



Preventive Maintenance for Irrigation Equipment

Craig A. Storlie, Ph.D., Extension Specialist in Agricultural Engineering

Irrigation system maintenance is an important management practice which can prevent costly repairs from occurring during the growing season. Late winter and early spring are appropriate times to perform maintenance duties. In developing plans for the upcoming growing season, avoid future problems by allotting time to perform these duties.

Drip irrigation systems are more likely to develop problems than other irrigation system types. For this reason, it is important to treat drip systems with extra care. Clogging of emitters is the most serious problem associated with drip systems and is caused by physical, biological, and chemical contaminants. Physical contaminants consist mainly of sediment and other materials that are carried by the irrigation water. Clogging by these materials is prevented through filtration. Biological contaminants, such as algae and bacteria, are removed through treatment with a chemical biocide and are either filtered or flushed from the system. Chemical reactions can occur and cause chemical contaminants to precipitate from the irrigation water and clog emitters. These reactions are usually avoided through water treatment.

In describing appropriate irrigation system maintenance procedures, it is convenient to divide the irrigation system into three sections: the pumping plant, the water treatment system, and the distribution system. The pumping plant consists of the pump, motor, and coupling system. The water treatment system include filters, pressure regulators, and chemical injectors. The distributions system consists of mains, submains, valves, pressure gauges, and back-flow prevention devices. Each of these sections are maintained in different ways.

Water Pumping Plant

Pumping plant maintenance is used to maximize pumping plant efficiency and prolong pump and motor life. Internal combustion engines should be maintained to operate at peak performance. Oil, coolant, filters, and lubricants should be checked and changed as specified by the manufacturer. Engines should also be kept clean so that they can dissipate heat effectively and sheltered to reduce weathering. Regular tune-ups will insure that engines run efficiently.

Electric motors require little service. Protective rodent screens should be cleaned to provide proper air circulation and replaced if they are damaged. An overhead shelter will also insure that electric motors are properly cooled and that rainfall does not cause corrosion or electrical shorts.

Insuring proper lubrication of the line shaft is an essential part of deep-well turbine pump maintenance and is usually the only upkeep required for these pumps. Pump adjustment might also be appropriate but must be performed by a trained professional. Pump impellers normally wear very slowly over their life. This causes pumping efficiency to slowly decrease. A system that pumps sand will wear much quicker and should be adjusted every 3-5 years by a trained professional, who will optimize the setting of the impellers in the pump bowls. A decreased flow rate or operating pressure are signs that a pump has lost efficiency. However, changes in the distribution system also influence system operating characteristics. A professionally performed pumping test is the only way to accurately assess the condition of the pumping plant.

Centrifugal pumps are also relatively maintenance free. Most centrifugal pumps have a packing gland where the drive shaft exits the volute case. Occasion-



ally, these must be tightened or replaced if leakage through them is excessive. Care must be taken not to over-tighten the packing gland. This could lead to pump failure.

Coupling systems are used to connect the motor to the pump or line shaft. Gear heads, belts, pulleys, and PTO shafts require lubrication and adjustment to insure peak performance. Belts, pulleys, and PTO's are typically used in systems using internal combustion engines. The speed at which a pump is operating can be adjusted by adjusting motor speed or coupling drive ratio. Use caution in adjusting the speed of the pump. A pump operates at peak efficiency under a narrow range of flow rates and pressures.

Water Treatment System

Irrigation water treatment components are used to filter water, inject chemicals, and reduce system pressure. Filters are used to remove sediment from irrigation water. Screen filters should be taken apart and inspected for rips or holes in the filter element. Filters are damaged when they are allowed to operate under heavy sediment loads without regular flushing. Clean filter elements by spraying them with water. Media filters may occasionally require that additional media be added to replace material that is slowly lost in the back-flush process. Electric and hydraulic lines and controls should also be inspected.

Pressure regulators should be inspected for physical damage. Hoses can rip and regulator bodies can crack. Diaphragms may also crack or split and should be inspected for wear. Pressure gauges are used to monitor system pressure and should be used at all locations in the system where a pressure change is expected. Placing them immediately up- and downstream of filters and regulators is particularly useful to monitor the operation of these devices. In addition, they can be used to trouble-shoot the distribution system. A higher-than-normal pressure might indicate that a valve that should have been opened is broken or stuck shut, or that sprinklers or driplines are clogged.

A low system pressure could be an indication that there is a leak somewhere in the system or that a valve to a zone that should have been closed was left open. Pressure gauges are fragile and should be replaced annually or calibrated. A simple manifold can be constructed from PVC to calibrate gauges. Use a tire pump to pressurize the manifold and check that all gauges read nearly the same as a high quality gauge that remains permanently on the manifold.

Chemical injectors require service to insure their proper operation. Seals and fittings become worn through abrasion and corrosion and should be inspected, cleaned, and replaced as necessary. Some materials cause certain rubber and plastic fittings to soften or expand. Always dilute materials, particularly pesticides and acids, at a ratio of 10:1 or greater. Maintenance of injectors might also include calibration to determine injection rates.

Water Distribution System

Maintenance of the water distribution system is simple, but very important. Inspect non-permanent pipes for animals or debris before installing in the field. Inspect mains if possible, and at least flush all mains and submains prior to connecting sprinklers or driplines. Flushing requires that the system be installed and ready to operate early in the season. Prevent disappointment later by getting the system ready early and run it once just to flush, inspect, and repair. Valves, fittings, and back-flow prevention devices can also be checked by running the system prior to the first time irrigation is needed.

A final preventative maintenance practice that is appropriate if problems with the water source are suspected or if a new water source is being used is to have a sample of irrigation water tested by a laboratory. Certain water quality characteristics give strong clues about problems that may arise. A local county extension agent can help you in determining which types of tests are appropriate and how results of these tests should be interpreted.

© 2004 by Rutgers Cooperative Research & Extension, NJAES, Rutgers, The State University of New Jersey.

Desktop publishing by Rutgers-Cook College Resource Center

Published: June 1995

**RUTGERS COOPERATIVE RESEARCH & EXTENSION
N.J. AGRICULTURAL EXPERIMENT STATION
RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY
NEW BRUNSWICK**

Distributed in cooperation with U.S. Department of Agriculture in furtherance of the Acts of Congress on May 8 and June 30, 1914. Rutgers Cooperative Extension works in agriculture, family and community health sciences, and 4-H youth development. Dr. Karyn Malinowski, Director of Extension. Rutgers Cooperative Research & Extension provides information and educational services to all people without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Rutgers Cooperative Research & Extension is an Equal Opportunity Program Provider and Employer.