

URNRD Remote Water Monitoring and Efficiency Annual Report, March 2022

Water Sustainability Fund Application #5221

The screenshot displays the Sensus web interface for a specific water meter. The browser address bar shows the URL: https://umrd.flexnet.net/dm/water#/water/device/detail/tab/about?id=88382462&device_category=WATER_METER&tenant=12&typefnum=WATER11. The page title is "Sensus Upper Republican Natural Resources District, NE - Manage Water".

The main content area is divided into several sections:

- Header:** "Meter 7581" with location "NW 12-05-39 78-8-2274, NE 120539NW". It also shows "SmartPoint North American 2-Way Water", "Lifecycle State: Installed (02/27/2019)", "Administrative State: Active", "RIS: 100%", "Voltage: 3.64 V (03/24/2022 4:16:21 PM)", "Latest Read: 5683.43 AF (03/24/2022 1:00:00 PM)", and "Latest Message: 1:39:40 PM (03/23/2022)".
- Navigation:** "About this Device", "Alerts", "Communications", "History", "Read Data".
- SmartPoint Information:**
 - SmartPoint: North American 2-Way Water
 - Product Type: 510M520M520G515M-3W
 - FlexNet ID: 88382462
 - Service Point ID: --
 - IP Address: --
 - Provisioned State: Basic Setup Complete
 - Installed Date: 02/27/2019
 - SmartPoint Firmware: R1.9.12
 - Last SmartPoint FW Update: 00/13/2021
 - SmartPoint Message Version: R1.9.12
- Configuration:**
 - SmartPoint Top Level State: Listen After Talk
 - SmartPoint Transmit:
 - Transmit Mode: Normal Mode
 - Meter Sample Rate: 1 Hour
 - Transmit Rate: 4 Hours
 - Transmit Modulation: Normal Power - 7FSK
 - SmartPoint Reads:
 - Meter Units: Acre Feet
 - Read Resolution: Hundredths of Acre Feet
 - History Resolution: Hundredths of Acre Feet
 - Enhanced History Compression: Disabled
 - Dials: 8
 - Security:
 - Encryption Management State: Encryption Supported
 - Device Encryption: Disabled
 - Encryption Status: Encryption is disabled
 - Encryption Desired: Decrypted by Default
 - Key Rotation Status: None
- Location:**
 - Address: NW 12-05-39 78-8-2274, NE 120539NW
 - Service Point ID: --
 - Latitude: 40.41857°
 - Longitude: -101.70002°
 - Time Zone: America/Boise/MDT
- Groups:**
 - All Water Meters: 280
 - 0 Chase County: 829
 - 05-39: 89
 - 00 allsites: 1,353
- Metrology Information:**
 - Product Type: --
 - Meter Type: Sensus 3-Wire
 - Meter ID: 7581
 - Meter Body ID: --
 - Meter Firmware: --
 - Last Meter FW Update: --
- SmartPoint Operations:**
 - Diagnosis Commands: 0
 - Operational Commands: 150
 - SmartPoint Firmware: 0

The URNRD was awarded a \$375,336 grant by the Natural Resources Commission in December 2018 and executed a contract with the Department of Natural Resources in February 2019. The project entails equipping irrigation well flow meters throughout the district with radio-based telemetry units so that water management is improved with real-time water usage information provided to irrigators, and the URNRD. The screen shot above illustrates current usage and other information about an individual meter transmitted by the telemetry equipment that is being installed. Usage data as granular as hourly water application rates is available from the radio-

based system that utilizes a network of towers and gateways erected by neighboring electric utilities that have partnered with the URNRD.

Project Progress

In early 2021, shortly after the last annual support was submitted for the project, 122 flow meters in the district were equipped with telemetry units using WSF funds. Per-site installation costs range from approximately \$700 - \$900, which is approximately half the per-site cost of self-contained telemetry units that utilize cellular and satellite signals to transmit instead of radio. Additionally, the monthly data fees for cellular and satellite-based systems are four times to six times the monthly, per-meter cost of meters that utilize radio-based transmissions. The picture below shows the units that are being installed. The white, cylindrical piece mounted to the horizontal irrigation pipe is a digital meter head that captures and stores water usage data generated by a traditional, prop-style water meter. It replaces an odometer-style head that must be manually read to collect water-usage information. A sensor placed inside the bearings of the prop-style meters logs usage detected by the prop and relays information to the digital meter head. The digital meter head is connected via cable to a radio module that relays the data to the URNRD using a network of radio towers owned by an electric utility that provides service to much of our NRD. The radio module in the photo is the box mounted to the top of the pole.



The following picture shows the digital “FlowCom” meter head that replaces manual, odometer-style meter heads.



There are approximately 3,300 irrigation wells within the URNRD and pursuant to our rules, all are required to be equipped with flow meters to measure water usage relative to our limitations on usage. To date, approximately one-third of the meters have been equipped with the necessary telemetry hardware and all of those are actively communicating water-usage data.

The URNRD telemetry units send signals to the radio towers owned and operated by Highline Electric Association and Y-W Electric Association, and the URNRD pays the two utilities a portion of the operations and maintenance costs associated with the towers that are used. We have been very pleased with the reliability and robustness of the network.

We originally planned to install a few hundred telemetry units beginning in late fall of 2021 through spring 2022. However, that time was instead been used to install corrective equipment in the McCrometer FlowComs to prevent electric interference. In mid-2021, we noticed unusually high variability in usage readings from a relatively small number of meters with the new equipment – approximately 20 of the approximately 1,300 meters that have been equipped with the new hardware. After an extensive investigation of the issue by our staff and McCrometer engineers, it was determined that electrical interference from sources near the location of the telemetry units was causing erratic readings in some cases. McCrometer determined that grounding the main electrical board inside the FlowComs would prevent outside electric currents from interfering with their operation. We thoroughly tested the proposed solution and determined that it worked.

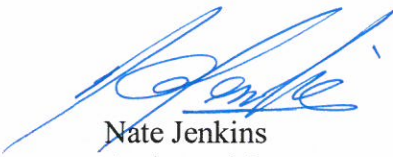
Since early winter of 2021, we have been installing the ground cables on the 1,300 FlowComs that have already been installed to prevent electric interference issues now and in the future.

Upcoming Activities

Installing the new meter heads and sensors located within the bearing near the prop of the meters requires removing the meters from the field and bringing them to the shop. This makes it

impractical to do any installation during the spring and summer irrigation season. Over the next several months we may test some new meter equipment, but won't install any telemetry units. Beginning in the summer, we will select areas of the district to install telemetry units, order the needed equipment, and begin installation in the fall. I expect we will install between 250-400 units from fall 2022-spring 2023. Also, during the spring and summer, we will finalize a decision on a cloud-based storage system for the collected data. Among the data that will be displayed is water usage compared to estimates of crop-water demands as estimated by evapotranspiration stations we own and operate throughout the district. This comparison is expected to help improve irrigation decisions by reducing instances of farmers applying more water than what evapotranspiration estimates indicate is needed.

Thank you and please contact me if you have questions about our project.



Nate Jenkins
Assistant Manager