www.ag.ndsu.edu/extension-aben/irrigation/water-spouts

water spouts

No. 322 June 2022

In this issue:

Upcoming 2022 NDSU Field Days

Details for the field day at each location listed below will be posted to their websites.

July 11	**Central Grasslands Research Extension Center, Streeter**
July 12	**Hettinger Research Extension Center**
July 13	**Dickinson Research Extension Center**
July 13 & 14	**Williston Research Extension Center** July 13 – Dryland Tour at the Williston REC July 14 – Irrigated Tour at the Nesson Research and Development Farm
July 18	**Agronomy Seed Farm,** Casselton
July 19	**Carrington Research Extension Center**
July 20	**North Central Research Extension Center, Minot**
July 21	**Langdon Research Extension Center**
Aug. 4	**CREC Oakes Irrigation Research Site** – Oakes (8:30 a.m.-Noon CDT)
Aug. 9	**NDSU Horticulture Research and Demonstration Gardens** – Fargo (3-7 p.m. CDT plants, local foods and outdoor spaces)
Aug. 25	**Northern Plains Potato Growers Association Potato Field Day** – various locations (7 a.m. CDT breakfast and research presentations at Hoverson Farms, Larimore; noon lunch and field research tour at Forest River Colony, Inkster; 5:30 p.m. barbecue and research presentations of chips and fresh potatoes, Oberg Farms, Hoople)
Sept. 10	**NDSU Horticulture Research Farm near Amenia**, pre-registration required (10 a.m.-3 p.m. CDT trees and ornamentals)

NDSU | EXTENSION

Project Safe Send – Pesticide Disposal

Farmers, ranchers, pesticide dealers and applicators, government agencies and homeowners with unusable pesticides can bring them to any of the Project Safe Send Sites listed below.

Project Safe Send is a safe, simple and non-regulatory program that helps people safely and legally dispose of unusable pesticides free of charge. Since 1992, more than 11,000 people have brought in over 5.7 million pounds of pesticides to Project Safe Send.

The program accepts old, unusable or banned pesticides, including herbicides, insecticides, rodenticides and fungicides. For a list of accepted items, click on Accepted Pesticides. The collected pesticides are shipped out of state for incineration. Project Safe Send is funded through product registration fees paid by pesticide manufacturers.

People are urged to check their storage areas for any unusable pesticides and safely set them aside for Project Safe Send. If the containers are deteriorating or leaking, pack them in larger containers with absorbent materials. Free, heavy-duty plastic bags are available from the North Dakota Department of Agriculture.

For more information on transporting your pesticides safely, go to the Project Safe Send website at www.nd.gov/ndda/pesticide-program/project-safe-send

If bringing more than 1,000 pounds, please contact me to pre-register. Each participant is limited to 5,000 total pounds and one shuttle. Chlorpyrifos will not be accepted.

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Pesticide Outreach Specialist,
North Dakota Department of Agriculture

2022 Project Safe Send Sites

8 a.m. to noon (local time) at North Dakota Department of Transportation (NDDOT) facilities

Tuesday, July 12	Adams	804 1st Ave
Wednesday, July 13	Larimore	1524 Towner Ave
Thursday, July 14	Valley City	1524 8th Ave SW
Friday, July 15	Lisbon	12999 Hwy 27
Tuesday, July 19	Tioga	425 2nd St SE
Wednesday, July 20	Minot	1305 Hwy 2 Bypass E
Thursday, July 21	Rugby	603 1 St NE
Friday, July 22	Devils Lake	1905 Schwan Ave NW
Tuesday, July 26	Dickinson	1700 3rd Ave W Ste 101
Wednesday, July 27	Beulah	205 Hwy 49 S
Thursday, July 28	Bismarck	218 S Airport Rd
Friday, July 29	Ashley	520 7th St. SW

Air in Irrigation Pipelines – Not Good

A commonly misunderstood concept is how air gets into a pipeline and its effect on the operation of the irrigation system. All irrigators are familiar with the air release valves mounted near the discharge of a pump. When the pump is turned on, the air in the pipeline is discharged from the valve, sometimes soaking those unfortunate enough to be standing in front of it.

Many irrigators are familiar with the air release valves installed at the high point where the pipeline goes over a hill between the pump and irrigation system. Since these are often in the middle of fields, they have to be farmed around and many have been broken off or shut off because they are perceived to be a nuisance and an obstacle to field operations. However, they should be maintained and kept working because they are important for proper operation of the irrigation system.

Air gets into a pipeline in three ways. The first is at startup, when the pipeline is being filled. Much of this air will be pushed down the pipeline where some will collect in the high points of the pipeline, and the rest will be pushed out through air release valves. If no air release valves are at the high points, the air will create a bubble that will not be pushed out by flowing water, even under pressure.

The second source of air is in the water. By volume, water contains about 2% air, even water from a well. This doesn't sound like much, but consider that this would form a 40-foot bubble in a 2000-foot pipeline, no matter the pipeline diameter. During pumping, the air will leave the water and contribute to the bubble at the high points of the pipeline.

The third source of air usually happens during dry periods when the pump "sucks" air because the water level in the well drops near the pump intake. This is commonly associated with older wells with partially plugged screens or dropping water level of the aquifer. This source can be significant and contribute to a bubble in late July and August when pumping is the greatest.

Can this bubble of accumulated air have an impact on the flow through the pipeline? Absolutely.

The air bubble acts like a pipeline restriction and can reduce the flow rate and increase the pressure at the pump. In addition, sometimes pockets of air will be pushed out of the bubble to flow downstream and potentially cause water hammer (a high-pressure surge) that can damage pipeline joints and connections. The solution is to make sure the air release valves are working and maintained.

Air in the water can also affect the operation of the sprinklers on a center pivot. If you notice that the sprinklers on the pivot sometimes hiss with escaping air, then there is air in water and it is probably accumulating near the top of the gooseneck. This can reduce the flow to the sprinkler head resulting in uneven water application. A solution is to install a **continuous** air release valve near the pivot point, preferably at the start of the first span. A continuous air release valve will let air out of the system even under pressure. They are readily available from irrigation dealers and sprinkler manufacturers.

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How long would you expect a center pivot and its components to last?

Just like any piece of machinery that is continuously exposed to the weather, center pivots have a recognized period of useful life. In economic terms, the useful life would be the period of time it takes 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 drastically change that prediction. Corrosive water, lack of preventative maintenance, ice storms in the fall and spring, tornados 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 lifespan as the structural members of the pivot.

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, whether plastic or brass, have a useful life ranging from 5,000 to 8,000 hours of pivot operation. 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 lifespan. If there is grit in the water, the nozzle diameter should be checked every two years. How do you know if there is grit 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.

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 lifespan. Poor quality tires will crack and split. Recaps, which are reworked truck tires, can last 20 years or more.

Calibrating a Center Pivot for Chemigation

Fertilizer, in particular nitrogen, is in short supply this year, so it is important to optimize the amount that is applied. Chemigation is the injection of any chemical into the water used for irrigation. In the past, this practice has been called fertigation for adding fertilizer, herbigation when herbicides were added, fungigation for fungicides, etc. Now it is just called chemigation. Irrigators have an advantage in that they can inject liquid nitrogen into their irrigation system and thus take advantage of split applications. Often, by using plant sampling techniques to determine the nitrogen status of crops during the growing season, nitrogen fertilizer can be reduced, thus saving some operational expenses.

Chemigation is a very efficient and effective irrigation management tool when used properly. It is recognized as a best management practice for irrigated agriculture. When chemigating, the irrigation water delivery system and the chemical injection equipment must conform to state laws regarding backflow prevention. In addition, the pesticide label must state that it can be used for chemigation and can be applied through a center pivot irrigation system.

Center pivot systems are used on over 90% of the irrigated land in North Dakota. With the cost of pesticides and liquid fertilizer increasing every year, it's important to properly calibrate a center pivot irrigation system for chemigation. Below are five easy steps to follow to ensure that a center pivot chemigation system is properly calibrated.

1. **Calibrate the injector pump.**

   Determine the injection rate of the chemical injection pump for a particular setting of the injection rate control knob. This must be done with the irrigation system running so the injection pump is working against the water pipeline pressure. Do this by letting the injection pump draw from a calibrated container on the suction side of the injector pump. Determine the time in minutes to inject 1 gallon of liquid, then use this equation to determine the injection pump rate in gallons per hour:

   Injector Pump Rate (gallons/hour) = 60 ÷ minutes to pump 1 gallon

2. **Determine the total hours to cover the field at the speed the center pivot will be operated and the number of acres covered:**

   Time to cover the field = _____ hours

   Acres covered = _____

3. **Determine the total gallons of chemical to be injected. Multiply the injection pump rate (step 1) by the total hours to cover the field (step 2). Use the following equation:**

   Total Gallons to be Injected = (injector pump rate) x (hours to cover field)

4. **Determine the amount of chemical required to cover the field.**

   Multiply the field acreage by the chemical rate as specified. For nitrogen, it would be the gallons of UAN-28 per acre. For a pesticide, it would be the rate that is recommended on the label for the particular crop. Use the following equation:

   Total Chemical Volume = field acres (step 2) x chemical volume/acre

5. **Add the total chemical (step 4) to the injection supply tank and then fill the supply tank to the total volume to be injected (step 3).**

When working with many pesticides and dry chemicals, make sure you have a method to agitate the injector supply tank to keep the chemicals in solution. Many chemicals will settle out if not agitated.

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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 will usually 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 will most likely 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 (both 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.

Endguns

The vertical swing arm design should last the life of the center pivot. However, the bearings can sometimes 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 burnout 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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County commissions, North Dakota State University and U.S. Department of Agriculture cooperating.

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This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7881.

North Dakota Water Education Foundation – Summer Water Tours

Access to substantial quantities of clean water is important for development in North Dakota, and the best way to learn about water projects is to see them in person via a tour.

These tours provide a firsthand look at North Dakota's critical water issues. Registration is $30 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to North Dakota Water magazine.

Tours offered are:

- June 30 – **Western Area Water Supply: Powering Industry with Water** (tour begins and ends in Williston)
- July 13 – **From Grey Water to Great Water** (tour begins and ends in Fargo in conjunction with the Joint Summer Meeting)
- July 19 – **Getting Water Where It Needs to Go** (tour begins and ends in Grafton)
- July 21 – **Where Water West Begins** (tour begins and ends in Dickinson)
- August 3 – **Water Supply for North-Central North Dakota** (tour begins and ends in Minot)

For more information about each tour online, go to https://ndwater.org/events/ or mail a check made out to NDWEF to PO Box 2254, Bismarck, ND 58502. Please indicate which tour or tours you want to attend and include the number of people. For more information, give us a call or send an email.

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