



County Well Index (CWI) Data Procedures Manual

VERSION 1.0

PROCEDURES FOR MANAGING MINNESOTA UNIQUE WELL NUMBERS AND LOCATION DATA

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Introduction

State agencies, along with other government entities and the Minnesota Geological Survey (MGS), rely on accurate well locations for many purposes, including but not limited to, well management and understanding, describing, and mapping subsurface geologic and hydrogeologic conditions. This procedures manual describes data management requirements for Minnesota Unique Well Numbers (Unique Numbers) and associated well location data housed in the County Well Index (CWI) database. CWI is recognized as Minnesota's authoritative source for well and boring data: including but not limited to, the location coordinates and Unique Numbers for wells and borings in the state.

These procedures were developed by the following state agencies, in partnership with MGS:

- MN Department of Health (MDH)
- MN Department of Natural Resources (DNR)
- MN Pollution Control Agency (MPCA)
- MN Department of Agriculture (MDA)

Purpose

The purpose of this document is to establish responsibilities and accountability along with a series of procedures to ensure that Unique Numbers and well location data in CWI are accurate, reliable, and easily integrated across information systems. These procedures clarify how data producers and users should coordinate with MGS and government data stewards to update CWI data. Over time, this effort is intended to improve the usability and reliability of CWI data, resulting in better water resource management decisions.

Scope & Applicability

Data producers and users from different government entities have unique methods, definitions, and criteria to capture and store well location data to satisfy their own business requirements. These procedures are only intended for data attributes that should be synchronized with CWI. Specifically they cover data management requirements and stewardship responsibilities for managing well location coordinates and Unique Numbers.

These procedures apply to all government employees who provide well location data to CWI.

Compliance

State agencies, along with other government entities, should comply with these procedures when working with MGS to update CWI data.

Data Stewardship Roles and Responsibilities

Data stewardship is a critical component of effectively managing CWI data. Clarifying data stewardship roles and responsibilities ensures the integrity of CWI data for groundwater management decisions and facilitates cross-agency resolution of data issues. It formalizes accountability for the multiple data sources (including data from official paper records) used to construct two of the most important components of CWI, the Unique Number and well location.

Data stewards serve as a single point of contact; defining, monitoring, educating, and advocating for appropriate usage and management of data on behalf of others and for the best interests of CWI, ensuring it remains the authoritative source for well information in the State of Minnesota. They provide a communication channel for data management decisions between data producers, subject matter experts, technical experts, external stakeholders, and authoritative decision makers from each agency or government entity (herein referred to as ‘agency’). Appointed data stewards must have the ability to work across business units within an agency, provide an interagency perspective, and coordinate decisions.

Data Stewardship Decision Framework

This procedures manual describes four unique roles that are required to coordinate data management decisions for CWI. These roles are: CWI chief data steward, lead agency data stewards, coordinating data stewards (optional), and data producers. Figure 1 shows the relationship between the CWI chief data steward and a lead agency data steward appointed at each state agency or government entity.

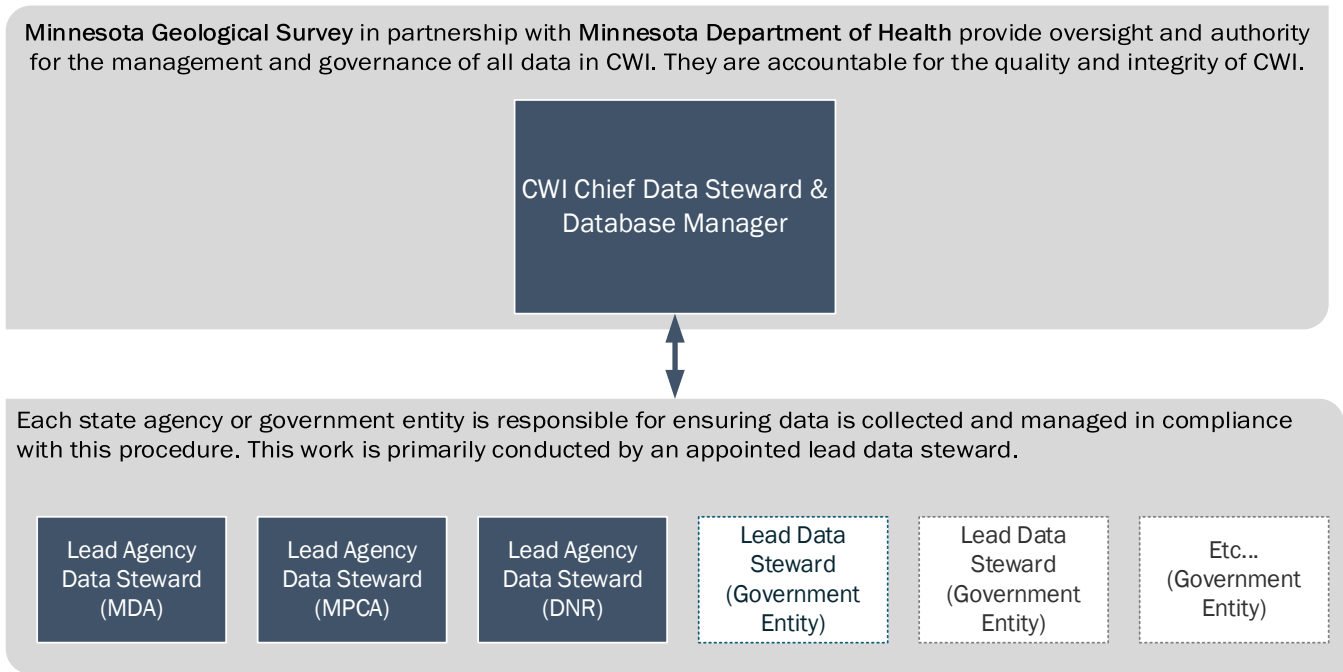


Figure 1

Figure 2 further describes what this decision framework may look like at each state agency or government entity. The level of responsibility delegated to a single data steward will depend on an individual's span of influence and official position description. Responsibilities may need to be delegated to multiple individuals. Data stewardship responsibilities should be customized to fit the specific needs of the data environment at each state agency or government entity. Specific responsibilities for [Coordinating Data Stewards](#) are described on page eight of this procedures manual.

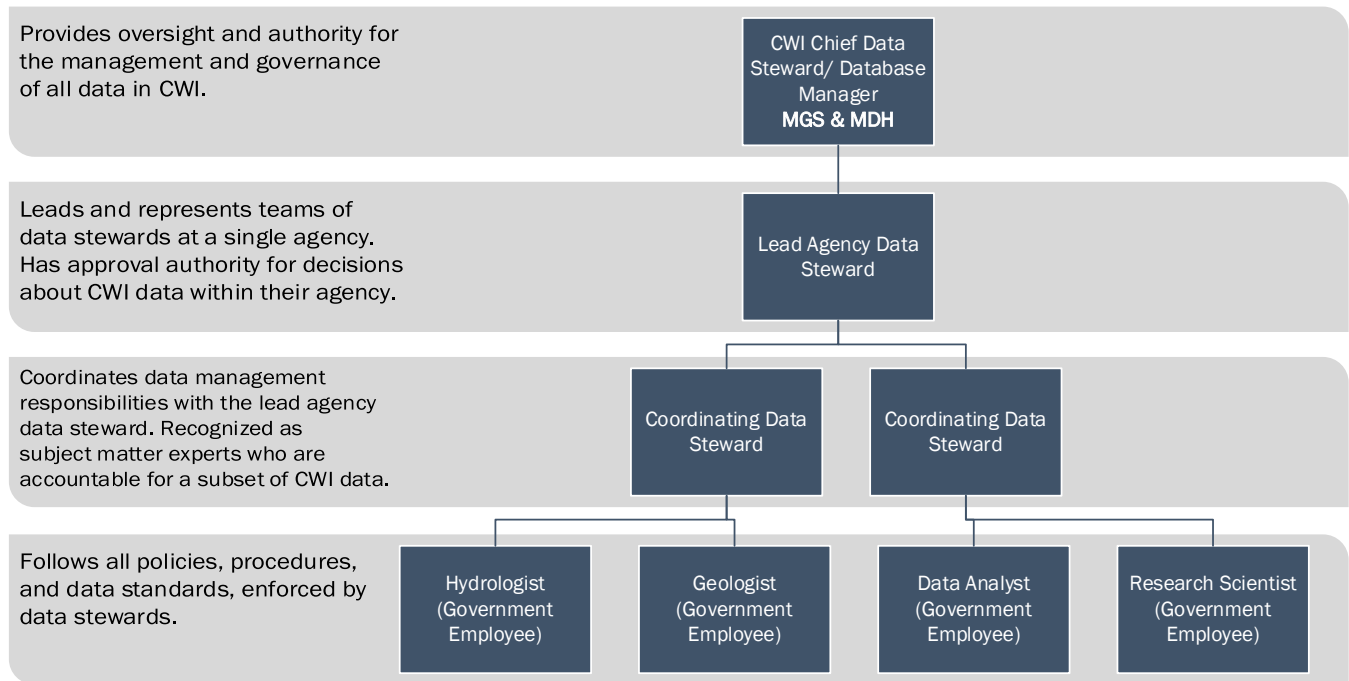


Figure 2 CWI Data Stewardship Framework for each Agency

CWI Chief Data Steward & Database Manager

MGS manages CWI in partnership with MDH, providing oversight and authority for the management and governance of all data in CWI. Data table structure and change or additions to lookup table code definitions are managed jointly by MGS and MDH.

MGS is responsible for:

- Entry, updates, and edits of lithologic and well construction information, as well as geologic and hydrogeologic interpretive fields, for newly drilled and existing well records and exploratory boreholes.
- Unique Number assignments and record changes for previously constructed wells and exploratory borings (herein referred to simply as 'wells').

MDH is responsible for:

- Implementing batch uploads and changes to the database structure per the needs, and following the approval of both MGS and MDH.
- Geographic Information System (GIS) support for CWI. This includes management of the Minnesota Well Index (MWI) online application that is used to share information from the CWI database with the public.
- Maintenance of CWI user interface forms used by data stewards for editing, updating and deleting well record information in CWI.
- Unique Number assignments for newly constructed wells.

Lead Data Stewards at Other Agencies

The lead agency data steward has authority to oversee the management of well location data for each state agency. This individual serves as a primary point of contact for well location data that needs to be synchronized with the CWI database. Depending on the organizational structure of an agency, the lead data steward also coordinates activities and decisions for a team of data stewards, referred to in **Figure 2 CWI Data Stewardship Framework** as *Coordinating Data Stewards*. To avoid confusion and streamline communication with MGS, it is advised that only one person be appointed to this role per agency.

Primary Responsibilities:

- Ensures CWI data are collected and managed in compliance with policies and procedures set by MGS and outlined in this document.
- Delegates CWI stewardship responsibilities to *Coordinating Data Stewards* within agency business or functional groups, as appropriate.
- Develops and maintains documentation and training materials, consistent with MGS data standards, to support agency business needs.
- Helps to connect *Coordinating Data Stewards* with internal resources and with external agency partners.

- Serves as the lead for standard contract language that requires subcontractors engaged in managing, collecting, and reporting CWI data to conform to required fields (defined by MGS) as a part of their contractual responsibilities.
- Based on agency business needs, proposes changes to CWI data structures to MGS in order to facilitate ongoing improvements in business processes and ability to share common data.
- Participates in conflict resolution for specific well records and locations that impact multiple divisions and/or programs within state agencies.

Coordinating Data Stewards

Coordinating data stewards are responsible for coordinating data management activities with the lead agency data steward. These individuals are recognized as subject matter experts and are accountable for a subset of CWI data within each agency. The number of data stewards appointed to this role is at the discretion of each agency. Depending on the size and complexity of their CWI data management processes, agencies or government entities may even choose to eliminate this role and only appoint a lead agency data steward.

Primary Responsibilities:

- Works with agency staff and their supervisors to complete the well location verification process and to correct any errors/omissions.
- Reviews and approves all proposed changes to a well record before submitting edit requests to MGS. Coordinates with MGS and the lead data steward to implement the changes.
- If proposed changes are rejected by MGS, works to correct the discrepancies and identify any issues in training and procedures that may have contributed to the problem.
- Trains new staff in the process of identifying existing wells and improving well locations in CWI.

Appointing Lead Data Stewards

Agency executives who lead groundwater management programs should appoint data stewards within each agency. The following criteria should be used when appointing lead data stewards:

- Background in groundwater hydrology, geology, environmental science, or a related field.
- Experience locating wells and an understanding of well data.
- Understanding of the CWI database, the database fields and the information reported through MWI.
- A lead (or experienced) person within the agency.
- Ability to work with agency staff, management, and external stakeholders to address issues and concerns with the process for updating CWI.

Minnesota Unique Well Number and Well Location Data Management Procedures

CWI users rely on the information provided in well records to understand, describe, and map geologic and hydrogeologic conditions. In order to use this information, it is critical to confirm the Unique Number and verify the location of the well.

Background

Minnesota Unique Well Numbers

Unique Numbers are assigned by MDH and MGS. MDH assigns Unique Numbers to newly constructed wells. [Minnesota Statute 103I](#) requires that drillers submit records for all new wells to MDH, which has the statutory authority to ensure these wells are constructed in compliance with the well code ([Minnesota Administrative Rules; Chapter 4725](#), Wells and Borings). In contrast, MGS assigns Unique Number to wells (and borings) that were previously drilled, but are not yet archived in CWI. If a well is missing a Unique Number, a new one may be requested from MGS per the procedures outlined in this document. Additional history and the process by which Unique Numbers are assigned in CWI is in [Appendix A](#).

Well Location Verification

Well locations in CWI are classified as either ‘verified’ or ‘unverified’. Previously, well locations were considered verified only if their locations were confirmed via a site visit. While site visits are still the best means to verify the location of a well, methods other than site visits have been allowed for well location verification. The acceptable methods by which a well’s location can be verified are defined by the ‘Location Method’ table in CWI ([Appendix B](#)). Additionally, the list of acceptable methods for determining the geographic (x,y) coordinates of a well are summarized in the ‘Geographic Coordinate Method’ table in CWI ([Appendix B](#)). In general, the location of a well or boring should be determined to an accuracy of 25 meters (approximately 80 ft) or better. This is the minimal location accuracy standard prescribed by the U.S. Environmental Protection Agency and is the current standard for verifying a well’s location.

Unverified well locations are derived from Public Land Survey System (PLSS) data submitted by well drillers. These locations should only be used to help identify the approximate location of a well to start the verification process. The MGS will update the locations of unverified wells and reclassify them to ‘verified’ when the procedures outlined in this document are followed.

How does Well Location Impact Well Elevation?

Accurate location data are required to portray the elevation of geologic surfaces (e.g. contacts between formations) and of hydraulic head surfaces (e.g.: the water level in wells for a given aquifer). Well elevations in CWI were historically based on a point on the USGS 1:24,000 scale topographic maps.

Today, more accurate technologies exist for determining the location, and thus the elevation of the ground surface at a well. In the office, ground surface elevations can be derived from DEMs and LiDAR data. In the field, GPS grade survey equipment promotes the capture of elevation data to even greater accuracies. Acceptable methods for establishing elevation data at a well are found in the Elevation Method code table in CWI ([Appendix B](#)).

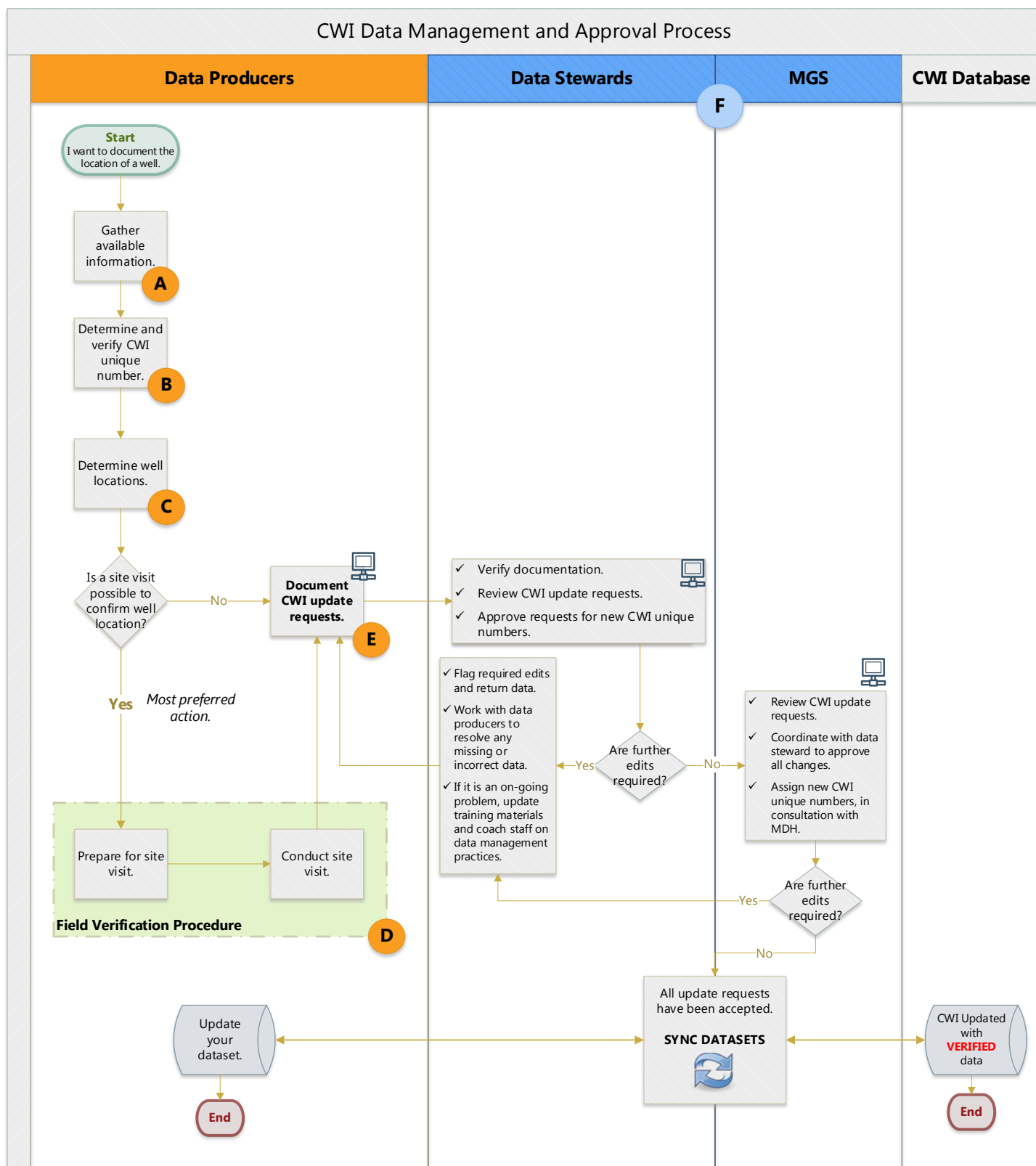
Process Overview

The process map illustrated in Figure 3 describes how to verify Unique Numbers, capture location coordinates, request updates to well records, and synchronize data with CWI. The process map highlights the roles and responsibilities of data producers (orange swim lane) and data stewards and MGS (blue swim lanes). It includes six steps that are highlighted on the map using colored circles labeled **A** through **F**, details for each of these are described in subsequent sections of this document.

Table 1. CWI Management and Approval Process Steps

A	Step A. Gather Available Information. Describes the information sources you will need to complete your work.
B	Step B. Determine and Verify Minnesota Unique Well Numbers. Helps you determine if a Unique Number exists and describes the information required to verify a Unique Number.
C	Step C. Determine Well Location. Describes the process to determine geographic coordinates of a well.
D	Step D. Conduct Field Verification. Describes how to prepare for and conduct a site visit, (required by MGS if feasible).
E	Step E. Document and Submit CWI Update Requests. Describes how to document and submit CWI update requests using either a spreadsheet or a web-based data staging application. These update requests are then sent to your agency's data steward for review (Step F).
F	Step F. Complete Data Approval Process. Describes how to work with data stewards and MGS to complete the data approval process and synchronize datasets.

Figure 3



* Work may be completed using a web-based data staging application. Check with your state agency for potential use and access.

Step A: Gather Available Information

Most well location efforts begin in the office and start by reviewing the available information. This section identifies available resources and useful information that should be captured from these resources.

What are my resources?

Well information can be obtained from a variety of resources. A summary of these resources is provided in Table 2. They should be reviewed before submitting edit requests to CWI as additional information may be discovered. Projects have been initiated to synchronize some of these resources with CWI. Continued efforts to synchronize these resources with CWI will alleviate the workload challenges associated with continuous file review. Additional details about these resources, how to access files and the status of synchronization efforts is found in [Appendix C](#).

Table 2. Well Information Resources

Resources Types	Examples
CWI Database	CWI is shared though the following formats: <ul style="list-style-type: none">• Oracle Database, PostgreSQL copies, Access Database, GIS resources• Minnesota Well Index (MWI) online
Agency Records	<ul style="list-style-type: none">• MDH Sealing Records and Disclosure Records• Other Agency Records: DNR, MDA, MPCA, USGS, MGS
Well or Property Owner	<ul style="list-style-type: none">• Owner at the time the well was drilled• Current owner
Well Contractor	<ul style="list-style-type: none">• Original driller• Contractor that has acquired records from original driller
Community Records	<ul style="list-style-type: none">• County, City, Local Government records• Delegated Well Programs
Parcel Data	<ul style="list-style-type: none">• Plat Maps, Public Land Survey System Data, additional GIS resources
Historic Records	<ul style="list-style-type: none">• Fire Insurance Maps• Historical Society Records• MDH Sanitary Surveys
Consultant's reports	<ul style="list-style-type: none">• Reports from site investigations

What information do I need to collect?

When reviewing these resources, the following information should be gathered to properly identify the Unique Number and the well location:

- Unique Number and Alternate IDs
- Well Construction Information and a Driller's Log
- Well Location Information (Ex. maps, sketches, coordinates, address, PLS, etc.)

Proceed to [Step B](#) once all available information has been gathered.

Step B. Determine and Verify the Minnesota Unique Well Number

Every effort should be made to determine whether a Unique Number already exists for a well before requesting a new Unique Number be assigned by MGS. When a Unique Number does exist, there is value in verifying that the number has been properly assigned or transcribed. Tips for identifying and verifying the Unique Number are provided in this section.

Does a Minnesota Unique Well Number exist for this well?

Begin by reviewing all available documentation to see if a Unique Number has been assigned to the well or boring of interest. If a Unique Number is not documented, staff should review CWI to see if the well exists and a Unique Number can be identified. This effort will involve a map based search of wells in the area or by querying the database using identifying parameters.

Map Based Search Tips

- If using a map based search, the search radius will expand and contract based on the accuracy of the available location information. Be aware that public water supply wells are not available on publically accessible resources such as MWI.
- Wells with unverified locations are mapped at the center point of the given location reported on the driller's log. This is usually to the section or subsection level, but there are instances on the driller's log where PLSS data are omitted. If more than one unverified well is reportedly in this section or subsection, they will all be stacked on top of one another and appear as one point in GIS or map based resources.

Database Queries

The following information can be used to query CWI for existing wells. Please note that errors do exist in the database and overly restrictive searches may impact your search results. Additionally, some information may not be available if records are incomplete.

- county
- township, range, section
- casing diameter, casing material
- depth completed
- date drilled
- well name (often the name of the original owner)

Every effort should be made to identify existing Unique Numbers. Requesting a new Unique Number should be the last resort.

What information is needed to confirm the Minnesota Unique Well Number?

A variety of information can be used to confirm the proper assignment of a Unique Number. Much of this information can be found in CWI or on the well and boring records and reports available for download from MWI (Appendix D). Table 3 shows information from the *Well and Boring Report*. Particularly useful fields are indicated with an asterisk (*).

Table 3. Useful information from Well and Boring Reports for verifying a Unique Number

Record Header	Guidance
Unique Number*	Minnesota Unique Well Number. Assigned by the MGS and the MDH.
County*	County
Wellname	Refers to the local name of the well (i.e. Anoka well #2) or the owner's name for domestic wells.
Township Name	Township name, not the township number
Township*	Township number (north-south), from the PLSS
Range*	Range number (east-west), from the PLSS.
Dir	Range direction, east of the 4 th Principal Meridian or west of either the 4 th Principle Meridian or the 5 th Principle Meridian for the Public Land Survey System.
Section	Section number with in the township and range.
Subsection	Quarter section. Up to six quarter sections. Largest quarter to smallest quarter.
Address	Address. May be the address associated with the location of the well (W), the contact's address (C), or the address that applies to both the location of the well and the contact (B). Batch updates may alter these addresses. Be sure to review the original scanned logs.
Addition Name	Addition name. Note: Only found on older versions of the water well record forms.
Block Number	Block number. Note: Only found on older versions of the water well record forms.
Lot Number	Lot number. Note: Only found on older versions of the water well record forms.
Fire Number	Fire number. Note: "Y" represents the location of the Fire Number. This was added to more recent versions of the water well forms.
Sketch	Scanned well records may or may not include a hand-drawn sketch of the wells location relative to roads or other structures.
Property Owner's Name*	Name of the original property owner or well owner.
Well Owner's Name*	Name of the well owner. This may or may not be the same name as the property owner. This field and the "Property Owner's Name" appear on different locations in newer versions of the records.

Record Header	Guidance
Stratigraphy*	Sequence of geologic material versus depth recorded at the site.
Remarks	Additional information is provided in the remarks. Example: alternate well ids, etc.
Depth Drilled*	Deepest depth drilled in feet from land surface. Note: This field is currently represented by the "Well Depth" label on the "Well and Boring Reports" available from MWI.
Depth Completed*	Finished depth of the hole in feet. Usually the same as depth drilled but can be less if the hole was backfilled before finishing.
Date Well Completed*	Date well installation was complete.
Well Contractor*	This section identifies the well contractor and the driller that installed the well.
Use	Primary use of the well
Status	Status of the well. Note: Sealed wells may be difficult to locate in the field.
Casing Diameter*	Diameter in inches of the casing. Caution: The well casing is not the same as the protective casing.
Casing Material*	Casing material (steel, PVC, etc)

What to do if a Unique Number is missing from CWI?

For a short period of time, after the advent of CWI, MGS had a practice of providing agencies a batch of Unique Numbers for assignment to wells. In most instances, agencies returned information to MGS for every well the agency assigned one of those Unique Numbers to. MGS would then update CWI accordingly. However, in some instances, agencies assigned Unique Numbers to wells and the information for those wells was never returned to MGS. Consequently, those wells were not documented in CWI, and the Unique Numbers remained unused. Contact MGS to resolve situations in which an agency has record of a well with a Unique Number that is missing from CWI.

Caution!

MDH currently assigns a ten digit number, known as the sealing record number, or H-Series Number, to records submitted by drillers when they seal wells (and borings greater than 15 feet deep). These H-Series numbers are not Unique Numbers. The sealing record number can be tracked in CWI as an alternate id; however, tracking sealing record numbers in CWI is not a standard practice at this time.

When Should a New Unique Number be requested from MGS?

CWI stores information for every **new hole** drilled in the ground. This allows the database to track geologic and hydrogeologic information for both borings and wells alike. There are a variety of circumstances that have made assigning unique numbers more complicated than one might expect. This is a result of differing business practices and reporting procedures over time. This section clarifies the best practices for assigning Unique Numbers under a variety of circumstances.

Table 4. When to assign a new Unique Number.

Scenario	Same X,Y Location	Different X,Y Location
Test <i>hole</i> replaced with a well	Both should be assigned the same unique number. The fact that the well was drilled at the same location as the test hole should be noted in the remarks field in CWI.	Each should be assigned a different unique number.
Test <i>well</i> replaced with a larger diameter well	Both should be assigned the same unique number. The fact that the larger well was drilled at the same location as the test well should be noted in the remarks field in CWI.	Each should be assigned a different unique number.
Existing well deepened but penetrates the same aquifer	Unique Number remains the same.	N/A
Existing well deepened and penetrates a deeper aquifer	Assign a new unique number.	N/A

Step C. Determine Well Location

Well location information is the most critical component of CWI. This information does not just allow database users to locate and map wells, these locations can also be used to derive elevations for the ground surface and geologic surfaces present at a location. This section provides guidance for locating wells using available tools and information in the office. It also helps staff to determine when it is possible and practical to conduct a site visit to field verify the location of a well.

Are location data consistent?

Review the available location information to evaluate whether the data are consistent.

- Does the property address fall within the proper PLSS boundaries?
- Does the well address match the parcel the well is mapped in?
- In MWI, do the data on the Well and Boring Reports match the original data recorded on the scanned copies of the Water Well Records initially submitted by the driller?

If any of these data are inconsistent, you likely will need to do additional work to identify and resolve the issues. The location data in the evaluated datasets, however, may be inaccurate, and this may affect data consistency.

What causes location data to be inconsistent?

Data inconsistencies may exist for a variety of reasons. Some of these are listed below:

- Use of older, less accurate digitizing technologies and survey methods.
- Inconsistent field data collection procedures.
- Property infrastructure misidentified as the well.
- Batch updates of information in CWI.
- Transcription errors.
- Variants of PLSS and parcel data, as well as inconsistently registered air photos and aerial imagery.

Caution!

Please note that GIS resources such as parcel fabrics and PLSS data have been maintained in parallel between agencies and organization over the years. Air photos and aerial imagery may have also been inconsistently registered. This has led to variants of the datasets and presents limitations to their accuracy.

MGS will not update well locations based on this information alone due to the inconsistencies between boundary and imagery data. Location edit requests must be accompanied by additional information from the well owner, a driller-updated record, or a site visit by staff.

When is a site visit necessary, possible or practical?

In general, well locations should be field verified through a site visit. Site visits are the best way to confirm the identity and location of a well. These are especially critical when:

- There is more than one well located on a property, and based on the available information there is no way to tell where each is located.
- The property has large elevation changes (approximately 15 feet or greater throughout the property) and based on the available information there is no way to tell where the well is located.

Guidance for completing site visits to verify well locations are provided in [Step D](#).

Caution!

There are instances in which wells no longer exist, and therefore cannot be field verified. In these instances it is not *possible* to visit a well. In other instances, project efforts to archive or update historic well information may be of the scale that it is not *practical* to visit all of the sites. Agencies should work with MGS to determine if office based verification efforts are acceptable for their work.

How to determine a well location in the office?

Use all information available when locating a well. The following table summarizes some common location information with tips on how to use all of the information. In some instances, the available information might not be enough to locate a well. Work with your data stewards if you encounter data inconsistencies, or if you are having difficulty determining the proper location of a well. In some instances, this may be the only means you have to locate a well. In other instances, this file review serves as preparation for field verification.

Table 5. Types of location information

Data types	Examples	How to determine coordinates?
Survey Data	Survey reports, tables	Survey coordinates (x,y) collected in the field. The level of accuracy varies based on data collection methods. All horizontal and vertical datums that are referenced should be reported to MGS.
Maps	Maps with locations of wells	Maps can be georeferenced to determine coordinates. Note: Maps may display points located using survey information or points plotted by visual estimation.
Sketches	Field notes, sketches on well and boring logs	The level of accuracy with which a well can be located will be highly dependent on the level of detail documented in these sketches. For example, some sketches may include drawings of the location of a well, and its distance relative to the corner of a house.
Photos	Site photos	Wells can be located using photos of the well and other nearby features or structures.
Parcel Data	PIN	If the parcel associated with the well is known, the well location should be mapped within the parcel boundary. The well's use type might also influence the well's location within that parcel. For example, domestic wells are likely to be closer to dwellings, and some homes have wells installed below grade in basements.
Address Data	Address, Fire Number, etc.	Address data can be used to determine the approximate location of a well. It may even be used to identify the proper parcel. There are times when only VAGUE addresses are available (eg. RR1). In these instances more information is required to verify a well's location. Be sure to distinguish between well and contact/owner addresses.
PLSS Data	Township, range, section, subsection	Well coordinates can be derived from public land survey information. The coordinates should be derived from the center point of the smallest available PLSS unit. 'ABCD' subsection method goes from largest to smallest PLSS unit. Direction method (typically used on driller's logs) goes from smallest to largest PLSS unit.

Well Locations and the Minnesota Data Practices Act

The locational coordinates of public water supply wells are classified by MDH as nonpublic security information¹ under Minnesota Statutes, section 13.37, subd. 1(a). Data classified as not public data under the MGDPA, is referred to as protected data. All protected data is secured from unauthorized use and disclosure. For this reason, you will not be able to access public water supply well location data via MWI's map interface.

¹ Under the Minnesota Government Data Practices Act (MGDPA), nonpublic security information is defined as government data that, if disclosed, would likely substantially jeopardize the security of information, possessions, individuals, or property. State agencies may classify otherwise public data as nonpublic security information at the time of a data request. Security information includes many different types of specific data elements, one being the location of municipal wells.

Step D. Conduct Field Verification

The following provides general guidance that should be followed when preparing for a site visit. Many state agencies and government entities already have detailed procedure documents to meet their business needs. Agencies, organizations or workgroups that would like to establish field procedures for locating wells can obtain more detailed guidance from MGS upon request.

Field Prep

Action	Details
Make Contact	<p>Contact the property owner. Request permission to access their property. Note: If the well owner is different than the property owner, contact them as well.</p> <p>Contact the local Sheriff. Notify the local sheriff of your activities before a well locating projects starts. A strange car pulling into driveways will inevitably raise suspicion and initiate calls to the sheriff. Much inconvenience can be avoided if the sheriff's office is aware of your activity and has a description of your vehicle. See Appendix D for an example letter that can be mailed or emailed to the local sheriff's office.</p>
Plan Route	<p>Plan the most efficient route. Use the sites you have permission to visit.</p>
Prepare Files	<p>Generate site maps. Site maps should be generated using the resources available to an agency or government entity. These maps should illustrate the locations of verified and unverified wells on or near the sites you plan to visit. If the well you plan to locate is not currently in CWI, plot the preliminary locations of those wells.</p> <p>Print copies of the well and boring reports. There may be more than one well per site. Print these additional well and boring records for reference in the field. Note: The original driller's records often contain a hand-drawn sketch of the location of the well relative to roads, structures and other landmarks.</p> <p>Prepare field forms. Prepare one field form for each well you plan to visit. Bring extra field forms in case you find additional wells on the property.</p>
Prepare field equipment	<p>Gather the following field equipment for your site visit:</p> <ul style="list-style-type: none">• Clipboard, writing utensils, binoculars, sunglasses, first aid kit, tape measure, GPS unit, camera, etc.

Site Visit

Action	Details
1. Drive to site	<p>Field teams should consist of two staff.</p> <ul style="list-style-type: none"> • Driver: Team member that focuses on driving safely. • Passenger: Navigates and directs the driver.
2. Arrive on site	<ul style="list-style-type: none"> • Ensure you have arrived at the correct location. <ul style="list-style-type: none"> ○ Confirm location using maps, the address, or the emergency service number on the mailbox or sign. • Park in a safe location. • Assess the site for hazards (e.g. dogs) • Contact the property owner. <ul style="list-style-type: none"> ○ Greet them and introduce yourself. Explain the purpose of your visit. ○ Obtain permission to be on their property to locate the well if you do not already have permission. • Ask if they are able to assist you with locating the well. • Useful questions to ask the well owner that can help confirm well construction information: <ul style="list-style-type: none"> • When was the well drilled? • Who services the well? • Who drilled it? • Casing diameter? • Casing material? <ul style="list-style-type: none"> ○ Plastic or steel <ul style="list-style-type: none"> ▪ Watch for steel pitless with plastic casing • Well depth is secondary importance
3. Locate well	<ul style="list-style-type: none"> • Locate the well; check the well tag or well construction to confirm this is the well of interest. • Photograph the site and the well. • Collect GPS coordinates at the well (if you are able to safely access the well) • Verify the location of the well on the maps brought into the field. This redundancy is an important part of the field location process.
4. Complete field notes	<p>Take complete field notes.</p>

Step E. Document and Submit CWI Update Requests

Step E involves preparing the information and materials that are required to update locations and associated well information in CWI. This includes entering new information (or edit requests) into spreadsheets and preparing scanned copies of all documents that contain the proof of this information.

Digitize information

All information submitted to MGS for input into CWI should be created in an organized electronic format. This involves entering the information into a spreadsheet or web application which helps to reduce the workload for MGS staff. Information that should be entered includes 1) edit requests for wells that already exist in CWI and 2) requests for new Unique Number for wells not yet in CWI.

While the **MGS template spreadsheet** is available with this document, agencies and organizations can create their own spreadsheets or web applications to capture additional information required for their business needs. Guidance for what information is required, as well as how it should be formatted, is provided in the [Required Data Fields](#). This section includes the CWI database fields and data types required to support efficient upload of information into the database.

Scan documents

All information submitted to MGS for updates in CWI should be accompanied by documentation. This documentation will be reviewed by the Data Stewards involved in the data approval process. This documentation is used to support the edit requests. It can also be used to resolve transcription errors that are possible when information is gathered and processed.

MGS requests that one PDF file of scanned materials is provided for each well. These PDFs should be clean, organized and easy for reviewers to navigate in order to expedite CWI update requests.

Submit CWI update request

Submit your CWI update request to the Coordinating or Lead Agency Data Stewards for review. The actions required of the Data Stewards are outlined in the [Data Approval Process](#).

Required Data Fields

After all preliminary information has been gathered from both a background review and site visit, a spreadsheet is filled out for each newly verified well. This document is provided to the data stewards for further processing. **Any and all field forms, spreadsheets or web applications built to collect and submit information to MGS should use, at a minimum, the following fields and field forms to ensure efficient updating of the CWI database.**

NOTE: *Valid Values* are further defined online in the [CWI Database Dictionary](#)

IDENTIFICATION (ID)

Field Name	Database Field Name	Data Type	Definition	Business Rules/ Notes	Valid Values
Unique Number	WELLID	NUMBER	The Minnesota Unique Well Number serves as the primary key for each constructed well or borehole.	<ul style="list-style-type: none">WELLID is currently not listed as a field in C5IX according to the CWI online data dictionary.WELLID relates to the RELATEID, UNIQUE_NO, WELL_LABEL fields in CWI (C5IX table).MDH assigns this number for newly constructed wells. MGS assigns this number to all other wells that don't currently have a number assigned.	
Well Name	WELLNAME	VARCHAR	Refers to the local name of the well (i.e. Anoka well #2) or the owner's name for domestic wells.	<ul style="list-style-type: none">Found in the C5IX CWI data table.Should not be used to uniquely identify a well, this is the purpose of the Unique Number.The well owner's name may not match the property owner.	

LOCATION (LOC) - found in the C5IX CWI data table

Field Name	Database Field Name	Data Type	Definition	Business Rules/ Notes	Valid Values
Location Method	LOC_MC	CHAR	Minnesota Unique Well Number verification codes specifies the method used to verify the location of the well.	<ul style="list-style-type: none"> Refer to Appendix C. Known as the Unique Number verification in the Well & Boring Report. More than one method can be used to verify the location of a well. All methods used should be documented and reported to MGS. 	LOC_MC
UTM Easting	UTME	NUMBER	The x coordinate of the well in meters, rounded to the meter.	<ul style="list-style-type: none"> Also known as X in the Well & Boring Report. Note: Coordinates on these reports are reported in NAD83 UTM Zone 15N. 	
UTM Northing	UTMN	NUMBER	The y coordinate of the well in meters, rounded to the meter.	<ul style="list-style-type: none"> Also known as Y in the Well & Boring Report. Note: Coordinates on these reports are reported in NAD83 UTM Zone 15N. 	
Geographic Coordinate Method	GCM_Code	CHAR	Method for obtaining the x, y coordinate locating the well.	<ul style="list-style-type: none"> Known as system in the Well and Boring Reports available online through MWI. Note: The datum and any projection used should also be reported to MGS. 	GCMCODE
County	COUNTY_C	CHAR	Two digit county identification code.	<ul style="list-style-type: none"> Use standard CWI county code(nn)[domain-county] 	COUNTY
Township	TOWNSHIP	NUMBER	Township number (north-south), from the Public Land Survey System (PLSS).		26-71 North, 101-168 North
Range	RANGE	NUMBER	Range number (east-west), from the Public Land Survey System (PLSS).		1-51 West, 1-7 East
Range Direction	RANGE_DIR	CHAR	Range direction, east of the 4 th Principal Meridian or west of either the 4 th Principle Meridian or the 5 th Principle Meridian for the Public Land Survey System.		E-East, W-West
Section	SECTION	NUMBER	Section number with in the township and range.		1 - 36
Subsection	SUBSECTION	VARCHAR2	Quarter section. Up to six quarter sections. Largest quarter to smallest quarter.	<ul style="list-style-type: none"> The quarter sections (up to six) are described using ABCD notation from largest to the smallest quarter, quarter-quarter, quarter-quarter-quarter, quarter-quarter-quarter-quarter section. 	ABCD

ADDRESS (ADD) – [found in the C5AD CWI data table](#)

Element Name	Database Field Name	Data Type	Definition	Business Rules/ Notes	Valid Values
House Number	HOUSE_NO	NUMBER	The numeric identifier for the address of the parcel.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. 	
Street Name	STREET	CHAR	The portion of the complete street name that identifies the particular thoroughfare.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. For numbered streets (e.g. Third Street, 3rd Street), use the format and spelling as defined by each official local address authority. For street name formats like 2nd, 3rd and 4th, use lower case letters. 	
Street Type	ROAD_TYPE	CHAR	A word or phrase that follows the street name and identifies a type of thoroughfare.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. 	ROADTYPE
Street Direction	ROAD_DIR	CHAR	A word following the Street Name that indicates the direction or position of the thoroughfare relative to an arbitrary starting point or line, or the sector where it is located.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. 	MAP_DIR
City	CITY	CHAR	A city name recognized by the USPS.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. 	MNCITY
State	STATE	CHAR	The two character state code. This will always be “MN” for wells drilled in Minnesota.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. 	
Zip Code	ZIPCODE	CHAR	The 5 digit zip code as recognized by the USPS.	<ul style="list-style-type: none"> Known as address in the Well & Boring Report. 	

Data Fields that are Desirable, Not Mandatory

Element Name	Database Field Name	Data Type	Definition	Business Rules/ Notes	Valid Values
Use*	USE_C	CHAR	Code indicating the use of the well.		USE
Status*	STATUS_C	CHAR	The status of the well.		STATUS
Depth*	DEPTH_COMP	NUMBER	Depth Completed - Finished depth of the hole in feet. Can be the same as depth drilled or it can be less if the hole was backfilled before finishing.	<ul style="list-style-type: none"> Known as the depth completed in the Well & Boring Report. Depth should be reported from Land Surface. Note: Some drillers report the depth from the top of casing. 	
Well Casing Diameter*	CASE_DIAM	NUMBER	Diameter in inches of the well casing.	<ul style="list-style-type: none"> The diameter reported in the C5IX table. This represents the top of the well casing, not the protective casing, which is derived from the C5C1 table. 	
Drilling Company*	DATA_SRC	CHAR	Drilling company that drilled and installed the well.	<ul style="list-style-type: none"> Known as the licensee business in the Well & Boring Report. 	DATA_SRC
Drill Date*	DATE_DRLL		Date the drilling is complete.	<ul style="list-style-type: none"> Known as the date drilled in the Well & Boring Report. This is the date the driller records on the form. 	
Identifier*	IDENTIFIER	VARCHAR2	Alternate identifier for a well.	<ul style="list-style-type: none"> Found in the C5ID CWI data table. 	
ID Type*	ID_TYPE	VARCHAR2	The agency or group who has authority to assign the ID and provide data.	<ul style="list-style-type: none"> Found in the C5ID CWI data table. 	AGENCY
Program ID*	ID_PROG	VARCHAR2	Indicates the specific program associated with an agency or group who is providing data.	<ul style="list-style-type: none"> Found in the C5ID CWI data table. 	PROGRAM

*Optional

Step F. The Data Approval Process

The data approval process appropriately leverages staff time and expertise to ensure compliance with the procedures outlined in this document. Data Stewards involved in the approval process have received more rigorous training and regularly work with these data and procedures. While MGS is ultimately responsible for the review and approval of CWI update requests, the lead and coordinating data Stewards at partner agencies provide staff resources which facilitates MGS's review of the data request.

The Data Approval Process expands upon the Data Management Process summarized in earlier sections of the document. A diagram of this process is provided in Figure 3. The following clarifies key points in this process:

- Staff that request updates to CWI are responsible for compiling all the necessary information per the procedures and standards outlined in this document. This information must be submitted to the Data Stewards for review before the information is **submitted** to MGS.
- Data Stewards are responsible for **reviewing** CWI update requests from their colleagues before forwarding the requests to MGS. All requests should be reviewed for accuracy and completeness. If errors or issues are identified, the data stewards should **return** materials to the requestors for further editing and **coach** them on the proper data submittal process.
- MGS can reject CWI update requests if they do not comply with the procedures and standards outlined in this document. MGS has the **authority and responsibility** to manage changes to data in CWI.
- Updates made to CWI by MGS should be communicated to the requesting agency so that data systems can be synchronized.

Well Primacy

Minnesota state agencies use water well records as part of their statutory responsibilities. Locations for these wells are generally managed within each state agency. It is important to maintain and distribute information about wells owned by state agencies for monitoring networks. Sometimes more than one agency uses a well for monitoring purposes; however, only one agency owns the well. Agencies that own wells should have primacy over the location of those wells. Changes and updates to well records in CWI can only be done after obtaining approval from the government entity who has primacy over that well. MGS is working to document well primacy within CWI.

These state agencies have primacy over the locations in CWI for the following wells and well networks:

- DNR: Observation wells owned by the DNR.
- MDH: Public water supply wells.
- MDA: Monitoring wells owned by the MDA.
 - Ambient monitoring wells

- Incident Response wells
- MPCA: Monitoring wells owned by the MPCA.
 - Ambient groundwater monitoring wells
 - Remediation site wells
- MGS: All other wells and borings, including those wells that are part of a monitoring network, but not owned by one of the operating agencies.

Agency database managers have primary governance over the locations of wells specified above. These data managers may or may not be assigned broader stewardship roles as defined in [Figure 1: CWI Data Stewardship Framework](#).

Appendix A. History of the Minnesota Unique Well Number

Minnesota Unique Well Numbers are ‘unique’ to a well or boring (herein referred to as ‘wells’) and represent the official state identifier for wells drilled in Minnesota. Unique Numbers were first assigned to wells recorded in CWI following the development of the state well code in 1974 (Minnesota Statute Chapter 1031, Rules Chapter 4725). Unique well numbers were also created for exploratory borings, which are regulated under Minnesota Rules Chapter 4727. Presently, new wells are assigned a Unique Number as drillers complete the water well record and submit these files to MDH. Wells drilled prior to the well code are considered ‘historic records’ and are assigned Unique Numbers by MGS as they are identified and recorded in CWI. Historically blocks of Unique Numbers were assigned for specific purposes as shown in the table below.

Table. Historic assignment of Unique Numbers.

Unique Numbers	Description
1 - 9,999	Minnesota Department of Transportation (MNDOT) Soil Borings
10,000 - 19,999	Water Wells
20,000 - 49,999	Mining Companies Exploration Borings
50,000 - 99,999	Minnesota Department of Transportation Exploration Borings
100,000 - 199,999	MDH Well Management Well and Boring Records
200,000 - 258,000	Historical Well Records
258,001 - 270,000	MDH – Public Water Supplies and historical well records
270,001 - 299,999	Historical Well records
300,000 - 399,999	Historical mining exploration borings and H-Series with good geologic logs and verified locations.
400,000 - 1,500,000	MDH Well Management Well and Boring Records

Unique Number fields in CWI

A new numeric field named WELLID houses the Minnesota Unique Well Number in the CWI. Unique Numbers were previously stored in character fields in three obsolete or soon-to-be obsolete fields in the CWI tables (listed below). Currently, RELATEID is the primary key field in CWI, but there are plans to change this to the WELLID. The date of this change has not been determined. When WELLID is made the primary key, RELATEID, UNIQUE_NO, and WELL_LABEL will be deleted from the database.

Attribute	Data Type	Character Limit	Notes
WELLID	Numeric	10	New primary key field established to reference the Unique Number for a well or boring
RELATEID	Character	10	Existing primary key field. This field will become obsolete when the CWI database primary key fully transitions to WELLID.
UNIQUE_NO	Character	8	Obsolete field
WELL_LABEL	Character	6	Obsolete field

1B Unique Numbers and W-Series Unique Numbers

The “1B” (1 billion) numbers are the series of Unique Numbers used to identify wells lacking geologic information. These Unique Numbers start at 1,000,000,000. In the past, this information was stored in CWI using W-Series Unique Numbers. The W-Series Numbers were a 10-character ID that was stored in the obsolete or soon-to-be obsolete character fields referenced in the previous section of this document. All wells originally assigned a W-Series Unique Number were assigned a 1B number below 1,000,020,000 by the MGS, and the previously assigned W-Series Unique Numbers were retained as “Alternate IDs” in the C5ID table in CWI.

2B Unique Numbers

The “2B” (2 billion) numbers are the series of Unique Numbers used to identify soil boring records lacking a Unique Number. In the past, soil borings were not assigned Unique Numbers, but this changed in 2017 when the MDH began to require permits and provided abandonment rules for temporary borings greater than 15 feet deep. CWI business rules dictate that soil boring records where no previous number has been assigned will receive a “2B” number. The “2B” numbers are a series of numbers starting at 2,000,000,001. MGS coordinates the assignment of the 2B numbers.

Unique Number Assignment Issues

Unique Numbers are the primary means of identifying and sharing information about wells. However, there are instances in which one well may have been assigned more than one Unique Number. This has happened when drillers turned in multiple MDH water well records for the same well. This also has happened when different parties request a new Unique Number for the same well. Finally, this can also occur when data requestors provide conflicting information that suggests the presence of more than one well in an area.

Having two or more Unique Numbers assigned to the same well creates complications and confusion. For legal reasons these existing Unique Numbers should NOT be deleted from the database or re-assigned to a new well. Instead, both Unique Numbers will be retained and the other Unique Number assigned to a well should be noted in the “Alternate ID” field for each record. If already made available to the public, these numbers likely were used and may be still may meet a business need of an agency, organization or company. Retention of the other Unique Numbers assigned to a well is critical, especially when CWI Data Stewards are called to testify about the data in court.

Appendix B. CWI Code Tables

Location Method Code Table: LOC_MC

Acceptable methods used to verify a well's location. These codes have been ranked in decreasing priority order. Note: Planned revisions to CWI will allow for the tracking of one or more of the location method options.

Code	Description	Business Rules/ Notes
T	Tag on Well	During field visit the well tag was read and the well location was noted with GPS or plotted on field map.
5	Info from owner; with site visit	Well located by discussion in field with owner - you should see the well and note its location by GPS or on field map. See list of questions you should ask owner in 'Site Visit' section.
Y	Info from owner; without site visit	Existing well record information verified by communication with owner. See list of questions you should ask owner.
1	Address verification	Well located by well address provided on well record by driller.
3	Lot Block	Well located by matching Addition name, Block number and Lot number listed on well record to those listed in property records.
X	Tax records	Well was located by confirming location information on well record with tax records. Take note that TRS matches area - although the driller doesn't always put correct TRS, it's good to take pause and check all available information before deciding to locate. Owner name on well record should match in tax records during year well was drilled.
S	Site Plan	Drawings or maps where well location is depicted in detail (distance & direction provided from buildings or street intersections in feet, meters, or other units. to establish location).
6	Info from neighbor	Suspected property was visited and you can see well (take GPS or plot on field map), but owner is not home. Through discussion with neighbor it is confirmed property is or was owned by person listed on well record.
2	Name on mailbox	Well located in field by site visit to suspected location (based on address info, Township Range Section [TRS], etc.) and owner name listed on mailbox matches owner name listed on well record.
E	Emergency services number	Well located by matching fire or emergency services number listed on well record with sign posted on property (if in field) or in property records. Fire number signs can sometimes be seen using internet based mapping applications.
G	info/GPS from data source	Well located by x,y coordinates provided on well record - take note that the TRS and other location information on well record matches to confirm x,y coordinates was reported correctly. If TRS does not match x,y coordinates, you must use an additional method to verify well location.
4	Plat Book	Well located by matching location and owner information on well record with plat book records.
U	Unable to locate	Could not locate well - make a note of why - such as well record didn't contain enough location/owner information to locate.
7	Other, note in remarks	Give detailed information about how well was located. Example: Drillers description or diagram (rough sketch of well location in relation to house is sometimes drawn on well records). This would be secondary location verification. Primary would be confirming address listed on well record, ownership in tax records, etc. Site maps from property owners for permit applications would also fall under this category.

Geographic Coordinate Method Code Table: GCMCODE

Acceptable methods used to determine the well's x,y coordinate location.

Code	Description	Business Rules/ Notes
A	Digitized – scale 1:24,000 or larger (digitizing table; + 83 feet or better)	Reference the horizontal datum. Note: This field is obsolete in that it is no longer assigned, but it has been retained for historical purposes.
A**	Digitized – scale 1:24,000 or larger – Irregular section (Digitizing Table)	Reference the horizontal datum. Note: This field is obsolete in that it is no longer assigned, but it has been retained for historical purposes.
B	Digitized – scale 1:100,000 to 1:24,000 (+ 83 to 296 feet)	Reference the horizontal datum. Note: This field is obsolete in that it is no longer assigned, but it has been retained for historical purposes.
DS1	Digitization (Screen) – Map (1:24,000; 15 meters or better)	Reference the horizontal datum.
DS2	Digitization (Screen) – Map (1:12,000; >15 meters)	Reference the horizontal datum.
G3	GPS Differentially Corrected (25 meters)	Reference the horizontal datum.
G6A	GPS SA On (averaged; 100 meters)	Reference the horizontal datum. Note: This field is obsolete in that it is no longer assigned, but it has been retained for historical purposes.
G6O	GPS SA Off (averaged; 15 meters)	Reference the horizontal datum.
I	GPS; accuracy 3 to 12 meters (+ 10 to 40 feet)	Reference the horizontal datum.
PQ6	Public Land Survey – QQQQQQ Section (+90 feet or better)	Reference the horizontal datum.
S	Surveyed	Reference the horizontal datum.
SPL	Derived from State Plane coordinates (variable-capture method unknown)	Reference the horizontal datum.
UNK	Unknown method	

Elevation Method Code Table: ELEV_MC

Acceptable methods used to determine the well's elevation.

Code	Description	Business Rules/ Notes
A	Altimeter (+/- 1 foot)	Reference the appropriate vertical datum.
L1	LiDAR 1m DEM (MNDNR)	Reference the appropriate vertical datum.
L3	LiDAR 3m DEM (MNDNR)	Reference the appropriate vertical datum.
S	Surveyed	Reference the appropriate vertical datum.
T	7.5 minute topographic map (+/- 5 feet)	Reference the appropriate vertical datum. Note: This field is obsolete in that it is no longer assigned, but it has been retained for historical purposes.
T2	Calc from DEM (USGS 7.5 min or equiv)	Reference the appropriate vertical datum. Note: This field is obsolete in that it is no longer assigned, but it has been retained for historical purposes.
T3	CALC FROM 2-FOOT COUNTY DEM	Reference the appropriate vertical datum.
T4	Calc from NED (Natl.Elev.Dataset-30m)	Reference the appropriate vertical datum.

Appendix C. Well Information Sources

County Well Index

Resource	Summary
CWI Database Products	At present, MDH maintains the Oracle database of CWI. Additional copies of the CWI database will be made available to partner agencies by MDH upon request. How to Access: Contact MDH to acquire access to copies of the database or feature class derived products.
Minnesota Well Index (MWI) Online	The online web application that makes CWI data available to the public. This resource contains text and map based search tools for acquiring Well and Boring Reports. Note: The mapping application in MWI does not show the locations of public water supply wells. How to access: Minnesota Well Index
Database Dictionary	A database dictionary that shows the table relationships, table fields and domain tables is available for reference online. How to access: Database Dictionary
Unscanned Well and Boring Records	MGS also has paper copies for a considerable number of wells with unverified locations that are not yet in CWI. How to access: Site visit and file review at MGS. Synchronized: In Progress

Historic Records

Resource	Summary
Original Plats	Local and county historical societies sometimes have original plats indicating homesteads and types of businesses. How to Access: Online through the Library of Congress and a variety of other sites referenced on the Minnesota Geospatial Commons: Land Ownership: Property Boundaries Synchronized: No
Fire Insurance Maps	These maps are excellent references for historic wells dating to the late 1800s. How to Access: Annotated copies of these maps are commonly found in county land record departments, the Minnesota Historical Society, or the University of Minnesota's Borchert Map Library. Efforts are underway to make these maps available online through the Library of Congress: Sanborn Fire Insurance Maps from Library of Congress Synchronized: No
MDH Sanitary Surveys	The MDH public water supply microfiche files contain sanitary surveys dating from about 1920. These reports list community wells and other high capacity wells that were connected to the public water supply system. MGS Bulletins 31 and 32 used these sanitary surveys, in part, as sources of information. If a wellhead protection area has been established for your area of interest, these historical files may have been mined and the records may then be available from the MDH or local public water supplier. How to Access: Contact the MDH Well Management Program Synchronized: No

Agency Records

Resource	Summary
MDH Well Disclosure Records	<p>Property owners are required under Minnesota Law to disclose the existence of known wells on a property before it transfers to a new owner. These records are maintained by MDH and are searchable based on PLS location information.</p> <p>How to Access: https://eh.health.state.mn.us/wellmanagement/searchDisclosureAddress.jsf</p> <p>Synchronized: No</p>
MDH Well Sealing Records	<p>Once a well is sealed, the well contractor is required to submit a Well and Boring Sealing Record to MDH. MDH maintains these records and assigns sealed wells an H-Series Number. In some instances, a single H-series number can be applied to more than one well or boring. Sealed wells are not regularly assigned a Unique Number if they do not already exist in CWI. Note: CWI is capable of tracking H-Series numbers for Sealing Well Records in the alternate ID field in the C5ID table.</p> <p>How to Access: Contact the MDH Well Management Program</p> <p>Synchronized: No</p>
DNR Water Appropriation Permit Records	<p>DNR permits the use of water from wells that pump more than 10,000 gallons per day or 1,000,000 gallons per year. Location information and additional water use data for these and nearby wells are maintained by DNR in the Minnesota Permitting and Reporting System (MPARS).</p> <p>How to access: MNDNR Permitting and Reporting System Minnesota Water Use Data</p> <p>Synchronized: In Progress</p>
DNR Observation Wells	<p>Wells in the DNR Observation Well Network are used to monitor groundwater levels in aquifers throughout the state.</p> <p>How to access: Cooperative Groundwater Monitoring (CGM) Network Online. MNDNR Cooperative Groundwater Monitoring</p> <p>Synchronized: In Progress</p>
MPCA Environmental Monitoring Wells	<p>Monitoring wells have been installed at many pollution investigation sites. However, because these wells were not used for drinking water, regulation of soil and exploratory boring companies lagged that of well drillers. Most monitoring wells drilled from 1972 through 1986 did not have an official well record submitted to the MDH. The driller's records for these wells are located in the MPCA site remediation and redevelopment section files and petroleum remediation and redevelopment section files.</p> <p>How to access: Contact the MPCA</p> <p>Synchronized: In Progress</p> <p>The Remediation and Redevelopment section is actively working to get well information from their files into CWI. Active monitoring wells owned by the MPCA will be updated by the appropriate MPCA database manager and may not need to be reviewed. Check with the relevant database manager.</p>
MDA Environmental monitoring Wells	<p>Additional records are found in the MDA, Incident Response Unit files (pesticide and fertilizer spills). The files for most of these sites are archived and difficult to obtain. However, if your survey needs the information, that is the public source for the original documents. Many early environmental well records were submitted without township, range and/or section information, so additional criteria should be used if available. Copies of many records are on file at MGS, but have not yet been entered into CWI. Soil boring records are also available.</p> <p>How to access: Contact the MDA</p> <p>Synchronized: In Progress</p> <p>Active monitoring wells owned by the MDA will be updated by the appropriate MDA database manager and may not need to be reviewed. Check with the relevant database manager.</p>

Community Records

Resource	Summary
County Records	<p>In southeastern Minnesota, some counties have a ‘delegated’ well program where the county and the state have a contractual agreement that the county administer the well code, not the MDH. In these counties, a greater amount and possibly more accurate well information usually exists at the local level. Counties may also have copies of water testing results that were generated by county-sponsored well water testing programs. A list of cities and counties with delegated well programs is provided at the end of this section. In addition some counties have done their own well inventories, either on their own or as part of a county geologic atlas program. Check with County staff to see if a well inventory exists.</p> <p>How to Access: Contact the County</p> <p>Synchronized: No</p>
City Records	<p>Some cities in Minnesota have a ‘delegated’ well program where the city and the state have a contractual agreement that the city administer the well code, not the MDH. In these cities, a greater amount and possibly more accurate well information may exist at the local level. A list of cities and counties with delegated well programs is provided at the end of this section.</p> <p>How to Access: Contact the City</p> <p>Synchronized: No</p>
Local Government Records	<p>Cities with public water supply (PWS) distribution systems typically require homeowners to connect to the community water supply at some point. City records will indicate when areas were developed and annexed. Dwellings that pre-date the PWS or annexation probably have at least one well on the property. Work with the city planning and zoning department to establish the development timeline for your survey area. The city or chambers of commerce also have information on drillers that have been active in the area. Some cities may have a well sealing ordinance in place that authorizes the building inspectors to track wells to make sure they get sealed. These communities are an excellent source of well information. If the well survey is conducted in the bounds of a developed area, check with the municipality(s) as to the timing of installation of the PWS. Correlate that information to the land records to establish which buildings pre-date the PWS and therefore, are candidates for wells.</p> <p>How to Access: Contact the Local Government Unit</p> <p>Synchronized: No</p>

List of Delegated Well Programs in Minnesota

City or County	Delegated Well Programs	Tel. Number
City of Bloomington	Delegated Water, Monitoring, and Dewatering Well Programs	(952) 563-8934
City of Minneapolis	Delegated Water and Monitoring Well Programs	(612) 673-5807 (612) 673-3179
Blue Earth County	Delegated Water Well Program	(507) 304-4381
Dakota County	Delegated Water, Monitoring, and Dewatering Well Programs	(952) 891-7556
Goodhue County	Delegated Water Well Program	(651) 385-6130
Le Sueur County	Delegated Water Well Program	(507) 357-8231
Olmsted County	Delegated Water, Monitoring, and Dewatering Well Programs	(507) 328-7111
Wabasha County	Delegated Water Well Program	(651) 565-5200
Waseca County	Delegated Water Well Program	(507) 835-0655
Winona County	Delegated Water, Monitoring, and Dewatering Well Programs	(507) 457-6405

Appendix D. Examples of a Driller's Record and Well and Boring Report

1. LOCATION OF WELL		STATE OF MINNESOTA		DEPARTMENT OF HEALTH		MINNESOTA UNIQUE WELL NO.	
County Name		WATER WELL RECORD		Minnesota Statutes 15A.01, .02		194313	
Ottertail		Dead Lake		135N 40W 23 NW 1/4 NW 1/4 NW 1/4		Henry LaCourse Richville, Minnesota	
Township Number		Range Number		Section No.		Fraction	
135N		40W		23		NW 1/4 NW 1/4 NW 1/4	
Distance and Direction from Road Intersections or Street Address and City of Well Location							
Show exact location of well on section grid with "X."				Sketch map of well location.			
				Addition Name: Block Number: Lot Number:			
2. FORMATION LOG		COLOR		HARDNESS OF FORMATION		FROM TO	
Sand		Brown		Soft		0 10	
Gravel		Brown		Hard		10 30	
Sand-Gravel		Brown		Soft		30 35	
Gravel		Brown		Hard		35 75	
Clay		Blue		Hard		75 110	
Gravel-Clay		Gray		Soft		110 127	
(Bat Hole)				Hard		127 129	
3. WELL DEPTH (completed)							
125'							
Date of Completion							
June 17, 1983							
4. USE							
<input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Municipal <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Other							
5. CASING							
<input checked="" type="checkbox"/> Steel <input type="checkbox"/> Throated <input type="checkbox"/> Surface <input type="checkbox"/> 1" N. <input type="checkbox"/> Galv. <input type="checkbox"/> Welded <input type="checkbox"/> Drive Shoe? Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> <input type="checkbox"/> Plastic <input type="checkbox"/> 4" 121' 11.00' 61' 125'							
6. SCREEN							
Make: Johnson <input type="checkbox"/> Orifice hole <input type="checkbox"/> Type: Stainless Steel <input type="checkbox"/> Dia. 4" <input type="checkbox"/> Size/Gauge: .018 <input type="checkbox"/> Length: 48' <input type="checkbox"/> Set between 121' ft. and 125' ft. <input type="checkbox"/> Fittings: K-Packer							
7. STATIC WATER LEVEL							
92' <input type="checkbox"/> Below land surface <input type="checkbox"/> Above Date Measured: 6-17-83							
8. PUMPING LEVEL (below land surface)							
125' ft. after 1 hrs. pumping 39' g.p.m.							
11. WELL HEAD COMPLETION							
<input checked="" type="checkbox"/> Plugless adapter, manufacturer: Monitor model: 7PBR475401 <input type="checkbox"/> Basement offset <input type="checkbox"/> At least 18" above grade							
12. WELL GROUTED?							
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Near Cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Grout material: _____ from _____ to _____ ft. Cu. Yds. _____							
13. NEAREST SOURCES OF POSSIBLE CONTAMINATION							
100' feet N direction Septic type							
Well disinfected upon completion? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							
14. PUMP							
Date installed: 7-29-83 <input type="checkbox"/> Not installed							
Manufacturer's Name: Sta-Rite							
Model Number: 8F4D023 HP 3/4 Volts 230							
Length of drop pipe: 103' ft. capacity 10 g.p.m.							
Material of drop pipe: Steel							
Type: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> L.S. Turbine <input type="checkbox"/> Rechargeable							
<input type="checkbox"/> Jet <input type="checkbox"/> Centrifugal <input type="checkbox"/>							
15. WATER WELL CONTRACTOR'S CERTIFICATION							
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.							
Antonsen Well Drilling 56132							
Licensee Business Name License No.							
Address: Vergas, Minnesota 56587							
Signed: [Signature] 7-29-83							
Authorized Representative Date							
Dave & Jerry 7-29-83							
Name of Driller Date							
5/14 30M 7/78 30M 7/78 30M 2/82 10M							

RECEIVED
 DEC 27 1983
 Minn. Dept. of Health
 6-27-83
 MINN. DEPT. OF HEALTH COPY 194313
 MD 01805-01

Minnesota Unique Well Number

194313

County Otter Tail
 Quad Walker
 Quad ID 217B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 04/17/1988
 Update Date 02/14/2014
 Received Date

Well Name LACOURSE,	Township 135	Range 40	Dir Section W 23	Subsection BABADB	Well Depth 129 ft.	Depth Completed 125 ft.	Date Well Completed 06/17/1983
Elevation 1431	Elev. Method 7.5 minute topographic map (+/- 5 feet)	Drill Method Non-specified Rotary		Drill Fluid			
Address C/W RICHVILLE MN					Use domestic	Status Active	
Stratigraphy Information					Well Hydrofractured? Yes <input type="checkbox"/> No <input type="checkbox"/> From To		
Geological Material					Casing Type Single casing		
From To (ft.) Color Hardness					Drive Shoe? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Above/Below 1 ft.		
SAND 0 10 BROWN SOFT					Casing Diameter 4 in. To 121 ft. lbs./ft.		
GRAVEL 10 30 BROWN HARD					Hole Diameter 6 in. To 125 ft.		
SAND-GRAVEL 30 35 BROWN SOFT							
GRAVEL 35 75 BROWN HARD							
CLAY 75 110 BLUE HARD							
GRAVEL-CLAY 110 127 GRAY SOFT							
(RAT HOLE) 127 129 HARD							
					Open Hole From ft. To ft.		
					Screen? <input checked="" type="checkbox"/> Type stainless Make JOHNSON		
					Diameter Slot/Gauze Length Set		
					4 in. 18 4 ft. 121 ft. 125 ft.		
					Static Water Level 92 ft. land surface Measure 06/17/1983		
					Pumping Level (below land surface) 125 ft. hrs. Pumping at 39 g.p.m.		
					Wellhead Completion Pitless adapter manufacturer MONITOR Model 7PSB45S4C1		
					<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 <input type="checkbox"/> Not Specified		
					Nearest Known Source of Contamination 100 feet North Direction Septic tank/drain field Type		
					Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					Pump <input type="checkbox"/> Not Installed Date Installed 07/29/1983		
					Manufacturer's name STA-RITE		
					Model Number 8P4DO2S HP 0.75 Volt 230		
					Length of drop pipe 103 ft Capacity 10 g.p. Typ Submersible		
					Abandoned 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		
					Miscellaneous		
					First Bedrock Aquifer Quat. buried		
					Last Strat Quaternary deposit Depth to Bedrock ft		
					Located by Minnesota Geological Survey		
					Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)		
					System UTM - NAD83, Zone 15, Meters X 293510 Y 5152907		
					Unique Number Verification Address verification Input Date 01/01/1998		
					Angled Drill Hole		
					Well Contractor Antonsen Well Co. 56132 DAVE/JERRY Licensee Business Lic. or Reg. No. Name of Driller		
Remarks							
Minnesota Well Index Report					194313		
					Printed on 07/09/2018 HE-01205-15		

Appendix E. Template Letter to Sheriff Explaining Project Activity

<Date>

<Recipient's Name>

<Recipient's Street Address>

<Recipient's City, State, Zip code>

Dear <Recipient>,

<EXAMPLE TEXT: The Minnesota Geological Survey is working with **ADD COUNTY NAME HERE** to produce a geologic atlas of the county. This set of maps and databases will be used by the county to manage ground water and other natural resources. Records of wells are a useful source of information that we rely on in making our maps. The geologic materials penetrated by wells are described in a well construction log when the wells are drilled. It is essential that we know the exact location and elevation of the wells to use this information. For that reason we will have field crews travel by car to the well sites and mark their location on a detailed map.

I am notifying you of this work because unfamiliar vehicles and people entering driveways can trigger inquiries to law enforcement departments. Our vehicles will be rented from the University of Minnesota and will have the University logo on its doors. Our local contact in the county is **ADD CONTACT NAME HERE** and I've included his contact information, as well as my own, below.

If you need further information please contact me.>

Sincerely,

<Sender>

<Sender's Job Title>

<Sender's Place of Employment>

<Sender's Street Address>

<Sender's City, State, and Zip code>

<Sender's telephone number (and extension if available)>

<Sender's Email>