant Source Inventory Table
- IWMZ Potential Contaminant Source Inventory Form
- MDH Well Records East DWSMA
- MDH Well Records SE DWSMA

Potential Contaminant Source Inventory Map East DWSMA

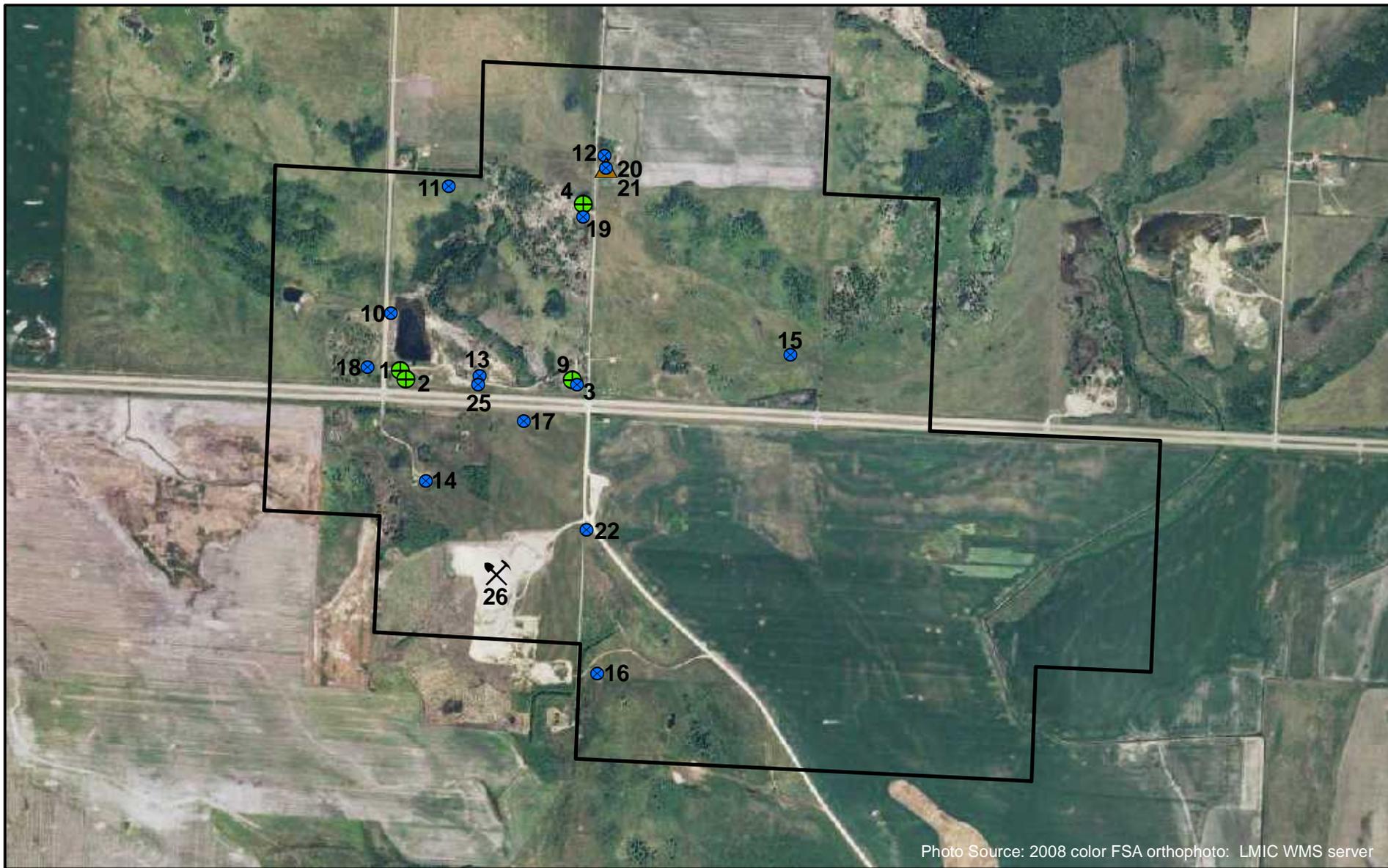
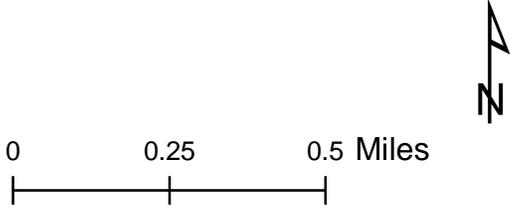


Photo Source: 2008 color FSA orthophoto: LMIC WMS server

**City of Crookston
Wellhead Protection Plan: Part 2
Crookston, Minnesota**

Prepared By:
West Central Environmental Consultants, Inc.
Project No. 07-5865-30, May 2009

-  Crookston Water Supply Well
-  Well
-  Individual sewage treatment system
-  Gravel Pit
-  DWSMA



Potential Contaminant Source Inventory within the East DWSMA

Potential Contaminant Source Inventory Map SE DWSMA

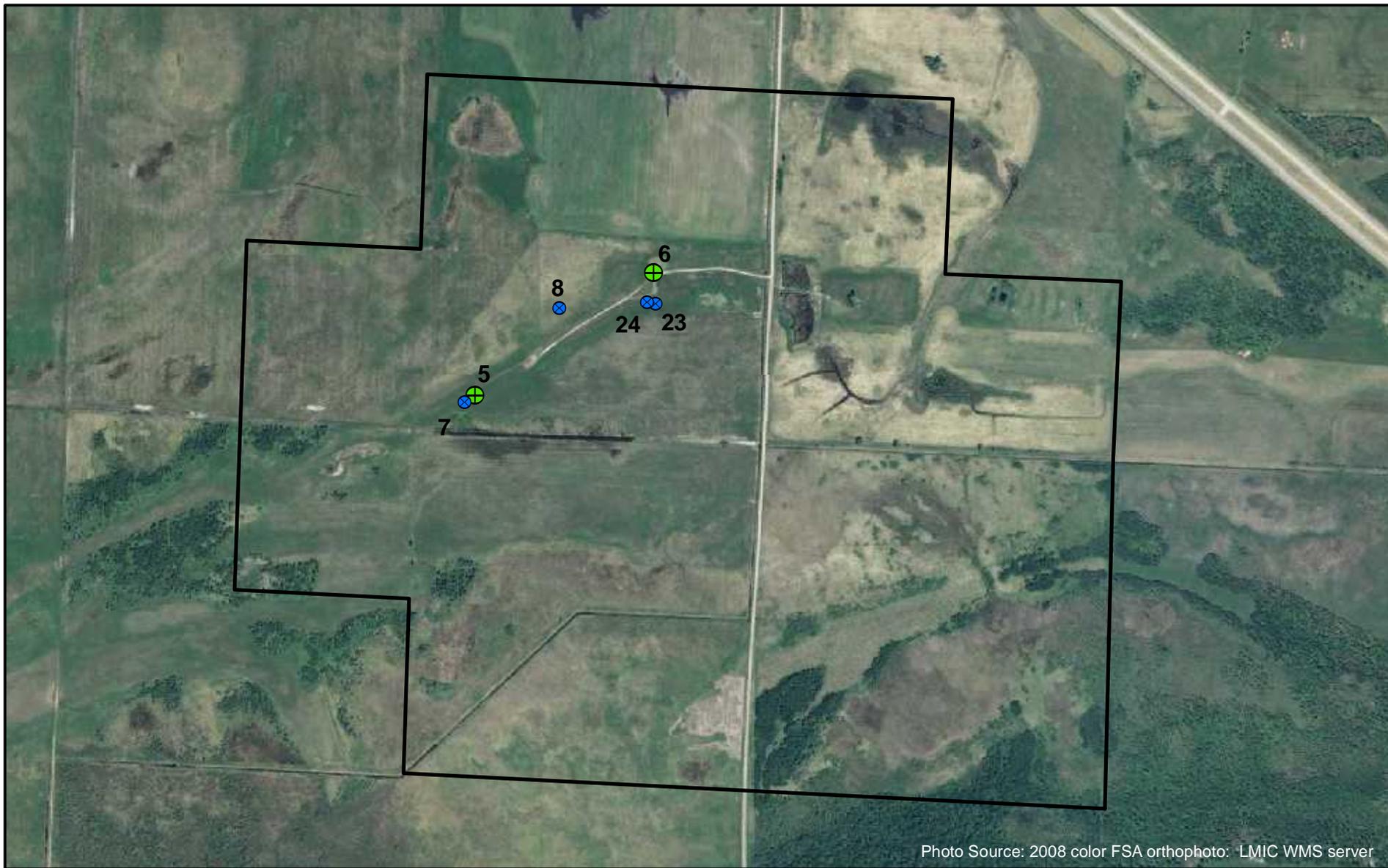
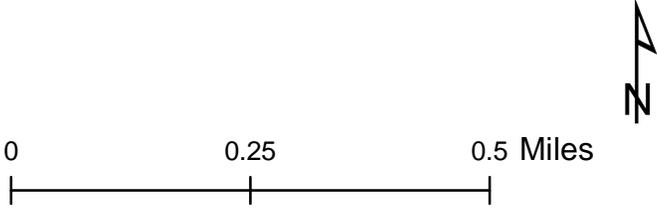


Photo Source: 2008 color FSA orthophoto: LMIC WMS server

**City of Crookston
Wellhead Protection Plan: Part 2
Crookston, Minnesota**

Prepared By:
West Central Environmental Consultants, Inc.
Project No. 07-5865-30, May 2009

-  Crookston Water Supply Well
-  Well
-  Individual sewage treatment system
-  Gravel Pit
-  DWSMA



Potential Contaminant Source Inventory within the SE DWSMA

Potential Contaminant Source Inventory Table

Table 1: Potential Contaminant Source Inventory (PCSI)

Map #	Name	Unique No.	DWSMA	Township/Range/Section	Sub-Section	Well Use	PCSI ID	UTM Easting	UTM Northing
1	Crookston 1	147243	East	T150N, R44W, Sec. 31	CCCCAC	PC	Crookston Water Supply Well	248897.44	5295199.72
2	Crookston 2	191552	East	T150N, R44W, Sec. 31	C	PC	Crookston Water Supply Well	248917.00	5295169.00
3	Crookston 3	191553	East	T150N, R44W, Sec. 31	C	PC	Crookston Water Supply Well	249503.53	5295167.54
4	Crookston 4	191554	East	T150N, R44W, Sec. 31	C	PC	Crookston Water Supply Well	249541.08	5295784.36
5	Crookston 5	685465	SE	T149N, R43W, Sec. 18	CCD	PC	Crookston Water Supply Well	259382.75	5289981.63
6	Crookston 6	685466	SE	T149N, R43W, Sec. 18	DCC	PC	Crookston Water Supply Well	259173.00	5289810.00
7	City Of Crookston	685472	SE	T149N, R43W, Sec. 18	DCDBAC	OB	Well	259304.00	5289893.00
8	City Of Crookston	654761	SE	T149N, R43W, Sec. 18	DDBCAB	OB	Well	259505.00	5290022.00
9	City Of Crookston	105665	East	T150N, R44W, Sec. 31	CDDCDC	TW	Well	249519.62	5295151.45
10	City Of Crookston	105666	East	T150N, R44W, Sec. 31	CCBBCC	TW	Well	248865.25	5295403.54
11	City Of Crookston	147237	East	T150N, R44W, Sec. 31	CBDAAA	TW	Well	249069.07	5295848.72
12	City Of Crookston	147241	East	T150N, R44W, Sec. 31	ACBCCD	TW	Well	249616.17	5295956.00
13	City Of Crookston	125721	East	T150N, R44W, Sec. 31	CCDDCC	OB	Well	249176.35	5295183.63
14	Crookston Cattle Co	102614	East	T149N, R44W, Sec. 6	BBDBCC	CO	Well	248988.62	5294813.54
15	Crookston Cattle Co.	147225	East	T150N, R44W, Sec. 31	DDADBC	CO	Well	250268.00	5295256.00
16	Crookston Cattle Co	171463	East	T149N, R44W, Sec. 6	ACC	DO	Well	249589.35	5294137.72
17	City Of Crookston	267833	East	T149N, R44W, Sec. 6	BABACB	OB	Well	249332.14	5295025.23
18	Crookston Cattle Co	171464	East	T150N, R45W, Sec. 36	DDD	DO	Well	248783.00	5295213.00
19	City Of Crookston	267670	East	T150N, R44W, Sec. 31	CAAA	TW	Well	249541.08	5295741.45
20	Mr. Jarvis	267672	East	T150N, R44W, Sec. 31	ACCB	DO	Well	249621.53	5295913.09
21	Mr. Jarvis	NA	East	T150N, R45W, Sec. 36	DDD	NA	Ind. sewage treatment system	248783.00	5295228.24
22	The Nature Conservancy	620679	East	T149N, R44W, Sec. 6	BAD	MW	Well	249551.80	5294641.90
23	City Of Crookston	620680	SE	T149N, R43W, Sec. 18	DDB	OB	Well	259588.00	5290021.00
24	USGS	654760	SE	T149N, R43W, Sec. 18	DDB	OB	Well	259568.52	5290023.65
25	City Of Crookston	Unavailable	East	T150N, R44W, Sec. 31	CCD	OB	Well	249170.98	5295151.45
26	Gravel Mining Operation	NA	East	T149N, R44W, Sec. 6	BD	Gravel	Gravel Pit	249241.00	5294491.00

IWMZ Potential Contaminant Source Inventory Form

PWS ID / FACILITY ID	1600002 S01	UNIQUE WELL NO.	147243
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Community	Distances Noncomm-unity	Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
*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		
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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

*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	3	
WEL	Operating well	record dist.	record dist.		Y	27	
WEL	Operating well	record dist.	record dist.		Y	62	
UUW	Unused, unsealed well or boring	50	50		N		

General

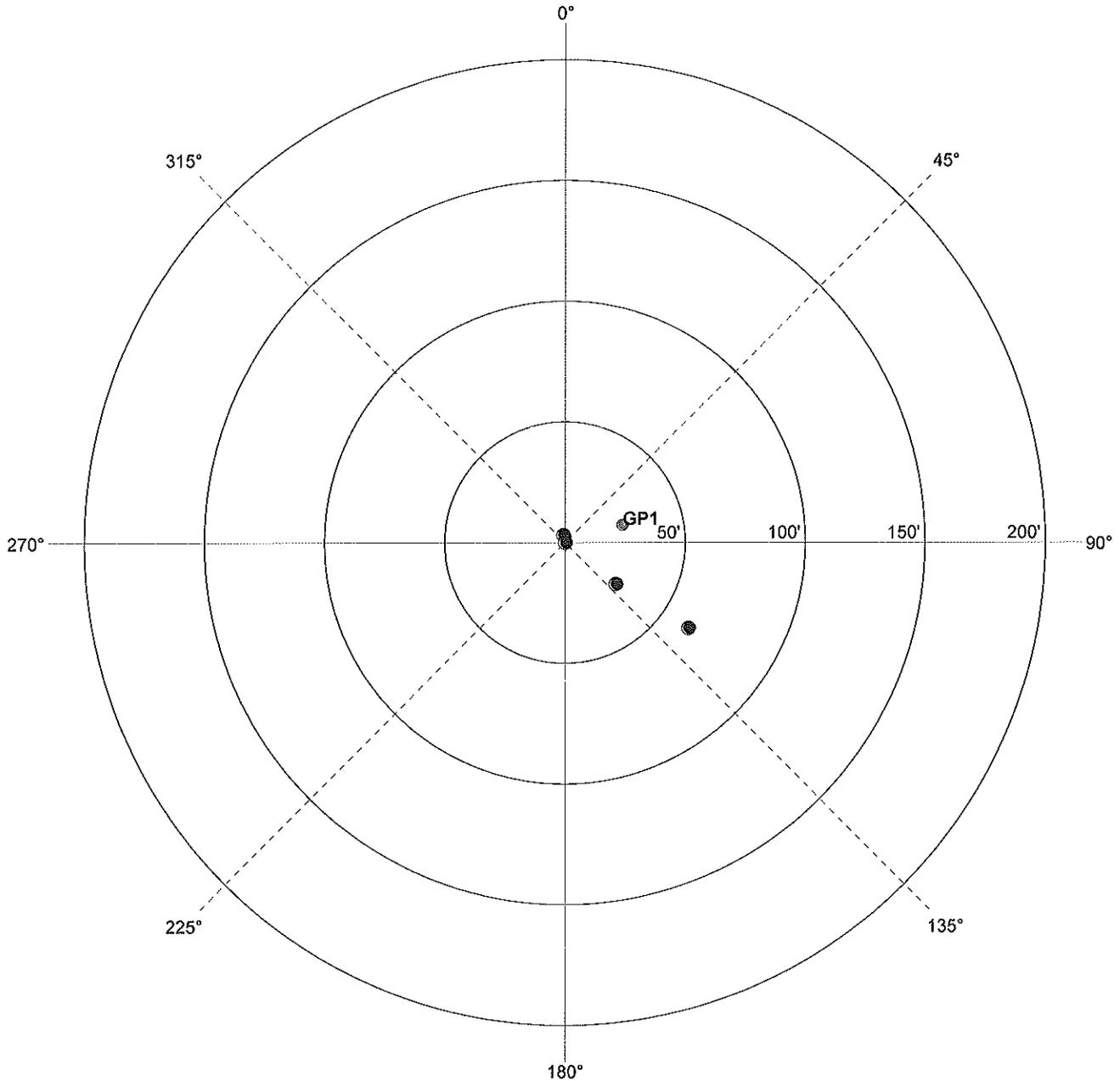
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		Y	25	
*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		
*PP1	Petroleum buried piping	50	50		N		

PWS ID / FACILITY ID 1600002 S01

UNIQUE WELL NO. 147243

SETBACK DISTANCES All potential contaminant sources must be noted on the 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
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Is the system monitoring existing nonconforming sources of contamination?	Y	N	N/A
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Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR Kluthe, Beth	DATE 05/07/2009
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RECOMMENDED WELLHEAD PROTECTION MEASURES	WELLHEAD PROTECTION MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Floor drains, such as in pumphouses, that discharge to a gravel pocket or seepage pit should have a "No Dumping" sign posted.		
Determine the status and location of TW #147234.		
Determine the status and location of well #191551.		
Continue to maintain and monitor TW #147238 using past practices.		
Explore options to minimize impacts from accidental spills along US Highway #2.		

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	1600002	COMMUNITY
NAME	Crookston	
ADDRESS	Crookston Water Superintendent, c/o Mr. Pat Kelly, City Hall, 124 North Broadway, Crookston, MN 567161731	

FACILITY (WELL) INFORMATION

NAME	#2	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S02	
UNIQUE WELL NO.	191552	
COUNTY	Red Lake	

PWS ID / FACILITY ID	1600002 S02	UNIQUE WELL NO.	191552
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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	Noncomm-unity				

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							
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	50/300/150	100/600/300	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-leased, 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		
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		

PWS ID / FACILITY ID	1600002 S02	UNIQUE WELL NO.	191552
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PGSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Community	Distances Noncomm-unity	Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
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		
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	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* (Class V well - illegal ³)	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells							
*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	65	
WEL	Operating well	record dist.	record dist.		Y	62	
WEL	Operating well	record dist.	record dist.		Y	35	
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		Y	51	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		
*PP1	Petroleum buried piping	50	50		N		

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	Noncomm-unity				
*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□	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		

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

- * 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 feet 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.
- Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.
- 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.

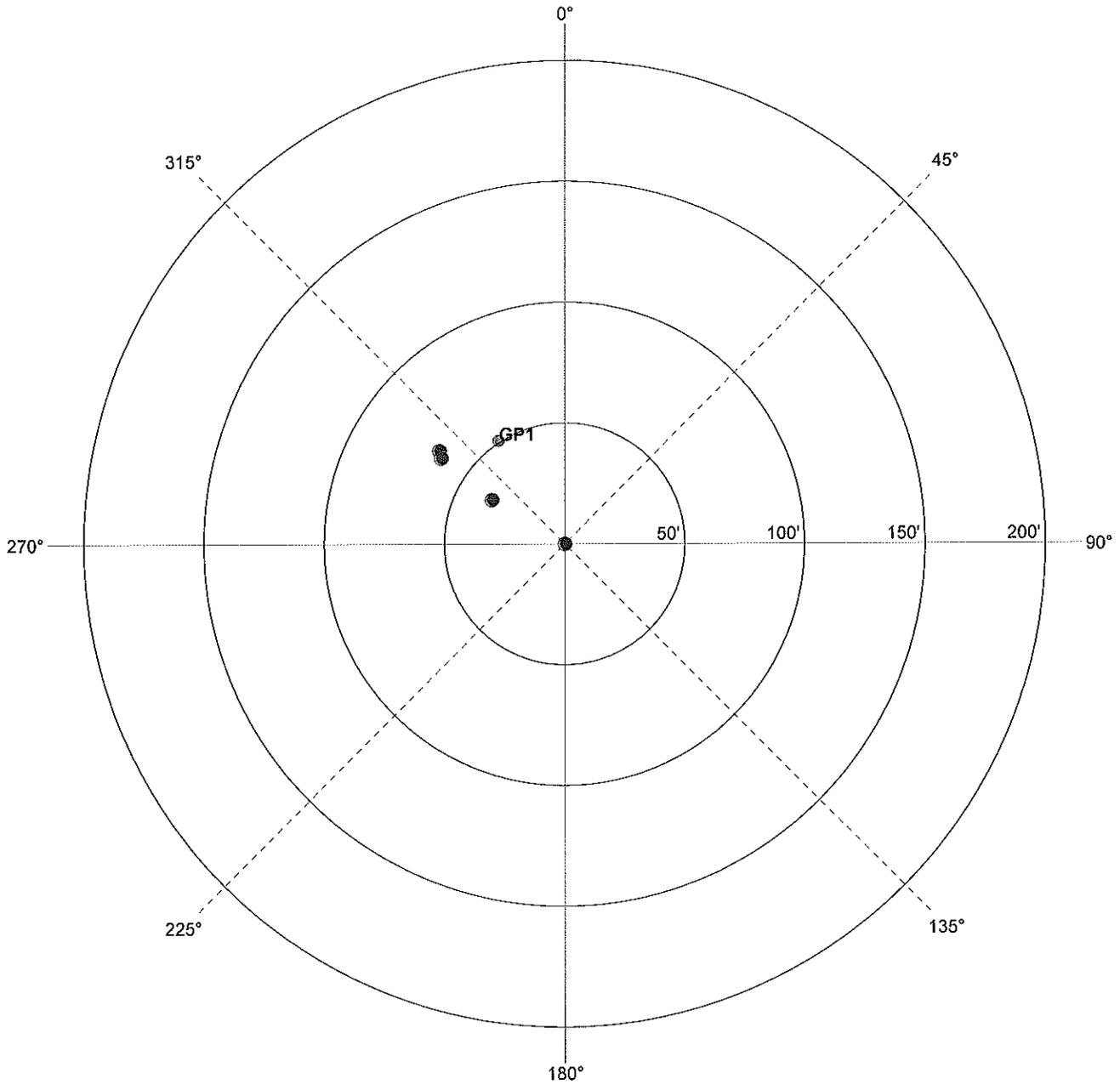
This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID 1600002 S02

UNIQUE WELL NO. 191552

SETBACK DISTANCES All potential contaminant sources must be noted on the 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 Kluthe, Beth

DATE 05/07/2009

PWS ID / FACILITY ID	1600002 S02	UNIQUE WELL NO.	191552
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RECOMMENDED WELLHEAD PROTECTION MEASURES	WELLHEAD PROTECTION MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Determine status and location of Well #191551.		
Determine status and location of TW #147234.		
Continue to maintain and monitor TW #147238 using past practices.		
Floor drains, such as in pumphouses, that discharge to a gravel pocket or seepage pit should have a "No Dumping" sign posted.		
Explore options to minimize impacts from accidental spills along US Highway #2.		

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	1600002	COMMUNITY
NAME	Crookston	
ADDRESS	Crookston Water Superintendent, c/o Mr. Pat Kelly, City Hall, 124 North Broadway, Crookston, MN 567161731	

FACILITY (WELL) INFORMATION

NAME	#3	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S03	
UNIQUE WELL NO.	191553	
COUNTY	Red Lake	

PWS ID / FACILITY ID	1600002 S03	UNIQUE WELL NO.	191553
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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	Noncomm-unity				

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) ²	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	50/300/150	100/600/300		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	
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	

PWS ID / FACILITY ID	1600002 S03	UNIQUE WELL NO.	191553
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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	Noncomm-unity				
*SF1	Watertight sand filter; peat filter; or constructed wellland	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		
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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* (Class V well - illegal ³)	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		

Wells

*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	129	
WEL	Operating well	record dist.	record dist.		Y	20	
UUW	Unused, unsealed well or boring	50	50		N		

General

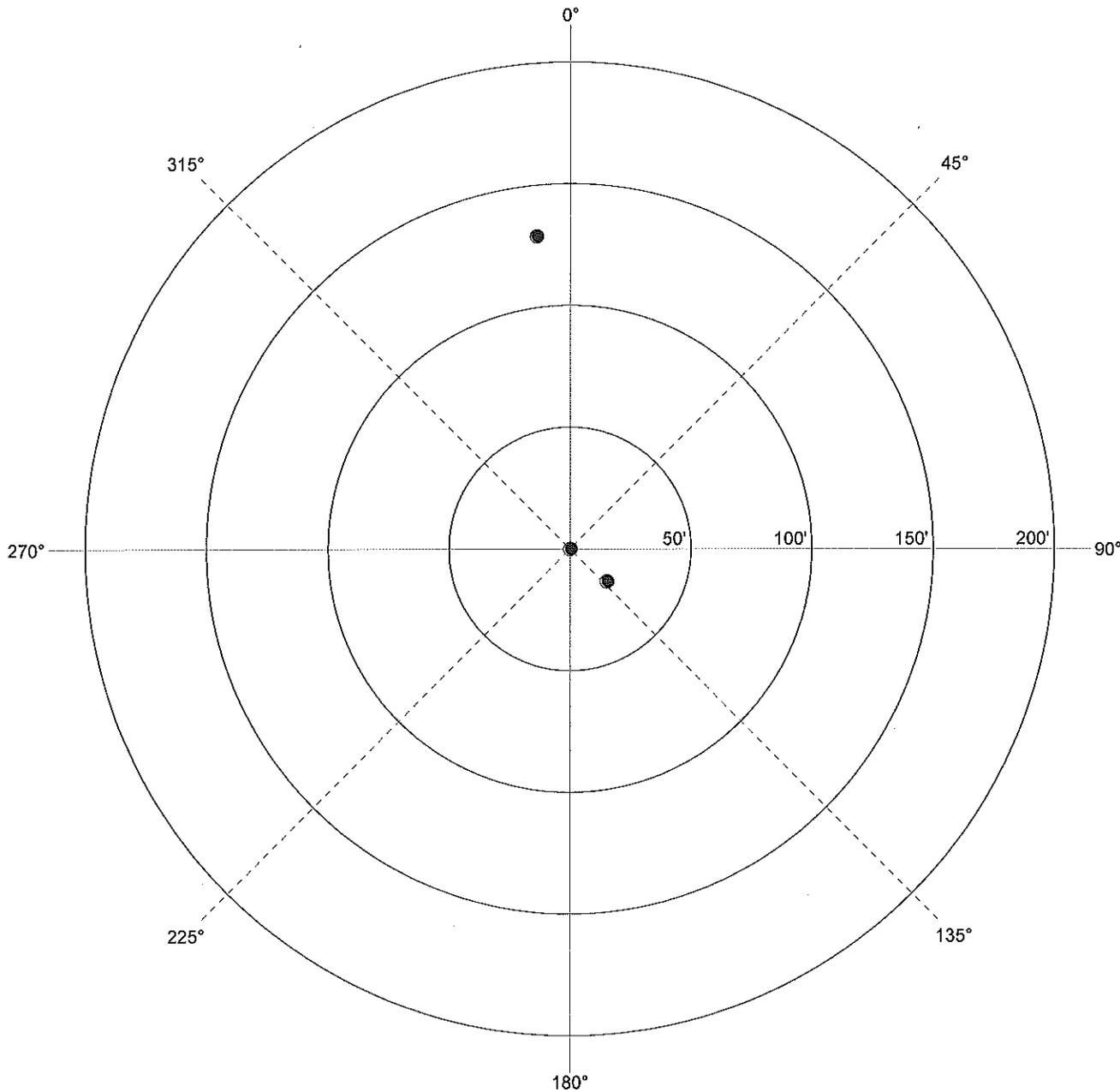
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
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		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

PWS ID / FACILITY ID 1600002 S03

UNIQUE WELL NO. 191553

SETBACK DISTANCES All potential contaminant sources must be noted on the 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 Kluthe, Beth

DATE 05/07/2009

PWS ID / FACILITY ID	1600002 S03	UNIQUE WELL NO.	191553
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RECOMMENDED WELLHEAD PROTECTION MEASURES	WELLHEAD PROTECTION MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Determine status and location of TW #267671.		
Continue to monitor and maintain TW #105665 using past practices.		
Explore options to minimize impacts from accidental spills along US Highway #2.		

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	1600002	COMMUNITY
NAME	Crookston	
ADDRESS	Crookston Water Superintendent, c/o Mr. Pat Kelly, City Hall, 124 North Broadway, Crookston, MN 567161731	

FACILITY (WELL) INFORMATION

NAME	#4	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S04	
UNIQUE WELL NO.	191554	
COUNTY	Red Lake	

PWS ID / FACILITY ID	1600002 S04	UNIQUE WELL NO.	191554
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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	Noncomm-unity				

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	50/300/150	100/600/300	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		
MVV	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		

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances Community	Noncomm-unity	Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
*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		
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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

*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	75	
UUW	Unused, unsealed well or boring	50	50		N		

General

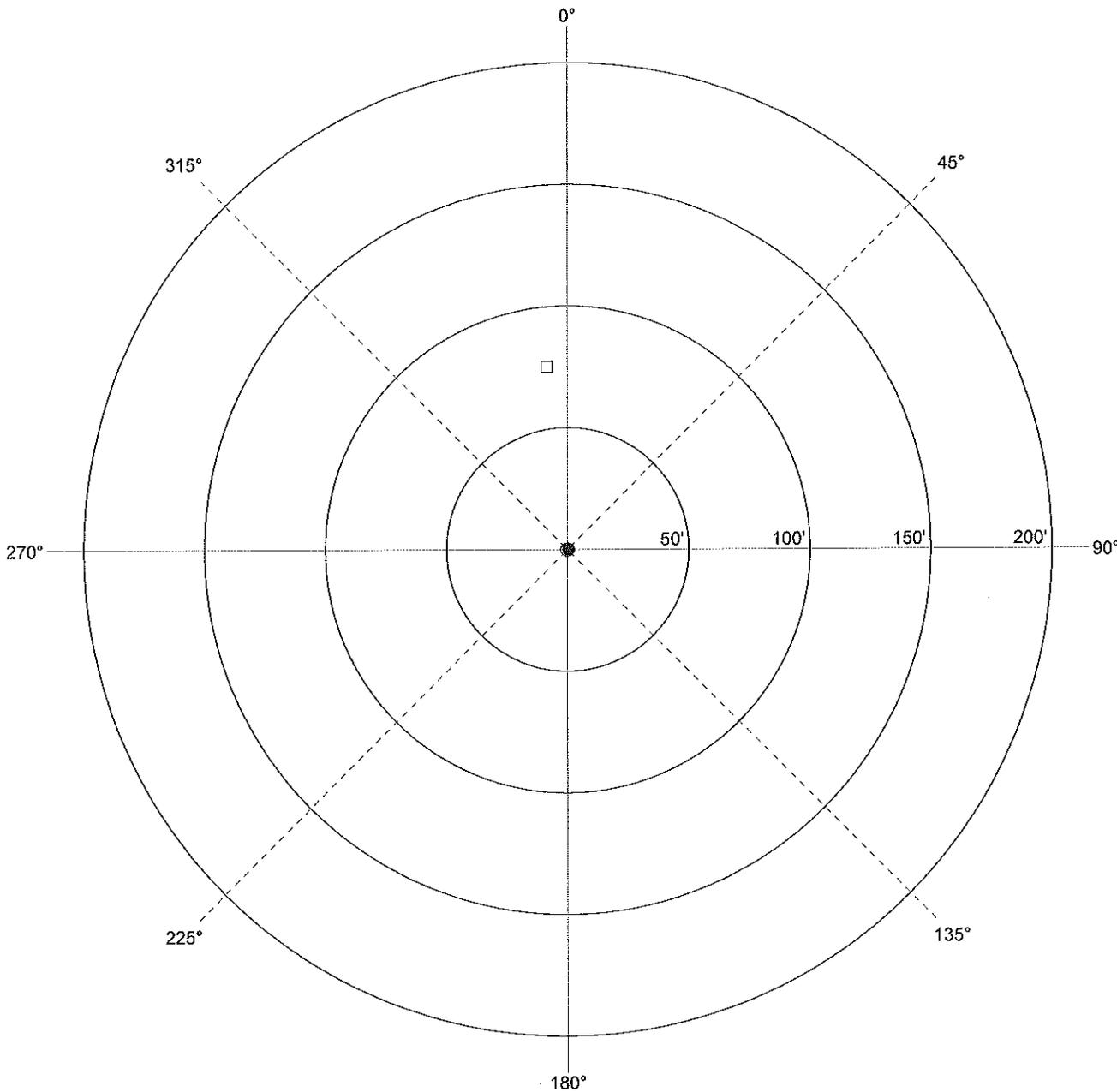
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
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		
*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		

PWS ID / FACILITY ID 1600002 S04

UNIQUE WELL NO. 191554

SETBACK DISTANCES All potential contaminant sources must be noted on the 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
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Is the system monitoring existing nonconforming sources of contamination?	Y	N	N/A
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Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR	Kluthe, Beth	DATE	05/07/2009
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PWS ID / FACILITY ID	1600002 S04	UNIQUE WELL NO.	191554
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RECOMMENDED WELLHEAD PROTECTION MEASURES	WELLHEAD PROTECTION MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Continue to monitor and maintain TW #267670 using past practices.		

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	1600002	COMMUNITY
NAME	Crookston	
ADDRESS	Crookston Water Superintendent, c/o Mr. Pat Kelly, City Hall, 124 North Broadway, Crookston, MN 567161731	

FACILITY (WELL) INFORMATION

NAME	#5	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S05	
UNIQUE WELL NO.	685465	
COUNTY	Polk	

PWS ID / FACILITY ID	1600002 S05	UNIQUE WELL NO.	685465
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well*	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Noncomm-unity				

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* (Class V well - illegal)*	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)*	50/300/150	50/300/150	100/600/300	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)*	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)*	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Community	Distances Noncomm-unity	Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
*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		
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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

*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	23	
UUW	Unused, unsealed well or boring	50	50		N		

General

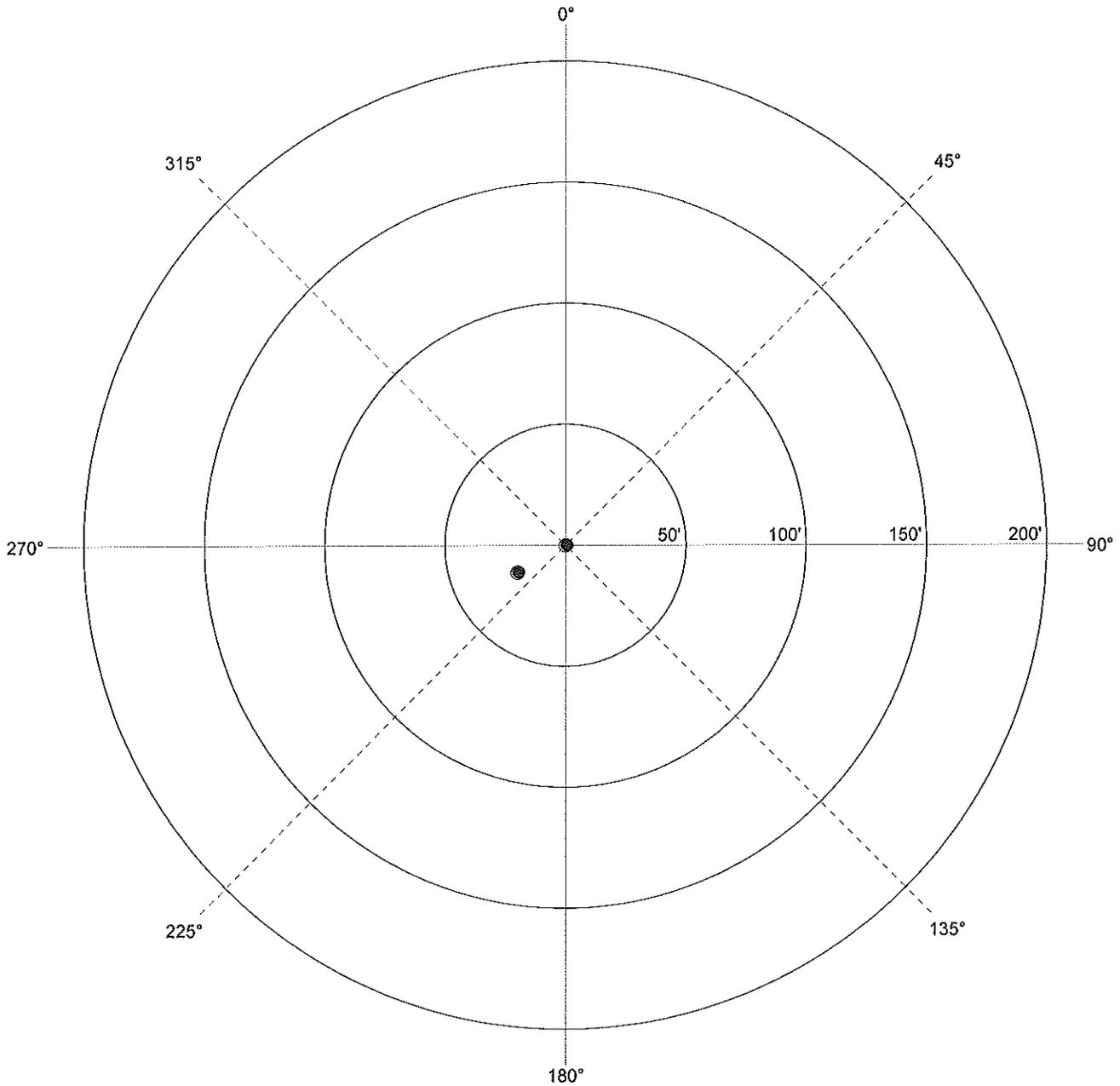
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
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		
*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		

PWS ID / FACILITY ID 1600002 S05

UNIQUE WELL NO. 685465

SETBACK DISTANCES All potential contaminant sources must be noted on the 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 Kluthe, Beth DATE 05/07/2009

PWS ID / FACILITY ID	1600002 S05	UNIQUE WELL NO.	685465
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RECOMMENDED WELLHEAD PROTECTION MEASURES	WELLHEAD PROTECTION MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Continue to monitor and maintain TW #685472 using past practices.		

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	1600002	COMMUNITY
NAME	Crookston	
ADDRESS	Crookston Water Superintendent, c/o Mr. Pat Kelly, City Hall, 124 North Broadway, Crookston, MN 567161731	

FACILITY (WELL) INFORMATION

NAME	#6	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S06	
UNIQUE WELL NO.	685466	
COUNTY	Polk	

PWS ID / FACILITY ID	1600002 S06	UNIQUE WELL NO.	685466
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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	Noncomm-unity				

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 ²)	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 [□]	50/300/150 [□]	100/600/300 [□]	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		
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		

PWS ID / FACILITY ID	1600002 S06	UNIQUE WELL NO.	685466
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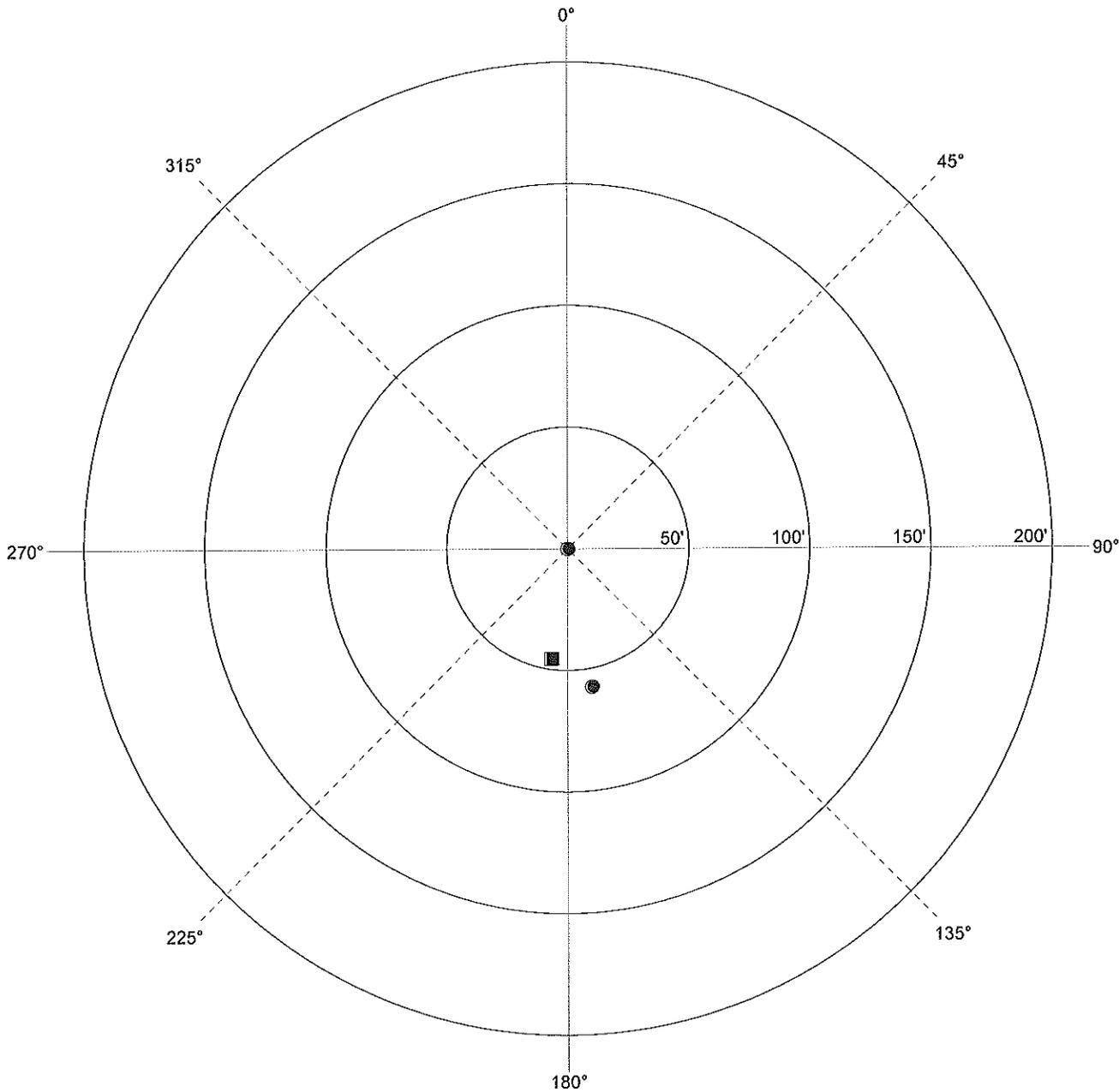
PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Noncomm-unity				
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	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							
*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	46	
WEL	Operating well	record dist.	record dist.		Y	58	
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		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

PWS ID / FACILITY ID 1600002 S06

UNIQUE WELL NO. 685466

SETBACK DISTANCES All potential contaminant sources must be noted on the 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
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Is the system monitoring existing nonconforming sources of contamination?	Y	N	N/A
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Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR Kluthe, Beth	DATE 05/07/2009
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PWS ID / FACILITY ID	1600002 S06	UNIQUE WELL NO.	685466
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RECOMMENDED WELLHEAD PROTECTION MEASURES	WELLHEAD PROTECTION MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Continue to maintain and monitor Well #620680.		
Continue to monitor and maintain Well #654760.		

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



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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1600002	COMMUNITY
NAME	Crookston	
ADDRESS	Crookston Water Superintendent, c/o Mr. Pat Kelly, City Hall, 124 North Broadway, Crookston, MN 567161731	

FACILITY (WELL) INFORMATION

NAME	#1	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S01	
UNIQUE WELL NO.	147243	
COUNTY	Red Lake	

PWS ID / FACILITY ID	1600002 S01	UNIQUE WELL NO.	147243
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Community	Distances Noncomm-unity	Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)

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 ²)	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	50/300/150	100/600/300	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		
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PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		

MDH 2007 Drinking Water Report for the City of Crookston

CONSUMER CONFIDENCE REPORT

PWSID: 1600002

City of Crookston 2007 Drinking Water Report

The City of Crookston is issuing the results of monitoring done on its drinking water for the period from January 1 to December 31, 2007. The purpose of this report is to advance consumers' understanding of drinking water and heighten awareness of the need to protect precious water resources.

Source of Water

The City of Crookston provides drinking water to its residents from a groundwater source: six wells ranging from 56 to 164 feet deep, that draw water from the Quaternary Buried Artesian and Quaternary Water Table aquifers.

The water provided to customers may meet drinking water standards, but the Minnesota Department of Health has also made a determination as to how vulnerable the source of water may be to future contamination incidents. If you wish to obtain the entire source water assessment regarding your drinking water, please call 651-201-4700 or 1-800-818-9318 (and press 5) during normal business hours. Also, you can view it on line at www.health.state.mn.us/divs/eh/water/swp/swa.

Call *218-281-5711* if you have questions about the City of Crookston drinking water or would like information about opportunities for public participation in decisions that may affect the quality of the water.

Results of Monitoring

No contaminants were detected at levels that violated federal drinking water standards. However, some contaminants were detected in trace amounts that were below legal limits. The table that follows shows the contaminants that were detected in trace amounts last year. (Some contaminants are sampled less frequently than once a year; as a result, not all contaminants were sampled for in 2007. If any of these contaminants were detected the last time they were sampled for, they are included in the table along with the date that the detection occurred.)

Key to abbreviations:

MCLG—Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MCL—Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MRDL—Maximum Residual Disinfectant Level.

CONSUMER CONFIDENCE REPORT

PWSID: 1600002

MRDLG—Maximum Residual Disinfectant Level Goal.

AL—Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirement which a water system must follow.

90th Percentile Level—This is the value obtained after disregarding 10 percent of the samples taken that had the highest levels. (For example, in a situation in which 10 samples were taken, the 90th percentile level is determined by disregarding the highest result, which represents 10 percent of the samples.) Note: In situations in which only 5 samples are taken, the average of the two with the highest levels is taken to determine the 90th percentile level.

pCi/l—PicoCuries per liter (a measure of radioactivity).

ppb—Parts per billion, which can also be expressed as micrograms per liter (µg/l).

ppm—Parts per million, which can also be expressed as milligrams per liter (mg/l).

N/A—Not Applicable (does not apply).

Contaminant (units)	MCLG	MCL	Level Found		Typical Source of Contaminant
			Range (2007)	Average /Result*	
Barium (ppm)	2	2	N/A	.17	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Fluoride (ppm)	4	4	1-1.2	1.11	State of Minnesota requires all municipal water systems to add fluoride to the drinking water to promote strong teeth; Erosion of natural deposits; Discharge from fertilizer and aluminum factories.
Haloacetic Acids (HAA5) (ppb) (09/12/2006)	0	60	N/A	8	By-product of drinking water disinfection.
Mercury (inorganic) (ppb)	2	2	N/A	.06	Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Runoff from cropland.
Nitrate (as Nitrogen) (ppm)	10	10	N/A	.07	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.

CONSUMER CONFIDENCE REPORT

PWSID: 1600002

Contaminant (units)	MCLG	MCL	Level Found		Typical Source of Contaminant
			Range (2007)	Average /Result*	
TTHM (Total trihalomethanes) (ppb) (09/12/2006)	0	80	N/A	2.3	By-product of drinking water disinfection.

Contaminant (units)	Level Found		Typical Source of Contaminant
	Range (2007)	Average/ Result*	
Radon (pCi/l) (10/27/2003)	N/A	518	Erosion of natural deposits.

*This is the value used to determine compliance with federal standards. It sometimes is the highest value detected and sometimes is an average of all the detected values. If it is an average, it may contain sampling results from the previous year.

Radon is a radioactive gas which is naturally occurring in some groundwater. It poses a lung cancer risk when gas is released from water into air (as occurs during showering, bathing, or washing dishes or clothes) and a stomach cancer risk when it is ingested. Because radon in indoor air poses a much greater health risk than radon in drinking water, an Alternative Maximum Contaminant Level (AMCL) of 4,000 picoCuries per liter may apply in states that have adopted an Indoor Air Program, which compels citizens, homeowners, schools, and communities to reduce the radon threat from indoor air. For states without such a program, the Maximum Contaminant Level (MCL) of 300 pCi/l may apply. Minnesota plans to adopt an Indoor Air Program once the Radon Rule is finalized.

Contaminant (units)	MRDLG	MRDL	****	*****	Typical Source of Contaminant
Chlorine (ppm)	4	4	.78-1.07	.95	Water additive used to control microbes.

****Highest and Lowest Monthly Average.

*****Highest Quarterly Average.

Contaminant (units)	MCLG	AL	90% Level	# sites over AL	Typical Source of Contaminant
Copper (ppm)	N/A	1.3	1.2	0 out of 20	Corrosion of household plumbing systems; Erosion of natural deposits.
Lead (ppb)	N/A	15	3	0 out of 20	Corrosion of household plumbing systems; Erosion of natural deposits.

CONSUMER CONFIDENCE REPORT

PWSID: 1600002

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. City of Crookston is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

Some contaminants do not have Maximum Contaminant Levels established for them. These unregulated contaminants are assessed using state standards known as health risk limits to determine if they pose a threat to human health. If unacceptable levels of an unregulated contaminant are found, the response is the same as if an MCL has been exceeded; the water system must inform its customers and take other corrective actions. In the table that follows are the unregulated contaminants that were detected:

Contaminant (units)	Level Found		Typical Source of Contaminant
	Range (2007)	Average/Result	
Sodium (ppm)	N/A	32	Erosion of natural deposits.
Sulfate (ppm)	N/A	48.5	Erosion of natural deposits.

Compliance with National Primary Drinking Water Regulations

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

CONSUMER CONFIDENCE REPORT

PWSID: 1600002

Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U. S. Environmental Protection Agency (EPA) prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium are available from the Safe Drinking Water Hotline at 1-800-426-4791.

MDH Well Records East DWSMA

620679

County Polk
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 10/18/2007
 Update Date 10/18/2007
 Received Date 10/16/2003

Minnesota Statutes Chapter 103I

Well Name THE NATURE CONSERVANCY Township Range Dir Section Subsections Elevation 1086 ft. 149 44 W 6 BDAAAB Elevation Method Calc from DEM (USGS 7.5 min or equiv.)	Well Depth Depth Completed Date Well Completed 45 ft. 45 ft. 07/08/2003 Drilling Method Auger (non-specified)									
Geological Material Color Hardness From To GRAVEL COARSE WITH SAND ORG RICHDK. BRN 0 2 GRAVEL COARSE WITH SAND CLASTS BROWN 2 4 MED SAND, VERY WELL SORTED MED RED/BRN 4 45	Drilling Fluid Well Hydrofractured? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No -- From Ft. to Ft.									
	Use Monitor well									
	Casing Type Plastic Joint Threaded Drive Shoe? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No No Above/Below ft.									
	<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Weight</th> <th style="text-align: left;">Hole Diameter</th> </tr> </thead> <tbody> <tr> <td>2 in. to 38.6 ft.</td> <td>0.72 lbs./ft.</td> <td>8.25 in. to 45 ft.</td> </tr> <tr> <td>2 in. to 43.5 ft.</td> <td>0.72 lbs./ft.</td> <td></td> </tr> </tbody> </table>	Casing Diameter	Weight	Hole Diameter	2 in. to 38.6 ft.	0.72 lbs./ft.	8.25 in. to 45 ft.	2 in. to 43.5 ft.	0.72 lbs./ft.	
	Casing Diameter	Weight	Hole Diameter							
	2 in. to 38.6 ft.	0.72 lbs./ft.	8.25 in. to 45 ft.							
	2 in. to 43.5 ft.	0.72 lbs./ft.								
	Open Hole from ft. to ft.									
	Screen YES Make JOHNSON Type stainless steel									
	<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Diameter</th> <th style="text-align: left;">Slot/Gauze</th> <th style="text-align: left;">Length</th> <th style="text-align: left;">Set Between</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>10</td> <td>4.3</td> <td>38.6 ft. and 42.9 ft.</td> </tr> </tbody> </table>	Diameter	Slot/Gauze	Length	Set Between	2	10	4.3	38.6 ft. and 42.9 ft.	
Diameter	Slot/Gauze	Length	Set Between							
2	10	4.3	38.6 ft. and 42.9 ft.							
Static Water Level 22.57 ft. from Land surface Date Measured 07/08/2003										
PUMPING LEVEL (below land surface) ft. after hrs. pumping g.p.m.										
Well Head Completion Pitless adapter manufacturer Model <input checked="" type="checkbox"/> Casing Protection Y <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)										
<p style="text-align: center;"><i>NO REMARKS</i></p> Located Minnesota Department of Health Method Digitization (Screen) - Map (1:24,000) Unique Number Verification Info/GPS from data source Date 08/09/2005 System UTM - Nad83, Zone15, Meters X: 249556 Y: 5294646	Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: Bentonite from 3 to 25 ft. 8 bags Grout Material: CONCRETE from to 3 ft. 2.5 bags									
First Bedrock Aquifer Last Strat Depth to Bedrock ft.	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No									
	Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number __ HP _ Volts Length of drop Pipe _ft. Capacity _g.p.m Type Material									
	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No									
	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No									
Well Contractor Certification U.S. Geol Survey M0113 LARSON, W. License Business Name Lic. Or Reg. No. Name of Driller	<table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">County Well Index Online Report</td> <td style="width:20%;">620679</td> <td style="width:30%; text-align: right;">Printed 8/21/2008 HE-01205-07</td> </tr> </table>	County Well Index Online Report	620679	Printed 8/21/2008 HE-01205-07						
County Well Index Online Report	620679	Printed 8/21/2008 HE-01205-07								

102614

County Polk
 Quad Red Lake Falls
 Quad ID 365A

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 08/19/2002
 Received Date

Minnesota Statutes Chapter 103I

Well Name CROOKSTON CATTLE CO Township Range Dir Section Subsections Elevation 1068 ft. 149 44 W 6 BBDBCC Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 67 ft. Depth Completed 59 ft. Date Well Completed 06/01/1976 Drilling Method Non-specified Rotary																																			
<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Geological Material</th> <th style="text-align: left;">Color</th> <th style="text-align: left;">Hardness</th> <th style="text-align: left;">From</th> <th style="text-align: left;">To</th> </tr> </thead> <tbody> <tr> <td>TOP SOIL</td> <td>BLACK</td> <td></td> <td>0</td> <td>0</td> </tr> <tr> <td>SAND & GRAVEL</td> <td>VARIED</td> <td></td> <td>0</td> <td>12</td> </tr> <tr> <td>SANDY CLAY</td> <td>BLUE</td> <td></td> <td>12</td> <td>14</td> </tr> <tr> <td>SAND COARSE</td> <td></td> <td></td> <td>14</td> <td>37</td> </tr> <tr> <td>SAND</td> <td></td> <td></td> <td>37</td> <td>59</td> </tr> <tr> <td>SANDY CLAY</td> <td>BLUE</td> <td></td> <td>59</td> <td>67</td> </tr> </tbody> </table>	Geological Material	Color	Hardness	From	To	TOP SOIL	BLACK		0	0	SAND & GRAVEL	VARIED		0	12	SANDY CLAY	BLUE		12	14	SAND COARSE			14	37	SAND			37	59	SANDY CLAY	BLUE		59	67	Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.
	Geological Material	Color	Hardness	From	To																															
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	Use Commercial	Casing Type Steel (black or low carbon) Joint Threaded Drive Shoe? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Above/Below 2 ft.																																		
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Diameter	Slot/Gauze	Length	Set Between																																	
4	10	6	52.5 ft. and 58.5 ft.																																	
Static Water Level 11 ft. from Land surface Date Measured 06/01/1976	PUMPING LEVEL (below land surface) 11.3 ft. after 0 hrs. pumping 70 g.p.m.																																			
Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Grouting Information Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																			
Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number __ HP _ Volts Length of drop Pipe _ft. Capacity _g.p.m Type Material																																			
Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No																																			
First Bedrock _____ Aquifer Quat. Water Table Aquifer Last Strat Clay & sand-gray Depth to Bedrock ft.	Well Contractor Certification Ltp Enterprises 91353 WIETECHOLT, D License Business Name Lic. Or Reg. No. Name of Driller																																			

County Well Index Online Report

102614

Printed 8/21/2008
 HE-01205-07

105665

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 07/20/2005
 Received Date

Minnesota Statutes Chapter 1031

Well Name CITY OF CROOKSTON Township Range Dir Section Subsections Elevation 1073 ft. 150 44 W 31 CDDDBC Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 206 ft. Depth Completed 50 ft. Date Well Completed 10/10/1976 Drilling Method Non-specified Rotary																																													
<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Geological Material</th> <th style="text-align: left;">Color</th> <th style="text-align: left;">Hardness</th> <th style="text-align: left;">From</th> <th style="text-align: left;">To</th> </tr> </thead> <tbody> <tr> <td>SILTY SAND</td> <td>LIGHT</td> <td>SOFT</td> <td>0</td> <td>9</td> </tr> <tr> <td>CLAY</td> <td>DK. GRY</td> <td>SFT-HRD</td> <td>9</td> <td>21</td> </tr> <tr> <td>SAND, GRAVEL MIX</td> <td>LIGHT</td> <td>HARD</td> <td>21</td> <td>69</td> </tr> <tr> <td>CLAY</td> <td>GRAY</td> <td>HARD</td> <td>69</td> <td>130</td> </tr> <tr> <td>FINE SAND</td> <td>GRAY</td> <td>SOFT</td> <td>130</td> <td>133</td> </tr> <tr> <td>CLAY</td> <td>GRAY</td> <td>SOFT</td> <td>133</td> <td>139</td> </tr> <tr> <td>FINE SAND</td> <td>GRAY</td> <td>SOFT</td> <td>139</td> <td>198</td> </tr> <tr> <td>STICKY CLAY</td> <td>GRAY</td> <td>HARD</td> <td>198</td> <td>206</td> </tr> </tbody> </table>	Geological Material	Color	Hardness	From	To	SILTY SAND	LIGHT	SOFT	0	9	CLAY	DK. GRY	SFT-HRD	9	21	SAND, GRAVEL MIX	LIGHT	HARD	21	69	CLAY	GRAY	HARD	69	130	FINE SAND	GRAY	SOFT	130	133	CLAY	GRAY	SOFT	133	139	FINE SAND	GRAY	SOFT	139	198	STICKY CLAY	GRAY	HARD	198	206	Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.
	Geological Material	Color	Hardness	From	To																																									
	SILTY SAND	LIGHT	SOFT	0	9																																									
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	FINE SAND	GRAY	SOFT	130	133																																									
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	STICKY CLAY	GRAY	HARD	198	206																																									
Use Test well	Casing Type Joint No Information Drive Shoe? <input type="checkbox"/> Yes <input type="checkbox"/> No Above/Below ft.																																													
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Screen YES	Make JOHNSON	Type																																												
Diameter	Slot/Gauze	Length	Set Between																																											
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Static Water Level ft. from Date Measured	PUMPING LEVEL (below land surface) ft. after hrs. pumping g.p.m.																																													
NO REMARKS Located Minnesota Geological Survey Method Digitization (Screen) - Map (1:24,000) Unique Number Verification N/A Date 07/20/2005 System UTM - Nad83, Zone15, Meters X: 249527 Y: 5295138	Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)																																													
Grouting Information Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																																													
Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number __ HP _ Volts Length of drop Pipe _ft. Capacity _g.p.m Type Material	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No																																													
First Bedrock Last Strat Clay-gray	Aquifer Depth to Bedrock ft.																																													
Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No	Well Contractor Certification Davidson R. Well Co. 57032 NELSON, O. License Business Name Lic. Or Reg. No. Name of Driller																																													
County Well Index Online Report	105665																																													
Printed 8/21/2008 HE-01205-07																																														

105666

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 07/20/2005
 Received Date

Minnesota Statutes Chapter 103I

Well Name CITY OF CROOKSTON Township Range Dir Section Subsections Elevation 1067 ft. 150 44 W 31 CCBCC Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 205 ft. Depth Completed 147 ft. Date Well Completed 10/12/1976 Drilling Method Non-specified Rotary																																								
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	Geological Material	Color	Hardness	From	To																																				
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	Use Test well	Casing Type Joint No Information Drive Shoe? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No No Above/Below 4 ft.																																							
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NO REMARKS Located Minnesota Geological Survey Method Digitization (Screen) - Map (1:24,000) Unique Number Verification N/A Date 07/20/2005 System UTM - Nad83, Zone15, Meters X: 248881 Y: 5295417	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																								
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105666	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No Well Contractor Certification Davidson R. Well Co. 57032 NELSON, O. License Business Name Lic. Or Reg. No. Name of Driller																																								
Printed 8/21/2008 HE-01205-07																																									

125721

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 07/14/2005
 Received Date

Minnesota Statutes Chapter 103I

Well Name CROOKSTON CATTLE CO Township Range Dir Section Subsections Elevation 1066 ft. 150 44 W 31 CCDDBD Elevation Method Calc from DEM (USGS 7.5 min or equiv.)	Well Depth 158 ft. Depth Completed 56 ft. Date Well Completed 04/14/1976 Drilling Method Non-specified Rotary																																								
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Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Grouting Information Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No																																								
REMARKS TWO WELLS ON THIS LOG Located United States Geological Survey Method Digitization (Screen) - Map (1:24,000) Unique Number Verification Information from owner Date 07/14/2005 System UTM - Nad83, Zone15, Meters X: 249155 Y: 5295163	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No																																								
First Bedrock Aquifer Quat. Buried Artes. Aquifer Last Strat Pebbly sand/silt/clay Depth to Bedrock ft.	Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number HP Volts Length of drop Pipe _ft. Capacity _g.p.m. Type Material																																								
County Well Index Online Report	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No Well Contractor Certification Davidson R. Well Co. 57032 NELSON, O. License Business Name Lic. Or Reg. No. Name of Driller																																								

125721

Printed 8/21/2008
 HE-01205-07

147225

County Red Lake
 Quad
 Quad ID 365

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 02/04/2004
 Received Date

Minnesota Statutes Chapter 103I

<p>Well Name CROOKSTON CATTLE CO. Township Range Dir Section Subsections Elevation 1070 ft. 150 44 W 31 DDADBC Elevation Method 7.5 minute topographic map (+/- 5 feet)</p> <p>Well Address CROOKSTON MN</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Geological Material</th> <th>Color</th> <th>Hardness</th> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr><td>TOP SOIL</td><td>BLACK</td><td></td><td>0</td><td>2</td></tr> <tr><td>SAND</td><td>BROWN</td><td></td><td>2</td><td>12</td></tr> <tr><td>SANDY CLAY</td><td>BLUE</td><td></td><td>12</td><td>65</td></tr> <tr><td>SAND DRILLED POOR</td><td>VARIED</td><td></td><td>65</td><td>72</td></tr> <tr><td>SAND WITH CLAY LENSES</td><td>VARIED</td><td></td><td>72</td><td>76</td></tr> <tr><td>SANDY CLAY</td><td>BLUE</td><td></td><td>76</td><td>80</td></tr> <tr><td>SANDY CLAY</td><td>BLUE</td><td></td><td>80</td><td>180</td></tr> <tr><td>ROCK</td><td>WHITE</td><td></td><td>180</td><td>181</td></tr> <tr><td>SAND COARSE</td><td></td><td></td><td>181</td><td>183</td></tr> <tr><td>SANDY CLAY</td><td>BLUE</td><td></td><td>183</td><td>190</td></tr> <tr><td>FINE SAND DRILLED POOR</td><td>GRAY</td><td></td><td>190</td><td>203</td></tr> <tr><td>SANDY CLAY WITH LENSES</td><td></td><td></td><td>203</td><td>205</td></tr> <tr><td>SANDY CLAY</td><td>BLUE</td><td></td><td>205</td><td>217</td></tr> </tbody> </table>	Geological Material	Color	Hardness	From	To	TOP SOIL	BLACK		0	2	SAND	BROWN		2	12	SANDY CLAY	BLUE		12	65	SAND DRILLED POOR	VARIED		65	72	SAND WITH CLAY LENSES	VARIED		72	76	SANDY CLAY	BLUE		76	80	SANDY CLAY	BLUE		80	180	ROCK	WHITE		180	181	SAND COARSE			181	183	SANDY CLAY	BLUE		183	190	FINE SAND DRILLED POOR	GRAY		190	203	SANDY CLAY WITH LENSES			203	205	SANDY CLAY	BLUE		205	217	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>Well Depth 217 ft.</td> <td>Depth Completed 204 ft.</td> <td>Date Well Completed 11/09/1978</td> </tr> <tr> <td colspan="3">Drilling Method Non-specified Rotary</td> </tr> <tr> <td>Drilling Fluid --</td> <td colspan="2">Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.</td> </tr> <tr> <td colspan="3">Use Commercial</td> </tr> <tr> <td colspan="3">Casing Type Steel (black or low carbon) Joint Threaded Drive Shoe? <input type="checkbox"/></td> </tr> <tr> <td colspan="3">Yes <input checked="" type="checkbox"/> No Above/Below 2 ft.</td> </tr> <tr> <td>Casing Diameter 4 in. to 191 ft.</td> <td>Weight 11 lbs./ft.</td> <td>Hole Diameter 6.25 in. to 204 ft.</td> </tr> <tr> <td colspan="3">Open Hole from ft. to ft.</td> </tr> <tr> <td colspan="3">Screen YES Make JOHNSON Type stainless steel</td> </tr> <tr> <td>Diameter 2</td> <td>Slot/Gauze 12</td> <td>Length 15 Set Between 189 ft. and 204 ft.</td> </tr> <tr> <td colspan="3">Static Water Level 15 ft. from Land surface Date Measured 11/09/1978</td> </tr> <tr> <td colspan="3">PUMPING LEVEL (below land surface) 100 ft. after 4 hrs. pumping 30 g.p.m.</td> </tr> <tr> <td colspan="3">Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)</td> </tr> <tr> <td colspan="3">Grouting Information Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="3">Nearest Known Source of Contamination _feet _direction _type</td> </tr> <tr> <td colspan="3">Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</td> </tr> <tr> <td colspan="3">Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number __ HP __ Volts Length of drop Pipe __ft. 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147237

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 07/14/2005
 Received Date

Minnesota Statutes Chapter 103I

Well Name CITY OF CROOKSTON Township Range Dir Section Subsections Elevation 1065 ft. 150 44 W 31 CBABAC Elevation Method Calc from DEM (USGS 7.5 min or equiv.)	Well Depth 200 ft. Depth Completed 200 ft. Date Well Completed 11/02/1978 Drilling Method --																																																																																										
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County Red Lake
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 Quad ID 365

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 02/04/2004
 Received Date

Minnesota Statutes Chapter 103I

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Well Contractor Certification Ltp Enterprises 91353 HEIRASS, R. License Business Name Lic. Or Reg. No. Name of Driller																																																																												
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147243

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 04/17/1988
 Update Date 10/18/2007
 Received Date

Minnesota Statutes Chapter 103I

Well Name CROOKSTON 1
 Township Range Dir Section Subsections Elevation 1069 ft.
 150 44 W 31 CCCAB Elevation Method 7.5 minute topographic map (+/- 5 feet)

Well Depth 177 ft. Depth Completed 164 ft. Date Well Completed 11/22/1978

Drilling Method Non-specified Rotary

Well Address
 CROOKSTON MN 56716

Geological Material

Geological Material	Color	Hardness	From	To
TOP SOIL SAND GRAVEL	BROWN	0	7	7
HARD SANDY CLAY ROCKY	BLUE	7	16	16
HARD SILTY SANDY CLAY	GRAY	16	24	24
SAND W/LAYERS CLAY	GRAY	24	29	29
SAND GRAVEL	VARIED	29	47	47
SAND GRAVEL MIXED W/CLAY	GRAY	47	52	52
HARD SANDY CLAY ROCKY	GRAY	52	63	63
HARD SANDY CLAY W/LENSES SAND	GRAY	63	72	72
HARD SANDY CLAY ROCKY	GRAY	72	87	87
SANDY CLAY W/ LENSES SAND	GRAY	87	99	99
SAND GRAVEL	VARIED	99	104	104
HARD SANDY CLAY ROCKY	GRAY	104	107	107
BOULDER	RED	107	108	108
HARD SANDY CLAY ROCKY	GRAY	108	137	137
SAND GRAVEL	VARIED	137	146	146
BOULDER	RED	146	147	147
GRAVEL ROCKS	VARIED	147	157	157
BOULDER	RED	157	158	158
GRAVEL ROCKS	VARIED	158	164	164
SANDY SILTY CLAY W/LENSES SAND	GRAY	164	177	177

Drilling Fluid -- Well Hydrofractured? Yes No
 From Ft. to Ft.

Use Community Supply PWS ID 1600002 Source S01

Casing Type Steel (black or low carbon) Joint Threaded Drive Shoe?
 Yes No Above/Below 2 ft.

Casing Diameter	Weight	Hole Diameter
12 in. to 140 ft.	49.56 lbs./ft.	17 in. to 164 ft.

Open Hole from ft. to ft.
 Screen YES Make JOHNSON Type stainless steel

Diameter	Slot/Gauze	Length	Set Between
12	100	26	138 ft. and 164 ft.

Static Water Level 12.5 ft. from Land surface Date Measured 11/16/1978

PUMPING LEVEL (below land surface)
 99.4 ft. after 120 hrs. pumping 760 g.p.m.

Well Head Completion
 Pitless adapter manufacturer Model
 Casing Protection 12 in. above grade
 At-grade (Environmental Wells and Borings ONLY)

NO REMARKS

Located Minnesota Geological Survey Method GPS SA Off (averaged)
 Unique Number Verification Information from owner Date N/A
 System UTM - Nad83, Zone15, Meters X: 248897 Y: 5295182

Grouting Information Well Grouted? Yes No
 Grout Material: Neat Cement from 0 to 60 ft.

Nearest Known Source of Contamination
 _feet _direction _type
 Well disinfected upon completion? Yes No

Pump Not Installed Date Installed
 Manufacturer's name Model number HP Volts
 Length of drop Pipe _ft. Capacity _g.p.m. Type Material

First Bedrock
 Last Strat Pebble free clay/sand/silt-
 Aquifer Quat. Buried Artes. Aquifer
 Depth to Bedrock ft.

Abandoned Wells Does property have any not in use and not sealed well(s)?
 Yes No

Variance Was a variance granted from the MDH for this well? Yes No

Well Contractor Certification
 Ltp Enterprises 91353 SCHROEDER, F.
 License Business Name Lic. Or Reg. No. Name of Driller

County Well Index Online Report

147243 Printed 8/21/2008
 HE-01205-07

171463

County Polk
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 09/08/1990
 Update Date 07/14/2005
 Received Date

Minnesota Statutes Chapter 103I

Well Name CROOKSTON CATTLE CO Township Range Dir Section Subsections Elevation 1085 ft. 149 44 W 6 DBBCBB Elevation Method Calc from DEM (USGS 7.5 min or equiv.)	Well Depth 65 ft. Depth Completed 65 ft. Date Well Completed 08/18/1982 Drilling Method Non-specified Rotary																														
<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Geological Material</th> <th style="text-align: left;">Color</th> <th style="text-align: left;">Hardness</th> <th style="text-align: left;">From</th> <th style="text-align: left;">To</th> </tr> </thead> <tbody> <tr> <td>TOP SOIL</td> <td>BLACK</td> <td>SOFT</td> <td>0</td> <td>1</td> </tr> <tr> <td>SAND</td> <td>RED</td> <td></td> <td>1</td> <td>8</td> </tr> <tr> <td>SAND</td> <td>RED</td> <td>MEDIUM</td> <td>8</td> <td>20</td> </tr> <tr> <td>SAND</td> <td>BLUE</td> <td></td> <td>20</td> <td>50</td> </tr> <tr> <td>SAND</td> <td>BLUE</td> <td>MEDIUM</td> <td>51</td> <td>65</td> </tr> </tbody> </table>	Geological Material	Color	Hardness	From	To	TOP SOIL	BLACK	SOFT	0	1	SAND	RED		1	8	SAND	RED	MEDIUM	8	20	SAND	BLUE		20	50	SAND	BLUE	MEDIUM	51	65	Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.
	Geological Material	Color	Hardness	From	To																										
	TOP SOIL	BLACK	SOFT	0	1																										
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	Use Domestic	Casing Type Plastic Joint No Information Drive Shoe? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No No Above/Below 2 ft.																													
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Diameter	Slot/Gauze	Length	Set Between																												
4	18	4	61 ft. and 65 ft.																												
Static Water Level 12 ft. from Land surface Date Measured 08/18/1982	PUMPING LEVEL (below land surface) 48 ft. after 2 hrs. pumping 100 g.p.m.																														
Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Grouting Information Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																														
Located City or Township (Minor Civil Division) Method Digitization (Screen) - Map (1:24,000) Unique Number Verification Info/GPS from data source Date 07/14/2005 System UTM - Nad83, Zone15, Meters X: 249579 Y: 5294145	Nearest Known Source of Contamination 75 feet E direction Septic tank/drain field type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																														
First Bedrock Aquifer Last Strat Depth to Bedrock ft.	Pump <input type="checkbox"/> Not Installed Date Installed 08/18/1982 Manufacturer's name AERMOTOR Model number HP 0.5 Volts 230 Length of drop Pipe 40 ft. Capacity 12 g.p.m Type Submersible Material																														
Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No																														
County Well Index Online Report	Well Contractor Certification License Business Name Lic. Or Reg. No. Name of Driller SAGA																														

171463

Printed 8/21/2008
 HE-01205-07

171464

County Polk
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 09/08/1990
 Update Date 07/14/2005
 Received Date

Minnesota Statutes Chapter 1031

Well Name CROOKSTON CATTLE CO Township Range Dir Section Subsections Elevation 1067 ft. 150 45 W 36 DDACDC Elevation Method Calc from DEM (USGS 7.5 min or equiv.)	Well Depth 48 ft. Depth Completed 48 ft. Date Well Completed 05/14/1982 Drilling Method Non-specified Rotary																														
Well Address MENTOR MN <table border="0" style="width:100%;"> <tr> <td style="width:25%;">Geological Material</td> <td style="width:15%;">Color</td> <td style="width:15%;">Hardness</td> <td style="width:10%;">From</td> <td style="width:10%;">To</td> </tr> <tr> <td>CLAY</td> <td>YELLOW</td> <td>HARD</td> <td>0</td> <td>5</td> </tr> <tr> <td>ROCKS</td> <td></td> <td>HARD</td> <td>5</td> <td>7</td> </tr> <tr> <td>CLAY</td> <td>YELLOW</td> <td>HARD</td> <td>7</td> <td>21</td> </tr> <tr> <td>CLAY</td> <td>BLUE</td> <td>MEDIUM</td> <td>21</td> <td>40</td> </tr> <tr> <td>SAND</td> <td></td> <td>MEDIUM</td> <td>40</td> <td>48</td> </tr> </table>	Geological Material	Color	Hardness	From	To	CLAY	YELLOW	HARD	0	5	ROCKS		HARD	5	7	CLAY	YELLOW	HARD	7	21	CLAY	BLUE	MEDIUM	21	40	SAND		MEDIUM	40	48	Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.
	Geological Material	Color	Hardness	From	To																										
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Diameter	Slot/Gauze	Length	Set Between																												
4	18	4	44 ft. and 48 ft.																												
Static Water Level 8 ft. from Land surface Date Measured 05/14/1982	PUMPING LEVEL (below land surface) 38 ft. after 2 hrs. pumping 30 g.p.m.																														
Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Grouting Information Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																														
NO REMARKS Located Minnesota Department of Health Method Digitization (Screen) - Map (1:24,000) Unique Number Verification Info/GPS from data source Date 07/14/2005 System UTM - Nad83, Zone15, Meters X: 248698 Y: 5295337	Nearest Known Source of Contamination 50 feet direction Septic tank/drain field type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																														
Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number HP Volts Length of drop Pipe ft. Capacity g.p.m. Type Material	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No																														
First Bedrock Last Strat Aquifer Depth to Bedrock ft.	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No Well Contractor Certification Saga Well Co. 60347 SAGA License Business Name Lic. Or Reg. No. Name of Driller																														
County Well Index Online Report	171464 Printed 8/21/2008 HE-01205-07																														

191552

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 07/14/2000
 Update Date 10/18/2007
 Received Date

Minnesota Statutes Chapter 103I

<p>Well Name CROOKSTON 2 Township Range Dir Section Subsections Elevation 1068 ft. 150 44 W 31 CCCCAD Elevation Method 7.5 minute topographic map (+/- 5 feet)</p>	<p>Well Depth 63 ft. Depth Completed 56 ft. Date Well Completed 08/06/1982 Drilling Method Non-specified Rotary</p>
<p>Well Address CROOKSTON MN 56716</p>	<p>Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.</p> <p>Use Community Supply PWS ID 1600002 Source S02</p> <p>Casing Type Steel (black or low carbon) Joint Welded Drive Shoe? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Above/Below 2 ft.</p> <p>Casing Diameter Weight Hole Diameter 12 in. to 41 ft. 49.56 lbs./ft. 17.5 in. to 56 ft.</p> <p>Open Hole from ft. to ft.</p> <p>Screen YES Make JOHNSON Type stainless steel</p> <p>Diameter Slot/Gauze Length Set Between 12 45 15 41 ft. and 56 ft.</p> <p>Static Water Level 3.2 ft. from Land surface Date Measured 08/02/1982</p> <p>PUMPING LEVEL (below land surface) 41.1 ft. after 72 hrs. pumping 575 g.p.m.</p> <p>Well Head Completion Pitless adapter manufacturer MONITOR Model 8PS1214WBW <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)</p>
<p>Geological Material Color Hardness From To SAND AND GRAVEL BROWN 0 8 HARD SANDY CLAY BROWN 8 14 SAND AND GRAVEL 25 SLOT & BIGGER) VARIED 14 31 SAND (DRILLED POOR) VARIED 31 38 SAND AND GRAVEL W/ROCK VARIED 38 43 SAND AND ROCK (DRILLED POOR) VARIED 43 48 SAND AND GRAVEL W/ROCK VARIED 48 56 SANDY CLAY BLUE 56 63</p>	<p>REMARKS 18 IN. SURFACE CASING GROUTED IN TO 41 FT. 12 IN. GROUTED TO WITHIN 10 FT. OF SURFACE.</p> <p>Located Minnesota Department of Health Method GPS SA Off (averaged) Unique Number Verification N/A Date 07/15/2005 System UTM - Nad83, Zone15, Meters X: 248912 Y: 5295171</p>
<p>First Bedrock Last Strat Clay & sand-gray</p>	<p>Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: Neat Cement from 10 to 41 ft.</p> <p>Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Pump <input type="checkbox"/> Not Installed Date Installed 10/22/1982 Manufacturer's name BERKLEY Model number 783M-2 HP 15 Volts 460 Length of drop Pipe 35 ft. Capacity 150 g.p.m. Type Submersible Material Steel (black or low carbon)</p> <p>Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Well Contractor Certification Ltp Enterprises 91353 HEJMANEK, D. License Business Name Lic. Or Reg. No. Name of Driller</p>
<p>County Well Index Online Report</p>	<p>191552</p>
<p>Printed 8/21/2008 HE-01205-07</p>	

191553

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 07/14/2000
 Update Date 10/18/2007
 Received Date

Minnesota Statutes Chapter 103I

<p>Well Name CROOKSTON 3 Township Range Dir Section Subsections Elevation 1070 ft. 150 44 W 31 CDDDBC Elevation Method 7.5 minute topographic map (+/- 5 feet)</p>	<p>Well Depth 75 ft. Depth Completed 70 ft. Date Well Completed 05/16/1982 Drilling Method Non-specified Rotary</p>																																																																		
<p>Well Address CROOKSTON MN 56716</p>	<p>Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.</p>																																																																		
<p>Geological Material</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Geological Material</th> <th style="text-align: left;">Color</th> <th style="text-align: left;">Hardness</th> <th style="text-align: left;">From To</th> </tr> </thead> <tbody> <tr><td>TOP SOIL</td><td>BLACK</td><td>0</td><td>1</td></tr> <tr><td>SAND AND LIGHT GRAVEL</td><td>BROWN</td><td>1</td><td>9</td></tr> <tr><td>SANDY CLAY</td><td>BLUE</td><td>9</td><td>16</td></tr> <tr><td>SAND</td><td>VARIED</td><td>16</td><td>33</td></tr> <tr><td>SAND/LIGHT GRAVEL</td><td>VARIED</td><td>33</td><td>43</td></tr> <tr><td>SAND 18 SLOT</td><td>VARIED</td><td>43</td><td>48</td></tr> <tr><td>SAND 12 SLOT</td><td>VARIED</td><td>48</td><td>53</td></tr> <tr><td>SAND 12 SLOT</td><td>VARIED</td><td>53</td><td>58</td></tr> <tr><td>SAND AND GRAVEL 35 SLOT TOOK WATER</td><td>VARIED</td><td>58</td><td>63</td></tr> <tr><td>GRAVEL TOOK WATER 35-50 SLOT CLAY</td><td>VARIED</td><td>63</td><td>70</td></tr> <tr><td></td><td>BLUE</td><td>70</td><td>75</td></tr> </tbody> </table>	Geological Material	Color	Hardness	From To	TOP SOIL	BLACK	0	1	SAND AND LIGHT GRAVEL	BROWN	1	9	SANDY CLAY	BLUE	9	16	SAND	VARIED	16	33	SAND/LIGHT GRAVEL	VARIED	33	43	SAND 18 SLOT	VARIED	43	48	SAND 12 SLOT	VARIED	48	53	SAND 12 SLOT	VARIED	53	58	SAND AND GRAVEL 35 SLOT TOOK WATER	VARIED	58	63	GRAVEL TOOK WATER 35-50 SLOT CLAY	VARIED	63	70		BLUE	70	75	<p>Use Community Supply PWS ID 1600002 Source S03 Casing Type Steel (black or low carbon) Joint Welded Drive Shoe? <input type="checkbox"/> Yes <input type="checkbox"/> No Above/Below 2 ft.</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Weight</th> <th style="text-align: left;">Hole Diameter</th> </tr> </thead> <tbody> <tr> <td>12 in. to 50 ft.</td> <td>49.56 lbs./ft.</td> <td>17.5 in. to 70 ft.</td> </tr> </tbody> </table> <p>Open Hole from ft. to ft. Screen YES Make JOHNSON Type stainless steel</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Diameter</th> <th style="text-align: left;">Slot/Gauze</th> <th style="text-align: left;">Length</th> <th style="text-align: left;">Set Between</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>40</td> <td>10</td> <td>50 ft. and 60 ft.</td> </tr> <tr> <td>12</td> <td>50</td> <td>10</td> <td>60 ft. and 70 ft.</td> </tr> </tbody> </table> <p>Static Water Level 3.9 ft. from Land surface Date Measured 05/12/1982 PUMPING LEVEL (below land surface) 45.1 ft. after 72 hrs. pumping 700 g.p.m.</p>	Casing Diameter	Weight	Hole Diameter	12 in. to 50 ft.	49.56 lbs./ft.	17.5 in. to 70 ft.	Diameter	Slot/Gauze	Length	Set Between	12	40	10	50 ft. and 60 ft.	12	50	10	60 ft. and 70 ft.
Geological Material	Color	Hardness	From To																																																																
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<p>REMARKS 18 IN. SURFACE CASING GROUTED IN TO 50 FT. 12 IN. CASING GROUTED TO WITH IN 10 FT. OF SURFACE.</p> <p>Located Minnesota Department of Health Method GPS Differentially Corrected Unique Number Verification N/A Date N/A System UTM - Nad83, Zone15, Meters X: 249522 Y: 5295142</p>	<p>Well Head Completion Pitless adapter manufacturer MONTOR Model 8PS1214WBW <input type="checkbox"/> Casing Protection <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)</p> <p>Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: Neat Cement from 10 to 50 ft.</p>																																																																		
<p>First Bedrock Last Strat Clay-gray</p>	<p>Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No Pump <input type="checkbox"/> Not Installed Date Installed 10/21/1982 Manufacturer's name BERKELEY Model number 8S5M-2 HP 25 Volts 460 Length of drop Pipe 43 ft. Capacity 800 g.p.m. Type Submersible Material Steel (black or low carbon)</p> <p>Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Well Contractor Certification Ltp Enterprises 91353 HEJMANEK, D. License Business Name Lic. Or Reg. No. Name of Driller</p>																																																																		
<p>County Well Index Online Report</p>	<p>191553</p>																																																																		
<p>Printed 8/21/2008 HE-01205-07</p>																																																																			

191554

County Red Lake
 Quad Marcoux Corners
 Quad ID 365D

WELL AND BORING RECORD

Entry Date 07/14/2000
 Update Date 10/18/2007
 Received Date

Minnesota Statutes Chapter 103I

Well Name CROOKSTON 4
 Township Range Dir Section Subsections Elevation 1067 ft.
 150 44 W 31 CAADBB Elevation Method 7.5 minute topographic map (+/- 5 feet)

Well Depth 166 ft. Depth Completed 156 ft. Date Well Completed 08/05/1982

Drilling Method Non-specified Rotary

Well Address
 CROOKSTON MN 56716

Geological Material

Geological Material	Color	Hardness	From	To
SAND AND GRAVEL	BROWN	0	0	10
SAND FINE/SMALL LENSES OF CLAY	BROWN	10	10	34
FINE SAND	GRAY	34	34	55
SANDY CLAY/ROCK	BLUE	55	55	126
SAND AND LIGHT GRAVEL	VARIED	126	126	131
DIRTY SAND	BLUE	131	131	133
SAND AND GRAVEL 35 SLOT	VARIED	133	133	138
GRAVEL 40 SLOT	VARIED	138	138	143
LENSES OF GRAVEL AND CLAY	VARIED	143	143	148
GRAVEL	VARIED	148	148	156
FINE SAND AND CLAY	BLUE	156	156	166

Drilling Fluid -- Well Hydrofractured? Yes No
 From Ft. to Ft.

Use Community Supply PWS ID 1600002 Source S04

Casing Type Steel (black or low carbon) Joint Welded Drive Shoe?
 Yes No Above/Below 2 ft.

Casing Diameter	Weight	Hole Diameter
12 in. to 127 ft.	49.56 lbs./ft.	17.5 in. to 156 ft.

Open Hole from ft. to ft.

Screen YES Make JOHNSON Type stainless steel

Diameter	Slot/Gauze	Length	Set Between
12	70	29	127 ft. and 156 ft.

Static Water Level 12.7 ft. from Land surface Date Measured 08/01/1982

PUMPING LEVEL (below land surface) 122.8 ft. after 72 hrs. pumping 350 g.p.m.

Well Head Completion
 Pitless adapter manufacturer MONITOR Model 8PS1214WBW
 Casing Protection 12 in. above grade
 At-grade (Environmental Wells and Borings ONLY)

REMARKS
 18 IN. SURFACE CASING GROUTED IN TO 126.5 FT.
 12 IN. CASING GROUTED TO WITHIN 10 FT. OF SURFACE.

Located Minnesota Department of Health Method GPS Differentially Corrected
 Unique Number Verification N/A Date N/A
 System UTM - Nad83, Zone15, Meters X: 249543 Y: 5295755

Grouting Information Well Grouted? Yes No
 Grout Material: Neat Cement from 10 to 127 ft.

Nearest Known Source of Contamination
 _feet _direction _type
 Well disinfected upon completion? Yes No

Pump Not Installed Date Installed 10/21/1982
 Manufacturer's name BERKELEY Model number 7S3L-3 HP 20 Volts 460
 Length of drop Pipe 19 ft. Capacity 350 g.p.m.
 Type Submersible Material Steel (black or low carbon)

First Bedrock
 Last Strat Clay & sand-gray
 Aquifer Quat. Buried Artes. Aquifer
 Depth to Bedrock ft.

Abandoned Wells Does property have any not in use and not sealed well(s)?
 Yes No

Variance Was a variance granted from the MDH for this well? Yes No

Well Contractor Certification
 Ltp Enterprises 91353 HEJTMANEK, D.
 License Business Name Lic. Or Reg. No. Name of Driller

County Well Index Online Report

191554 Printed 8/21/2008
 HE-01205-07

685472

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 10/18/2007
 Update Date 09/12/2003
 Received Date 09/12/2003

Minnesota Statutes Chapter 1031

Well Name THE NATURE CONSERVANCY Township Range Dir Section Subsections Elevation 1151 ft. 149 43 W 18 DCDBAC Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 120 ft. Depth Completed 120 ft. Date Well Completed 06/08/2003 Drilling Method Non-specified Rotary																																			
Well Address 1313 5TH ST SE MINNEAPOLIS MN 55414 <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Geological Material</th> <th>Color</th> <th>Hardness</th> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td>TOP SOIL</td> <td></td> <td></td> <td>0</td> <td>1</td> </tr> <tr> <td>SAND & GRAVEL</td> <td></td> <td></td> <td>1</td> <td>12</td> </tr> <tr> <td>CLAY</td> <td></td> <td></td> <td>12</td> <td>24</td> </tr> <tr> <td>GRAVEL</td> <td></td> <td></td> <td>24</td> <td>26</td> </tr> <tr> <td>CLAY & ROCK</td> <td></td> <td></td> <td>26</td> <td>79</td> </tr> <tr> <td>SAND</td> <td></td> <td></td> <td>79</td> <td>120</td> </tr> </tbody> </table>	Geological Material	Color	Hardness	From	To	TOP SOIL			0	1	SAND & GRAVEL			1	12	CLAY			12	24	GRAVEL			24	26	CLAY & ROCK			26	79	SAND			79	120	Drilling Fluid Water Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.
	Geological Material	Color	Hardness	From	To																															
	TOP SOIL			0	1																															
	SAND & GRAVEL			1	12																															
	CLAY			12	24																															
	GRAVEL			24	26																															
	CLAY & ROCK			26	79																															
	SAND			79	120																															
	Use Observation well	Casing Type Plastic Joint No Information Drive Shoe? <input type="checkbox"/> Yes <input type="checkbox"/> No No Above/Below ft.																																		
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Casing Diameter</th> <th>Weight</th> <th>Hole Diameter</th> </tr> </thead> <tbody> <tr> <td>4 in. to 110 ft.</td> <td>lbs./ft.</td> <td></td> </tr> </tbody> </table>	Casing Diameter	Weight	Hole Diameter	4 in. to 110 ft.	lbs./ft.		Open Hole from ft. to ft.																												
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Well Head Completion Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: Neat Cement from 0 to 100 ft. 8 bags																																			
NO REMARKS Located Minnesota Department of Health Method GPS SA Off (averaged) Unique Number Verification N/A Date N/A System UTM - Nad83, Zone15, Meters X: 259304 Y: 5289893	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																																			
First Bedrock Last Strat Sand	Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number __ HP _ Volts Length of drop Pipe _ft. Capacity _g.p.m Type Material																																			
Aquifer Quat. Buried Artes. Aquifer Depth to Bedrock ft.	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																			
County Well Index Online Report	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Well Contractor Certification Lako Well Co. 91339 LAKO, P. License Business Name Lic. Or Reg. No. Name of Driller																																			

685472

Printed 8/21/2008
 HE-01205-07

MDH Well Records SE DWSMA

620680

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 10/18/2007
 Update Date 10/18/2007
 Received Date 10/16/2003

Minnesota Statutes Chapter 103I

Well Name THE NATURE CONSERVANCY Township Range Dir Section Subsections Elevation 1151 ft. 149 43 W 18 DDBACA Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth Depth Completed Date Well Completed 15 ft. 15 ft. 07/09/2003															
	Drilling Method Auger (non-specified)															
	Drilling Fluid -- Well Hydrofractured? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No From Ft. to Ft.															
	Use Monitor well															
	Casing Type Plastic Joint Threaded Drive Shoe? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Above/Below ft.															
	<table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Casing Diameter</th> <th style="text-align: left;">Weight</th> <th style="text-align: left;">Hole Diameter</th> </tr> <tr> <td>2 in. to 6.3 ft.</td> <td>72 lbs./ft.</td> <td>8.25 in. to 14.5 ft.</td> </tr> <tr> <td>2 in. to 15 ft.</td> <td>72 lbs./ft.</td> <td></td> </tr> </table>	Casing Diameter	Weight	Hole Diameter	2 in. to 6.3 ft.	72 lbs./ft.	8.25 in. to 14.5 ft.	2 in. to 15 ft.	72 lbs./ft.							
Casing Diameter	Weight	Hole Diameter														
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2 in. to 15 ft.	72 lbs./ft.															
	Open Hole from ft. to ft.															
	Screen YES Make JOHNSON Type plastic															
Geological Material SAND, ORGANIC, LOAMY SAND WITH GRAVEL WELL SORTED MED SAND VERY WELL SORTED COARSE DIAMICTON, CLAYEY DRY	<table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Color</th> <th style="text-align: left;">Hardness</th> <th style="text-align: left;">From To</th> </tr> <tr> <td>BLACK</td> <td>0</td> <td>2</td> </tr> <tr> <td>TAN</td> <td>2</td> <td>9</td> </tr> <tr> <td>TAN</td> <td>9</td> <td>11</td> </tr> <tr> <td>GRAY</td> <td>11</td> <td>15</td> </tr> </table>	Color	Hardness	From To	BLACK	0	2	TAN	2	9	TAN	9	11	GRAY	11	15
Color	Hardness	From To														
BLACK	0	2														
TAN	2	9														
TAN	9	11														
GRAY	11	15														
	Static Water Level 7.74 ft. from Land surface Date Measured 07/09/2003															
	PUMPING LEVEL (below land surface) ft. after hrs. pumping g.p.m.															
	Well Head Completion Pitless adapter manufacturer Model <input checked="" type="checkbox"/> Casing Protection Y <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)															
REMARKS USGS ID : 474310096121801. Located Minnesota Department of Health Method GPS SA Off (averaged) Unique Number Verification N/A Date N/A System UTM - Nad83, Zone15, Meters X: 259587 Y: 5290049	Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: CONCRETE from 0 to 3 ft. 3 bags															
	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No															
	Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number HP Volts Length of drop Pipe _ft. Capacity _g.p.m Type Material															
	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No															
	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No															
First Bedrock Last Strat Clay-gray Aquifer Quat. Water Table Aquifer Depth to Bedrock ft.	Well Contractor Certification U.S. Geol Survey M0113 LARSON, W. License Business Name Lic. Or Reg. No. Name of Driller															
County Well Index Online Report	620680 Printed 8/21/2008 HE-01205-07															

654760

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 02/21/2002
 Update Date 10/18/2007
 Received Date

Minnesota Statutes Chapter 103I

Well Name OB-4 Township Range Dir Section Subsections Elevation 1151 ft. 149 43 W 18 DDBACA Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 121 ft. Depth Completed 102 ft. Date Well Completed 09/12/2001 Drilling Method Non-specified Rotary																																								
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	Geological Material	Color	Hardness	From	To																																				
	TOP SOIL	BLACK		0	1																																				
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	Use Piezometer	Casing Type Plastic Joint Welded Drive Shoe? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No No Above/Below ft.																																							
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Static Water Level 3 ft. from Land surface Date Measured 09/12/2001	PUMPING LEVEL (below land surface) ft. after hrs. pumping g.p.m.																																								
Well Head Completion Pitless adapter manufacturer Model <input checked="" type="checkbox"/> Casing Protection Y <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																																								
NO REMARKS	Grout Material: Bentonite from 0 to 50 ft. 2 bags																																								
Located Minnesota Department of Health Method Digitization (Screen) - Map (1:24,000) Unique Number Verification Information Date N/A System UTM - Nad83, Zone15, Meters X: 259592 Y: 5290045	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																																								
First Bedrock Aquifer Quat. Buried Artes. Aquifer Last Strat Boulder or boulders Depth to Bedrock ft.	Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number HP Volts Length of drop Pipe _ft. Capacity _g.p.m. Type Material																																								
County Well Index Online Report	Abandoned Wells Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Well Contractor Certification L.t.p. Enterprises, Inc. 91686 RANUM, C. License Business Name Lic. Or Reg. No. Name of Driller																																								

654760

Printed 8/21/2008
 HE-01205-07

654761

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 02/21/2002
 Update Date 10/18/2007
 Received Date

Minnesota Statutes Chapter 103I

Well Name OB-5 Township Range Dir Section Subsections Elevation 1151 ft. 149 43 W 18 DDBCAB Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 122 ft. Depth Completed 102 ft. Date Well Completed 09/13/2001 Drilling Method Non-specified Rotary																																																	
Well Address MN <table border="0" style="width:100%;"> <tr> <td style="width:25%;">Geological Material</td> <td style="width:15%;">Color</td> <td style="width:15%;">Hardness</td> <td style="width:10%;">From</td> <td style="width:10%;">To</td> </tr> <tr> <td>TOP SOIL</td> <td>BLACK</td> <td></td> <td>0</td> <td>1</td> </tr> <tr> <td>SAND & ROCK</td> <td>BROWN</td> <td></td> <td>1</td> <td>8</td> </tr> <tr> <td>SANDY CLAY</td> <td>GRAY</td> <td></td> <td>8</td> <td>68</td> </tr> <tr> <td>SAND</td> <td>GRAY</td> <td></td> <td>68</td> <td>110</td> </tr> <tr> <td>SAND COARSE</td> <td>VARIED</td> <td></td> <td>110</td> <td>121</td> </tr> <tr> <td>ROCK</td> <td>VARIED</td> <td></td> <td>121</td> <td>122</td> </tr> </table>	Geological Material	Color	Hardness	From	To	TOP SOIL	BLACK		0	1	SAND & ROCK	BROWN		1	8	SANDY CLAY	GRAY		8	68	SAND	GRAY		68	110	SAND COARSE	VARIED		110	121	ROCK	VARIED		121	122	Drilling Fluid Bentonite Well Hydrofractured? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No From Ft. to Ft. Use Piezometer Casing Type Plastic Joint Welded Drive Shoe? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Above/Below ft. <table border="0" style="width:100%;"> <tr> <td style="width:25%;">Casing Diameter</td> <td style="width:25%;">Weight</td> <td style="width:25%;">Hole Diameter</td> </tr> <tr> <td>2 in. to 98 ft.</td> <td>lbs./ft.</td> <td>6.75 in. to 122 ft.</td> </tr> </table> Open Hole from ft. to ft. Screen YES Make Type plastic <table border="0" style="width:100%;"> <tr> <td style="width:25%;">Diameter</td> <td style="width:25%;">Slot/Gauze</td> <td style="width:25%;">Length</td> <td style="width:25%;">Set Between</td> </tr> <tr> <td>2</td> <td>12</td> <td>4</td> <td>98 ft. and 102 ft.</td> </tr> </table> Static Water Level 2 ft. from Land surface Date Measured 09/13/2001 PUMPING LEVEL (below land surface) ft. after hrs. pumping g.p.m. Well Head Completion Pitless adapter manufacturer Model <input checked="" type="checkbox"/> Casing Protection Y <input checked="" type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)	Casing Diameter	Weight	Hole Diameter	2 in. to 98 ft.	lbs./ft.	6.75 in. to 122 ft.	Diameter	Slot/Gauze	Length	Set Between	2	12	4	98 ft. and 102 ft.
	Geological Material	Color	Hardness	From	To																																													
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2	12	4	98 ft. and 102 ft.																																															
NO REMARKS Located Minnesota Department of Health Method Digitization (Screen) - Map (1:24,000) Unique Number Verification Information from owner Date N/A System UTM - Nad83, Zone15, Meters X: 259505 Y: 5290022	Grouting Information Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Grout Material: Bentonite from 0 to 50 ft. 2 bags																																																	
	Nearest Known Source of Contamination _feet _direction _type Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Pump <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model number __ HP _ Volts Length of drop Pipe _ft. Capacity _g.p.m Type Material																																																	
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	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Well Contractor Certification L.t.p. Enterprises, Inc. 91686 RANUM, C. License Business Name Lic. Or Reg. No. Name of Driller																																																	
	First Bedrock Aquifer Quat. Buried Artes. Aquifer Last Strat Boulder or boulders Depth to Bedrock ft.																																																	
County Well Index Online Report	654761	Printed 8/21/2008 HE-01205-07																																																

685465

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 10/18/2007
 Update Date 09/12/2003
 Received Date 06/09/2003

Minnesota Statutes Chapter 103I

Well Name CROOKSTON 5
 Township Range Dir Section Subsections Elevation 1151 ft.
 149 43 W 18 DCDBAC Elevation Method 7.5 minute topographic map (+/- 5 feet)

Well Depth 123 ft. Depth Completed 123 ft. Date Well Completed 06/09/2003

Drilling Method Non-specified Rotary

Geological Material	Color	Hardness	From	To
TOP SOIL			0	1
SAND & GRAVEL			1	11
CLAY			11	25
GRAVEL & ROCK			25	27
CLAY WITH ROCKS			27	77
SAND			77	123

Drilling Fluid Water
 Well Hydrofractured? Yes No
 From Ft. to Ft.

Use Community Supply PWS ID Source

Casing Type Steel (black or low carbon) Joint No Information Drive Shoe?
 Yes No Above/Below ft.

Casing Diameter 12 in. to 93 ft. Weight 49.56 lbs./ft. Hole Diameter

Open Hole from ft. to ft.

Screen YES Make JOHNSON Type stainless steel

Diameter	Slot/Gauze	Length	Set Between
12	40	30	93 ft. and 123 ft.

Static Water Level 4.28 ft. from Land surface Date Measured 06/27/2003

PUMPING LEVEL (below land surface) 70.31 ft. after 25 hrs. pumping 1000 g.p.m.

Well Head Completion
 Pitless adapter manufacturer MONITOR Model
 Casing Protection 12 in. above grade
 At-grade (Environmental Wells and Borings ONLY)

NO REMARKS

Located Minnesota Department of Health Method GPS SA Off (averaged)
 Unique Number Verification Information from owner Date 07/15/2005
 System UTM - Nad83, Zone15, Meters X: 259310 Y: 5289897

Grouting Information Well Grouted? Yes No
 Grout Material: Neat Cement from 10 to 73 ft. 81 bags

Nearest Known Source of Contamination
 _feet _direction _type
 Well disinfected upon completion? Yes No

Pump Not Installed Date Installed 09/05/2003
 Manufacturer's name GOULDS Model number 10RJMC HP 50 Volts 460
 Length of drop Pipe 78 ft. Capacity g.p.m Type Submersible Material

First Bedrock
 Last Strat Sand
 Aquifer Quat. Buried Artes. Aquifer
 Depth to Bedrock ft.

Abandoned Wells Does property have any not in use and not sealed well(s)?
 Yes No

Variance Was a variance granted from the MDH for this well? Yes No

Well Contractor Certification
 Lako Well Co. 91339 LAKO, P.
 License Business Name Lic. Or Reg. No. Name of Driller

County Well Index Online Report

685465 Printed 8/21/2008
 HE-01205-07

685466

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 10/18/2007
 Update Date 09/12/2003
 Received Date

Minnesota Statutes Chapter 103I

Well Name CROOKSTON 6 Township Range Dir Section Subsections Elevation 1151 ft. 149 43 W 18 DDBACA Elevation Method 7.5 minute topographic map (+/- 5 feet)	Well Depth 118 ft. Depth Completed 118 ft. Date Well Completed 06/10/2003 Drilling Method Non-specified Rotary																																													
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Printed 8/21/2008 HE-01205-07	Variance Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																													
Well Contractor Certification Lako Well Co. 91339 LAKO, P. License Business Name Lic. Or Reg. No. Name of Driller	685466																																													

685472

County Polk
 Quad Mentor
 Quad ID 334B

WELL AND BORING RECORD

Entry Date 10/18/2007
 Update Date 09/12/2003
 Received Date

Minnesota Statutes Chapter 1031

<p>Well Name THE NATURE CONSERVANCY Township Range Dir Section Subsections Elevation 1151 ft. 149 43 W 18 DCDBAC Elevation Method 7.5 minute topographic map (+/- 5 feet)</p>	<p>Well Depth 120 ft. Depth Completed 120 ft. Date Well Completed 06/08/2003 Drilling Method Non-specified Rotary</p>																																			
<p>Well Address 1313 5TH ST SE MINNEAPOLIS MN 55414</p>	<p>Drilling Fluid Water Well Hydrofractured? <input type="checkbox"/> Yes <input type="checkbox"/> No From Ft. to Ft.</p>																																			
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APPENDIX C

- Water Emergency and Conservation Plan DNR Approval Letter
- Water Emergency and Conservation Plan
- MDH Scoping II Letter
- City of Crookston Public Hearing Notice and City Council Meeting Minutes
- At A Glance WHP Measure Implementation Table

Water Emergency and Conservation Plan DNR Approval Letter



Minnesota Department of Natural Resources

DNR Waters
2115 Birchmont Beach Road NE
Bemidji, MN 56601
218-308-2620

March 6, 2008

Patrick Kelly, Public Works Director
City of Crookston
124 North Broadway
Crookston, MN 56716

Dear Mr. Kelly:

RE: WATER SUPPLY PLAN APPROVAL, CITY OF CROOKSTON, POLK COUNTY

DNR Waters has reviewed the revisions to the City of Crookston's Water Supply Plan received on January 8, 2008. This revised Plan has been found to be consistent with Minnesota Statutes, Section 103G.291, Subdivision 3, and therefore approved. This approval is contingent upon the Department's receipt of confirmation that the Plan has been adopted by the City. Please complete and return to this office the attached "Certification of Adoption" form.

Thank you for your efforts in planning for the future of Crookston's water supply and for conserving the water resources of the State of Minnesota. If you have any questions, please contact Area Hydrologist Garry Bennett at 218-681-0947, or by email at garry.bennett@dnr.state.mn.us.

Best regards,



Robert J. Bezek
Regional Hydrologist

RJB:cda

Enclosure

c: Garry Bennett, Area Hydrologist
Laurel Reeves, Water Appropriation Program Manager
Paige Guetter, West Polk County SWCD
Mark Malmanger, Minnesota Department of Health
file

DNR Information: 651-296-6157 • 1-888-646-6367 • TTY: 651-296-5484 • 1-800-657-3929

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Water Emergency and Conservation Plan

**DEPARTMENT OF NATURAL RESOURCES - DIVISION OF WATERS and
METROPOLITAN COUNCIL
WATER SUPPLY PLANS**

These guidelines are divided into four parts. The first three parts, Water Supply System Description and Evaluation, Emergency Response Procedures and Water Conservation Planning apply statewide. Part IV, relates to comprehensive plan requirements that apply only to communities in the Seven-County Twin Cities Metropolitan Area. If you have questions regarding water supply plans, please call (651) 259-5703 or (651) 259-5647 or e-mail your question to wateruse@dnr.state.mn.us. Metro Communities can also direct questions to the Metropolitan Council at watersupply@metc.state.mn.us or (651) 602-1066.

DNR Water Appropriation Permit Number(s)	2004-1100 and 1977-1760
Name of Water Supplier	City of Crookston
Address	124 North Broadway, Crookston, MN. 56716
Contact Person	Patrick T Kelly
Title	Public Works Director
Phone Number	218-281-5711
E-Mail Address	pkelly@crookston.mn.us

PART I. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

The first step in any water supply analysis is to assess the current status of demand and supplies. Information in Part I, can be used in the development of Emergency Response Procedures and Conservation Plans.

A. ANALYSIS OF WATER DEMAND.

Fill in Table 1 for the past 10 years water demand. If your customer categories are different than the ones listed in Table 1, please note the changes below.

TABLE 1 Historic Water Demand

Year	Total Population	Population Served	Total Connections	Residential Water Sold (MG)	C/I/I Water Sold (MG)	Wholesale Deliveries (MG)	Total Water Sold (MG)	Total Water Pumped (MG)	Percent Unmetered/Unaccounted	Average Demand (MGD)	Maximum Demand (MGD)	Residential gallons/capita/day	Total gallons/capita/day
1997	8175	8175	2662	158	122	0	280	339	17.4	.932	n/a	53	114
1998	8199	8199	2675	159	126	0	285	327	12.8	.893	1,535	53	109
1999	8199	8199	2696	153	125	0	278	312	10.9	.850	1,495	51	104
2000	8199	8199	2711	156	130	0	286	317	9.8	.864	1,404	52	106
2001	8192	8192	2735	150	119	0	269	322	16.5	.851	1,316	50	108
2002	8192	8192	2715	150	114	0	264	280	5.7	.763	1,180	50	94
2003	8192	8192	2715	146	129	0	275	296	7.1	.806	1,366	49	99
2004	8192	8192	2726	144	135	0	279	295	5.4	.799	1,344	48	99
2005	8192	8192	2739	144	109	0	253	282	10.3	.765	1,207	48	94
2006	8192	8192	2719	145	114	0	259	283	8.5	.767	1,402	49	95

MG – Million Gallons MGD – Million Gallons per Day C/I/I- Commercial, Industrial, Institutional

Residential. Water used for normal household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens.

Institutional. Hospitals, nursing homes, day care centers, and other facilities that use water for essential domestic requirements. This includes public facilities and public metered uses. You may want to maintain separate institutional water use records for emergency planning and allocation purposes.

Commercial. Water used by motels, hotels, restaurants, office buildings, commercial facilities, both civilian and military.

Industrial. Water used for thermoelectric power (electric utility generation) and other industrial uses such as steel, chemical and allied products, food processing, paper and allied products, mining, and petroleum refining.

Wholesale Deliveries. Bulk water sales to other public water suppliers.

Unaccounted. Unaccounted for water is the volume of water withdrawn from all sources minus the volume sold.

Residential Gallons per Capita per Day = total residential sales in gallons/population served/365 days Total Gallons per Capita per Day = total water withdrawals/population served/365 days

NOTE: Non-essential water uses defined by Minnesota Statutes 103G.291, include lawn sprinkling, vehicle washing, golf course and park irrigation and other non-essential uses. Some of the above categories also include non-essential uses of water.

Water Use Trends. Discuss factors that influence trends in water demand (i.e. growth, weather, industry, conservation). If appropriate, include a discussion of other factors that affect daily water use, such as use by non-resident commuter employees or large water consuming industry.

Water demand has continued to decline over the last ten years. Although population has remained level, there are a few factors contributing to the declining usage. A major industry(American Crystal Sugar Co.) has reduced usage through conservation, reuse and operational changes. Another factor is the current "wet" cycle that we have been in that has reduced the need for lawn and garden irrigation.

TABLE 2 Large Volume Users - List the top 10 largest users.

Customer	Gallons per year	% of total annual use
American Crystal	18,386,400	7.1
UMC	15,409,800	5.9
Riverview Hospital	8,226,400	3.2
Dahlgren	17,902,100	6.9
Mount St Benedict	2,708,400	1.0
Villa St Vincent	8,380,100	3.2
NW Rgeional Correction Center	2,500,000	1.0
Northland Inn	2,792,800	1.1
Nimens/Espegaard Apartments	2,426,200	1.0
Bemidji Management	2,538,400	1.0

B. TREATMENT AND STORAGE CAPACITY.

TABLE 3(A) Water Treatment

Water Treatment Plant Capacity	4,000,000	Gallons per day
Describe the treatment process used (i.e., softening, chlorination, fluoridation, Fe/Mn removal, reverse osmosis, coagulation, sedimentation, filtration, others). Also, describe the annual amount and method of disposal of treatment residuals, if any.		
Remove iron by pressure filters and add the chemicals of Chlorine and Fluoride before leaving the plant		

TABLE 3(B) Storage Capacity - List all storage structures and capacities.

Total Storage Capacity	Average Day Demand (average of last 5 years)	
1,500,000 Gallons	780,000	Gallons per day
Type of Structure	Number of Structures	Gallons
Elevated Storage	2	1,000,000
Ground Storage	1	500,000
Other:		

C. WATER SOURCES. List all groundwater, surface water and interconnections that supply water to the system. Add or delete lines to the tables as needed.

TABLE 4(A) Total Water Source Capacity for System (excluding emergency connections)

Total Capacity of Sources	3400	Gallons per minute
Firm Capacity (largest pump out of service)	2550	Gallons per minute

TABLE 4(B) Groundwater Sources - Copies of water well records and well maintenance information should be included with the public water supplier's copy of the plan in Attachment A. If there are more wells than space provided or multiple well fields, please use the List of Wells template (see Resources) and include as Attachment

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Well # or name	Unique Well Number	Year Installed	Well & Casing Depth (ft)	Well Diameter (in)	Capacity (GPM)	Geologic Unit	Status
C-5	685466	2005	118	12	850	Quaternary Artesian	Active
C-6	685465	2005	123	12	850	Quaternary Artesian	Active
C-1	147243	1982	164	12	850	Quaternary Artesian	Active
C-2	191552	1982	56	12	150	Quaternary Artesian	Active
C-3	191553	1982	70	12	450	Quaternary Artesian	Active
C-4	191554	1982	156	12	250	Quaternary Artesian	Active

Status: Active use, Emergency, Standby, Seasonal, Peak use, etc. GPM – Gallons per Minute
 Geologic Unit: Name of formation(s), which supplies water to the well

TABLE 4(C) Surface Water Sources

Intake ID	Resource name	Capacity (GPM/MGD)
None		

GPM – Gallons per Minute MGD – Million Gallons per Day

TABLE 4(D) Wholesale or Retail Interconnections - List interconnections with neighboring suppliers that are used to supply water on a regular basis either wholesale or retail.

Water Supply System	Capacity (GPM/MGD)	Wholesale or retail
None		

GPM – Gallons per Minute MGD – Million Gallons per Day

TABLE 4(E) Emergency Interconnections - List interconnections with neighboring suppliers or private sources that can be used to supply water on an emergency or occasional basis. Suppliers that serve less than 3,300 people can leave this section blank, but must provide this information in

In-water conservation plan-completed

Section II C.

Water Supply System	Capacity (GPM/MGD)	Note any limitations on use
NONE		

GPM – Gallons per Minute MGD – Million Gallons per Day

D. DEMAND PROJECTIONS.

TABLE 5 Ten Year Demand Projections

Year	Population Served	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Projected Demand (MGY)
2008	8197	.770	1.400	281.05
2009	8202	.771	1.400	281.415
2010	8207	.772	1.400	281.78
2011	8212	.773	1.400	282.145
2012	8217	.774	1.400	282.51
2013	8222	.775	1.400	282.875
2014	8227	.776	1.400	283.24
2015	8232	.777	1.400	283.605
2016	8237	.778	1.400	283.97
2017	8242	.779	1.400	284.335

MGD – Million Gallons per Day MGY – Million Gallons per Year

Projection Method. Describe how projections were made, (assumptions for per capita, per household, per acre or other methods used).
Used average growth/decline rate from last 10 yrs. to project forward

E. RESOURCE SUSTAINABILITY

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Sustainable water use: use of water to provide for the needs of society, now and in the future, without unacceptable social, economic, or environmental consequences.

Monitoring. Records of water levels should be maintained for all production wells and source water reservoirs/basins. Water level readings should be taken monthly for a production well or observation well that is representative of the wells completed in each water source formation. **If water levels are not currently measured each year, a monitoring plan that includes a schedule for water level readings must be submitted as Attachment**

TABLE 6 Monitoring Wells - List all wells being measured.

Unique well number	Type of well (production, observation)	Frequency of Measurement (daily, monthly etc.)	Method of Measurement (steel tape, SCADA etc.)
685466	Production	Daily	SCADA
685465	Production	Daily	SCADA
147243	Production	Daily	SCADA
191552	Production	Daily	SCADA
191553	Production	Daily	SCADA
191554	Production	Daily	SCADA

Water Level Data. Summarize water level data including seasonal and long-term trends for each ground and/or surface water source. If water levels are not measured and recorded on a routine basis then provide the static water level (SWL) when the well was constructed and a current water level measurement for each production well. Also include all water level data taken during well and pump maintenance.

Attachment : Provide monitoring data (graph or table) for as many years as possible.

Ground Water Level Monitoring – DNR Waters in conjunction with federal and local units of government maintain and measure approximately 750 observation wells around the state. Ground water level data are available online www.dnr.state.mn.us/waters. Information is also available by contacting the Ground Water Level Monitoring Manager, DNR Waters, 500 Lafayette Road, St. Paul, MN 55155-4032 or call (651) 259-5700.

Natural Resource Impacts. Indicate any natural resource features such as calcareous fens, wetlands, trout streams, rivers or surface water basins that are or could be influenced by water withdrawals from municipal production wells. Also indicate if resource protection thresholds have been established and if mitigation measures or management plans have been developed.

None

Sustainability. Evaluate the adequacy of the resource to sustain current and projected demands. Describe any modeling conducted to determine impacts of projected demands on the resource.

The City's concern for the vulnerability and sustainability of their original site caused us to look for additional supply sources. To that end a second well site was developed that doubled the City's production capability. With the projected low growth rate in usage, the City has an adequate supply for the long term demand. As part of developing the new wellfield pumping tests were completed to ensure the adequacy in the resource.

Source Water Protection Plans. The emergency procedures in this plan are intended to comply with the contingency plan provisions required in the Minnesota Department of Health's (MDH) Wellhead Protection (WHP) Plan and Surface Water Protection (SWP) Plan.	
Date WHP Plan Adopted:	Currently completing Phase II-due 4/13/09
Date for Next WHP Update:	To be determined
SWP Plan:	<input type="checkbox"/> In Process <input type="checkbox"/> Completed <input checked="" type="checkbox"/> Not Applicable

F. CAPITAL IMPROVEMENT PLAN (CIP)

Adequacy of Water Supply System. Are water supply installations, treatment facilities and distribution systems adequate to sustain current and projected demands? Yes No If no, describe any potential capital improvements over the next ten years and state the reasons for the proposed changes (CIP Attachment _____).

Proposed Water Sources. Does your current CIP include the addition of new wells or intakes? Yes No If yes, list the number of new installations and projected water demands from each for the next ten years. Plans for new production wells must include the geologic source formation, well location, and proposed pumping capacity.

Water Source Alternatives. If new water sources are being proposed, describe alternative sources that were considered and any possibilities of joint efforts with neighboring communities for development of supplies.

None Proposed

Deleted: Proposed

Preventative Maintenance. Long-term preventative programs and measures will help reduce the risk of emergency situations. Identify sections of the system that are prone to failure due to age, materials or other problems. This information should be used to prioritize capital improvements, preventative maintenance, and to determine the types of materials (pipes, valves, couplings, etc.) to have in stock to reduce repair time.

The City has a number of programs to address preventative maintenance. We annually check mainline valves and identify those needing replacement. A leak/break history on watermains is maintained and that information is used to prioritize water main replacement. We currently replace 1200-1500 feet of water main annually. Our water towers are inspected by professional engineering firms on a scheduled basis.

Water main and service line materials are kept on hand and inventoried routinely, also there are two major material distributors within 75 miles that allow access to additional materials.

PART II. EMERGENCY RESPONSE PROCEDURES

Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failures, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan. If your community already has written procedures dealing with water emergencies we recommend that you use these guidelines to review and update existing procedures and water supply protection measures.

Federal Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act as amended by the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Public Law 107-188, Title IV – Drinking Water Security and Safety) requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan. **Community water suppliers that have completed the Federal Emergency Response Plan and submitted the required certification to the U.S. Environmental Protection Agency have satisfied Part II, Sections A, B, and C of these guidelines and need only provide the information below regarding the emergency response plan and source water protection plan and complete Sections D (Allocation and Demand Reduction Procedures), and E (Enforcement).**

Provide the following information regarding your completed Federal Emergency Response Plan:

Emergency Response Plan	Contact Person	Contact Number
Emergency Response Lead	Richard Rock	218-281-4584
Alternate Emergency Response Lead	Patrick Kelly	218-281-5711
Emergency Response Plan Certification Date	May 10, 2004	

Operational Contingency Plan. An operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures as well as routine maintenance is recommended for all utilities. Check here if the utility has an operational contingency plan. At a minimum a contact list for contractors and supplies should be included in a water emergency telephone list.

Communities that have completed Federal Emergency Response Plans should skip to Section D.

EMERGENCY RESPONSE PROCEDURES

A. Emergency Telephone List. A telephone list of emergency contacts must be included as Attachment to the plan (complete template or use your own list). The list should include key utility and community personnel, contacts in adjacent communities, and appropriate local, state and federal emergency contacts. Please be sure to verify and update the contacts on the emergency telephone list on a regular basis (once each year recommended). In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Responsibilities and services for each contact should be defined.

B. Current Water Sources and Service Area. Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation, water well and maintenance records should be maintained in a central secured location so that the records are accessible for emergency purposes and preventative maintenance. A detailed map of the system showing the treatment plants, water sources, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. Check here if these records and maps exist and staff can access the documents in the event of an emergency.

C. Procedure for Augmenting Water Supplies. List all available sources of water that can be used to augment or replace existing sources in an emergency. In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Copies of cooperative agreements should be maintained with your copy of the plan and include in Attachment . Be sure to include information on any physical or chemical problems that may limit interconnections to other sources of water. Approvals from the MN Department of Health are required for interconnections and reuse of water.

TABLE 7 (A) Public Water Supply Systems – List interconnections with other public water supply systems that can supply water in an emergency.

Water Supply System	Capacity (GPM/MGD)	Note any limitations on use
None		

GPM – Gallons per Minute MGD – Million Gallons per Day

TABLE 7 (B) – Private Water Sources – List other sources of water available in an emergency.

Name	Capacity (GPM/MGD)	Note any limitations on use
None		

GPM – Gallons per Minute MGD – Million Gallons per Day

D. Allocation and Demand Reduction Procedures. The plan must include procedures to

address gradual decreases in water supply as well as emergencies and the sudden loss of water due to line breaks, power failures, sabotage, etc. During periods of limited water supplies public water suppliers are required to allocate water based on the priorities established in Minnesota Statutes 103G.261.

Water Use Priorities (Minnesota Statutes 103G.261)

First Priority. Domestic water supply, excluding industrial and commercial uses of municipal water supply, and use for power production that meets contingency requirements.

NOTE: Domestic use is defined (MN Rules 6115.0630, Subp. 9), as use for general household purposes for human needs such as cooking, cleaning, drinking, washing, and waste disposal, and uses for on-farm livestock watering excluding commercial livestock operations which use more than 10,000 gallons per day or one million gallons per year.

Second Priority. Water uses involving consumption of less than 10,000 gallons per day.

Third Priority. Agricultural irrigation and processing of agricultural products.

Fourth Priority. Power production in excess of the use provided for in the contingency plan under first priority.

Fifth Priority. Uses, other than agricultural irrigation, processing of agricultural products, and power production.

Sixth Priority. Non-essential uses. These uses are defined by Minnesota Statutes 103G.291 as lawn sprinkling, vehicle washing, golf course and park irrigation, and other non-essential uses.

List the statutory water use priorities along with any local priorities (hospitals, nursing homes, etc.) in Table 8. Water used for human needs at hospitals, nursing homes and similar types of facilities should be designated as a high priority to be maintained in an emergency. Local allocation priorities will need to address water used for human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. The volume of water and other types of water uses at these facilities must be carefully considered. After reviewing the data, common sense should dictate local allocation priorities to protect domestic requirements over certain types of economic needs. In Table 8, list the priority ranking, average day demand and demand reduction potential for each customer category (modify customer categories if necessary).

Table 8 Water Use Priorities

Deleted:

Customer Category	Allocation Priority	Average Day Demand (GPD)	Demand Reduction Potential (GPD)
Residential	1	396,595	79,000
Institutional	2	101,985	20,000
Commercial	3	150,700	30,000
Industrial	4	50,698	5,000
Irrigation	5	10,094	1,000
Wholesale		None	
Non-essential	6		
	TOTALS	710,072	135,000

GPD – Gallons per Day

Demand Reduction Potential. The demand reduction potential for residential use will typically be the base

demand during the winter months when water use for non-essential uses such as lawn watering do not occur. The difference between summer and winter demands typically defines the demand reduction that can be achieved by eliminating non-essential uses. In extreme emergency situations lower priority water uses must be restricted or eliminated to protect first priority domestic water requirements. Short-term demand reduction potential should be based on average day demands for customer categories within each priority class.

Triggers for Allocation and Demand Reduction Actions. Triggering levels must be defined for implementing emergency responses, including supply augmentation, demand reduction, and water allocation. Examples of triggers include: water demand >100% of storage, water level in well(s) below a certain elevation, treatment capacity reduced 10% etc. Each trigger should have a quantifiable indicator and actions can have multiple stages such as mild, moderate and severe responses. Check each trigger below that is used for implementing emergency responses and for each trigger indicate the actions to be taken at various levels or stages of severity in Table 9.

- | | | | |
|-------------------------------------|--|-------------------------------------|-------------------------|
| <input checked="" type="checkbox"/> | Water Demand | <input checked="" type="checkbox"/> | Water Main Break |
| <input type="checkbox"/> | Treatment Capacity | <input type="checkbox"/> | Loss of Production |
| <input type="checkbox"/> | Storage Capacity | <input type="checkbox"/> | Security Breach |
| <input type="checkbox"/> | Groundwater Levels | <input checked="" type="checkbox"/> | Contamination |
| <input type="checkbox"/> | Surface Water Flows or Levels | <input type="checkbox"/> | Other (list in Table 9) |
| <input checked="" type="checkbox"/> | Pump, Booster Station or Well Out of Service | | |
| <input checked="" type="checkbox"/> | Governor's Executive Order – Critical Water Deficiency (required by statute) | | |

Table 9 Demand Reduction Procedures

Deleted: _____

Condition	Trigger(s)	Actions
Stage 1 (Mild)	Distribution Break	Isolate area serviced by broken main
Stage 2 (Moderate)	Demand Exceeding Storage/ Production Capacity	Call for voluntary water restrictions
Stage 3 (Severe)	Supply Break/ Contamination	Suspend non-essential uses and institute boil order or total non-use
Critical Water Deficiency (M.S. 103G.291)	Executive Order by Governor & as provided in above triggers	Stage 1: Restrict lawn watering, vehicle washing, golf course and park irrigation and other nonessential uses Stage 2: Suspend lawn watering, vehicle washing, golf course and park irrigation and other nonessential uses

Note: The potential for water availability problems during the onset of a drought are almost impossible to predict. Significant increases in demand should be balanced with preventative measures to conserve supplies in the event of prolonged drought conditions.

Notification Procedures. List methods that will be used to inform customers regarding conservation requests, water use restrictions, and suspensions. Customers should be aware of emergency procedures and responses that they may need to implement.

Methods include- Television, Radio, Newspapers and possible door to door.

E. Enforcement. Minnesota Statutes require public water supply authorities to adopt and enforce water conservation restrictions during periods of critical water shortages.

Public Water Supply Appropriation During Deficiency.
Minnesota Statutes 103G.291, Subdivision 1.

Declaration and conservation.
(a) If the governor determines and declares by executive order that there is a critical water deficiency, public water supply authorities appropriating water must adopt and enforce water conservation restrictions within their jurisdiction that are consistent with rules adopted by the commissioner.
(b) The restrictions must limit lawn sprinkling, vehicle washing, golf course and park irrigation, and other nonessential uses, and have appropriate penalties for failure to comply with the restrictions.

An ordinance that has been adopted or a draft ordinance that can be quickly adopted to comply with the critical water deficiency declaration must be included in the plan (include with other ordinances in Attachment 7 for Part III, Item 4). Enforcement responsibilities and penalties for non-compliance should be addressed in the critical water deficiency ordinance. Sample regulations are available at www.dnr.state.mn.us/waters

Authority to Implement Water Emergency Responses. Emergency responses could be delayed if city council or utility board actions are required. Standing authority for utility or city managers to implement water restrictions can improve response times for dealing with emergencies. Who has authority to implement water use restrictions in an emergency?

- Utility Manager City Manager City Council or Utility Board
 Other (describe): City Administrator

Emergency Preparedness. If city or utility managers do not have standing authority to implement water emergency responses, please indicate any intentions to delegate that authority. Also indicate any other measures that are being considered to reduce delays for implementing emergency responses.

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PART III. WATER CONSERVATION PLAN

Water conservation programs are intended to reduce demand for water, improve the efficiency in use and reduce losses and waste of water. Long-term conservation measures that improve overall water use efficiencies can help reduce the need for short-term conservation measures. Water conservation is an important part of water resource management and can also help utility managers satisfy the ever-increasing demands being placed on water resources.

Minnesota Statutes 103G.291, requires public water suppliers to implement demand reduction measures before seeking approvals to construct new wells or increases in authorized volumes of water. Minnesota Rules 6115.0770, require water users to employ the best available means and practices to promote the efficient use of water. Conservation programs can be cost effective when compared to the generally higher costs of developing new sources of supply or expanding water and/or wastewater treatment plant capacities.

A. Conservation Goals. The following section establishes goals for various measures of water demand. The programs necessary to achieve the goals will be described in the following section.

Unaccounted Water (calculate five year averages with data from Table 1)	
Average annual volume unaccounted water for the last 5 years	21,200,000 gallons
Average percent unaccounted water for the last 5 years	7.4 percent
AWWA recommends that unaccounted water not exceed 10%. Describe goals to reduce unaccounted water if the average of the last 5 years exceeds 10%.	

Residential Gallons Per Capita Demand (GPCD)	
Average residential GPCD use for the last 5 years (use data from Table 1)	48.8 GPCD
In 2002, average residential GPCD use in the Twin Cities Metropolitan Area was 75 GPCD. Describe goals to reduce residential demand if the average for the last 5 years exceeds 75 GPCD.	

Total Per Capita Demand: From Table 1, is the trend in overall per capita demand over the past 10 years <input type="checkbox"/> increasing or <input checked="" type="checkbox"/> decreasing? If total GPCD is increasing, describe the goals to lower overall per capita demand or explain the reasons for the increase.

Peak Demands (calculate average ratio for last five years using data from Table 1)	
Average maximum day to average day ratio	1.7
If peak demands exceed a ratio of 2.6, describe the goals for lowering peak demands.	

B. Water Conservation Programs. Describe all short-term conservation measures that are available for use in an emergency and long-term measures to improve water use efficiencies for each of the six conservation program elements listed below. Short-term demand reduction measures must be included in the emergency response procedures and must be in support of, and part of, a community all-hazard emergency operation plan.

1. **Metering.** The American Water Works Association (AWWA) recommends that every water utility meter all water taken into its system and all water distributed from its system at its customer's point of service. An effective metering program relies upon periodic performance testing, repair, repair and maintenance of all meters. AWWA also recommends that utilities conduct regular water audits to ensure accountability.

Complete Table 10 (A) regarding the number and maintenance of customer meters.

TABLE 10 (A) Customer Meters

	Number of Connections	Number of Metered Connections	Meter testing schedule (years)	Average age/meter replacement schedule (years)
Residential	2442	2442	after 10 yrs. then every 5 yrs.	10 / when meter reaches beyond allowable accuracy. 15 to 30 yrs.
Institutional	7	7	same as above	8 / same as above
Commercial	213	213	same as above	7 / same as above
Industrial	12	12	same as above	10 / same as above
Public Facilities	35	35	same as above	7 / same as above
Other	10	10	same as above	10 / same as above
TOTALS	2719	2719		

Unmetered Systems. Provide an estimate of the cost to install meters and the projected water savings from metering water use. Also indicate any plans to install meters.

Have None

TABLE 10 (B) Water Source Meters

	Number of Meters	Meter testing schedule (years)	Average age/meter replacement schedule (years)
Water Source (wells/intakes)	4	No way testing	3 / 10
Treatment Plant	1	No way testing	8 / 10

2. **Unaccounted Water.** Water audits are intended to identify, quantify, and verify water and revenue losses. The volume of unaccounted-for water should be evaluated each billing cycle. The AWWA recommends a goal of ten percent or less for unaccounted-for water. Water audit procedures are available from the AWWA and MN Rural Water Association.

Frequency of water audits: each billing cycle yearly other:

Leak detection and survey: every year every years periodic as needed

Year last leak detection survey completed:

Reducing Unaccounted Water. List potential sources and efforts being taken to reduce unaccounted water. If unaccounted water exceeds 10% of total withdrawals, include the timeframe for completing work to reduce unaccounted water to 10% or less.

3. **Conservation Water Rates.** Plans must include the current rate structure for all customers and provide information on any proposed rate changes. Discuss the basis for current price levels and rates, including cost of service data, and the impact current rates have on conservation.

Billing Frequency: Monthly Bimonthly Quarterly
 Other (describe):

Volume included in base rate or service charge: 0 gallons or 0 cubic feet

Conservation Rate Structures

- Increasing block rate: rate per unit increases as water use increases
- Seasonal rate: higher rates in summer to reduce peak demands
- Service charge or base fee that does not include a water volume

Conservation Neutral Rate Structure

- Uniform rate: rate per unit is the same regardless of volume

Non-conserving Rate Structures

- Service charge or base fee that includes a large volume of water
- Declining block rate: rate per unit decreases as water use increases
- Flat rate: one fee regardless of how much water is used (unmetered)

Other (describe):

Water Rates Evaluated: every year every years no schedule

Date of last rate change: 12/10/03

Declining block (the more water used, the cheaper the rate) and flat (one fee for an unlimited volume of water) rates should be phased out and replaced with conservation rates. Incorporating a seasonal rate structure and the benefits of a monthly billing cycle should also be considered along with the development of an emergency rate structure that could be quickly implemented to encourage conservation in an emergency.

<p>Current Water Rates. Include a copy of the actual rate structure in Attachment _____ or list current water rates including base/service fees and volume charges below.</p>
<p>attached</p>

<p>Non-conserving Rate Structures. Provide justification for the rate structure and its impact on reducing demands or indicate intentions including the timeframe for adopting a conservation rate structure.</p>
<p> </p>

4. **Regulation.** Plans should include regulations for short-term reductions in demand and long-term improvements in water efficiencies. Sample regulations are available from DNR Waters. Copies of adopted regulations or proposed restrictions should be included in Attachment _____ of the plan. Indicate any of the items below that are required by local regulations and also indicate if the requirement is applied each year or just in emergencies.

- Time of Day: no watering between 11:00 am/pm and 8:00 am/pm (reduces evaporation) year around seasonal emergency only
- Odd/Even: (helps reduce peak demand) year around seasonal emergency only
- Water waste prohibited (no runoff from irrigation systems)
Describe ordinance:
- Limitations on turf areas for landscaping (reduces high water use turf areas)
Describe ordinance:
- Soil preparation (such as 4"-6" of organic soil on new turf areas with sandy soil)
Describe ordinance:
- Tree ratios (plant one tree for every _____ square feet to reduce turf evapotranspiration)
Describe ordinance:
- Prohibit irrigation of medians or areas less than 8 feet wide
Describe ordinance:
- Permit required to fill swimming pool every year emergency only
- Other (describe):

State and Federal Regulations (mandated)

- Rainfall sensors on landscape irrigation systems.** Minnesota Statute 103G.298 requires "All automatically operated landscape irrigation systems shall have furnished and installed technology that inhibits or interrupts operation of the landscape irrigation system during periods of sufficient moisture. The technology must be adjustable either by the end user or the professional practitioner of landscape irrigation services."
- Water Efficient Plumbing Fixtures.** The 1992 Federal Energy Policy Act established manufacturing standards for water efficient plumbing fixtures, including toilets, urinals, faucets, and aerators.

Enforcement. Are ordinances enforced? Yes No If yes, indicate how ordinances are enforced along with any penalties for non-compliance.

Our watering restriction ordinance is effective on an emergency basis only. We have not issued watering restrictions in the last 15 years. Enforcement would be through inspection, with violators issued a citation after one warning. The Building Official's Office enforces all State and Federal regulations as part of the permit process. Permits are not issued until plumbing plans are compliant.

5. **Education and Information Programs.** Customers should be provided information on how to improve water use efficiencies a minimum of two times per year. Information should be provided at appropriate times to address peak demands. Emergency notices and educational materials on how to reduce water use should be available for quick distribution during an emergency. If any of the methods listed in the table below are used to provide water conservation tips, indicate the number of times that information is provided each year and attach a list of education efforts used for the last three years.

Current Education Programs	Times/Year
Billing inserts or tips printed on the actual bill	
Consumer Confidence Reports	1
Local news papers	Varies
Community news letters	
Direct mailings (water audit/retrofit kits, showerheads, brochures)	
Information at utility and public buildings	Continuous
Public Service Announcements	1-2
Cable TV Programs	
Demonstration projects (landscaping or plumbing)	
K-12 Education programs (Project Wet, Drinking Water Institute)	
School presentations	1
Events (children's water festivals, environmental fairs)	
Community education	
Water Week promotions	
Information provided to groups that tour the water treatment plant	
Website (include address: crookston.mn.us)	Continuous
Targeted efforts (large volume users, users with large increases)	
Notices of ordinances (include tips with notices)	
Emergency conservation notices (recommended)	1
Other:	

List education efforts for the last three years in Attachment B of the plan. Be sure to indicate whether educational efforts are on-going and which efforts were initiated as an emergency or drought management effort.

Proposed Education Programs. Describe any additional efforts planned to provide conservation information to customers a minimum of twice per year (required if there are no current efforts).
 Go over monthly reading report and contact customer if water consumption is up and tell them how to check for leaks in toilet. Send with 2nd. grade class when touring City Hall a coloring book on water conservation.

A packet of conservation tips and information can be obtained by contacting DNR Waters or the Minnesota Rural Water Association (MRWA). The American Water Works Association (AWWA) www.awwa.org or www.waterwiser.org also has excellent materials on water conservation that are available in a number of formats. You can contact the MRWA 800/367-6792, the AWWA bookstore 800/926-7337 or DNR Waters 651/259-5703 for information regarding educational materials and formats that are available.

Ir-water conservation plan-completed

6. **Retrofitting Programs.** Education and incentive programs aimed at replacing inefficient plumbing fixtures and appliances can help reduce per capita water use as well as energy costs. It is recommended that communities develop a long-term plan to retrofit public buildings with water efficient plumbing fixtures and that the benefits of retrofitting be included in public education programs. You may also want to contact local electric or gas suppliers to see if they are interested in developing a showerhead distribution program for customers in your service area.

A study by the AWWA Research Foundation (Residential End Uses of Water, 1999) found that the average indoor water use for a non-conserving home is 69.3 gallons per capita per day (gpcd). The average indoor water use in a conserving home is 45.2 gpcd and most of the decrease in water use is related to water efficient plumbing fixtures and appliances that can reduce water, sewer and energy costs. In Minnesota, certain electric and gas providers are required (Minnesota Statute 216B.241) to fund programs that will conserve energy resources and some utilities have distributed water efficient showerheads to customers to help reduce energy demands required to supply hot water.

Retrofitting Programs. Describe any education or incentive programs to encourage the retrofitting of inefficient plumbing fixtures (toilets, showerheads, faucets, and aerators) or appliances (washing machines).

None

Plan Approval. Water Supply Plans must be approved by the Department of Natural Resources (DNR) every ten years. Please submit plans for approval to the following address:

DNR Waters	or Submit electronically to
Water Permit Programs Supervisor	wateruse@dnr.state.mn.us .
500 Lafayette Road	
St. Paul, MN 55155-4032	

Adoption of Plan. All DNR plan approvals are contingent on the formal adoption of the plan by the city council or utility board. Please submit a certificate of adoption (example available) or other action adopting the plan.

Metropolitan Area communities are also required to submit these plans to the Metropolitan Council. Please see PART IV. ITEMS FOR METROPOLITAN AREA PUBLIC SUPPLIERS.

METROPOLITAN COUNCIL

PART IV. ITEMS FOR METROPOLITAN AREA PUBLIC SUPPLIERS

Minnesota Statute 473.859 requires water supply plans to be completed for all local units of government in the seven-county Metropolitan Area as part of the local comprehensive planning process. Much of the required information is contained in Parts I-III of these guidelines. However, the following additional information is necessary to make the water supply plans consistent with the Metropolitan Land Use Planning Act upon which local comprehensive plans are based. Communities should use the information collected in the development of their plans to evaluate whether or not their water supplies are being developed consistent with the Council's Water Resources Management Policy Plan.

Policies. Provide a statement(s) on the principles that will dictate operation of the water supply utility: for example, "It is the policy of the city to provide good quality water at an affordable rate, while assuring this use does not have a long-term negative resource impact."

Impact on the Local Comprehensive Plan. Identify the impact that the adoption of this water supply plan has on the rest of the local comprehensive plan, including implications for future growth of the community, economic impact on the community and changes to the comprehensive plan that might result.

Demand Projections

Year	Total Community Population	Population Served	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Projected Demand (MGY)
2010					
2020					
2030					
Ultimate					

Population projections should be consistent with those in the Metropolitan Council's *2030 Regional Development Framework* or the Communities 2008 Comprehensive Plan update. If population served differs from total population, explain in detail why the difference (i.e., service to other communities, not complete service within community etc.).

PLAN SUBMITTAL AND REVIEW OF THE PLAN

The plan will be reviewed by the Council according to the sequence outlined in Minnesota Statutes 473.175. **Prior to submittal to the Council, the plan must be submitted to adjacent governmental units for a 60-day review period.** Following submittal, the Council determines if the plan is complete for review within 15 days. If incomplete, the Council will notify the community and request the necessary information. When complete the Council will complete its review within 60 days or a mutually agreed upon extension. The community officially adopts the plan after the Council provides its comments.

Plans can be submitted electronically to the Council; however, the review process will not begin until the Council receives a paper copy of the materials. Electronic submissions can be via a CD, 3 ½" floppy disk or to the email address below. Metropolitan communities should submit their plans to:

Reviews Coordinator
Metropolitan Council
390 Robert St,
St. Paul, MN 55101

electronically to:
watersupply@metc.state.mn.us

MDH Scoping II Letter

RP
5865

SCOPING DECISION NOTICE NO. 2

► **Remainder of the Wellhead Protection Plan**

Name of Public Water Supply: Crookston City of Crookston PWSID 1600002		Date: January 17, 2007
Name of the Wellhead Protection Manager: Mr. Patrick Kelly, P.E., Public Works Director		
Address: 124 North Broadway	City: Crookston	Zip: 56716
Unique Well Numbers: 147243 (Well 1), 191552 (Well 2), 191553 (Well 3), 191554 (Well 4), 685465 (Well 5), 685466 (Well 6)		Phone: 218-281-5711

Instructions for Completing the Scoping No. 2 Form

N	R	S	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.
X			

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

N	R	S	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.
		X	

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	An existing map or list of local precipitation gauging stations.
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing table showing the average monthly and annual precipitation in inches for the preceding five years.
	X	X	
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
GEOLOGY			
N	R	S	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.
	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 records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.
	X		
Technical Assistance Comments: The management of all Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	Existing borehole geophysical records from wells, borings, and exploration test holes.
	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 surface geophysical studies.
	X		
Technical Assistance Comments: The management of the all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
SOILS			
N	R	S	Existing maps of the soils and a description of soil infiltration characteristics.
	X	X	
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	A description or an existing map of known eroding lands that are causing sedimentation problems.
X			
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:			
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.
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		
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		
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 Area(s) must reflect what is known about these data elements, as follows:

Moderate Vulnerability - Wells, underground automotive waste disposal systems, sewer systems serving more than 20 people or 2 or more facilities, cesspools, and tanks.

High Vulnerability - All land uses and potential sources of contamination.

As a starting point, MDH will provide a list of specific potential sources of contamination from State data bases, and a list of categories of potential sources of contamination that helps identify what is meant by "all potential sources of contamination." At least 25 of each type of potential contaminant source and land use must be inventoried, location verified, and mapped during plan development. Management strategies must be developed for all potential sources of contamination. Also, the inventory of the Inner Wellhead Management Zone must be completed on forms provided by the MDH.

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 security of your system. An existing map of the storm sewers and sanitary sewers in all of the Drinking Water Supply Management Area(s) must be included in the wellhead protection plan and must also be submitted to the MDH as part of the approval process.

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 the vulnerable parts of 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	An existing record of construction, maintenance, and use of the public water supply well and other wells within the drinking water supply management area.
	X		
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 QUANTITY

SURFACE WATER QUANTITY			
N	R	S	An existing description of high, mean, and low flows on streams.
X			
Technical Assistance Comments:			
N	R	S	An existing list of lakes where the state has established ordinary high water marks.
X			
Technical Assistance Comments:			
N	R	S	An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.
X			
Technical Assistance Comments:			
N	R	S	An existing list of lakes and streams for which state protected levels or flows have been established.
X			
Technical Assistance Comments:			
N	R	S	An existing description of known water-use conflicts, including those caused by groundwater pumping.
	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.			

GROUNDWATER QUANTITY

N	R	S	An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.
	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 description of known well interference problems and water use conflicts.
	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 list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.
	X		

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

Technical Assistance Comments:

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

Technical Assistance Comments:

GROUNDWATER QUALITY

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

Technical Assistance Comments: The management of the Drinking Water Supply Management Area(s) must reflect what is known about this data element. If it exists, be sure to include the Nitrate probability mapping Study and use it to guide the management of the vulnerable Drinking Water Supply Management Area(s).

N	R	S	An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.
	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 report of groundwater tracer studies.
	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 site study and well water analysis of known areas of groundwater contamination.
	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 property audit identifying contamination.
	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 report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

City of Crookston Public Hearing Notice and City Council Meeting Minutes

LEGAL NOTICES

NOTICE to set a public hearing for July 14, 2009, on the Wellhead Protection Plan Phase II at a meeting of the City Council beginning at 7:00 p.m., in the Council Chambers at the Crookston City Hall, 124 North Broadway, Crookston, MN 56716.

By order of the City Council
Betty J. Arvidson
City Clerk-Treasurer
City of Crookston

June 26

le96

PROPOSED MINUTES OF THE CROOKSTON CITY COUNCIL, POLK COUNTY, MINNESOTA. THE FIRST REGULAR MEETING OF JULY 14, 2009, COUNCIL CHAMBERS, CITY HALL.

Mayor David Genereux called the meeting to order at 7:00 p.m. and requested all present to stand for a moment of silence.

ROLL CALL

Council Members present in answer to roll call were: Dana Johnson, Marlys Mjoen, Keith Mykleseth, Wayne Melbye, Dale Stainbrook, Tom Vedbraaten, Guy Martin, and Frank Lindgren.

Council Members absent: None.

Staff present were: Tom Lindo, Pat Kelly, Mike MacDonald, Scott Kleven, Richard Rock, Tim Motherway, Phyllis Hagen, Aaron Parrish and Betty Arvidson.

CROOKSTON FORUM

There was no one present to address the Council.

APPROVAL OF AGENDA

Arvidson asked to add item 8.03, "Approve accepting grant agreement from the State of Minnesota for Airport Improvements", to the Regular Agenda. On motion by Council Member Lindgren, seconded by Council Member Mjoen and duly carried that the Agenda be approved as amended.

CONSENT AGENDA

Council Member Mjoen asked that item 6.10 "Approve budget adjustments to accommodate the unallotment of a portion of LGA for 2009 and to lift the capital improvement moratorium" be moved to item 8.04 under the regular agenda. On motion by Council Member Melbye, seconded by Council Member Johnson, and duly carried by roll call vote to approve the Consent Agenda which includes the following items:

- 6.01 Council Minutes of June 23, 2009.
- 6.02 City of Crookston bills and disbursements in the amount of \$419,636.62 . Check Nos. 37516 through 37658. (RES. No. 25081)
- 6.03 Approve partial payment estimate No. 4, Crookston Flood Control Project Stage 3B-Phase 1 to Spruce Valley Corporation in the amount of \$139,249.48. (RES. No. 25082)
- 6.04 Approve setting public hearing on Drainage improvements on the east side of South Washington Ave for July 28, 2009. (RES. No. 25083)
- 6.05 Approve partial payment estimate No. 1, 2009 Street Improvements, to Gordon Construction of Mahnommen, Inc. in the amount of \$56,972.69. (RES. No. 25084)
- 6.06 Approve resolution for sale of 129 Mill Street. (RES. No. 25085)
- 6.07 Approve resolution for sale of 506 Pleasant Avenue. (RES. No. 25086)
- 6.08 Approve resolution waiving building permit fees for Habitat for Humanity. (RES. No. 25087)
- 6.09 Approve resolution utilizing Tobacco Settlement funds for worksite health screenings for the employees. (RES. No. 25088)
- 6.10 This item was moved to item 8.04 under the regular agenda.
- 6.11 Approve resolution for conveyance of property to the Crookston Housing and Economic Development Authority. (RES. No. 25089)
- 6.12 Approve resolution for a revised Intermediary Relending Program Work Plan. (RES. No. 25090)
- 6.13 Approve Dance Permit for Ox Cart Festival, August 14, 9 p.m. – 12 midnight, Central Park, Class Act – DJ.
- 6.14 Approve Dance permit for Ox Cart Festival, August 15, 9 p.m. – 1 a.m., Central park, Tommy Helgeson.

PUBLIC HEARINGS

7.01 Mayor Genereux opened the public hearing on the Wellhead Protection Plan Phase II for the City of Crookston. Pat Kelly, Public Works Director, stated the Department of Health requires municipalities that derive their drinking water from an underground source to create a Wellhead Protection Plan. The plan has two phases. The first phase is more of a technical phase that defines our drinking water supply management area. We completed Phase I a couple of years ago. The second phase, the one we are working on now, identifies potential hazards. It inventories contaminants within our drinking water supply management area; recommends best management practices and hazard mitigation strategies for us to best defend and protect our underground water supply. This public hearing is held to receive public comment. Copies of the Phase II plan was sent to all affected agencies, watersheds, and counties within our management area. Any comments, suggestions received will be included in our final draft that will be submitted to the Department of Health for their approval.

Mayor Genereux asked if anyone else wished to be heard and upon hearing none closed the public hearing.

7.02 Mayor Genereux opened the public hearing on Policies & Procedures for the 2009 Crookston Rehabilitation Grant. Robbin Brieland reviewed the grant information. The City was awarded a Small Cities Development Program (SCDP) grant through the Department of Employment and Economic Development (DEED) for 13 owner occupied units and 8 renter occupied units in the amount of \$533,747. Homeowners in the Woods Addition will be invited for a full application on a first come first serve basis. There are a few homeowners on a waiting list from the last rehabilitation grant and they will move to the top of the list. The maximum SCDP funds will be \$22,000 in both deferred and repayable loans. Owner occupied projects will have the option of SCDP deferred loans for a 7 year period or a 3% loan for a duration not to exceed 10 years based on applicants repayment ability. Renter occupied projects will have the option of SCDP deferred loans for 50% of project costs for a duration of 5 years or a 3% loan for 20% of project costs for a duration not to exceed 10 years. Council Member Mykleseth asked when could we apply for additional funds. Brieland stated that DEED likes to see at least 70% of existing grant funds spent before applying for additional funds. This means we would not be submitting an application this fall for 2010 funding but most likely the fall of 2010 for 2011 funding. We have received many applications from the Jerome's Addition as well as Sampson's Addition. They would be good target areas for future grant applications. Mykleseth asked if homeowners would have to reapply or if they could use the same applications. Brieland stated we could use the existing applications.

Mayor Genereux asked if anyone else wished to be heard and upon hearing none closed the public hearing.

REGULAR AGENDA

- 8.01 On motion by Council Member Mykleseth, seconded by Council Member Vedbraaten, and duly carried:
Resolution to approve Policies & Procedures for the 2009 Small Cities Development Program Owner Occupied Housing Rehabilitation Program authorizing to levy on all property Special Service District Charges for flood control. (RES. No. 25091)
- 8.02 On motion by Council Member Mjoen, seconded by Council Member Johnson and duly carried:
Resolution to approve Policies & Procedures for the 2009 Small Cities Development Program Renter Occupied Housing Rehabilitation Program (RES. No. 25092)
- 8.03 On motion by Council Member Vedbraaten, seconded by Council Member Lindgren and duly carried:
Resolution to accept a grant agreement from the State of MN for Airport Improvements (RES. No. 25093)
- 8.04 On motion by Council Member Melbye, seconded by Council Member Lindgren, and duly carried:
Resolution to approve budget adjustments to accommodate the unallotment of a portion of LGA for 2009 and to lift the capital improvement moratorium (RES. No. 25904)

REPORTS AND STAFF RECOMMENDATIONS

Tom Lindo, IT Director, reported that he has been working with Scott Kleven to provide WIFI to campers at Central Park.

Dan Johanneck, CHEDA Executive Director, reminded Council of the joint Planning Commission/CHEDA Board/Council meeting to review plans for the next housing development concept to be held on July 21st.

Frank Lindgren, Council Member At-Large	-	No Report
Dana Johnson, Council Member 1 st Ward	-	No Report
Marlys Mjoen, Council Member 2 nd Ward	-	No Report
Keith Mykleseth, Council Member 3 rd Ward	-	No Report
Wayne Melbye, Council Member 4 th Ward	-	No Report
Dale Stainbrook, Council Member 5 th Ward	-	No Report
Tom Vedbraaten, Council Member 6 th Ward	-	No Report
Guy Martin, Council Member At-Large	-	No Report

Mayor Genereux relayed an invitation from Craig Morgan at Titan Machinery to their grand opening to be held on July 23rd with ribbon cutting at 4:30.

ADJOURNMENT

Mayor Genereux declared the meeting adjourned at 7:23 p.m.

At A Glance WHP Measure Implementation Table

At A Glance Table for implementing WHP Measures Identified in The Crookston WHP Plan Part 2, Chapter 5.										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Measure	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A1										
A2								X		
A3		*		*				X		
B1								X		
B2										
B3										
B4										
B5										
B6										
B7										
C1										
C2										
C3										
C4										
D1										
E1								X		
E2										
E3								X		
E4								X		
F1								X		
F2								X		
F3										

X = Summarized in Year 8

* = Complete implementable measures with annual maintenance and monitoring