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# water spouts

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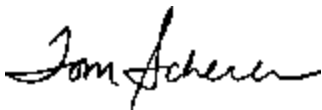
## An Irrigation Research Survey and the Water Spouts Mail List

Periodically, we need to update and correct the Water Spouts mail list. Included with this issue is an insert. We ask that you check the mailing label on the insert to make sure your name is spelled correctly and that the address is correct. If there are any changes, please make them on the mailing label on the insert. Please indicate in the check boxes whether or not you want to continue receiving Water Spouts.

Last November, an Irrigation Research Summit was held on the NDSU campus. The meeting was attended by researchers from NDSU and representatives from various organizations that rely on irrigation. The summit helped to identify and prioritize irrigation research needs to benefit the state. However, we need your input.

On the backside of the enclosed insert is an irrigation research survey. It will take you about five minutes to fill it out. The survey will be completely confidential. Your name (from the mail list label on the front) will not be associated in any way with your responses to the survey questions. If you would be willing to participate in a more detailed telephone survey, please indicate that on the last question of the survey.

After checking your name, address and completing the survey, fold the survey and mail it back. Postage is already paid.



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### Mark Your Calendar for these Irrigation Workshops

Dec 5	Radisson Inn, Bismarck	Forages, Animals, Marketing and Irrigation
Dec 6	Radisson Inn, Bismarck	High Value Crops, Farm Water Management
Dec 11	Grand Forks County Office Bldg.	Irrigated Potatoes, Drainage and High Value Crops
Dec 13	Carrington RE Center	New and Potential Irrigators

The North Dakota Water Users annual convention is scheduled for Dec. 5 and 6 at the Radisson Inn, Bismarck. An irrigation workshop for current irrigators will be held in conjunction with the convention on Wednesday December 5. A part of the convention will be an irrigation exposition where irrigation suppliers will demonstrate their products and services. The workshop on December 6 will cover two topics. The morning session will deal with water management on farm fields and the afternoon session will be on high value crops.

The workshop in Grand Forks will be for existing irrigators in the area. Potatoes, high value crops, farm water management and irrigation districts will be some of the topics. The workshop in Carrington will be for those interested in starting to irrigate. Basic information needed to develop an irrigation system will be presented.

More information about the workshops will be mailed in November. An application for Certified Crop Advisor (CCA) CEU's will be made for each workshop. Past workshops have had between two and five soil and water CEU's for each workshop. If you have any suggestions for topics to cover at the workshops, please give me a call; send an email or a letter.

## Lessons and Benefits from Renovating an Old Irrigation Well

The specific capacity of an irrigation well is a very important piece of information. It is used to estimate how many gallons of water one can withdraw from a well and is expressed in gallons per minute (gpm) per foot of drawdown. To determine specific capacity we needed to measure the static water level, the pumping water level, and the flow rate. The specific capacity of the well when constructed existed in the drilling record, but the records were not retained. At the operating flow rate, the current specific capacity of the irrigation well is 2 gallons per foot of drawdown.

Although we were not able to compare it to the original specific capacity, we were able to estimate its magnitude from the flow rate of the pump installed. By referencing it to yet another important record, the pump performance curve, the current specific capacity was found acceptable. The pump curve provided by the manufacturer indicated that the pump would attain a maximum efficiency of 65 percent when the flow rate is from 68 to 80 gpm. This corresponds to a pressure range from 100 psi to 120 psi when the pump was new. The renovation provided the flexibility necessary to operate the pump for variable amounts of water and be within safe pressure range. The lessons learned are:

1. Keeping records of wells to determine what is in the well and the specific capacity at the time of construction is very important.
2. Obtain and keep records of pump curves to compare current performance with the performance of the pumping plant when it was new.
3. Annual maintenance of the pump and well is very important.
4. Check the well and pump performances periodically.
5. Make sure the pump characteristics match the irrigation application system, especially if changes have been made to the irrigation system (for example, changing the sprinkler package on a pivot).

We found that the well, the pump and the irrigation application system are all connected. If the integrity of the well is compromised it affected the performance of the pump and eventually influenced the performance of the irrigation application system. We needed to know the components to appreciate the whole irrigation system. The heart of the irrigation system is the well. The well records provided information necessary to appreciate the productivity of the well and understand the limitations. These records are important information to keep and refer to on a regular basis.

### Benefits

The renovation of the irrigation well benefited researchers and extension specialists at the Carrington Research Extension Center in many ways. Described herein are two accounts:

#### Demonstration of different irrigation application systems

The research experiments demonstrated three types of microirrigation application systems, the microspray,

microsprinkler and the bubbler all operating at 30 pounds per square inch (psi) pressure. The microspray system was equipped with an automatic electric controller to simulate mist conditions continually over sunflower and canola crops. The microsprinkler and the bubbler systems were equipped with a separate controller for irrigating different kinds of herbs. The herbs evaluated in the experiments were feverfew, lemon grass, basil, cayenne chili, Italian parsley, and garlic chives. The smallest irrigation zone was designed for application of 20 gpm and the largest about 60 gpm. The two controllers were programmed to independently control the operation of the irrigation well, by turning on the pump, setting watering cycles to the irrigation zones and turning off the pump. We were able to operate a single zone or multiple zones and maintain required pressure in the system.

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## Pump Renovation Improves Disease Research

Renovation of an existing submersible pump at the NDSU Carrington Research Extension Center has resulted in a significant improvement in the infrastructure for conducting disease research. In addition to acidifying the well to clean the screen, several pump impellers were removed to better balance pump output to anticipated needs. An access port and aboveground assembly was installed to allow routine performance monitoring. New underground lines and access risers were added to deliver water to additional field areas and allow a five-year crop rotation. A long rotation is important to avoid buildup of non-target pests.

The pump is used to supply water to misting systems in disease research plots. In 2000, a sunflower head-rot screening project was initiated to evaluate commercial hybrids, breeding lines, and exotic germplasm for susceptibility to sclerotinia. This season, sclerotinia research on canola was added, with an evaluation of fungicides and a comparison of cultivars for resistance. In 2002, sclerotinia work in dry bean will begin.

A dependable water supply and delivery system is crucial to the success of these on-going projects. After inoculation, a period of 36-48 hours of constant humidity is necessary for sclerotinia ascospore germination. After that, a humid environment must be maintained to assure adequate disease development, without which superior treatments or germplasm cannot be identified. The pump and misting systems are run for 3-5 minutes every half-hour for several weeks after inoculation. Pump failure could easily result in trial failures. The pump renovation this year has brought the pump to the desired level of performance. Periodic monitoring will hopefully identify future problems before they become disasters.

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## Winterize Your Irrigation System

Irrigation systems, just like other farm equipment, need regular, routine maintenance, especially when most of the equipment stays outdoors all year. Performing the following maintenance items, will help ensure your irrigation equipment is in good shape when you start it next spring.

### Pumps and pipelines

Pipes, valves, tanks, centrifugal pumps, etc. should be drained of water or pumped out to prevent damage from freezing. Underground pipelines are full of water and need to be pumped, drained or blown out before Nov. 15.

If the pipeline has any air relief valves located at high points, before draining the pipeline check to make sure the air relief valve is not stuck. Often the plastic ball in the valve will stick shut, which will prevent water from draining out of the pipeline. Much like when a full liter bottle of soda is held upside down, only so much drains out before air has to enter the bottle. Making sure the air relief valves are not stuck will help the pipeline drain faster.

After the water has been pumped, the pipeline should be checked several days later to see that all the water has been removed. Protect pump-out risers and other equipment from livestock. Close or cover any openings that might invite animals or rodents to enter.

For oil-lubricated deep well turbine pumps, after the pump is cold, open the oiler and let oil drip into the line shaft bearings. Rotate the shaft to distribute the oil over the entire bearing. The cold oil will adhere to the cold bearings and provide good winter protection. Check the packing gland around the shaft on the pump head; if it is worn or missing pieces, replace with new material. On belt-driven pumps, remove the belts and store in a dry place. If you can't remove the belts easily, then reduce the tension on the belts. If the belts are worn or frayed, replace with new belts in the spring.

Accurate pressure gages and flow meters are the best way to keep track of the performance of your irrigation pumping system. If possible, remove the flow meter and pressure gages. Cover or plug the holes. If the flow meter does not work, winter is a good time to have it repaired. Note any broken pressure gages and replace with new ones in the spring.

### Above-ground pipelines and gaskets

Pipes should be stored on racks so that one end is above the ground to permit drainage and air circulation. Protect them from livestock.

Gaskets are an extremely important part of aboveground pipelines (including gated pipe). Flow testing in Nebraska showed that many aboveground pipelines lost from 10 to 35% of the pumped water between the pump and the irrigation system. Cracks and other leaks in the pipelines accounted for some of the lost water, but most of the water was lost due to old or missing gaskets.

If possible, remove the gaskets when storing pipe for winter. Inspect them and obtain replacements for any that are damaged or leaked during use. Store the gaskets in clean water in a place that will not freeze. This prevents them from cracking and drying out. Do not hang gaskets on a nail or hook. If they cannot be stored in water, place them over a pipe that has a slightly smaller

diameter than the gasket and keep out of direct sunlight. Covering the gaskets to restrict air movement will also help to prevent drying out and cracking. If the pipe is to remain in the field, loosen the connectors but don't split all the sections of pipe (some may need to be split to drain water). In the spring, make sure the gaskets are in good condition before inserting in the pipeline.

### Chemical injector pumps

Chemical injector pumps should be flushed with water, then drained and, if transportable, stored in a clean dry place. If the pump is belt driven, loosen the belt.

### Electrical motors and controls

Check all electric motor openings to make sure they are properly screened to keep rodents out. Rodents like to chew on motor winding insulation in the winter. Often chewed windings result in shorts and a burned out motor the next year. If a screen is damaged or missing, replace with ¼-inch mesh screen. This screen can then be left in place during operation without plugging with dust and debris. Electric motors are best left open to free air movement to keep moisture condensation in the motor to a minimum. Lubricate all bearings and rotate motor. Change oil in the motor reservoir if discolored.

On electrical control panel doors, replace hard or broken seals if to keep moisture, dust and rodents out. Seal all openings into the electrical control box to prevent rodents from entering and damaging the wiring. Lock the control box in the "OFF" position. Spraying electrical contacts with contact cleaner will displace dirt and moisture to prevent corrosion.

### Internal combustion engines

For internal combustion engines, special attention must be paid to lubrication, the cooling system, ignition, engine openings and the fuel system. Enclosing the engine would be ideal. Where it is impossible to provide housing, proper winterizing is especially important.

Change the oil and filter when the engine is warm, then run the engine briefly to circulate. Clean and replace the air cleaner. Remove and clean the spark plugs, pour 2 ounces of oil into each plug hole and replace plugs. Rotate the crankshaft several turns to allow the oil to thoroughly coat the cylinder walls.

The cooling system should be flushed and refilled with the proper anti-freeze solution. This will prevent rust and scale from forming in the cooling system. For gasoline engines, add fuel stabilizer and run engine, or drain all fuel from tank, lines, and carburetor. For diesel engines, fill tank, DO NOT drain. Replace the fuel filter and leave all lines and injectors filled with diesel fuel. For LP gas engines, drain the vaporizer-regulator (both fuel and water lines).

Seal all openings with weatherproof tape (air cleaner inlet, exhaust, distributor cap and crankcase breather tube. Lubricate all accessories. Loosen belts. Remove the battery, charge it and store in a cool, dry place.

A small amount of maintenance and repair will ensure your irrigation system starts and runs properly next growing season.

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