

MUNICIPAL WATER SUPPLIER DATA REPORTING IN THE TWIN CITIES METROPOLITAN AREA

Phase I – Background and Discovery

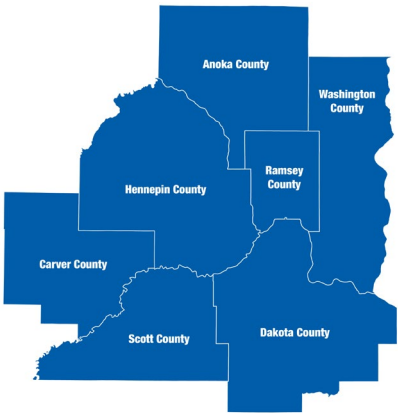


April 2020

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The Metropolitan Council is the regional planning organization for the seven-county Twin Cities area. The Council operates the regional bus and rail system, collects and treats wastewater, coordinates regional water resources, plans and helps fund regional parks, and administers federal funds that provide housing opportunities for low- and moderate-income individuals and families. The 17-member Council board is appointed by and serves at the pleasure of the governor.

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Background

Project Overview

The Metropolitan Council (Council) is tasked with planning activities that address the water supply needs of the Twin Cities Metropolitan Area (TCMA) (<https://www.revisor.mn.gov/statutes/cite/473.1565>). The Council's Water Supply Planning unit works with communities to carry-out these activities and consults with appointed committees who advise the Council on proposed water policy and to communicate common concerns. These groups are led by the Metropolitan Area Water Supply Advisory Committee (MAWSAC) and their supporting Technical Advisory Committee (TAC), established in 2005 by the Minnesota Legislature. Subregional working groups have been organized to facilitate communication of local issues, address drinking water supply challenges, and ensure that local perspectives are reflected in regional water supply planning activities.

Recently, the TAC and subregional groups have discussed challenges associated with the reporting of water supply data, primarily the annual and monthly reports required by state agencies. Specific concerns include duplicative submittal requirements, inconsistent terminology, conflicts between units of measurement, and excessive time commitments. Other general concerns about the interpretation and use of municipal water supplier data in scientific and regulatory assessments have been expressed by advisory committees and subregional working groups.

In December of 2017, regional advisory committees and subregional working groups met to understand and coordinate local water supply issues with regional planning efforts. During this meeting, the Southwest Working Group members identified data reporting challenges as an issue they would like the Council to address. In September 2018, the issue was discussed in greater detail at the Southwest Working Group meeting. At this meeting, the Council Water Supply Planning unit was asked to sponsor a project that could improve data reporting efficiency, the quality of the data reported, and documentation of reporting requirements.

The overall purpose of this report is to capture the reporting requirements for municipal water suppliers in the TCMA. This report summarizes the information and data collected during Phase I. This first phase set out to investigate and document water supplier data challenges and concerns through a series of interviews with municipal water suppliers and the agencies that require the data. This report summarizes the interviews and documents the data required. Also contained in this report is a list of suggestions for process improvement that is based on issues identified by municipal water suppliers and by state agencies. This report, however, does not attempt to assess the cost, benefit, or overall feasibility of these options.

Current Municipal Water Supplier Reporting Requirements

The data and information reported by municipal water suppliers to state agencies is based on Minnesota statutes and administrative rules adopted in response to specific legislation, as detailed below. The focus of this report is to examine the requirements that affect municipal water suppliers in the TCMA. Other authorities and responsibilities of state agencies that are not directly related to municipal water supplier reporting requirements are not referenced in this report.

Minnesota Department of Natural Resources

The Minnesota Department of Natural Resources (DNR) is charged with balancing the competing demands that are placed on the water resources of the state. To manage this mandate, the DNR has established a water appropriation permit process that requires permittees to report the quantity of water withdrawn and how that water is used. The DNR may also require additional data reporting in an

individual permit issued to a municipal water supplier. Often this additional data is for the purpose of tracking the water supply of a specific resource that is of concern to the DNR.

The authority to manage waters of the state are contained in Minnesota Statutes 103 through 114. The DNR's authority to manage water appropriations is contained in Minnesota Statute, Chapters 103A and 103G (<https://www.revisor.mn.gov/statutes/part/WATER>). Within Chapter 103G, Waters of the State, are several statutory requirements that govern municipal water supplies¹ including, but not limited to:

- Water law, definitions, water conservation program (103G.001 to 103G.101)
- Water Allocation Priorities (103G.261)
- Water Supply; Management (103G.265)
- Appropriation and Use of Water (103G.271)
- Installation for Water Use (103G.275)
- Water Use Prohibited without Measuring Quantities² (103G.281)
- Monitoring to Evaluate Impacts from Appropriations² (103G.282)
- Groundwater Appropriations (103G.287)
- Public Water Supply Plans; Appropriation during Deficiency (103G.291)
- Statewide Drought Plan (103G.293)
- Landscape Irrigation Systems (103G.298)
- General Permit; Application Procedures (103G.301)

The administrative rule that supplements Minnesota Chapter 103G is contained in Chapter 6115, Public Water Resources. Municipal water suppliers must comply with the following primary rule requirements including, but not limited to:

- Water Appropriation and Use Permits (6115.0600 through 6115.0810), including:
 - Application for Permit (6115.0660)
 - Additional Requirements and Conditions for Public Water Supplies (6115.0680 to 6115.0720)
 - Well Interference Problems Involving Appropriations (6115.0730)
 - Water Use Conflicts (6115.0740)
 - Provisions and Conditions of Water Appropriation Permits² (6115.0750)
 - Water Conservation² (6115.0770)

Minnesota Department of Health

The Minnesota Department of Health (MDH) manages programs that ensure municipal water supply systems are providing drinking water that is safe and adequate. The MDH statutory responsibilities are contained in Minnesota Chapter 144 and Administrative Rule 4720. Additionally, the Minnesota statutes

¹ DNR uses the term “public water supply” and MDH uses the term “municipal water supply” to identify suppliers in the state. For the purpose of this report, the term “municipal water supply/supplier” is utilized.

² Statute or Rule that contains reporting requirement.

and rules must be compliant with the Federal Safe Drinking Water Act. The sections of Chapter 144, Department of Health, that apply to municipal water supply include, but are not limited to:

- Fluoridation of Municipal Water Supplies (144.145)
- Safe Drinking Water Act (144.381 through 144.3871)

All sections of Rule 4720, Public Water Supplies, apply to municipal water suppliers. The following list contains requirements specifically relating to annual reporting requirements that include, but are not limited to:

- Fluoridation³ (4720.0030)
- Microbiological contaminant sampling and analytical requirements (4720.0550)

Disinfection and turbidity reporting requirements are contained in the Code of Federal Regulations (CFR) and include, but are not limited to:

- Monthly Turbidity Reports for Population > 10,000 (40 CFR §141.175)
- Monthly Turbidity Reports for Population < 10,000 (40 CFR §141.570)
- Monthly Disinfection Reports (40 CFR §141.75)

Metropolitan Council Environmental Services

The Metropolitan Council Environmental Services (MCES) manages public wastewater treatment facilities and infrastructure in the TCMA. Municipalities served by MCES are asked to complete an annual Wastewater Survey report on population, changes in land use, water consumption, onsite treatment systems, and other issues that influence regional wastewater management and planning. MCES tracks water usage for all municipalities to adequately predict changes in flows to wastewater treatment facilities. This survey must be completed by all metropolitan area municipalities, including those that purchase water from a neighboring municipal water supplier.

Municipal water suppliers are required to submit an annual report to the [Industrial Waste & Pollution Prevention \(IWPP\)](#) section of MCES. The Industrial Waste program is a requirement of the NPDES program required by the USEPA and managed by the Minnesota Pollution Control Agency (MPCA). Municipal water treatment plants fall into the industrial treatment category because of discharge of liquid waste, such as filter backwash water, into the regional sanitary sewer system. Municipal water treatment plants are covered under a general permit and are not required to collect and analyze samples of the discharges. Annual reporting is used to track the volume of discharges to the sanitary sewer system and to compute the annual fees. These water suppliers electronically report monitoring data through the [MCES Industrial Online Reporting System \(IORS\)](#). The volume information is reported to the MPCA each year in the MCES Annual Pretreatment Report.

Minnesota Pollution Control Agency

The MPCA does not have any direct authority over municipal water supply in the State. However, the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) program, managed by the MPCA, requires wastewater discharge permits for disposal of solids generated from media filters, softening treatment, and membrane filtration processes at water treatment facilities. The

³ Statute or Rule that contains reporting requirement.

MPCA requires a wastewater disposal permit and an annual report for discharges that involve land application of residual solids from these water treatment plant permitted operations.

Problem Statement

The current state of municipal water supplier reporting requirements is at times burdensome and confusing for communities and data end-users, as expressed in the interviews summarized in this report. This lack of clarity, from both the local community and agency perspective, increases the potential for inaccurate and/or missing data (low quality data). The result is added time, expense, and frustration for communities, less confidence in the resource assessments conducted by agencies and regional experts, and an undermining of trust regarding resource management and planning goals.

Reporting requirements have evolved from four (4) important state environmental and public health objectives:

- Management that ensures the sustainability of Minnesota’s water resources (DNR)
- Safety of the public drinking water (MDH)
- Water quality protection (MDH, MPCA, MCES)
- Long-range planning to ensure prosperity and provide essential services to enhance quality of life (MCES)

The water supply data supplied by municipal water suppliers and others is essential information that is used to support these objectives. The reporting requirements for municipal water suppliers has evolved within each agency as regulations, technical understanding, and technology have evolved. One agency’s requirements are not necessarily related to the reporting needs of other agencies. Reporting municipal water supplier data in agency-specific “silos” has resulted in separate reporting requirements that are simultaneously similar and dissimilar. Municipal water suppliers often struggle with a time-consuming process that involves:

- Different definitions and units of measurement for common terms
- Different reporting deadlines that do not necessarily align with billing cycles
- A lack of feedback and consultation from state agencies

Project Development

Project Approach

Phase I of this project aimed to understand the current municipal water supplier data reporting requirements and challenges through research, interviews, and review of data requirements. The project team sought to understand and document the perspectives of municipal water suppliers and state water agencies, understand requirements, and identify opportunities for addressing challenges. The following describes the interview process, information gathered, and initial findings.

Interview Phase

Municipal Water Supplier Interviews

Interviews were conducted with representatives from municipal water suppliers during April and May 2019. The project team met with six communities (Prior Lake, Burnsville, Shoreview, Mound, Brooklyn Park, and Eagan) from across the metropolitan area to gather information on their experiences regarding reporting to each of the agencies that request data. A questionnaire was developed, and in-person interviews were held to understand and document their experiences with the different data

reporting programs and processes. Several themes became evident during the interview process including, but not limited to:

- Inconsistent terminology used in different reports
- Inconsistent units of measurement across the various agencies
- Multiple divisions from within a city required to submit data
- Limited feedback from the agencies on correctness of data reported
- Unclear understanding of the purpose of the reported data
- Multiple deadlines within a short timeframe to collect and report data
- Limited or no pre-population of data from prior years
- Challenges with staff turnover and institutional knowledge loss
- Time-consuming processes that are not user-friendly and cumbersome

State Agency Interviews

Following the interviews with individual communities, the project team interviewed state agencies that request and require municipal water supply data. Similarly, the agencies were asked a series of questions to help the project team understand water supply data reporting challenges from their perspectives. The state agencies that were interviewed are:

- DNR
- MDH
- MCES⁴

A fourth agency, MPCA, was considered but not included in these interviews because the annual reporting requirement was limited to only those municipal water suppliers that use land application to dispose of residual solids. As with the municipal water supplier interviews, questions were developed prior to the first state agency interview and were consistently used for all interviews which were conducted in July and August 2019.

Several themes were evident during the interview process including, but not limited to:

- Incomplete or low-quality data
- Non-standardized, non-comparable data
- Inefficient submission methods (i.e., US mail instead of preferred electronic submittal)
- Not separating out data by installation or source (e.g., three wells reported as one)
- Limited ability to effectively process data (i.e., scanned images cannot be input into a system to populate databases)
- Information technology and data security challenges

⁴ Two separate interviews were conducted with MCES, the first for the annual Sewer Use Survey and the second for the Industrial Waste Discharge Permit.

The agencies were asked where municipal water suppliers have the most difficulty when reporting data. Some common difficulties they observed include:

- Difficulty splitting data into water use categories (i.e., Residential, Commercial, Institutional, and Industrial)
- Difficulty reporting requested units of measurement (i.e., gallons, 1000 gallons, millions of gallons)
- Challenges reporting data that is collected from billing systems (i.e., billing cycles do not necessarily equal the reporting timeframe causing data to be estimated instead of measured)
- Obtaining information by due date due to municipal water supplier staff turnover

Research Phase

Data Collection

After each interview, staff from the state agencies provided documents to help the project team understand reporting requirements and reporting systems related to the municipal water supplier data and information. The following is a list of all the reporting documents provided by state agencies during the interview phase that were reviewed as part of this project:

Minnesota Department of Natural Resources

- Minnesota Permit and Recording Systems (MPARS)
- Minnesota Water Conservation Reporting System
- Groundwater Level Data Entry Form
- Local Water Supply Plan Template, Third Generation⁵
- Groundwater Technical Review Examples

Minnesota Department of Health

- Community Public Water Supply Forms (links to MDH webpage with reporting forms)
- MN Rural Water Association Tools
- Drinking Water Revolving Fund

Metropolitan Council Environmental Services

- Survey of Sewer User Data
- On-Site Disposal Systems
- Unmetered Connections Certification
- Generalized Land Use (from Local Planning Handbook)
- Annual SMR for Water Treatment Plants, Help Sheet for the Industrial Online Reporting System⁶
- Permit Renewal Application for Water Treatment Plants, Help Sheet for the Industrial Online Reporting System

⁵ The Council Water Supply Planning unit reviews Local Water Supply Plan information as part of Comprehensive Plan updates.

⁶ This is the official title of the sample report provided by Metropolitan Council. The acronym SMR stands for Self-Monitoring Report.

Two additional and relevant documents were added to the review list based on additional research:

- MPCA Water Treatment Plant Residual Solids Annual Report
- Joint Assessment Study: Process/Application/Database Current State Document, Minnesota Information Technology, April 28, 2014

A detailed inventory of the information provided by the agencies is contained in Appendix A. Also included in Appendix A is a list of American Water Works Association (AWWA) manuals that could provide technical support to both state agencies and municipal water suppliers.

Data Review

The next step was to review the documents provided and create a detailed cross-reference that would be used to identify common and conflicting reporting requirements. Table 1 identifies the reporting requirements that were reviewed in detail during this project phase.

Table 1. Reports Provided to State Agencies by Municipal Water Suppliers

State Agency	Reports	Report Submittal Frequency
Metropolitan Council	Sewer Survey	Annual
	Industrial Waste Online Report	Annual
Minnesota Department of Natural Resources	Annual Water Use Report and Fee Calculation (MPARS)	Annual
	Water Conservation Reporting System ^a	Annual
	Groundwater Level ^b	As defined in permit
	Local Water Supply Plan ^c	10-Year
Minnesota Department of Health	Bacteriological/Disinfectant Residuals	Monthly
	Fluoridation	Monthly
	Turbidity and Disinfection	Monthly
Minnesota Pollution Control Agency	Residual Solids	Annual

Notes:

^a Required for all Metro Area municipal water suppliers

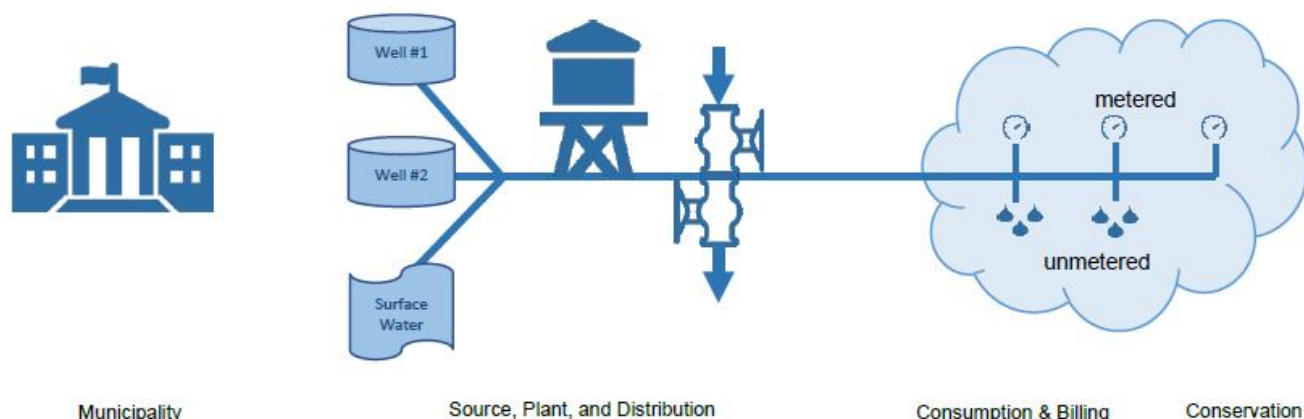
^b Only required by municipal water suppliers that have groundwater level monitoring as a condition of their MNDNR Appropriation Permit

^c The Council evaluates Local Water Supply Plan information as a part of the Regional Comprehensive Planning Process

Data required for each of the reports identified in Table 1 was compiled into a master Excel spreadsheet. The net result tabulated over 350 lines of data required, with the actual number for a specific municipal water supplier being dependent on local conditions such as population served, number of wells, and additional permit requirements. Not included in this tabulation are chemistry testing results that typically are provided to the MDH by laboratories working for municipal water suppliers.

To facilitate a cross-reference, each data requirement was categorized as shown in Figure 1.

Figure 1. Municipal Water Supplier Data Reporting Categories



These four (4) categories represent the major municipal sources of the required data.

- **Municipality** represents the community identifying data that usually does not change from year-to-year. This category includes municipality or municipal water supplier name, permit numbers, staff information, facility addresses, etc.
- **Source, Plant, & Distribution** includes pumping records, water treatment volumes, capital improvements, and other similar information. This information may be tracked in SCADA systems for those municipal water suppliers that have invested in SCADA software. This category also includes water conservation improvements implemented at a plant or within the distribution system which likely are associated with SCADA operations.
- **Consumption & Billing** focuses on customer information, including use categories, water volumes sold, unbilled water, wholesale water bought or sold, etc. This information is typically managed by the water billing software utilized by finance departments.
- **Conservation** includes programs managed by a municipality or municipal water supplier that improve water use efficiency or documents conservation and education efforts throughout communities. These actions are compiled into a separate category because the information is not typically tracked by billing software and may be tracked by multiple departments within a community.

These categories are generally organized according to where the information is collected within a typical municipality. For example, the Source, Plant, & Distribution data is managed by water plant personnel while the Consumption & Billing information is managed by a finance department. This categorization anticipates that future improvements in reporting requirements can be organized in a manner that focuses on where the data is collected within a municipality.

Reporting Comparison and Options

Comparison of Reporting Requirements

The magnitude of data reporting requirements prohibited the creation of a simple cross-reference matrix that would compare data across each agency. The creation of a matrix was further complicated by differences in terminology (data definitions) that were used by each agency and, in some instances, within an agency. A report-by-report comparison was created, and the information was input into a set of tables that organize the specific agency data requirements according to the categories described in the previous section: Municipality, Source/Plant/Distribution, Consumption/Billing, and Conservation. These tables are contained in Appendix B.

Commonalities and Differences

With respect to differences in reporting requirements, six (6) primary areas of mixed terminology and/or differing reporting requirements were found:

1. Municipal water supplier identification information
 - a. Municipality (MCES Sewer Survey)
 - b. Public Water Supply Identification (MDH)
 - c. Permit number (DNR MPARS)
 - d. Permit holder name, permit ID# (DNR MPARS)
 - e. DNR Water Appropriation Permit # (DNR Water Supply Plan)
 - f. Mailing address and contact information (MCES Sewer Survey, MCES Industrial Waste, MDH)
2. Water source
 - a. Source, well number, raw water source, water source (MDH, MCES Industrial Waste)
 - b. Source, well number, well name (DNR Water Conservation Reporting System)
 - c. MDH unique well #, permit ID# (DNR Groundwater Level)
 - d. Resource type, resource name, MN unique well # (DNR Water Supply Plan)
3. Water units
 - a. User defined unit per quarter (MCES Sewer Survey)
 - b. 1000 gallons per daily meter reading (MDH)
 - c. Whole gallons per month (DNR MPARS)
 - d. Total gallons per pump cycle (DNR Groundwater Level)
 - e. Gallons (MCES Industrial Waste)
4. Water sold
 - a. Water sold (MCES Sewer Survey)
 - b. Authorized consumption, billed metered, billed unmetered (DNR Water Conservation Reporting System)
 - c. Water use (DNR MPARS)
 - d. Metered, delivered, demand (DNR Water Conservation Reporting System, DNR Water Supply Plan)
 - e. Total incoming water, total water not sewered, total water sewered (MCES Industrial Waste)
 - f. Water not discharged to sanitary sewer (MCES Industrial Waste)
5. Number of water users
 - a. Population served (MCES Sewer Report, DNR Water Conservation Reporting, DNR Water Supply Plan)
 - b. Total connections (MCES Sewer Report)
 - c. Total connections and metered connections (DNR Water Conservation Reporting System)
 - d. Customers, metered connections, and automated meter readers (DNR Water Supply Plan)
6. Customer classification

- a. Residential, Institutional, Commercial, Industrial (MCES Sewer Survey)
- b. Residential single family, residential multi-family⁷, CII⁸, agricultural (DNR Water Conservation Reporting System)
- c. Residential single family, residential multi-family⁵, C/I/I⁶, non-essential, wholesale (DNR Water Supply Plan)

Potential Options (Steps) to Improve Water Supply Data Reporting

How might water supply data reporting be improved in a manner that is more efficient for municipal water suppliers, provides data that contains fewer errors, and offers greater value to the agencies? Both municipal water suppliers and state agencies have expressed a need to improve water supply data reporting processes. There are data commonalities and differences between the state agencies and between unique municipal water suppliers. None of the commonalities nor differences are improper as they typically meet the needs of the individual agency or municipal water supplier. However, differences in terminology or reporting requirements has the potential to increase erroneous or inaccurate data that is either unreliable or not useable, and increases the inefficiencies experienced by both the communities and the reporting authorities.

Discussions at community and agency interviews, presentations of initial findings, and internal project staff meetings have resulted in creative ideas that have a range of potential benefits. The following list organizes these suggested options from relatively straightforward to most complex. Note that the first options provide foundational information that is will be needed for the more complex options. This is far from an exhaustive list, and any steps to be taken to address these potential options will require significant discussion and collaboration between state agencies and municipal water suppliers. It should also be noted that these ideas will require additional investigation to assess specific costs, benefits, and obstacles that must be overcome prior to implementation. The following list of options are organized from simple to complex implementation requirements:

1. Do Nothing
2. Glossary of Standardized Terms: A glossary that contains a list of synonyms could help identify where agency terms are the same or dissimilar and specify the definition used by each agency. This could be a look-up guidance for municipal water suppliers to confirm that the information provided in response to a specific question or data request is correctly submitted. Ideally, the synonyms, definitions, and measurement units could be standardized across all municipal water suppliers and agencies.
3. Cross-Reference of Reporting Data: A spreadsheet or other guidance could be created that cross-references the data and information required by the various agency reports. Basically, it would be an expanded version of Appendix B contained in this report. The list of agencies would be expanded to show all agency required reports, and the list of requested data would highlight all data with an identifier that references the page number, section, and/or question number of the applicable report. This could also be utilized as a look-up guidance for municipal water suppliers to understand how data in one report may be duplicated in a

⁷ Billing software utilized by municipal water suppliers may classify multi-family residential as commercial customer

⁸ CII and C/I/I are acronyms for customer classification group of Commercial, Industrial, Institutional

different report and would expand on the glossary of terms. Ideally, the agencies and water suppliers would provide input that would help to simplify definitions and reporting units while ensuring their requirements continue to be met.

4. **SCADA Software Technical Provisions:** There are more than 100 municipal water suppliers in the metropolitan area, many of which utilize SCADA software to collect and maintain water plant operational data. As new SCADA systems come online and old systems are replaced, the new and/or updated systems can be set up to generate the data and information required in agency reports. To do so, a technical provision could be developed that could be inserted into a municipal water supplier's bidding specifications/document. This technical provision would incorporate the glossary and cross-reference created for Option 2 and Option 3. Additionally, it could output one spreadsheet for each public agency report that is specific to the language of the requested data, the units of measurement, and other requested items. Although agency requirements change over time, this option would address many of the current challenges. This idea was suggested by Southwest Workgroup members to the project team in the Fall of 2019, as they were being presented with the preliminary findings of this study.
5. **Billing Software Technical Provisions:** Billing software would replicate the SCADA software option, except that the technical provision would focus on the customer information required by the state agencies. To do so, a technical provision could be developed that could be inserted into a municipal water supplier's bidding specifications/document. It would incorporate the information created for Option 2 and Option 3 and would be in a similar format to Option 4. This would need to be done in such a way as to not limit each community's customer billing needs while providing a method for reporting uniform customer use data. The billing systems would be set up to provide either electronic or paper output of data in the format required by each state agency.
6. **Database Annual Report Output (for communities without SCADA systems):** This option is a database entry version of Option 3. It would provide a simple data management database for use by municipal water suppliers in the metropolitan area that do not utilize SCADA and/or billing software. The concept is that a user-friendly database software could be set up with data entry fields that replicate some or all data requested by state agencies. The data would allow for storage of historic data such that information from a previous year could be easily compared to the current year. The database would also be set up to output electronic and/or paper reports of information in the format required by each state agency.
7. **Agencies Share Common Data:** Data submitted by municipal water suppliers could be simplified if the state agencies could eliminate the submittal of data that is also required by a second, or even third, state agency. State agencies would need to work together to streamline data submission requirements and then establish protocols to share their respective internal data, with outside agencies. Conceivably, one state agency could serve as the clearinghouse of all data which would be shared by multiple state agencies. Alternatively, the data collection could be split among multiple agencies in a manner that does not create duplication of data submittal. The benefit would be improvements in data comparability between state agencies, improved reporting efficiencies for municipal water suppliers, and help to build a shared understanding of drinking water resource and infrastructure data in the state.
8. **One-Stop Informational Website:** A website could be created that could serve as a clearinghouse of information from state agencies. The website would contain guidance documents and templates (i.e., glossary, cross-reference matrix, technical provisions) developed for Option 2, Option 3, Option 4, and Option 5. It could also contain state agency contact information, links to annual reporting requirements, reporting deadlines, and notification of changes to reporting requirements. This option would likely require one state

agency to volunteer to host and maintain the website and requires all state agencies to regularly provide updated information.

9. **Agency Data Entry Portals:** Municipal water suppliers expressed interest in having the ability to submit required electronic data via a portal instead of email, regular mail, and hand-input data. Similarly, agencies expressed an interest in improving the way some types of data are submitted. Some agency reports are already submitted electronically, but other data is submitted manually via USPS mail or scanned documents attached to emails. Portals could allow for multiple methods of data submittal that would accommodate the range of data collection practices utilized by municipal water suppliers. Ideally, previous year reports would be stored within the portal for municipal water suppliers to review historic information. Preferably, the portal would allow for direct submittal of electronic data, either as a spreadsheet or database. The technical provisions developed in Option 4 and Option 5 (and potentially Option 6) would be expanded to define the specific data fields, characters, and other information to ensure that the electronic output reports are compatible with input into each agency portal. This option could be similar to, or expand upon, the wastewater customer portal maintained by the Metropolitan Council for inflow/infiltration reporting.
10. **Universal Agency Data Entry Portal:** A universal data entry portal would provide an ideal one-stop shop for municipal water supply data reporting. Municipal water suppliers would be able to submit all required information in a single online locale. State agencies would need to be able to extract the information that they require from this universal portal. This is clearly the most complex option and would require considerable assessment and coordination by both the state agencies and the municipal water suppliers to unify data entry requirements and terminology. As with Option 9, this option would require expansion of the technical provisions developed in Option 4, Option 5, and Option 6 so that electronic output reports are compatible with portal input requirements. This option, along with Option 9, would also require significant coordination with Minnesota Informational Technology to meet state digital security requirements.

Each of the options described above will resolve some of the issues identified by the municipal water suppliers and the state agencies during the interview phase. However, there is no clear option that easily resolves all identified themes and concerns. Table 2 identifies the theme, issue, and concern that are resolved by each of the options identified.

Table 2. Themes, Issues and Concerns Resolved by Options

Option	Themes, Issues, and Concerns Resolved by Option
1. Do Nothing	• None
2. Glossary of Standardized Terms	• Inconsistent units of measurement, definitions, and acronyms • Non-standardized data (e.g., land use categorization, units of measurement, billing cycles)
3. Cross-Reference of Reporting Data	• Inconsistent units of measurement, definitions, and acronyms • Non-standardized data (e.g., land use categorization, units of measurement, billing cycles)

Option	Themes, Issues, and Concerns Resolved by Option
4. SCADA Software Technical Provisions	• Inconsistent units of measurement, definitions, and acronyms • Time-consuming, not user-friendly, and cumbersome • Incomplete and/or poor-quality data submittal • Non-standardized data (e.g., land use categorization, units of measurement, billing cycles)
5. Billing Software Technical Provisions	• Inconsistent units of measurement, definitions, and acronyms • Time-consuming, not user-friendly, and cumbersome • Non-standardized data (e.g., land use categorization, units of measurement, billing cycles)
6. Database with Annual Report Output	• Inconsistent units of measurement, definitions, and acronyms • Time-consuming, not user-friendly, and cumbersome
7. Agencies Share Common Data	• Non-standardized submittal methods (i.e., web portal, email, U.S. mail)
8. One-Stop Informational Website	• Inconsistent units of measurement, definitions, and acronyms • Non-standardized data (e.g., land use categorization, units of measurement, billing cycles)
9. Agency Data Entry Portals	• Limited feedback from the agencies (e.g., correctness of data, pre-population of previous year data, how data is used) • Non-standardized submittal methods (i.e., web portal, email, U.S. mail) • Lack of data processing abilities (i.e., scanned images cannot be input into a system to populate)
10. Universal Agency Data Entry Portal	• Time-consuming, not user-friendly, and cumbersome • Limited feedback from the agencies (e.g., correctness of data, pre-population of previous year data, how data is used) • Non-standardized submittal methods (i.e., web portal, email, U.S. mail)

As shown on Table 2, there is no single option that resolves all identified themes, issues, and concerns. Yet, there is a benefit to developing the easier-to-implement options (aka, low-hanging fruit) which in time can be expanded as the more complex options are considered and developed.

Summary

The overall purpose of this project has been to identify the current challenges and issues faced by municipal water suppliers and state agencies regarding water supply data and information reporting, and to identify options that have the potential to resolve the identified issues. The discovery process

involved interviews that captured the perspectives and experiences of municipal water suppliers and state agencies combined with a detailed review of agency reporting requirements. Common themes emerged that allowed for a focused identification of the problem:

Uncoordinated data reporting requirements, inconsistent data definitions, and disparate units of measurement lessens data quality and creates inefficiencies that decreases trust and increases costs for municipal water suppliers and state agencies.

Findings

Specific areas identified for improvement include:

- Terminology (data definitions) and units of measurement should, at a minimum, be cross-referenced, and preferably be standardized where possible.
- State agencies could extend their efforts to provide feedback on the accuracy of submitted data and seek input from the data reporters (municipal water suppliers) regarding how their data is utilized.
- A data entry or reporting system could be created that would allow for review (or pre-population) of historic data so that municipal water suppliers can review whether current data aligns with historic data.
- State agencies and municipal water suppliers could train additional staff on reporting requirements to prevent significant errors and/or delays if the primary staff leaves their position. Clear reporting protocols and data definitions would help them to do so.
- A single water supply data reporting portal should be explored by the state agencies with the help of municipal water suppliers and Minnesota IT.
- Municipal water suppliers and state agencies should work together to progress towards a system that eliminates data and effort duplication, is efficient for all users, includes the highest quality data possible, provides real-time feedback, and allows communities and the state to meet their drinking water and water resource goals.

Recommendations and Conclusion

Some of the improvements identified above are relatively straightforward solutions that could be established independently by municipal water suppliers or state agencies. However, the larger issues will require coordinated discussion, collaboration, and development of guidance with the purpose of improved efficiency and data quality. Ideas emerged during the fact-finding process and subsequent discussions that are about resolving these issues. These ideas were compiled into 10 options (steps) that progress in complexity and effort. Initial, relatively straightforward options are likely needed to inform more complex efforts.

1. Do Nothing
2. Glossary with Standardized Terms
3. Cross-Reference of Annual Report Data
4. SCADA Software Technical Provisions
5. Billing Software Technical Provisions
6. Database with Annual Report Output
7. Agencies Share Common Data
8. One-Stop Informational Website
9. Agency Data Entry Portals

10. Universal Data Entry Portal

The “Do Nothing” option does not provide improvement and a “Universal Data Entry Portal” is not feasible without significant coordination between regulatory agencies, state information technology specialists, and requires a sustainable funding source. Instead, a phased approach is recommended. This phased approach could begin with the simpler options such as Option 2 and advance through more complex options. A well-developed Glossary (Option 2) and Technical Provisions (Option 4 and Option 5) can become a solid foundation for the more complex electronic options (Option 7 through Option 10). The initial steps of Option 2 and Option 3 are likely needed for any subsequent steps to be successful. Members of Subregional Working Groups have specifically expressed support for the agencies coming together to provide communities with specific, coordinated data reporting requirements that could be used when communities set up new or replacement SCADA software. Therefore, it is recommended that initial options, such as the Glossary and Technical Provisions, be developed in the near-term that would support future development of more advanced electronic data sharing and reporting systems. Prior to implementation of any option, additional study is needed to consider the costs and benefits of the option as well as State of Minnesota electronic data policies.

Appendix A

Inventory of Information Provided by Agencies and List of American Water Works Association Manuals

Report Title	File Name	Report Overview	Submittal Date
Minnesota Department of Natural Resources			
<i>Minnesota Water Conservation Report 2018</i>	2018-Full_FINAL-MN-WaterConservationReport2018edit1 10418.pdf	Summary of water conservation efforts using data from MWCR (MN Water Conservation Reporting System)	As required
<i>Memo: Groundwater Technical Review of 2016 Water Supply Plan, 1981-6089, Chanhassen</i>	2019-04-15 Chanhassen WSP GW rpt.pdf	Technical review of groundwater use and potential impact to Seminary Calcareous Fen	NA
<i>Memo: Groundwater Technical Review, Groundwater Supply Plan for 1984-6141 - City of Elko New Market</i>	2019-05-30-ElkoNewMarketWSPTech1984-6141.pdf	Analysis of historic and current water use. Contains information to improve monitoring data.	NA
Groundwater Level Data Entry Form	APP_PERMIT_GWL_DATA_w_instr uctions_v3_04_18_2018.xlsx	Required for permit holders with monitoring requirements in permit and anyone collecting groundwater level data	???
2018 Municipal Water Accounting	ESPWater 2018 Muni Water Accounting.csv	Municipal data for 2018 (rec'd 2019?)	NA
<i>Local Water Supply Plan Template, Third Generation for 2016-2018</i>	Final WSP TEMPLATE 12-8-15.docx	Instructions for completing a 10-year water supply plan	2017/2018
Sample PWS Water Report	Sample PWS Water Use Report.pdf	Blank worksheets for 2018	
MPARS screen shots for 2019 reporting	1989-3235 WUR-Screen0.png <i>through</i> 1989-3235 WUR-Screen7.png	Screen shots of MPARS data entry web pages	15-Feb
Metropolitan Council			
2018 On-Site Disposal Systems	18 On-Site Disposal Sys Survey.pdf	Blank data entry form	March
Survey of Sewer User Date for 2018	18 Sewer Use Survey.pdf	Blank data entry form	March
Unmetered Connections Certification, Period Covering December 31, 2017 - December 31, 2018	18 Unmetered Connections.pdf	Blank data entry form	March
2016 Generalized Land Use (from Local Planning Handbook)	https://metro council.org/Handbook/Files/Resources/Fact-Sheet/LAND-USE/2016-Generalized-Land-Use-	Fact sheet	

Report Title	File Name	Report Overview	Submittal Date
	Categories-and-Definitio.aspx		
Minnesota Department of Health			
Email: MGEC Meeting – Citations requested	*MR 4720.0030, Monthly fluoridation report *40 CFR §141.175, Monthly turbidity reports (PWSs >= 10,000 population) *40 CFR §141.570, Monthly turbidity reports (PWSs < 10,000 population) *40 CFR §141.75, Monthly disinfection reports	N/A	N/A
Community Public Water Supply Forms	https://www.health.state.mn.us/comunities/environment/water/com/com.html		Monthly
	https://www.health.state.mn.us/comunities/environment/water/docs/com/bactimonthly.pdf	Bacteriological/Disinfectant Residual Monthly Report	Monthly
	https://www.health.state.mn.us/comunities/environment/water/docs/com/flnitrate.pdf	Fluoridation & Nitrate or Nitrite Removal Monthly Report	Monthly
	https://www.health.state.mn.us/comunities/environment/water/docs/com/flnitrate.pdf	Fluoridation Phosphate # Nitrate or Nitrite Removal Monthly report	Monthly
	https://www.health.state.mn.us/comunities/environment/water/docs/com/fl3300.pdf	Fluoride Monthly Report: Fewer Than 3300	Monthly
	https://www.health.state.mn.us/comunities/environment/water/docs/com/flmulti.pdf	Fluoride Monthly Report: Multi-Well	Monthly
	https://www.health.state.mn.us/comunities/environment/water/docs/com/flphos.pdf	Fluoride Monthly Report: Phosphate	Monthly

Report Title	File Name	Report Overview	Submittal Date
Community Public Water Supply Forms	https://www.health.state.mn.us/com/munities/environment/water/docs/com/fisnglepoint.pdf	Fluoride Monthly Report: Single Treatment Points	Monthly
	https://www.health.state.mn.us/com/munities/environment/water/docs/com/intplan.pdf	Community Public Water System Interconnection Plan	As required
	https://www.health.state.mn.us/com/munities/environment/water/docs/planreview/planreviewfeesheet.pdf	Plan Review Fee Worksheet	As required
	https://www.health.state.mn.us/com/munities/environment/water/docs/com/turbidsmall.pdf	Turbidity Monthly Report: Small Surface Water Systems	Monthly
	https://www.health.state.mn.us/com/munities/environment/water/docs/com/turbidlarge.pdf	Turbidity Monthly Report: Large Surface Water Systems	Monthly
	https://www.health.state.mn.us/com/munities/environment/water/docs/com/turbmembrane.pdf	Turbidity Monthly Report: Membrane Filtration Systems	Monthly
	https://www.health.state.mn.us/com/munities/environment/water/docs/wateroperator/opexamapp.pdf	Water Operator Exam Application	As required
	https://www.health.state.mn.us/com/munities/environment/water/docs/water/tank.pdf	Water Tank Record for an Event	As required
Drinking Water Revolving Fund	https://www.health.state.mn.us/com/munities/environment/water/docs/dwrf/erchecklist.pdf	Environmental Review Checklist by Category	As required
	https://www.health.state.mn.us/com/munities/environment/water/docs/dwrf/erecordcover.pdf	Environmental Review Record Cover Page	As required

Report Title	File Name	Report Overview	Submittal Date
Drinking Water Revolving Fund	https://www.health.state.mn.us/communities/environment/water/docs/dwrf/erxemptcklist.pdf	Environmental Review Exemption Checklist	As required
	https://www.health.state.mn.us/communities/environment/water/docs/dwrf/erxemptcklist106.pdf	Section 106 Exemption Checklist	As required
	https://www.health.state.mn.us/communities/environment/water/docs/dwrf/erinfowsheet.pdf	Environmental Review Information Worksheet	As required
	https://www.health.state.mn.us/communities/environment/water/docs/dwrf/ersolicmaillist.pdf	Environmental Review Solicitation Mailing List	As required
	https://www.health.state.mn.us/communities/environment/water/docs/dwrf/templtr.docx	Template Letter to the Minnesota Historic Preservation Office	As required
MN Rural Water Association Tools	http://www.mrwa.com/tools.html#Forms		
	http://www.mrwa.com/assetmgmt.html	Asset Management Templates	
	http://www.mrwa.com/PDF/EmergencyWaterSupplyPlan.pdf	Emergency Water Supply Plan Document	
	http://www.mrwa.com/PDF/EmergencyWaterSupplyPlan.pdf	Security Vulnerability Assessment / Emergency Response Templates	
	http://www.mrwa.com/Excel/mdhfluosingle.xlsx	MDH Fluoridation Monthly Report - Single Treatment Point (Excel version)	
	http://www.mrwa.com/Excel/mdhfluosinglecorrosion.xlsx	MDH Fluoridation Monthly Report - Single Treatment Point with Corrosion Control (Excel version)	
	http://www.mrwa.com/Excel/mdhcpwsinterconnect.xlsx	MDH Community PWS Interconnection Plan - Interim or Long-Term Interconnection (Excel version)	

Report Title	File Name	Report Overview	Submittal Date
Minnesota Pollution Control Agency			
Water Treatment Plant Residual Solids Annual Report	https://www.pca.state.mn.us/water/compliance-and-facility-operations	Annual report for reporting period September 1 through August 31	January
Multi-Agency Integration Subteam			
<i>Joint Assessment Study: Process/Application/Database Current State Document, Minnesota Information Technology, April 28, 2014</i>	CWF Water Data Portal Assessment Summary 20140428.docx Available online at: https://www.pca.state.mn.us/sites/default/files/wq-cwc2-14f.pdf (document is attached to CWP meeting minutes for June 16, 2014)	*Information developed for the purpose of creating a (future) multi-agency water information portal. *funded by Clean Water Fund *Drinking water section focuses on MDH water chemistry databases: WCHEM, MNDWIS, CWI, and Wells MNDNR MPARS database summaries focus on the Work in Water Permit and Appropriations Permit - no info on data from water utility reporting	
American Water Works Association			
The Water Dictionary: A Comprehensive Reference of Water Terminology, Second Edition	https://www.awwa.org/Store/Product-Details/productId/6298	Standardized terminology reference	
M1-Principles of Water Rates, Fees, and Charges, 7 th Edition	https://www.awwa.org/Store/Product-Details/productId/61556627	Water rates, fees, and charges	
M6-Water Meters: Selection, Installation, Testing, and Maintenance. 5th Edition	https://www.awwa.org/Store/Product-Details/productId/28471	Practice manual on types, selection, use and maintenance of water meters	
M21-Groundwater, 4th Edition	https://www.awwa.org/Store/Product-Details/productId/36972536	Groundwater principles and impact on design, construction, and maintenance of groundwater well systems.	
M33-Flowmeters in Water Supply, 3rd Edition	https://www.awwa.org/Store/Product-Details/productId/69279701	Information on most commonly used large flowmeters.	
M36-Water Audits & Loss Control Programs, 4th Edition	https://www.awwa.org/Store/Product-Details/productId/51439782	Information to improve water loss program, including AWWA Water Audit Software.	
M50-Water Resources Planning, 3rd Edition	https://www.awwa.org/Store/Product-Details/productId/62573688	How to create long-term Integrated Water Resource Plan with information on how to	

Report Title	File Name	Report Overview	Submittal Date
		develop new water supplies.	
M52-Water Conservation Programs, A Planning Manual, 2nd Edition	https://www.awwa.org/Store/Product-Details/productId/61841578	Information to develop, implement, and measure the success of water conservation programs.	
M54-Developing Rates for Small Systems, 2nd Edition	https://www.awwa.org/Store/Product-Details/productId/43980741	Best practices for water utilities serving population up to 10,000.	
M60-Drought Preparedness & Response, 2nd Edition	https://www.awwa.org/Store/Product-Details/productId/75759388	Strategies, tactics, tools, and methods for drought mitigation.	

Appendix B

Data Requirements by Category

Agency/Report	Data Requested in Report	Frequency		
		Daily	Monthly	Annual
Municipal Water Supplier Data Requirements				
Metropolitan Council: Sewer Use Survey	▪ Municipality ▪ Estimated Population ▪ Community Contacts: Administrator, General Information, Utility Billing ▪ Ordinances ▪ PDF Form Submitted via Email			√
Minnesota Department of Natural Resources: MPARS	▪ Permit Number ▪ Landowner ▪ County ▪ Number of Installations ▪ Invoicing of Annual Permit Fee ▪ Online Data Entry with Username and Password		√	√
Minnesota Department of Natural Resources: Water Conservation Reporting System	▪ Sources ▪ Permit number ▪ Population Served ▪ Online Data Entry with Username and Password			√
Minnesota Department and Natural Resources: Groundwater Levels ¹	▪ Permit Holder Name ▪ Permit ID Number ▪ Primary Contact ▪ Unique Well ID Number ▪ Ordinances			√
Minnesota Department of Health: Reports ²	▪ Public Water System ID (PWSID) ▪ Name of Water System ▪ Well Number ▪ Distribution Location/Entry Point ▪ PDF Form or Excel Spreadsheet Submitted via Email or U.S. Mail	√	√	
Minnesota Pollution Control Agency: Residual Solids Report	▪ Permit Name ▪ Permittee Number ▪ Facility Contact ▪ Type IV Certification Number/Expiration Date ▪ PDF Form Submitted via U.S. Mail			√
Source and Distribution Reporting Requirements				
Minnesota Department of Natural Resources: MPARS	▪ Authorized Volume (gallons) ▪ Maximum Pump Rate (gallons per minute) ▪ Measurement Method ▪ Monthly Water Use (whole gallons)		√	√
Minnesota Department of Natural Resources: MPARS	▪ Maximum Pump Rate (gallons per minute) ▪ Measurement Method			√

Agency/Report	Data Requested in Report	Frequency		
		Daily	Monthly	Annual
Minnesota Department of Natural Resources: Water Conservation Reporting System	- Total Volume (gallons) - Imported Raw Water Source (gallons) - Exported Raw Water Destination - Total Water Supplied to Treatment (gallons)			√
Minnesota Department of Natural Resources: Water Conservation Reporting System	- Treatment Losses (gallons) - Improved Treatment Efficiency (cost and gallons saved) - Storage Mixing Efficiency (cost and gallons saved) - Pressure Control (cost and gallons saved) - Finished Imported Water (gallons) - Finished Exported Water (gallons)			√
Minnesota Department of Natural Resources: Groundwater Levels ¹	- Pump Start Time - Pump Stop Time - Water Level (feet and inches)	√		
Minnesota Department of Health: Reports ²	- Source - Meter Reading (1,000 gallons) - Pumpage (1,000 gallons)	√		
Minnesota Department of Health: Reports ²	Bacteriological/Disinfectant Residual Monthly Report - Coliform and E. Coli Sampling, Testing Methods, Results (positive samples only) - Chlorine Residual Sampling, Results, Percentage of Samples with Positive Coliform Fluoride Monthly Report (varies by type of report) - Phosphate Chemical Usage (gallons per pounds) - Raw Water Fluoride Concentrations - Daily Fluoride Chemical Usage (gallons per pounds) - Raw Water Nitrate or Nitrite Concentrations - Nitrate or Nitrite Analysis Concentrations Turbidity and Disinfection Monthly Report (varies by type of report) - Disinfectant Residual Concentration (milligrams per liter), Duration, and Date - Turbidity Measurements (total number of measurements, number with turbidity greater than allowed, percentage with turbidity greater than allowed)	√	√	
Minnesota Pollution Control Agency: Residual Solids Report	Treatment Plant Residual Solids (by-products, quantity, method of disposal, analytical results)			√

Agency/Report	Data Requested in Report	Frequency		
		Daily	Monthly	Annual
Consumption and Billing Reporting Requirements				
Metropolitan Council: Sewer Use Survey	▪ Number of Municipal Water Supply Connections (residential, institutional, commercial, industrial, total) ▪ Number of Sewer Connections with Private Water Supply ▪ Municipal Residential Water Sold per Quarter ▪ Commercial/Institutional/Industrial Water Sold per Quarter ▪ Total Water Sold ▪ Unit of Measurement		√	√
Minnesota Department of Natural Resources: Water Conservation Reporting System	▪ Authorized Monthly Consumption (gallons) ▪ Number of Connections (residential, non-residential) ▪ Number of Metered Connections (residential, non-residential) ▪ Billed Metered (gallons) (residential, non-residential) ▪ Unbilled Metered (gallons) (residential, non-residential) ▪ Meter Technology (number of manual-read residential and non-residential, number of touch-read residential and non-residential, number of mobile-read residential and non-residential, number of networked residential and non-residential) ▪ Billing Rate Method (base rate zero gallons, uniform, flat, declining block, increasing block, seasonal rate, individual goal rate, excess use rate, time of day rate, other)			√
Conservation Program Reporting Requirements				
Minnesota Department of Natural Resources: Water Conservation Reporting System	▪ Single-Family Residential Direct Conservation Measures (toilet rebates, rainwater rebates, shower kits, clothes water rebates, rain barrels, high-efficiency water softeners, irrigation controllers, irrigation nozzles – quantity, total gallons served) ▪ Multi-Family Residential Direct Conservation Measures (rainwater harvesting, clothes washer rebates, toilet retrofits, coin-operated clothes washer rebates, showerhead rebates, large landscape projects, irrigation controllers – quantity, total gallons saved) ▪ CII Direct Conservation Measures (large landscape projects, irrigation controllers, food steamers, dishwashers, laundromats, spray rinse valves, toilet retrofits, waterless urinals, automatic faucets – quantity, total gallons saved) ▪ Indirect Conservation Ordinances/Policies/Codes in Effect (list all) ▪ Indirect Conservation Education and Outreach Methods and Collaborations (list all)			√

Notes:

¹ As required in unique Minnesota Department of Natural Resources Water Use Permits² Bacteriological/Disinfection Reports and Fluoridation Reports



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