Greetings
Welcome to another year of Water Spouts, the newsletter for irrigators. You probably noticed we did not have an April issue. The prolonged cool weather delayed the snowmelt but kept everyone worried about flooding.

However, the slow melt caused the flood levels in many rivers to be much less than forecasted. The generally accepted reason is that much of the water was absorbed by the dry soil in many parts of the state. The low warmup did set the planting season back about two weeks from normal.

As we enter the growing season, determining the soil moisture status in many fields throughout the state is difficult. We know from water table measurements last fall and this spring on tiled land in the Red River Valley that, generally, the water table is below the tile lines.

We also know that many of the tile drainage systems hardly ran or did not run at all this spring. This would indicate that much of the melt water infiltrated and was absorbed by the soil.

Beginning the irrigation season with good topsoil moisture (top 2 feet) and less stored water in the lower soil layers is normal in most parts of the state. Because of the dry conditions last year, the soil moisture status probably has returned to normal conditions. That means you may have to start your irrigation systems earlier than normal this year.

Tom Scherer, (701) 231-7239
NDSU Extension Agricultural Engineer
Thomas.Scherer@ndsu.edu

Summer Water Tours – North Dakota Water Education Foundation
This summer, the North Dakota Water Education Foundation will offer six water tours. The first tour will start on June 5 and the last will be on Aug. 21. These tours provide a firsthand look at North Dakota’s critical water issues.

Registration is $20 per person and includes tour transportation, meals, refreshments, informational materials and a one-year subscription to North Dakota Water magazine. Tours offered are:

Irrigation in Motion – July 23
The five southeastern counties in North Dakota have about 85,000 acres of irrigated land planted with a variety of crops, many of which are high value. This area of the state has the potential to develop more irrigation. The tour will focus on irrigation in the Oakes area and will start with a visit to the Oakes Irrigation Research site. Irrigation research at this site has been ongoing since 1970 and, through the years, has provided valuable information for irrigation development and water management.

On the next stop on the tour, participants will view and hear a discussion on a new innovation in irrigation water supply for the area: horizontal wells. Several horizontal
wells have been installed in the area, and this technology has the potential to increase irrigation development. The tour also will include a visit to the facilities of the Oakes Test Area, a 5,000-acre irrigation development, and stops to view and discuss irrigated high-value crops. The tour begins and ends in Jamestown.

Other tours
• Sites of the Sheyenne River Valley – June 5
• Devils Lake Solutions in Action – June 9
• Southwest: Mixing Oil and Water – July 11
• Managing the Mighty Mouse – Aug. 8
• Missouri River Expedition – Aug. 21

To register for one or more of these tours, go to www.ndwater.com and click on “2013 North Dakota Water Tour Registration Form” or send a check to NDWEF, P.O. Box 2254, Bismarck, ND 58502. Please indicate which tour or tours you want to attend and include the number of people who will participate. For more information, give us a call or send an email.

North Dakota Water Education Foundation,
(701) 223-8332
Fax (701) 223-4645
ndwaterusers@btinet.net

A Video on Center Pivot Sprinkler Uniformity

The sprinklers on a center pivot are the most important part of the irrigation system, but sometimes they are the least understood by irrigators.

The set of sprinklers on a pivot are called the sprinkler package. A quarter-section center pivot often will have more than 100 sprinkler heads. As you move farther from the pivot point, the area irrigated increases for each sprinkler; thus, the diameter of the nozzle in each sprinkler becomes larger.

Many different designs of sprinkler heads are available. Some have moving parts, such as impact sprinklers, and some have no moving parts, such as spray heads. However, all have one thing in common: They have a nozzle.

Through the years, the nozzle can become worn due to particulates in the water or due to age. Also, the nozzle can become partially plugged due to corrosion, or the sprinkler head can become damaged.

Many sprinkler packages on center pivots have pressure regulators for each sprinkler head. This is another item that can develop leaks or become plugged.

A properly designed and installed sprinkler package will apply water uniformly over the entire length of the pivot.

However, with each growing season, the possibility of worn or plugged nozzles, poorly working pressure regulators, damaged sprinkler heads or leaks increases. These will affect the water application uniformity. Therefore, if your sprinkler package has been in place more than five years, now is the time to check the water application uniformity.

The NDSU Extension Service has created a video to show you how a typical sprinkler uniformity test is conducted for a center pivot sprinkler system. You can find the video on YouTube by doing a search using the phrase ‘youtube sprinkler uniformity.’ The NDSU video will be at or near the top of the list. In addition, I have copies of the video on DVD. If you want a copy, send me an email or a note by regular mail with your name and mailing address.

Updated Publication on Soil Compatibility for Irrigation

When irrigation is put on new land, the determination of soil and water compatibility is critical to achieve high, sustainable yields without damaging the soil. A new NDSU Extension Service publication, AE1637, “Compatibility of North Dakota Soils for Irrigation,” is available to help with irrigation development.

This publication is a condensed version of the “North Dakota Irrigation Guide” published by the Natural Resources Conservation Service (NRCS). Almost 350 soil series have been classified in the state.

The soil series generally fall into three categories: nonirrigable, conditional and irrigable. All soils series have been assigned to one of 29 irrigability groups. Groups 1 to 7 are irrigable, 8 to 22 are conditionally irrigable and 23 to 29 are not irrigable. This publication is a first step to help current and prospective irrigators understand the principles behind the irrigability of soils in North Dakota.

This publication should be used in combination with the soil survey information of the land to be irrigated. Soil surveys of every county in North Dakota have been completed and documented. Many counties have printed copies, but official, up-to-date soil survey information can be found only on the Internet at http://websoilsurvey.nrcs.usda.gov/.

Here is how to use the publication. First, use Web Soil Survey to determine the soil series on the field to be irrigated. Next, look up the soil series in AE1637 to find its irrigability group. Then look up the characteristics for that group. Some of the characteristics listed are drainage classification, infiltration rate, water-holding capacity by 1-foot increments and irrigation water quality.

Printed copies of AE1637 can be obtained from any county Extension office or a pdf copy can be found online at www.ag.ndsu.edu/pubs/ageng/irrigate/ae1637.pdf.
Irrigation System Maintenance and Recordkeeping

Irrigation equipment is no different than other crop-production equipment. If not properly cared for, it may fail at the time it is most needed. Fixing small problems is less expensive than fixing a major breakdown in July or August.

Repairs should be made early in the season (before June 15) when the crop water demands are low. If maintenance was performed on the irrigation system last fall, then early season maintenance should require only checking to see that no damage occurred during the winter.

Spring maintenance should include checking the operation of the pump, motor (or engine), electrical control boxes, piping and distribution system (sprinkler system, gated pipe, etc.). Rodents, dirt and water do the most damage to electrical components. If you don’t feel confident performing routine irrigation system maintenance or you don’t have the time, most irrigation dealers offer an annual service contract.

Check electrical motors, phase converters and control panels

Before starting your irrigation system, check the control panels and equipment condition. To begin, make sure the electrical power to your equipment is locked in the OFF position at the main disconnection point. You always should use extreme caution when working around electrical power boxes and machinery. If you are not sure the power is off, use a voltmeter to measure and make sure it is disconnected.

Electric motors and phase converters are especially susceptible to dust and moisture accumulation, particularly if a severe storm occurred during the winter. High winds can deposit snow and fine dust inside presumably sealed boxes. Rodents often cause significant damage to electrical components. If you see evidence of rodent damage, find the entry hole and plug it.

Check the motor shaft to see that it turns freely. Phase converters, especially the static type, should be cleaned thoroughly. If your power supplier furnishes the phase converter, contact the company about servicing it. If you own the phase converter, treat it like other electrical equipment, thoroughly cleaning it with compressed air and cleaning relay contacts with a high-quality electrical contact cleaner.

Open all the electrical covers and examine for dirt, rodent damage, leaking door seals, and loose or damaged wires, and ensure that the bare copper grounding wire is properly connected to the panel box and the grounding rod.

Examine any relays with exposed contacts. Moisture condensation may cause corrosion that will make the contacts remain open or stick together. Be sure all switches operate freely. If moisture is present, remove it and leave the box open until it dries.

Check the piping and sprinkler systems

Visually inspect the piping between the pump and the distribution system (center pivots, lateral moves, big guns or gated pipe). Check all the air release valves to make sure they work. Replace broken pressure gauges. Check all valves to make sure they open and close properly.

Check the owners manual for specific maintenance items. If you do not have an operators manual, get one from a dealer or the manufacturer. If the sprinkler system is relatively new, determine what service is required to keep the warranty in effect. Also, determine any other service the manufacturer suggests before the system is put into operation each year.

On center pivots, check gearbox lubricant levels, drain off moisture and refill with approved lubricant or change the lubricant if discolored. Lubricate all fittings, joints, bearings and the pivot point.

Check the inflation pressure on all tires. Improper inflation can cause tire breakdown and also may place stress on the drive system. Open the collector ring cover and inspect the brushes and contacts. The sprinkler heads should be checked thoroughly for damage.

Finally, remove the end cap from the center pivot. For electric and oil-drive center pivots and lateral moves, start the machine and run dry. For the individual tower boxes, do the following:

- Do a visual check, clean any contact corrosion with high-quality sandpaper or emery cloth and apply cleaner.
- Check and tighten all connection screws because freeze/thaw cycles cause electrical contacts to loosen. Repair or replace any damaged or broken wires.

Now that you have completed the dry walk-through of the irrigation system, start the pump and put some water through the system. However, don’t stand in front of the main electrical panel when starting the system for the first time. Stand to the side of the panel.

Check the pump and well performance

Assuming you have performed a “dry walk-through” of the irrigation system, turn on the pump. Listen for any unusual sounds. When the system comes up to pressure, if your flow meter works, record the flow rate. Compare this with the pump design rate and past recordings. If the flow rate and pressure are the same as in previous years, you can assume the pump and well are in good condition.
Take Care of Your Well

Weather conditions have been drier than normal for more than a year, which means that the static water level in many aquifers will be lower. That’s when irrigation wells develop problems due to partially plugged screens.

A common cause of plugged screens is the iron in the water. Most water in the state contains enough iron to provide a source of energy for the growth and development of “iron bacteria.” These bacteria are not the cause of high iron concentrations, but they grow very well in the constant water temperature in the well.

Iron bacteria accumulate on the screen, casing, pump and piping in the form of a slimy, red-brown to pink mass. The accumulation of iron bacteria will plug the open area of the screen and formation, thus reducing the rate at which water can flow into the well.

Keeping a well near its original productivity is possible with chlorination. Wells with iron in the water should be chlorinated at least once per year. However, if your well’s production last year was low, it may need to be rehabilitated by swabbing and using acid to dissolve encrusted minerals on the screen. If your well needs to be rehabilitated, do it early in the growing season (before the end of June).

Before you turn the pump on for the first time, measure and record the depth to the static water level in the production well and any nearby observation wells. The depth to the static water level and the date of measurement should be recorded in a convenient place, such as the inside of the pump control panel or pivot panel. Compare this year’s reading with past readings. This will tell you what is happening in the aquifer.

Instructions for chlorination and well rehabilitation can be found in NDSU Extension publication AE97, “Care and Maintenance of Irrigation Wells,” available at your county Extension office.

Tom Scherer (701), 231-7239
NDSU Extension Agricultural Engineer
Thomas.Scherer@ndsu.edu