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water spouts

No. 314 October 2020

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Virtual Irrigation Workshop Set for Dec. 15-16

A virtual irrigation workshop is scheduled for Dec. 15-16 via Zoom with sessions from 9 to 11:30 a.m. both days. The workshop will be held after the North Dakota Water Users Convention, which also is a virtual event. The planning of the workshop is a collaborative effort of the North Dakota Water Users Association, North Dakota Irrigation Association and NDSU Extension.

Registration for the workshop will be online through the North Dakota Water website at *https://ndwater.org/waterconvention*. After registering, you will receive an email with the Zoom access information.

The registration fee will be $30. However, participating in the workshop is free of charge for those who register for the 57th annual North Dakota Water Convention. The agenda for the workshop is shown at right.

	Tuesday, Dec. 15	Wednesday, Dec. 16
8:50-9	**Introductions**	**Introductions**
9-9:20	**Remote Sensing and Irrigation Management: An Evaluation Project** – *Dean Steele*, NDSU	**UAS Performance for Irrigation Management** – *Jose Chavez*, Colorado State
9:20-9:40	**NRCS EQIP update** – *Christi Fisher* and *Erica Althoff*, Natural Resources Conservation Service	**Benefits of Residue Management Under Irrigation** – *Joel Schneekloth*, Colorado State
9:40-10	**Oakes Irrigation Research Update** – *Kelly Cooper*, NDSU	**Nesson Valley Irrigation Research Update** – *Tyler Tjelde*, NDSU
10-10:10	**Stretch Break** (Questions)	**Stretch Break** (Questions)
10:10-10:30	**Nebraska TAPS Project** – *Chuck Burr*, University of Nebraska	**Saline/Sodic Soils: How Do We Remediate** – *Naeem Kalwar*, NDSU
10:30-10:50		**Soil Moisture Measurement** – *James Herrick*, Cascade Earth Sciences, Valley, Neb.
10:50-11:10	**Soil Moisture Monitoring/ Scheduling** – *Josh Messer*, AgIntel	**VanRay Irrigation Operation** – *Matt VanRay*, Pettibone, N.D., farmer
11:10	**Questions and Closing Remarks**	**Questions and Closing Remarks**

One advantage of a virtual workshop is that we can access the irrigation expertise of colleagues in other states. One of the featured presentations will be on the Testing Ag Performance Solutions (TAPS) program *(https://taps.unl.edu)* developed at the University of Nebraska.

This program facilitates a number of interactive real-life farm management competitions centered around irrigation management. The contestants, usually a team, manage replicated irrigated plots, which includes selecting the seed variety, fertilizer rates and irrigation needs. All the plots are managed by the University of Nebraska.

The other featured presentations, both by colleagues from Colorado State University, will deal with the benefits of residue management under irrigation and how it affects soil properties such as infiltration and soil temperature. The other presentation will show the results and evaluation of 10 years of using unmanned aerial systems (UAS) for irrigation management. The results are from research performed at several universities and highlights advantages and problems with using UAS.

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Determining Amount of Pumped Water for the Season

If you have an irrigation water permit, sometime this winter you will receive a notice from the North Dakota State Water Commission requesting a report of the amount of water you pumped for irrigation this past growing season. Here are three methods you can use to determine the volume of water to report.

1. **Do you have a working flow meter?**

   A working flow meter with a volume totalizer makes filling out the postcard easy to do. The volume totalizer is a counter similar to the odometer in a car. Some meters record the volume in hundreds or thousands of gallons.

   Determining which one you have is easy because the manufacturer will show zeros to the right of the counter. If hundreds of gallons are recorded, then the counter will have two extra zeros. If it records thousands of gallons, it will have three zeros. Some record the volume in cubic feet of water (1 cubic foot equals 7.5 gallons) and some record in acre-inches or acre-feet.

   If you wrote down the numbers on the volume totalizer at the start of the season, then all you need to do is read the meter again and subtract the numbers to obtain the volume pumped. You can report water use in gallons or acre-feet. Just remember that an acre-foot of water covers an acre 1 foot deep in water and is equal to 325,800 gallons. An acre-inch is equal to 27,150 gallons.

2. **Do you have an hour meter on the center pivot or pump?**

   For a center pivot system, you can calculate an estimate of the amount of water pumped using the hour meter in the pivot control panel. However, you need to have written down the hour meter reading at the beginning of the growing season. Subtract the current reading from the previous reading to get the number of hours the pivot operated this year.

   You then need to know the approximate flow rate to your center pivot. This can be obtained from the center pivot sprinkler chart. Now that you know the flow rate, use the following formula to calculate the acre-feet of water that was pumped:

   Volume pumped =
   (hours of operation) x (gallons per minute) / 5,430

   For example, say your center pivot ran for 895 hours and the sprinkler flow rate is 800 gallons per minute, then the volume pumped is approximately:

   (895 x 800) / 5,430 = 131.9 acre-feet

   You also can use this method if you have a diesel or gasoline engine with an hour meter or have an hour meter in the pump electrical control panel and know the average flow rate being pumped.

3. **No water meter or hour meter?**

   If this is the case, estimating the volume pumped will be difficult. However, for electrically driven water pumps, you can obtain an estimate of the number of hours of operation using the electric meter. Modern electric meters not only record the total energy use in kilowatt-hours (kwh) but also other parameters such as peak kwh and average kwh use. You can estimate the total hours the pump was operated by dividing the total kwh used during the growing season by the average kwh.

   The seasonal total and average electric draw for each meter can be obtained from your electrical supplier. For instance, say your pumping plant used a total of 43,937 kwh and the average pumping load was 43 kw. Dividing 43,937 kwh by 43 kw shows that the pump operated for 1,021.8 hours.

   Again, you need an estimate of the flow rate to calculate the total volume used. The calculated hours will be correct even if the meter is recording the electricity used by the pump and a center pivot or if it is recording electrical use of just the pump. The extra electrical load of the center pivot is recorded in the average draw and the total, so it doesn't affect the calculated hours of operation.

Estimating the volume of pumped water becomes very difficult where irrigation systems have one pump that supplies multiple pivots or multiple wells that supply a single or multiple center pivots. If you have difficulty estimating pumped water volume, consider installing a flow meter, or if you have a center pivot, write down the reading on the hour meter. You have other ways of estimating the volume of pumped water from electrical use, but they involve a few more calculations. Contact me if you have questions.

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Useful Life Expectancy of a Center Pivot and its Components

Just like any piece of machinery that is exposed to the weather continuously, center pivots have a recognized period of useful life. In economic terms, the useful life would be the period of time you need to depreciate the pivot to a value of zero dollars.

Generally, the useful life of a pivot is expected to be 25 years or more. However, several factors can change that prediction drastically. Corrosive water, lack of preventive maintenance, ice storms in the fall and spring, tornadoes and lightning in the summer, pumping sand and obstacles (parked tractors, etc.) affect the life of a pivot. Not all the component parts of a pivot have the same life span as the structural members of the pivot.

Tires

You should expect the tires on a pivot to last at least 15 years, provided you keep the tire pressure at recommended levels. However, the quality of the tire really has a large effect on its life span. Poor-quality tires will crack and split. Recaps, which are reworked truck tires, can last 20 years or more.

Gearboxes and U-Joints

Generally, gearboxes and u-joints on the pivot towers are the most common cause of pivot breakdown. With good maintenance, they should last 15 years. To achieve this life expectancy, accumulated water in the gearboxes should be drained and replaced with new oil every year, preferably in the fall before freezing weather.

Quite often irrigators check the water and oil level on the gearboxes driving the wheels but forget about the center drive gearbox. The oil in the gearboxes should be replaced every three to five years, depending on hours of use each growing season.

The gearboxes on the last tower of a pivot will accumulate more wear than the towers near the pivot point. The gearboxes on first and second towers usually will accumulate more water.

The hills associated with irrigated potatoes are very hard on gearboxes. The up and down motion puts added strain on the gears and causes them to wear faster. Older pivots (more than 10 years old) used to irrigate potatoes for the first time most likely will have gearbox or u-joint problems. Deep wheel tracks, high hills and muddy low spots also reduce the useful life of gearboxes.

Tower Drive Motors

The drive motors (electric and hydraulic) should last the life of the pivot. Lightening and submergence in water are probably the biggest factors that affect their useful life.

Tower Control Box

Barring lightening, contactor and micro-switches in the tower control box should last from 10 to 15 years. However, a good preventative maintenance program would replace them about every 6,000 hours of pivot operation.

Sprinkler Heads

Sprinkler heads, including pressure regulators, are probably the most important part of a pivot. Properly spaced and with correct nozzle sizes, the sprinkler package will apply the proper amount of water uniformly over the field.

Given the importance of these components and remembering that the sprinkler package is less than 10% of the cost of the pivot, irrigators should pay particular attention to the condition of the sprinkler heads. Under North Dakota weather conditions, most sprinkler heads have a useful life ranging from 5,000 to 8,000 hours of pivot operation, whether plastic or brass. Sand or rust in the water reduces the expected life of sprinkler heads.

Nozzles

With no sand or rust in the water, the nozzles should last as long as the sprinkler head. Plastic and brass nozzles have about the same life span. If grit is in the water, the nozzle diameter should be checked every two years.

How do you know if grit is in the water? Check the sand trap at the end of the pivot; any more than a gallon or two of grit will justify checking the nozzle diameter.

Endguns

The vertical swing arm design should last the life of the center pivot. However, the bearings sometimes can wear out, which requires them to be replaced. Endguns have tapered bore nozzles, so only gritty debris in the water will affect their life. Older endguns with the horizontal swing arm and the whipping return motion usually last about 10 years or less.

Endgun Booster Pumps

The endgun booster pump should last the life of the pivot, barring any lightening hits. The electric motor on booster pumps can burn out, especially with sprinklers mounted on the top of the span pipe and may have to be replaced after 10 to 15 years. Pivots with sprinkler heads mounted on drop tubes appear to have less electric booster pump trouble.

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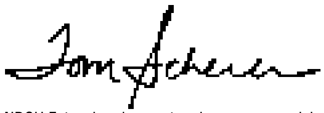

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