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Upcoming Irrigation Workshops

- Dec. 4, 2014 (Thursday) – Bismarck Ramkota Hotel
  This workshop is held in conjunction with the North Dakota Water Users Association’s annual convention Dec. 3-5.
  The NDSU Extension Service, North Dakota Irrigation Association and North Dakota Water Users Association sponsor the workshop. The convention will include an irrigation exposition where suppliers display their products and services.

- Dec. 11, 2014 – Ernie French Center, Williston Research Extension Center
  Contact person is Chet Hill, (701) 774-4315, Chet.Hill@ndsu.edu.

Irrigation Maintenance Fall Checklist

- Check the level of oil in the reservoir and change if discolored.
- Loosen the packing gland if used.
- Loosen any belts.
- Remove the flow meter and pressure gauges, and cover the holes.
- Store gated and straight pipe so they can drain.
- Inspect the gaskets in portable pipes.
- On center pivots, check all gearboxes for moisture accumulation, lubricate all fittings, check the water drain valve on each span, remove and clean the system end cap, and drain all water-carrying lines and the booster pump case.
- Park the center pivot into or with the prevailing wind (northwest or southeast).
- Winterize stationary engines.

What’s the Life Expectancy of a Center Pivot and its Components?

Unlike most farm machinery, center pivots are exposed to the vagaries of the weather continuously. The freeze/thaw cycles of late fall and early spring, along with winter winds, all affect the useful life of the structural parts of a center pivot.

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, high winds, ice storms, tornadoes, lightning 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 for at least 10 years, provided you keep the tire pressure at recommended levels. However, the quality of the tires has a large effect on their life span. Poor-quality tires will crack, and poorly applied recaps will separate from the tire proper.

Gearboxes

Generally, gearboxes on the pivot towers are the most common cause of pivot breakdown. With good maintenance, they should last for 15 years. To achieve this life expectancy, accumulated water in the gearboxes should be drained and replaced with new oil every year. 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 the hours of use each growing season.

Because they run more often, the gearboxes on the outside towers of a pivot will accumulate more wear than the towers near the
pivot point. The gearboxes on the first and second towers usually will accumulate more water.

Hilled 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 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 Head and Pressure Regulator**

The array of sprinkler heads and pressure regulators along a center pivot make up the “sprinkler package.” Properly spaced and with correct nozzle sizes at the right locations, 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 only about 10 percent of the cost of the pivot, irrigators should pay particular attention to the condition of the sprinkler heads and regulators. These two components have a useful life ranging from 5,000 to 8,000 hours of center pivot operation. Sand pumping and corrosive water, along with deterioration of plastic and rubber parts, are the primary causes of problems.

**Nozzles**

With no sand or other mineral particles in the water, the nozzles should last as long as the sprinkler head. If minerals are in the water, the nozzle diameter should be checked every two years to make sure it is the correct size. Plastic and brass nozzles have about the same life span except with corrosive environments. In these conditions, plastic nozzles are the preferred choice. Due to the improved design of plastic sprinkler heads, replacing or exchanging nozzles is very easy.

**Endguns**

The new designs using the vertical swing arm 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 whipping return motion usually last about 10 years.

**Endgun Booster Pumps**

The endgun booster pump should last the life of the pivot, barring any lightening hits. The electric motor on booster pumps may burn out, especially with sprinkler packages mounted on top of the span pipe. Pivots with sprinkler heads mounted on drop tubes appear to have less electric booster pump trouble.

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**North Dakota Irrigation Statistics**

(2013 data from the USDA Farm Service Agency)

| Total planted cropland acres in North Dakota | 20,990,000 |
| Number of acres irrigated | 271,024 |
| Percentage of cropland irrigated | 1.3% |

**Major Irrigated Crops (acres)**

- Corn: 135,535
- Soybeans: 40,806
- Small grains: 27,944
- Potatoes: 26,530
- Sugar beets: 12,385
- Alfalfa: 11,913
- Edible beans: 8,445

**Subtotal**: 263,558

**Miscellaneous irrigated crops:**

- mixed forage, field peas, onions, grass, rye, sorghum, flax, sunflower, canola, carrots, millet, lentils and triticale — a total of 7,466 acres

**Top 12 Counties With Irrigation**

1. Kidder: 26,350 acres
2. Grand Forks: 22,956 acres
3. McLean: 22,383 acres
4. Ransom: 21,770 acres
5. Sargent: 20,385 acres
6. Williams: 17,890 acres
7. Dickey: 17,090 acres
8. Cass: 11,886 acres
9. McKenzie: 10,162 acres
10. McHenry: 8,778 acres
11. Emmons: 8,506 acres
12. LaMoure: 8,208 acres

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**Chlorinating an Irrigation Well**

Has the production of your irrigation well fallen off the last few years? If so, it may be due to accumulated iron and minerals in the screen, especially if the well hasn’t been chlorinated or cleaned for a few years.

Groundwater in North Dakota contains small amounts of iron, which provides energy for the growth and development of iron bacteria. These bacteria form a slimy, gelatinous mass on the well screen, casing and pump, and in the aquifer surrounding the well screen. If your irrigation equipment has a rust color or the water has a rotten-egg smell, then growth of iron bacteria in the well is a good possibility.

As iron bacteria spread in the well, they reduce the amount of open area of the screen and the open area of the spaces in the material that surrounds the screen, which increases the depth of the pumping water level and can reduce the production of the well. During dry periods, reduced well yield will affect the operation of the irrigation system and increase energy costs, and
could reduce crop yields. The only way to control iron bacteria effectively is by chlorinating the well on an annual basis.

Well chlorination should be performed at least once per year. The object of well chlorination is to raise the level of active chlorine in the well to 500 parts per million (ppm) and hold it there for a period of time to allow the chlorine to attack and kill the bacteria. Also getting the chlorine into the aquifer material surrounding the well screen is especially important.

The two common sources of chlorine used in well chlorination are household bleach with about 6 percent chlorine and a dry form of calcium hypochlorite (HTH). About 65 percent chlorine is available in HTH. Dry forms of HTH can be purchased from well drillers and some irrigation dealers. Swimming pool companies also stock dry chlorine forms. However, many are slow-release to prolong the residual concentration in pool water. Slow-release forms do not have enough “activity” to superchlorinate an irrigation well.

Remember, chlorine is a noxious and dangerous gas. I recommend using common household bleach for a couple of reasons. Household bleach is the safest form of chlorine and it is easy to obtain; almost all grocery and convenience stores have it in stock. Make sure to use unscented bleach.

Irrigators with oil-lubricated, deep-well turbine pumps should be especially careful if they chlorinate their wells with HTH. These wells commonly have a layer of oil on top of the water. Mixing chlorine and oil can have explosive repercussions; therefore, if a granulated or pelleted form of chlorine is used, be especially careful if they chlorinate their wells with HTH. Irrigators with oil-lubricated, deep-well turbine pumps should be especially careful if they chlorinate their wells with HTH. These wells commonly have a layer of oil on top of the water. Mixing chlorine and oil can have explosive repercussions; therefore, if a granulated or pelleted form of chlorine is used, please mix it with a suitable amount of water before pouring it into the well.

You must chlorinate the well before you pump out your pipelines for the winter. Use the following procedure:

1. Determine the depth of water standing in the well. This is the total well depth minus the depth to static water.
2. From Table 1, determine the amount of chlorine needed. For example, if you have a 12-inch-diameter well 100 feet deep and a static water level at 20 feet, the column of water is 80 feet. The amount of chlorine bleach needed is 8 x 0.6 gallon/10 feet, or 4.8 gallons (use 5 gallons). The amount of HTH needed would be 8 x 0.35 pound/10 feet, or 2.8 pounds (use 3 pounds).
3. Introduce the chlorine into the well using one of the following methods. Use protective gloves and goggles. Chlorine solutions strong can cause skin burns.
   a. When using liquid bleach, mix with 50 or more gallons of water and pour into the well. Add at least 100 gallons of water to distribute the bleach throughout the well.
   b. When using chlorine granules or powder, dissolve slowly by adding it to 50 gallons of water or more. Pour slowly into the well, then add at least 100 gallons of water to distribute the chlorine throughout the well.
   c. When using chlorine pellets, drop them through the well access hole very slowly (about 20 to 30 pellets every minute). Afterward, pour at least 50 gallons of water down the access hole to wash off any pellets stuck in the access pipe or hung up on pipe flanges.
4. Wait at least four hours.
5. Mix the chlorinated water in the well. This can be done by recirculating the water from the well or surging the well. Recirculating means having the ability to put pump discharge water back into the well. Surging is starting and stopping the pump but not letting the water discharge from the well. Surge the well for one hour. This action is called “rawhiding” a well. Do this at least four times. For deep-well turbine pumps with electric motors, allow five minutes between starts to allow the water to flow back into the well. With some deep-well turbine pumps, water flowing back into the well can cause the impellers to rotate backward. Starting the pump during this time may loosen the impellers from their seats.
6. Let the chlorine stand in the well for 24 hours. Chlorine needs time to kill the iron bacteria.
7. Surge the well at least four more times, then pump the water to waste. Pumping the dirty water out of the well and not letting the chlorine stay in the well during the winter is important because the chlorine is very corrosive to iron. The water should smell and be dark brown, black or red. Stand upwind because the chlorine smell could be strong. Pump until the odor of chlorine is gone and the water is clear.

By chlorinating your well on a consistent basis, the production of the well should stay close to what it was when it was drilled. NDSU Extension publication “Care and Maintenance of Irrigation Wells” (AE97) contains more information about the different types of chlorine, the chlorination procedure, causes of well problems, how to determine well performance and rehabilitation procedures. You can obtain a copy from your local county Extension office or by contacting the NDSU Agricultural Communications publication distribution center at (701) 231-7882. You also can find a copy online at www.ag.ndsu.edu/publications/crops/irrigation-and-drainage.

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