United States Department of Agriculture
Natural Resources Conservation Service

2011 Ranking Period 1

Water Quantity Enhancement Activity – WQT03 - Irrigation pumping plant evaluation

Enhancement Description
This enhancement consists of the evaluation of the pumping plant performance and efficiency using the Nebraska Irrigation Pumping Plant Performance Criteria.

Land Use Applicability

Cropland and pastureland.

Benefits
A pumping plant performance test can determine the energy efficiency of an irrigation pumping plant and provide information on adjustments or modifications needed to improve the energy efficiency. Efficiency improvements come in the form of reduced energy consumption, reduced water use and better management techniques. A pumping plant test may be performed regardless of the age of the system.

Criteria

An irrigation pumping plant performance test must be performed by a trained service provider with appropriate testing equipment. A full and complete report must be completed by the service provider. This should include:

1. Age and condition of the components of the irrigation system and pumping plant
2. Water levels during pumping, a pressure / discharge curve
3. Pump and engine speed (rpm)
4. Actual Pump Plant Performance versus the Nebraska Performance Criteria
5. Actual pump efficiency versus the Manufacturers Published efficiency
6. Recommendations for improvements to the overall system efficiency
7. Estimate of energy savings if improvements are implemented

Nebraska Performance Standards for Irrigation Pumping Plants [8]

Energy Source	Energy Unit	Hp-hr[1] Per Unit of Energy	Water Hp-hr[2] Per Unit of Energy[3]
Diesel	Gallon	16.7	12.5
Gasoline	Gallon	11.5 [4]	8.66
Propane	Gallon	9.2 [4]	6.89
Natural Gas	1,000 cu ft	88.9[5]	66.7
Electricity	kWh	1.18[6]	0.885[7]

(1) Horsepower-hours is the work being accomplished by the power unit with losses considered.

(2) Water horsepower-hours is the work being accomplished by the pumping plant, engine or motor and pump, at the Nebraska Performance Criteria.

(3) Based on 75 percent pump efficiency.

(4) Taken from Test D of Nebraska Tractor Test Reports. Drive losses are accounted for in the data. (Assumes no cooling fan)

(5) Manufacturers' data corrected for 5 percent gear-head drive loss and no cooling fan. Assumes natural gas energy content of 1,000 Btu per cubic foot

(6) Assumes 88 percent electric motor efficiency.

(7) Direction connection, assumes no drive loss.

Documentation Requirements

A completed pumping plant evaluation report including the items identified in the above criteria.

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Written documentation shall include the manufacturer and model number of irrigation pumping equipment currently being used.