Irrigation Technology

- Surface
- Center Pivot

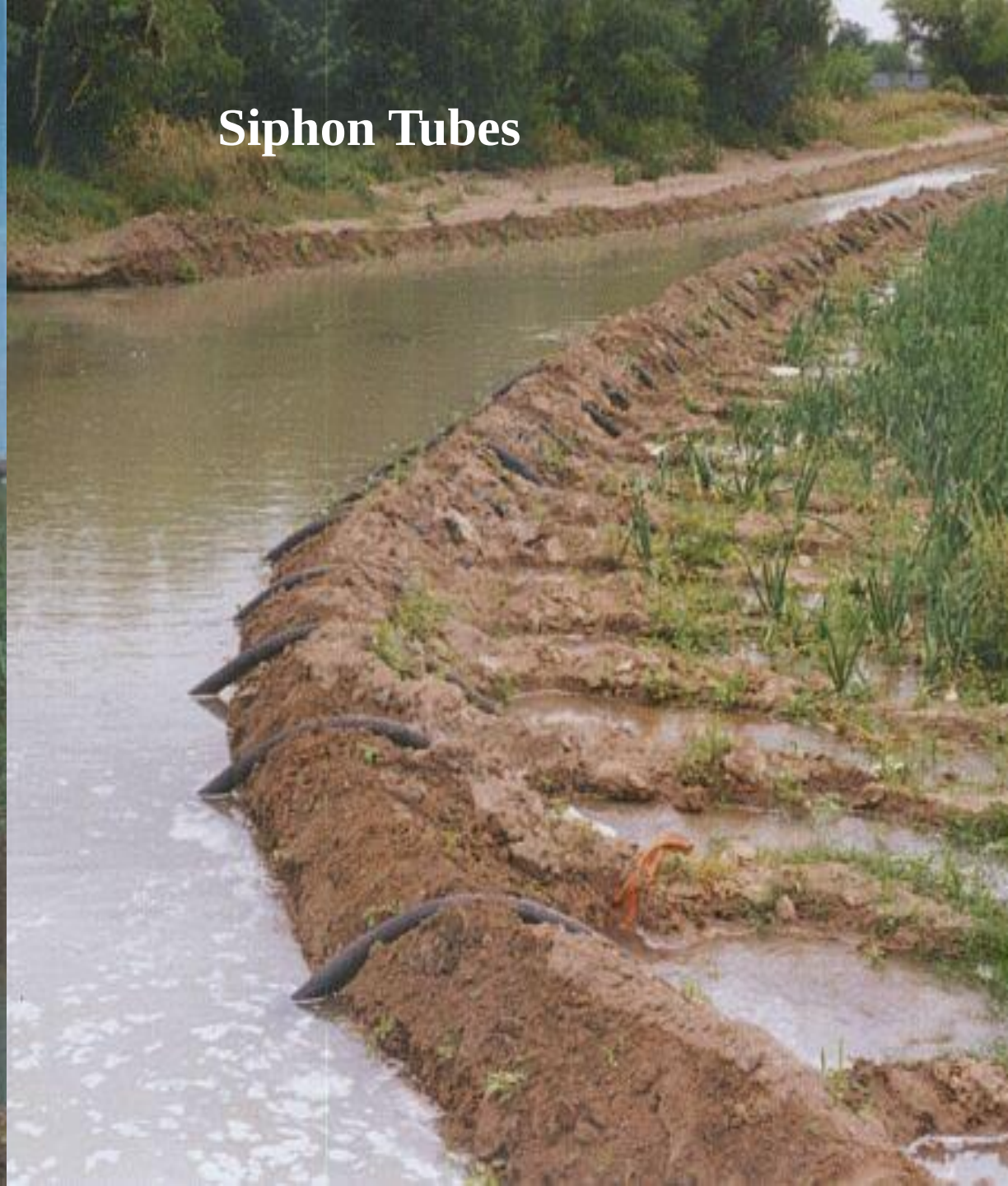
Ten Steps – Irrigation Design

Surface Irrigation

Poor to good efficiency

- Cutting of field ditches
- Siphon tubes
- Gated pipe (plastic/aluminum)
- Gated pipe with cutback irrigation
- Gated pipe with surge flow irrigation


Field Ditch

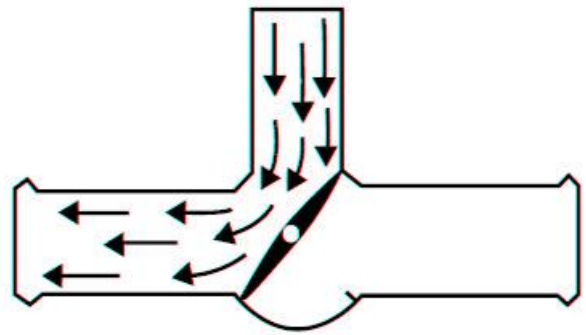

Siphon Tubes

POLYPIPE SURFACE

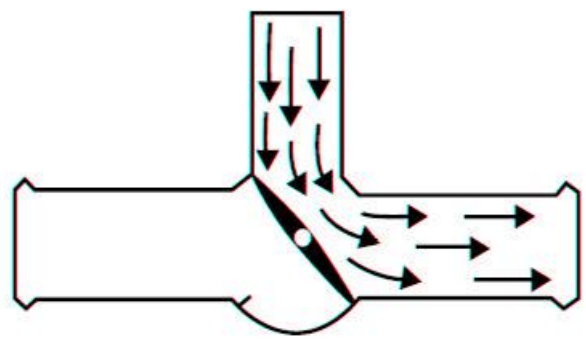
SURGE SURFACE FLOW

How does surge work?

Single butterfly type valve



Diverted left

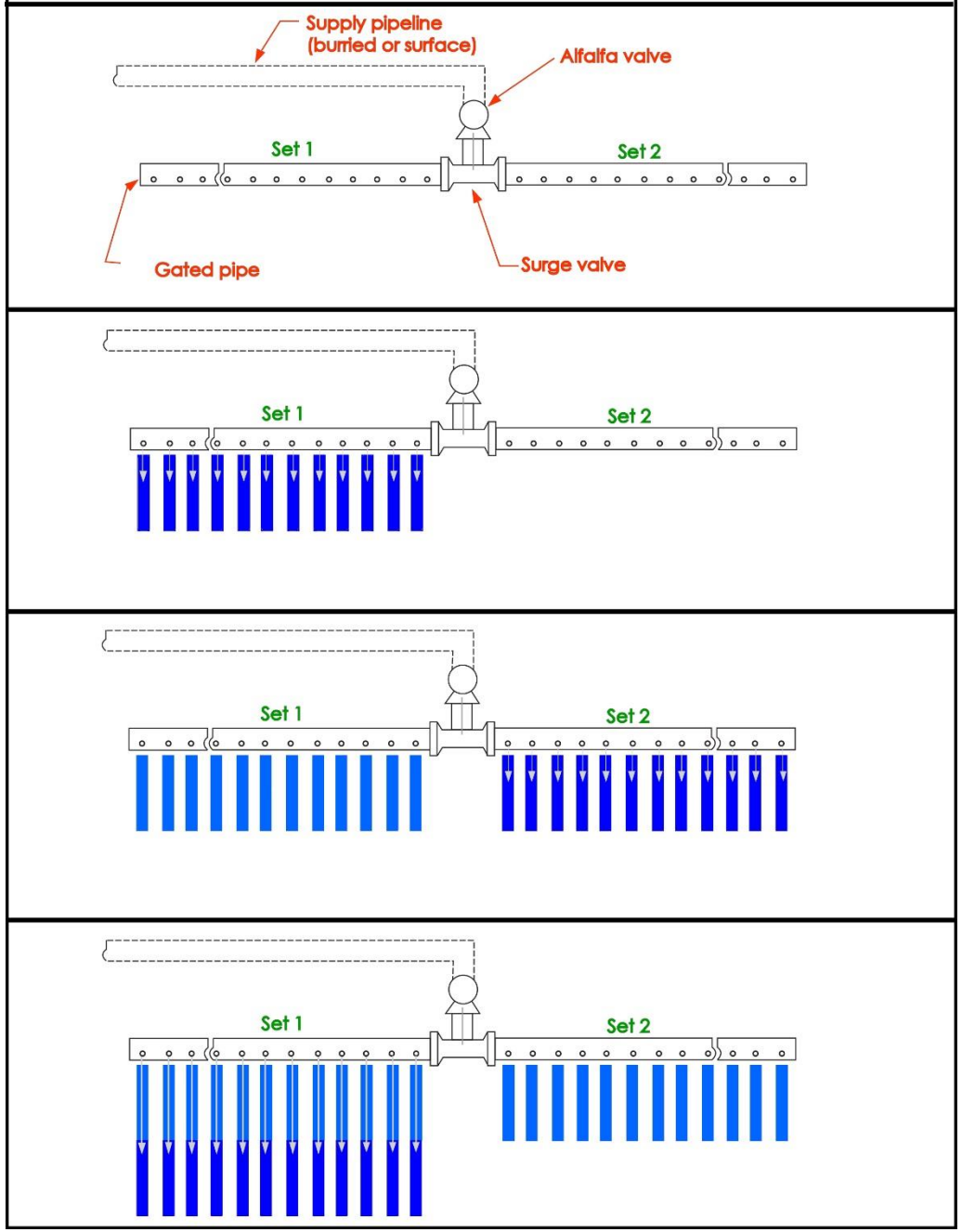


Diverted right

P&R Surge Systems, Inc. Website

http://prsurge.com/

Diagram of a split-set gated pipe system used for surge flow irrigation.
Flow is alternated from side to side.



Available surge valves from Waterman and P&R

Valve Pipe Size	Capacity gpm	Weight lbs
4”*	300	19
6”	625 - 700	31 - 37
8”	1100 - 1200	44 - 46
10”	1700 - 2000	50 - 54
12”	2500 - 3000	67 - 90

Surge Flow Irrigation

Where it works - increases the efficiency of furrow irrigation by 10 to 30%

Works by sending surges of water to alternating sides of a field

Can help automate surface irrigation of large blocks

Surface Irrigation
Keys to Success

USE:

- Large water stream per row
  (25 + gallons per minute for each row)

  - depends on soil type –check with NRCS

- Gated pipe: plastic or aluminum

- Surge flow?

Typical On-farm Overall Irrigation System Efficiencies

System	Overall Efficiency
Surface	
a. Average	0.5
b. Land leveling and delivery pipeline meeting design standards	0.7
c. Tailwater Management System	0.8
d. Surge	0.6-0.9
Sprinkler	0.55-0.75
Center Pivot	0.55-0.9
LEPA	~0.95
Drip	0.8-0.9


ZIMMATIC

Sprinkler Irrigation

Types of Pivot/Linear-move Water Applicators

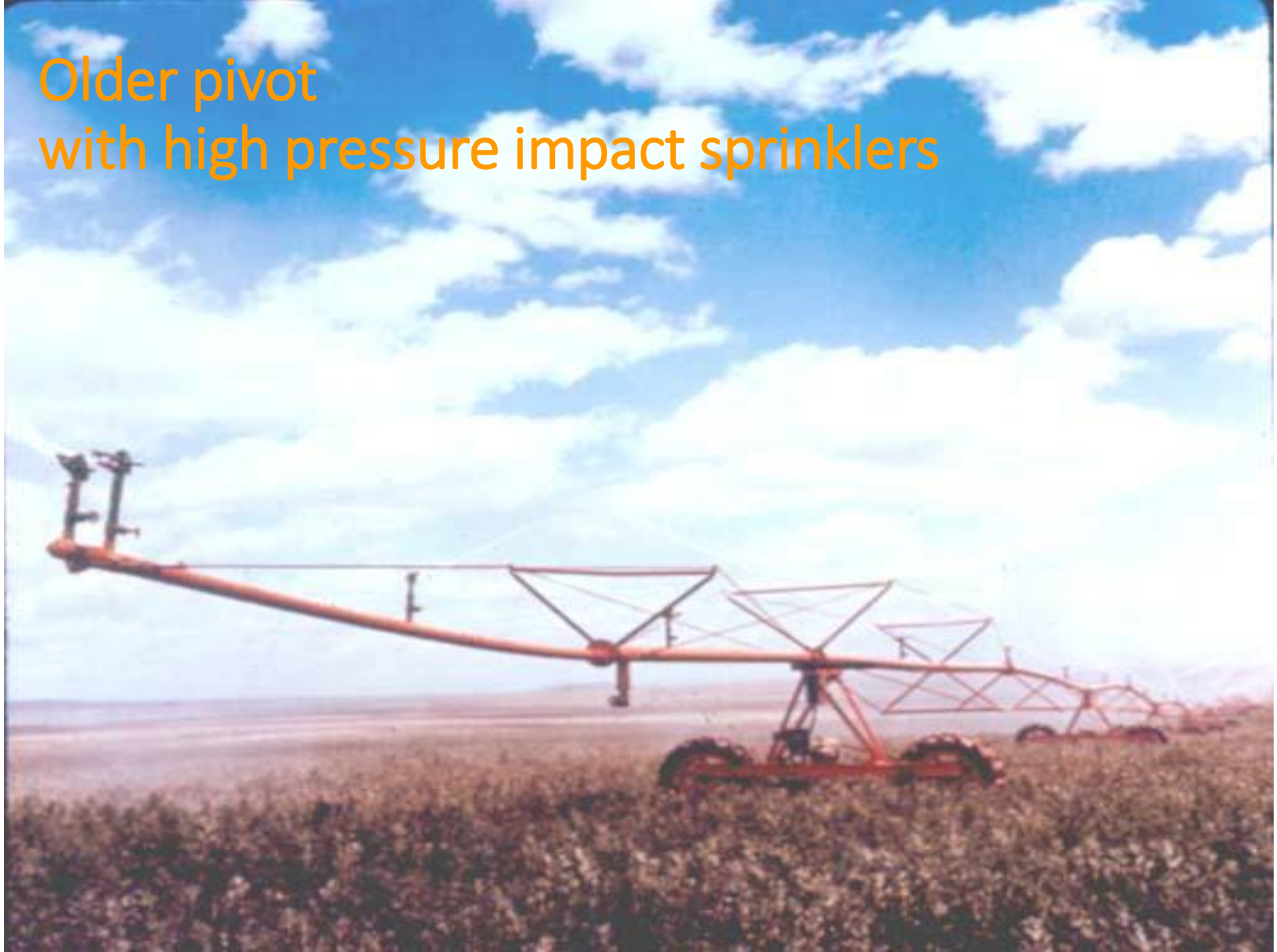
(1) high pressure impacts

(2) medium elevation spray applicators (MESA)

(3) low energy precision applicators (LEPA)

(4) low elevation spray applicators (LESA)

Water-move pivot


Older pivot
with high pressure impact sprinklers

MESA CENTER PIVOT


MESA
(medium elevation spray applicators)

LESA CENTER PIVOT

LEPA
(low energy precision applicators)


LEPA
with alternate row furrow dikes

LEPA CENTER PIVOT

Efficiency

- LESA 90%+
- LEPA 95-98%

Ten Steps in Irrigation System Design

Recommended Steps

1) Define goals
   - Full irrigation, Supplemental irrigation, Planned deficit irrigation
   - Specific crops and rotation
   - Other uses such as wastewater irrigation
2) Do you have enough water?
   - Existing pump flow and pressure
   - Volume of water available
   - Peak consumptive use analysis
3) What is the water quality?
   - Salinity, sodium/SAR, boron, iron
   - Other limiting constituents
   - Does the well pump sand/silts?
4) Collect field information
   - size, shape, soils, slopes, etc.

Recommended Steps

5) Pre-screen irrigation technologies
6) Obtain rough cost estimates for selected irrigation alternatives and discuss with grower
7) Select irrigation system
8) Select required accessories
   - Pressure gages, flow meter, pressure regulators
   - Center pivot – pressure gage drop
   - Drip - filters

Recommended Steps

9. Obtain site specific design, including
   - proper mainline pipe sizing
   - telescoping of pivot mainline (if needed)
10. Select pump and power units based on head/flow requirements and other factors