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water spouts

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Irrigation Workshop to be held in Bismarck

An irrigation workshop is scheduled for Thursday, Dec. 9 at the Best Western Ramkota Hotel as part of the North Dakota Water User Association's annual convention. North Dakota State University (NDSU) Extension, the North Dakota Irrigation Association and the North Dakota Water Users Association sponsor the workshop. The convention will include an irrigation and water products exposition.

Some of the presentation topics include an update on the status of aquifer levels, irrigation development along the McClusky Canal, introduction of the new head of the North Dakota Department of Water Resources, the impact of drought on irrigation infrastructure, an update on the remote sensing and irrigation management research project and irrigation research site updates from Oakes and Nesson Valley.

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Fall Irrigation Maintenance Checklist

Due to the drought conditions this past growing season, your irrigation systems put on more hours than normal. This means more wear and tear on parts. Make sure the system is in good working order for next season by doing fall maintenance using the checklist below.

- ❑ Check all motor and pump openings to see that they are properly screened to keep rodents out. Rodents can do a lot of damage to wiring and other electronic controls. Plus, if you disturb their nests, it may cause some health problems.
- ❑ Chlorinate the well if you have iron in the water.
- ❑ Drain pipes, valves, tanks and centrifugal pumps.
- ❑ On center pivots, check the gearboxes on all towers for moisture accumulation and oil level, check the u-joints for wear, lubricate all fittings, check the drain valve on each span, drain all water-carrying lines and drain the booster pump case.
- ❑ Empty the sand trap at the end of the center pivot.
- ❑ Park a center pivot where exposure to high winds is minimized such as aligning it with the prevailing wind (northwest or southeast) or next to a shelter belt.
- ❑ Pump out low spots in pipelines and protect the pump-outs from cattle and/or snowmobiles.
- ❑ Lubricate all pump motor bearings and shafts.
- ❑ Spray electrical contacts with contact cleaner to displace dirt and moisture and prevent corrosion.
- ❑ Lock the electric control box in the "OFF" position.
- ❑ Fix or replace electric panel door seals if hard or broken to keep out moisture, dust and rodents.
- ❑ Loosen the packing gland if used.
- ❑ Loosen belts.
- ❑ Remove the flow meter and pressure gages and store in a warm place for the winter.
- ❑ Inspect the gaskets in portable pipes and make a note to replace those that are cracked and/or broken.
- ❑ Winterize stationary engines

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Fall is the Time to Fix Center Pivot Wheel Tracks

Now that the crops are off the field, it's time to level out or fix the problem areas with deep wheel tracks. This was a drought year which resulted in more revolutions of the center pivot that probably contributed to increased wheel track ruts in some parts of the field. Every irrigator with a center pivot knows that the wheel tracks under each tower can turn into ruts in some parts of their fields. It is common to find wheel tracks up to 6-inches deep even on very sandy soil, but when the wheel track is 10 inches or deeper, something needs to be done.

Tom Scherer, NDSU

Deep wheel tracks can cause drive wheels on towers to get stuck and trip the safety circuit on a center pivot. They also interfere with tillage and harvesting equipment. Deep wheel tracks are generally caused by saturated conditions that reduce the weight-bearing capacity of soil. The deepest wheel tracks are usually found where water collects in low spots or under the first and second towers from the pivot point. If you have deep wheel tracks at several locations in the field, now is the time to correct the problem.

Major factors that affect the depth of pivot wheel tracks are:

- The soil texture. Usually locations with heavier soils (clay, clay loams) have deeper tracks because they remain wet longer due to higher water-holding capacity and slower drainage. Deep wheel tracks commonly form in the low spots where water accumulates. Often the wheel track acts like a drainage canal where rain and irrigation water run down the wheel track to the low spot.
- The number of revolutions the pivot makes in the tracks before tillage levels them.
- The weight supported by each tower. Short spans between towers (130 to 170 feet) have less weight than long spans (180 to 200 feet). For instance, a standard 160-foot span with 6 5/8-inch tubing will contribute an additional 2,200 pounds of water when full.
- The amount of wheel contact area with the soil surface.

Some wheel tracking problems can be due to poor adjustment of the wheel toe alignment on each tower. The wheel toe alignment involves adjusting the wheels on each tower to a slight angle so that they follow a circular path. The circular path is smallest on the first tower from the pivot point and thus has the tightest turn ratio. If not adjusted properly, the tires create a drag on the tower and make the wheel tracks wider. For example, if the first tower with standard tires is 160 feet from the pivot point, the wheel toe alignment should be offset from straight by about 2 inches. More information on this topic can be found in an online article written by Steve Melvin with Lindsay at *https://www.ksre.k-state.edu/irrigate/oow/p16/Melvin16.pdf*

If you have deep wheel tracks in only the low areas of your field, consider filling the bottom of the wheel tracks with crushed rock (1 to 3 inches in diameter). This will provide more load support for the towers.

You can fill in the rut and build a road for the tower wheels using a plow, disc plow or blade to build a ridge where the deep wheel track is located. Be sure to pull soil from both sides of the track.

If you have a persistent problem with wheel tracks, manufacturers offer a wide range of solutions from using taller tires or metal or plastic wheels to adding tracks and/or additional wheels to the tower. All are designed to minimize deep wheel tracks.

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Soil Sampling for Salinity or Sodicity in Irrigated Fields

Drought always makes salinity problems worse, and it has been noticeable this year as more white spots, sometimes called alkali spots, have grown in size. One of the negative effects of irrigation is the concentration of minerals in the soil. The degree to which this occurs is determined by the quality of the irrigation water and the type of soil irrigated. The soil and water compatibility limits for all soil series in North Dakota can be found in the NDSU Extension publication AE1637, “Compatibility of North Dakota Soils for Irrigation.” All soils are listed in one of three categories; irrigable, conditional or non-irrigable. Most of the soils prone to sodicity and/or salinity are in the conditional category. Some problem soils may be irrigated if certain management recommendations are followed and are regularly tested for salinity and sodicity.

Regular soil testing for salinity and sodicity will determine whether or not irrigation increases soluble salts and sodium. In general, soil salinity will begin to have noticeable effects on crop yields when the electrical conductivity (EC) of the soil saturation extract is 4-deci-Siemens per meter (dS/m) in the root zone. When the sodium adsorption ratio (SAR) of the soil saturation extract exceeds 13, soil physical conditions deteriorate and cause significant reductions in crop yields. The goal of regular soil testing is to detect and control salinity and sodicity long before these levels are reached.

The most critical layer of soil that must be monitored is the surface few inches. Most plants are least resistant to salinity and sodicity during germination and early growth stages. Soil changes due to irrigation are most likely to occur from the surface downward. The topsoil should be sampled more frequently than soil from deeper layers. Soluble salts may fluctuate substantially between seasons due to water movement. Therefore, it is important that surface samples are taken during germination and seedling emergence. The SAR is a reflection of cation exchange complex, so is not influenced by seasonal changes in water content. Sample timing for SAR is not as important as for salinity.

Sampling should be done prior to the first year of irrigation so that a baseline is established. Sampling for salinity and sodicity under irrigation is different than soil fertility sampling. The goal is to determine where salts or sodium are increasing in the field and at what rate. Composite sampling as done for soil fertility does not accomplish this goal. The field should be sampled on a grid that covers the portion of the field that has soils recommended in AE1637 for regular monitoring.

Samples should be taken at no greater than a 500-foot interval. The sampling grid should include an unirrigated corner to serve as a control for comparison. The grid should be adjusted so that problem areas, such as low spots or areas next to saline or sodic soils, are identified and monitored. Sample locations should be marked (on an aerial photo or with GPS) so that soil samples are taken from approximately the same location in subsequent years. The first year of sampling should include a sample from 0 to 6-inches, 6 to 24-inches, and 24 to 36 inches at each of the grid nodes. EC should be determined on the saturated extract of all three depth increments and SAR on the top two increments. Subsequently, every three years EC and SAR should be determined for the 0- to 6-inch increment and EC for the 6- to 24-inch increment. Every six years SAR should also be determined on the 6- to 24-inch increment and EC should be determined on the 24- to 36-inch increment.

Monitoring of irrigated fields consisting of mostly of irrigable soils with smaller inclusions of non-irrigable saline or sodic soils may be necessary. Irrigation may contribute to expansion of salinity or sodicity into the field. Monitoring soils along the edges of these problem areas using the sampling depth increments and intervals suggested above will help determine the rate of encroachment.

Every irrigated field is unique and soil quality monitoring requirements will vary. Many fields are predominantly irrigable soils that require no monitoring. Only small portions of some fields will require monitoring. Whatever the situation, it is important that consideration of soil monitoring be included in the planning stages of the irrigation system. When the soils in your field are listed as conditional, implementation of regular soil monitoring will definitely help maintain the productivity of the soil.

Reprinted from a Water Spouts article written by Bruce Seelig, former water quality specialist with NDSU Extension.

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