

**IRRIGATION TRAINING TOOLBOX
IRRIGATION SYSTEM EVALUATION**

**Lesson Plan
Data Gathering and Acquisition Methods**

**National Employee Development Center
Natural Resources Conservation Service
Fort Worth, Texas
October 1996**

COURSE: Pumping Plant Evaluation

LESSON: Data Gathering During Evaluations and Correct Data Acquisition Methods

OBJECTIVES: Upon completion of this module, student will be able to:

1. Identify data needed to complete a pumping plant evaluation.
2. Describe situations that may be encountered which could affect the accuracy of the results.
3. Select data acquisition methods that will ensure accurate results.

REFERENCES:

1. Horsepower Determinations from Watthour Meters, Agricultural Extension Service, University of Wyoming, B-654, Nov 1977.
2. Computing Horsepower from RPM of Watthour Meter Disc, Berkley Pump Co., Engineering 9020, Sept. 1993.
3. Temcorector Types I-T-W, Rockwell Manufacturing Co., I-1221, Dec. 1964.
4. How Your Gas Meter Works, furnished by Energas Co.
5. Personal communication with North Plains Underground Water District concerning the use of a draw down gage.
6. NRCS area and field office personnel experiences.
7. Groundwater and Wells, Johnson & Vision, VOF, Inc., 1975.

Training Aids: Slides

Total Time: 40 Minutes

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Data Gathering During Evaluations and Correct Data Acquisition Methods

A. Identify Data Needed to Complete a Pumping Plant Evaluation

1. Well flow rate (gpm).
2. Electricity or gas being used by pumping plant in Kwh/hr or MCF/hr.
3. Total head the pump is working against.
 - a. Pumping lift.
 - b. Discharge pressure.
 - c. Friction loss in column pipe.

B/C. Describe Conditions Which Could Affect Accuracy of Results and Correct Data Acquisition Methods Which Will Insure Accurate Results.

1. Well flowrate
 - a. Propeller Meters
 - (1) Make sure pipe is full.
 - (2) Make sure flow is stable - try to check at highest point of underground pipeline.
 - (3) Don't haul a propeller meter in back of a pickup without propeller being blocked from turning. Wind going through meters and turning propellers will wear out the bearings.
 - (4) When measuring flow, use odometer and stop watch rather than needle.
 - b. Velocity Meter - for pressurized systems only.
 - (1) Be aware of individual meter correction curves.
 - (2) Be sure you have true pipe inside diameter.
 - (3) Watch for air bubbles or sand in your meter.
2. Energy being used by pumping plant.
 - a. Reading gas meter.
 - (1) Time revolutions of test dial. This will be one which is 10-5 or 2 ft³/rev.
 - (2) Be aware that a pressure correction factor may be needed to get an accurate measurement.

$$\text{Pressure Correction Factor} = \frac{\text{Gage(psi)} + \text{Atmospheric Pressure(psi)}}{\text{Calibration Pressure(psi)} = \text{Atmos.Pressure(psi)}}$$

- (3) If a farmer or gas company starts talking about decatherms, call me and we'll talk about it.
- b. Reading electric meter.
 - (1) Time 10 revolutions of disk.

- (2) Record Kh.
 - (3) Additional multipliers.
 - (a) CTR - current transformer ratio -200:5.
 - (b) PTR - potential transformer ratio - 4:1.
 - (4) Use equation on forms to calculate Khw/hr.
3. Total head that pump is working against.
- a. Pumping lift measured withdraw down gage.
 - (1) Types of draw down gages.
 - (a) airline.
 - (b) electric.
 - (2) Get easement form signed.
 - (3) Know where top of pump is located.
 - (4) Be sure you are using the correct hole.
 - (5) Copper tubing bender spring and washer to protect sliding tags.
 - (6) Well "Gremlins".
 - (7) If you get a line hung, tie it off and leave it there. **Do not break the line.**
 - (8) Techniques of lowering the line. Beware of cascading and oil on the water surface.
 - b. Discharge pressure.
 - (1) Pressure gage on faucet x 2.31 = ft of head.
 - (2) Feel of steel pipe and measure.
 - (3) Watch for entrapment in stand if it is capped.
 - c. Column pipe friction.
 - (1) Estimate.
 - (2) Use table attached.
 - d. Total head = Pumping Depth (ft) + Discharge Pressure (ft) + n Pipe Friction.
4. Pump rpm - measure with counter tachometer - **Be Careful.**