

# Minnesota DNR Water Use Program Work Plan

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## Minnesota DNR Water Use Program Work Plan

### **Minnesota DNR's water appropriation permit program**

Minnesota Department of Natural Resources, Division of Ecological and Water Resources (Minnesota DNR) administers the a water appropriation permitting program for Minnesota under a modified riparian system with a priority designated for different classes of water permit holders. The priority system is used in times of scarcity among competing users. All water users of over 1 million gallons per year or 10,000 gallons a day are required to obtain a water appropriation permit. A reasonable need must be demonstrated to grant a permit to use water and a demonstration that the use is not likely to interfere with other current users. Minnesota DNR must manage the water resources in a way that assures an adequate supply to meet the long-range requirements of all users of the water resources including in-stream uses. We currently administer over 9,300 water appropriation permits that authorize water use from 13,600 individual sources of water (installations). 12% of the installations are surface water sources and 88% are groundwater sources. The location of each installation of water use on each permit is known and tracked.

Each active water appropriation permit is required to track their water use to an accuracy of 10%. Permit holders are required to submit an annual water use report that states how much water was used from each source specifying how much was used for each authorized use type on a monthly basis. Use types are the descriptors of how the water is used by the permit holder (e.g., agricultural crop irrigation, municipal water supply, mine dewatering).

Water use information collected from the annual water use reports forms the basis of data used for the 5-year water use data compilation which is supplied to the local US Geological Survey (USGS) water science center.

Minnesota DNR stores its permit information including water use reports in the Minnesota DNR Permitting and Reporting System (MPARS). Data are stored in a Postgres database server with a web-based front end for permit holders and Minnesota DNR permit administrators. Data reports from the Postgres database with water use details are given to the USGS when requested for the 5-year compilations.

#### ***Accuracy of water use reporting (quality assurance and quality control)***

Water use reporting can have inaccuracies. Individual reports of water use are checked by comparing past reported water use values from recent years to current reported values and comparing the report of water used for a given year to the annual permitted volume and authorized use types. This allows us to check for common errors when a reported value changes drastically from one year to the next or the value received is outside of the expected range based on the use type and authorized permit volume.

The database system tracks when each water use permit is active. A permit that is active for any portion of any calendar year has a water use reporting requirement for that year. Notifications are sent to each permit holder to remind them of the reporting requirement. Entities that fail to report their water use in a given year are contacted multiple times. Failure to report water use is a reason to terminate a water appropriation permit. Annually, 20 to 50 water use permits are terminated for lack of water use reporting out of about 9,300 active permits. Many of these permits are later reinstated after water use reports are received. Compliance efforts for agricultural crop irrigation permits have shown that a

significant number of non-compliant (non-permitted) operations formerly had a water appropriation permit which was previously terminated for non-compliance.

Values that are in question are verified with the water use reporter. We contact the reporter by email message, phone call or letter. The water use reporter is asked if the original value (although outside of the expected range) is correct or if an update to the report is needed.

Common errors encountered on water use report entry include:

- A) Entering a value in the wrong units. For example "13,500,000" gallons is entered as "13.5" in an entry screen field that requires units of whole gallons.
- B) Entering the wrong number of zeroes for large numbers. For example entering a value of "13,500,000" as "13,500"
- C) Calculating water use based on the pumping rate times the time of operation in hours when the conversion factor is expecting units of minutes instead of hours. By not using the number of minutes, the calculation is incorrect by a multiplication factor of 60.

About 10% of the water use reports are received in a paper format from our permit holders vs. 90% that are entered directly into the online permitting and reporting system. The water use data from paper reports is later entered into the permitting system database by Minnesota DNR staff. Each manually entered water use report value is double-checked for accuracy by a separate person by looking at each report page and comparing it to the database entry for that report. This can catch mistyping problems and omission errors if a report is accidentally not entered.

Water use is required to be measured either by a flow meter or using an alternate method that will be within an accuracy of 10%. Water use values are self-measured and self-reported by each permit holder. The precision used to measure or calculate (based on an alternate method) will vary based on the abilities and motivation of each permittee. We assume each report is accurate to at least 10% of actual pumping, but we do not have independent verification of the reported water values.

### ***Permit compliance***

As the water use information is gathered primarily from water use reporting from the water appropriation permitting program, deficiencies in permitting the users required to obtain permits and lack of reporting by those that have permits decreases the accuracy of our information. A review of each potential permit holder in each category could yield greater permit compliance. Specific compliance efforts for municipal water supply systems and golf course irrigation have taken place in the program's past. The most recent ongoing compliance efforts are in the sectors of agricultural irrigation and livestock watering at feedlots (concentrated animal feeding operations). Some Minnesota DNR permitting staff are also doing detailed surveys of existing wells which are capable of appropriating water at a rate that would require a permit.

## **Evaluation of state program with respect to compilation categories and baseline goals**

The primary values reported to the USGS are system withdrawals. These are equivalent to the Minnesota concept of water use reported by each permit holder. So the water use values organized by

use type can be directly used to aggregate water use (withdrawals) by USGS 5-year compilation categories.

#### ***Output of water use by location***

Each source of water is characterized in the permit database with information on location, source type and source name. As the point of taking for each water withdrawal is known to a good level of spatial accuracy, aggregation by county, HUC-8 watershed or other location categories is possible.

#### ***Output of water use by principal aquifer***

Minnesota DNR stores groundwater resource names (when known) for each groundwater installation using Minnesota-specific aquifer names. Minnesota has the following national principal aquifers: Surficial Sands (glacial), Lower Cretaceous, Upper Carbonate and Cambrian-Ordovician. Groundwater withdrawals can be classified into these principal aquifers from the stored groundwater resource aquifer names. 93% of water sources have an aquifer identified. In 6% of those cases we can estimate the likely aquifer to be surficial sands/gravels due to shallow depth based on the location. The net result is 7% of groundwater withdrawals have no aquifer identified, representing 4% of groundwater water use.

#### ***Output of water use by water type – fresh or saline***

Minnesota has no saline water, so all water reported is fresh water.

#### ***Output of water use by source of water***

Minnesota DNR closely tracks self-supplied surface water and groundwater as sources of water that meet permitting requirements. We do not directly track reclaimed wastewater, wastewater effluent or in-facility recycled water.

### ***Compilation Categories***

#### **Public Supply**

Minnesota DNR has all required municipal, public, community and rural water district water supply systems under permit. Public water supply systems that serve over 1000 people are required to submit an annual inventory of water used by customer category including the number of residential customers served.

#### ***Quantity of water purchased/sold/transferred between systems***

The amount of water delivered through interconnections between cities is not well known. It would help to know how much water is transferred between systems when comparing water withdrawn to water delivered to assess system losses. Some subdivisions of some cities are served by other cities distribution systems. In cases where a city estimates their customer base but does not factor in areas of the city that are served by other systems or are self-supplied, the per capita per day use values may be incorrect.

The Lewis and Clark Regional Water System has begun delivery of water to two southwest Minnesota counties to supplement water supplies in the Luverne and Worthington areas. We are not currently tracking this input of water.

### *Smaller cities*

Cities are asked to report the amount of water delivered in their distribution system grouped by customer category (residential, commercial, industrial, irrigation, etc.). Completing this survey is only required for cities serving over 1000 people. This information is incomplete for those cities with fewer than 1000 population as it is not required for them to return this information. Many of the smaller cities do submit the form but will complete just a portion of the survey.

### *Aquifer Storage and Recovery (ASR)*

The Joint Powers Water Board (JPWB) of Albertville, Hanover, St. Michael is the only user in this class. The net use of water by their system is known, however the amount of treated water that is reinjected into a local aquifer for later recovery is not known.

### *Native American reservations*

Tribal governments on tribal lands are not required to obtain State of Minnesota water appropriation permits. Water supply systems are operated by several tribal entities which are not included in the Minnesota DNR information base. These omissions may be giving us poorly comparable values for counties with tribal populations served by systems that are not required to be under permit.

## **Industrial**

Minnesota DNR has most self-supplied industrial water users under permit. General compliance efforts should bring new systems into compliance with permitting requirements.

### *Industrial code tracking*

Industrial classification codes by facility are not tracked. NACIS/SIC classifications of production output by permitted facility could be documented. This has not been a priority.

### *Consumptive use*

We could ask for site-specific consumptive use on water use reporting. Minnesota's definition of consumptive use is fairly strict. Unless water is discharged/returned back to the original source, it is considered 'consumptive'. All groundwater use is thus considered consumptive as no water is allowed to be reinjected by state law. The JPWB ASR project has an exemption. The USGS definition of consumptive use (water removed from the immediate water environment) could be determined by industrial facilities from differences between withdrawals vs. discharges. We do not currently track discharge volumes. Estimates of consumptive use by type of facility could also be performed.

## **Irrigation-Crop**

Minnesota DNR has most self-supplied crop irrigation operations under permit. Compliance efforts are ongoing to achieve full compliance. We track a variety of crop and non-crop use types. Golf course irrigation is tracked by a specific MPARS use type, for instance. DNR asks irrigators to note the number of acres irrigated and the crop type grown as a survey question on annual water use reports. We have 99% compliance with collecting crop type information. We have recently dropped the irrigation system type as a survey question. Minnesota's style of irrigation does not have return flows. Only wild rice irrigation typically has open field flooding. Periodic surveys of system type and age of system could be performed in the future.

### *Use of reclaimed water*

Some use of treated wastewater occurs in the state for crop irrigation for non-human food supply. The Minnesota Pollution Control Agency maintains a partial list of systems. This is not actively tracked as a water appropriation permit is not required.

### **Thermoelectric**

Minnesota DNR has all self-supplied thermoelectric power generation facilities under permit. We have separate use types for *once-through* and *recirculated* system types. Reconfirming the type of cooling at each power plant would be a good idea. Some facilities employ both system types. The type of cooling system may have changed over time and may not be current in the Minnesota DNR permitting system. There are also hybrid systems which employ a mixture these two system types. See the work plan section for more details on proposed activities to verify current permits have correct use types.

### **Self-supplied Domestic**

Minnesota DNR does not have any direct water use information in this category. Values in this category are currently estimated via a standard methodology by the USGS. DNR has no plans to improve or enhance the USGS methodology to update the estimation method.

### **Irrigation-Golf Courses**

Minnesota DNR permits golf course irrigation systems. Golf course irrigation is tracked as a separate use type from other irrigation. The survey of acres irrigated and “crops” grown are asked as a survey on water use reports for this use type. A permit compliance check of all golf course operations in Minnesota was performed about a decade ago. A new round of checking could be performed to make sure all current systems are permitted.

### **Livestock**

Minnesota has many concentrated animal feeding operation (CAFO) facilities. The Minnesota Pollution Control Agency (MPCA) has the best information on the number and type of operations through their NPDES permit program for feedlots. There are 29,500 registered CAFOs in the MPCA dataset. Most of these are for smaller facilities that would not require a DNR water appropriation permit. The exact number from the MPCA dataset requiring a DNR permit is unknown but likely in the thousands. DNR has 570 active livestock watering operations permitted. 30 more permits are in the application phase. This low number is partly due to having a general permit for livestock watering for the last 10 years that has authorized livestock operations using from 1 to 5 million gallons. The original permit allowed facilities to be informally covered without registering. The latest version of the livestock watering general permit requires a specific general permit authorization. These authorizations are equivalent to individual permits for the purposes of water use reporting and tracking.

At this time, the estimates of water use from surveys of existing feedlot operations and from estimates of current animal operations will yield better water use values than the numbers from the Minnesota DNR permitting system water use reports.

Compliance efforts are underway by hydrologists in our local permit issuing offices to contact known feedlot operations. They are also working with county feedlot officers to identify operations that may need permits and educate the industry about permitting requirements.

## **Mining**

Minnesota DNR has all self-supplied mining operations under permit.

### *Commodity identification*

Currently only 'sand and gravel washing' is tracked as a separate use type under industrial processing which would indicate a commodity type for permits under mining water use. Identifying the mining product for each facility would have advantages. For 'water level maintenance' we differentiate 'mine dewatering', 'quarry dewatering', and 'sand gravel pit dewatering'. Classification of each operation by type of output product may be helpful.

### *Disambiguate mine processing from mine dewatering*

While these are two separate use types tracked in the permitting system, older permits were commonly issued for 'mining' which were later interpreted as mine processing. There is the tendency for these older operations to really perform a mix of uses under one permit. There are 30 mine processing permits and 32 mine dewatering permits. See the work plan section for more details on proposed actions.

## **Aquaculture**

The DNR permitting system has a use type to track aquaculture water use.

DNR does not track the ownership type of aquaculture systems (public/private), type of operation (aquarium, hatchery, commercial harvest, bait shop, etc.) or the types or class of species cultured. These may be useful.

## **Commercial**

This is a very broad category and it may be a default grouping area for specific use types which Minnesota DNR tracks but do not fit well into other categories. This category is an optional part of the compilation and is not reported in the published 5-year report. It was identified that consideration of specific use types for this category needs to occur during the next compilation to ensure they are correctly applied. Input from the national office may be needed.

## **Hydropower**

Minnesota DNR requires water appropriation permits for hydropower facilities that divert water outside of a river channel. In-stream hydropower water use is not subject to permit. Currently DNR has only one active permit in this category. Some hydropower water use information is collected by Minnesota DNR in our stream monitoring unit through agreements with facility operators when required by FERC licensing. As this is not a required compilation category, hydropower water use information is currently only compiled for the Great Lakes watershed area of Minnesota for required water use reporting as part of the Great Lakes Compact.

In the past, this water use information was not requested by the local USGS office to be included in the compilation because the category is optional. Tracking water use at all hydropower facilities can be incorporated into Minnesota DNR's responsibility if needed. Collecting this information may require new cooperative agreements with additional hydropower operators.

### **Wastewater Treatment**

This concerns deliveries of water from wastewater treatment plants for reuse.

Minnesota DNR does not track these types of water use as no permit is required for the reuse of water already permitted. We are only aware of one facility that reused wastewater treatment water for industrial purposes. Some smaller systems use land spreading/irrigation as a partial means of disposal.

### **Identify Areas to Improved Data Compilation (State Priorities)**

Fundable Project Ideas (detailed in a further section)

- **Native American Water Supply Systems (high)** – Develop a system to obtain information on water used by tribal systems that are not required to have water use permits
- **Confirm older permits have correctly assigned use types (high)** - Mining, Mine dewatering and Power Generation facilities use a lot of water and older water use permits for these activities are prone to miscategorization. Checking all permits of these types will help us report in the right categories.
- **Metering Accuracy (medium)** – verify individual metering and water use reporting accuracy of all permits. Check each permitted water use meter with a high-accuracy, non-invasive, temporary, clamp-on meter as a service to permit holders to foster more accurate water use reporting.
- **Document the USGS 5-year water use compilation process (low)** - to automate data output and summaries by compilation categories from the Minnesota DNR water use information repository in MPARS.

Other Project Ideas

- **General Permit Compliance** – fund an enhanced inventory of high volume water users that do not currently have appropriate permits.
- **Census of water reuse** – Develop a list of systems that reuse water or wastewater to be able to add this information to the compilation. The water uses could include Pollution Containment, Wastewater and Rainwater storage. The Minnesota Department of Health has started a list of water reuse projects. The Minnesota Pollution Control Agency has started a list of irrigation from waste water treatment effluent.
- **Document aquifers for existing permits** – 7% of groundwater sources do not have an identified aquifer. Complete the inventory of aquifer information on groundwater permits. Investigate documentation on wells and interpret well logs to assign aquifers where missing.

- **Agricultural Tile Drainage** – agricultural tile drainage does not require a water appropriation permit. Use estimates of the installed base of tile drainage systems to estimate the water use from these systems.
- **Livestock watering** – Use Minnesota Pollution Control Agency feedlot permit information to more accurately estimate livestock watering water use. The USGS compilation currently uses National Agricultural Statistic Service Census of Agriculture information. The NASS data is for a time-period that is 3 years behind the USGS Water Use compilation year.
- **Categorize permit use types** that can map to different USGS compilation categories. For the MPARS use types that can map to different USGS categories, classify each permit situation.
- **Flowing Wells** - Find and document unpermitted flowing wells. Add estimates of water use (wasted water) to the compilation.

### **Collaboration with USGS local staff**

Minnesota DNR staff met several times with Minnesota USGS Water Science Center staff to review the current Minnesota water use program and how past data sharing has worked to summarize water use for the 5-year compilations. We spoke with our main USGS contacts at length about how Minnesota DNR collects water use information and the limitations of knowing water use in each category based on how DNR is charged with conducting our permitting program and in some cases our lack of complete information in some categories.

After developing a list of areas where more work could be done, Minnesota DNR prioritized the topics and tried to determine which ideas could be developed into fundable projects. Some ideas developed during the process did not reach the level of a fundable project but can be incorporated into future collaboration when compiling the 5-year data. Minnesota DNR shared its findings with USGS staff and gained agreement on the usefulness of the topic ideas.

Minnesota DNR is the only state agency that collects water use information statewide. The only category (besides self-supplied domestic) of significant water use that Minnesota DNR does not collect uniformly is hydropower. Only certain hydropower situations require a water appropriation permit. As previously noted, estimated values for water use are better than the permitting reporting information for Livestock. Minnesota DNR permits Livestock Watering operations. Our permit compliance is currently low enough that, estimates based on the agricultural census produce more comprehensive results. While other state and federal agencies have more comprehensive information on the number and size of livestock operations, they do not compile water use information on those facilities. These are the reasons why there was no collaborative effort to reach out to other state/federal agencies in these topic areas when undertaking this review.

## Project Idea Descriptions and Work Plans

### 1.

**Native American water supply systems** – Engage with tribal entities to survey public water supply and other water use systems. These systems are not required to obtain a DNR water appropriation permit and subsequently they do not report water use to Minnesota DNR; thus this information is not included in the 5-year compilation data. There amount of water use that could be collected for municipal, institutional and landscaping categories is unknown. We would develop a protocol to obtain information on water used by tribal systems that are not required to have water use permits.

#### *Work Plan*

Minnesota DNR will survey the Native American communities to determine the number and type of facilities that would meet the requirement of needing a water appropriation permit. Tribal systems do not require Minnesota DNR water appropriation permits if they are operated by Native Americans on Native American owned lands. The Minnesota Indian Affairs Council identifies 11 American Indian tribes in Minnesota. Each tribe has the potential to have a municipal water supply and other water systems. Many of the tribes operate entertainment facilities including casinos and golf courses that would be regionally significant users of water. The tribal governments collectively operate 22 casinos. Minnesota DNR will identify contacts in the conservation or facilities management areas of operations and request sharing of monthly water use information. If necessary, a formal agreement will be developed with each tribal government covering the transfer of information.

Minnesota DNR collects water use data from active permits through the electronic Minnesota Permitting and Reporting System (MPARS). This system uses the database of permitted water users to send automated notifications about the requirement to submit annual water use reports to all registered permit holders. Users of the system log in to accounts to perform functions such as applying for a permit or reporting annual water use. A new class of “non-required” permit records will need to be developed to hold the facility information and water use data for the Native American systems. The “Non-required” listings need to be handled in a way that does not send automated permit notifications and does not perform other actions like it would for workflows for standard permits that have specific requirements. Computer program development time will be needed to make these changes to the permitting and water use reporting components of MPARS.

### 2.

**Confirmation of use types for older permits** – Mining, industrial processing and thermoelectric power generation water appropriation permits may have ambiguous, arbitrary or outdated use types due to the amount of time that has passed since the permit was issued or amended.

Certain older mining, industrial processing and thermoelectric power generation permits were issued with a “purpose” that may not match to the modern MPARS “use types”. Use types are the descriptors of how the water will be used by the permit holder. They are the most granular level of tracking the purpose of the water use and are aggregated into use categories. Some older permits were issued for “mining” without specifying how much of the water was authorized specifically for mine dewatering, direct mining activities, or mine processing of the ore. At a later time, as the permit records were being computerized to track existing authorizations, a use type was assigned. A few instances of incorrectly assigned use types have been discovered in the past. This leads us to believe there are other permitting

situations where the recorded use type for the permit does not adequately describe the current use of the water.

Identifying the correct use type is important to place these very large water use volumes in correct USGS compilation categories.

There may also have been changes over time at permitted facilities concerning how water is used. The current use of water may not match the current authorization on the permit if the permit has not been recently evaluated. This can lead to a water use type for an older permit which does not reflect the current operation. This is most likely to occur in mining, mine processing and power generation permits.

There are 60 mining related permits and 55 power generation permits which require investigation. Other industrial users could be added to the investigation as warranted. There are 425 other industrial processing permits.

### ***Work Plan***

The investigation of correct use type may be as simple as researching Department of Energy (DOE) records for the power generating facilities. Their records should describe the type of cooling system used at each facility. Some power plants have a more complex setup with multiple types of cooling systems which are operated at different times of the year. This type of evaluation can only be done for electrical power generation plants licensed by the DOE. A more rigorous investigation will be required for other operations. Permit holders will be contacted to verify and confirm current uses of water.

Minnesota DNR will contact each permit holder where there is a likelihood of a misclassification of use type in the mining, industrial processing and power generation sectors. In some cases there may be alternative resources to verify the use type of these large water users.

### **3.**

**Metering Accuracy** – Minnesota DNR will verify individual metering and water use reporting accuracy of all permits. We will check each permitted water flowmeter with a high-accuracy, non-invasive, temporary, clamp-on flowmeter as a service to the permit holder and to foster more accurate water use reporting.

Measuring water use accurately is important for the veracity of the USGS water use compilation. We want to have confidence in the reported water use values from all permitted users. Some Minnesota cities have found large inaccuracies in the existing water metering infrastructure of their customers. It is not uncommon to hear that a metering system yields very different values when replaced by a new system. Minnesota DNR has concerns about the methods of measurement and reliability of existing meters used to measure or calculate water use by our permit holders.

Public water suppliers tell us once every ten years what their water flowmeter testing and replacement program is. Other permit holders do not have this requirement. We are currently operating with too many questions about the accuracy of water use reporting by our permit holders, and flowmeter accuracy is at the heart of the issue.

A multi-pronged approach is needed to ensure accuracy of reported water use.

## **Work Plan**

For those water users who do not have or employ a true water flowmeter, most are using an estimate of flow rate and a timing device to calculate the volume of water used. The flow rate value used in that calculation may come from the capacity of the pumping system, a one-time calibration of system equipment or elsewhere. Minnesota DNR would like to test a variety of installations with accurate, non-invasive ultrasonic or magnetic induction flow meters to confirm metering accuracy.

In cases where a flow rate is assumed and a timing device is the primary means of measurement, calculation of the true flow rate under a variety of normal operating conditions will help each permit holder report more accurate water use.

In cases where a flowmeter is already employed, calibration of the existing measuring devices with a temporary clamp-on meter will be used.

The greatest gain in reporting accuracy will be for larger facilities. A certain percent difference in metering accuracy at a facility using a large volume of water will generate the largest total discrepancy between reported and real water use. We would start our investigations and courtesy measurements at larger facilities.

Minnesota DNR will survey existing large water users to find out what equipment is used to measure water use, how long it has been in service and the schedule for testing of the devices for accuracy. Based on the results of the survey, Minnesota DNR will provide independent flow volume testing of facilities to evaluate the relative accuracy of the existing metering infrastructure.

The results of the survey and on-site meter calibration testing will help inform Minnesota DNR about the level of accuracy of existing high-volume permitted water users. This information will help us to recommend additional actions including statutory changes in measuring/metering requirements, recommended flowmeter length of service and meter testing/calibration intervals.

How a flowmeter is installed affects the overall accuracy it can report. Many flowmeter types require a pipe to be full of fluid and that the fluid moves through the pipe at the place of measurement in a non-turbulent flow regime to provide consistent and accurate results. This is usually accomplished by careful placement of the flowmeter along piping away from bends in the pipe, running the pumping equipment so the pipe is full of fluid at the flowmeter position and sizing the flowmeter appropriately to the pipe size and expected flow rate.

There is a larger issue concerning the accuracy of operators when reading existing meters. There is a need for guides for less experienced operators describing how to accurately read water flowmeters. Many permitted system operators could benefit from a printed manual or a video guide to reading common water meter types. It is important to report the water used in the correct units. Meters may display the volume information in a condensed format that requires the reader to convert the displayed value by using a multiplying factor to produce the desired output units. Minnesota DNR requires reporting in units of gallons. Meters may display collected values in a variety of units and system operators may gloss over that detail resulting in reporting of incorrect values.

Minnesota DNR will develop educational materials including print-ready guides and online video segments about meter reading. The goal is to have available materials that can teach water use reporters about the variety of metering display formats and have helpful tips for accurate meter reading.

#### 4.

##### **Document the USGS 5-year compilation process**

Currently, water use data is transferred to USGS water science center staff for processing into different compilation categories for input into AWUDS and for use in the published report of the national compilation. Use types and use categories as they are used by Minnesota DNR and the MPARS system are provided with water use values to the USGS. Applicability of these use types to the definitions of compilation categories has not been scrutinized. During the examination of our current process, we realized that there are unanswered questions about use type mapping to compilation categories in some areas.

At times there has not been clear communication on when to use summary water use data from the Minnesota DNR permitting system and when to use estimates of water use provided by the USGS's national program office. Close inspection of the process used by USGS staff would allow for Minnesota DNR to write repeatable queries to report output from the MPARS database that could be directly imported into AWUDS.

Working together during the whole compilation process will allow cross-checking of information by both Minnesota DNR and USGS before the compiled data are finalized for the 5-year report.

##### ***Work Plan***

Minnesota DNR will work with the Minnesota USGS water science center during the compilation process to better understand how the data DNR provides is processed. Each step and decision of the process to populate AWUDS and develop values for the published report will be documented. Attention will be paid to compilation category and AWUDS data summary areas including: county, HUC-8 watershed and principle aquifers.

Once the data output format from MPARS is agreed upon, customized reports can be finalized to capture the compilation process. Stored queries for each component needed for the compilation will be developed for repeatable output for any year of data available in the MPARS system (currently 1988 to 2015). By standardizing output that is ready to include into AWUDS, annual data compilation will be feasible.