Particule Phosphorus

Source, Transport and Control

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Components of a Sample of Water

- Water: 40% Soluble Fertilizers
- Sediment: 60% Particulate Soils, Vegetation

100% Phosphorus
Particulate Phosphorus

Potential Sources

- Soil Erosion
- Erosion of Canal Bottom
- Erosion of Canal Banks
- Floating Aquatic Vegetation (FAV)
Management Practices to avoid Particulate P

- Soil Erosion
  - Fallow fields Flooding
  - Land Leveling
  - Sediment Sump in Culverts
  - Canal Berms
- Erosion of Canal Bottom
  - Slow velocity when draining
  - High water levels in the canals
- Erosion of Canal Banks
  - Vegetation in canals banks
  - Gentle slope in canal banks
- Floating Aquatic Vegetation (FAV)
  - Canal Cleaning Program
Management Practices to avoid Particulate P

- Fallow fields Flooding
- Field Leveling
Management Practices to avoid Particulate P

- Sediment Sump in Culverts
- Canal Berms
Management Practices to avoid Particulate P

- Vegetation in canals banks
- Gentle slope in canal banks

Effect of Velocity on Erosion Rate
(Qualitative Illustration with relative units)

Critical Velocity
Erosion Rate = 3
Erosion Rate = 13
Erosion Rate = 36

Effect of Velocity on Erosion Rate - mass/unit area/time
Critical Velocity
Erosion Rate = 3
Erosion Rate = 13
Erosion Rate = 36
Management Practices to avoid Particulate P

Water Pump Management

Event UF9200A-276 Year 2000
Particulate Phosphorus and Velocity

- **Start-Up Flush**
- **Cumulative High Velocity**
- **Re-Start Flush**
- **Spike**

**Graph Details**:
- **Y-axis**: PP Concentration (mg/l)
- **X-axis**: Decimal Date
- **Legend**:
  - Red line: PP
  - Blue line: Velocity

**Observations**:
- The graph illustrates the concentration of particulate phosphorus (PP) and velocity over time during the Event UF9200A-276 in the year 2000.
- Key events include start-up flush, cumulative high velocity, re-start flush, and spikes.
Management Practices to avoid Particulate P

Water Level Management

Correlation of Discharge TSS Concentration with Canal Level for UF9206N
Management Practices to avoid Particulate P

Water Velocity Control

- Limit maximum speed
- Pump for a long time at a low rate
- Long Pumping cycles are good, short pumping cycles are bad
- Determine critical water levels: Do not drain the farm below Stop elevations
Management Practices to avoid Particulate P

Canal Cleaning Program
Where to Place the Sediment

Best

Better

Bad
Management Practices to avoid Particulate P

Canal Cleaning Program
Floating Aquatic Vegetation Mechanical Removal
Water Levels in South Florida
Start & Stop Elevations
Water Levels in South Florida

Start & Stop Elevations

Primary C.: 1% Drainage
Secondary C.: 20% Drainage
Water Levels in South Florida
Start & Stop Elevations

Primary Canal:
- 1% Drainage

Secondary Canal:
- 20% Drainage

Field Ditches:
- 79% Drainage
Water Levels in South Florida
Start & Stop Elevations

When we lower the canals,
How much are we draining?

Field Ditch 79 % + Secondary Canal 20 % = 99 %

Primary Canal 1 %

Operating Range
Stop Elevations
Ditches and Canals Design

Start Elevation Reached

Water in the Ditches  =  Wet Conditions for the Crop

Wet Conditions
Dry Conditions
High Conveyance
Stop Elevations

Canals & Ditches Design

- Case 1:
- Stop Elevation Below Rock Level
- Culvert is submerged
- Water in the fields

- Why?

![Image of a canal with water in the fields and red markings]
Stop Elevations
Canals & Ditches Design

Case 2:
Stop Elevation Below Rock Level
Culvert is above water level
Water in the fields and ditches

Why?
Management Practices to avoid Particulate P (Brainwashing)

- **Soil Erosion**
  - Fallow fields Flooding
  - Land Leveling
  - Sediment Sump in Culverts
  - Canal Berms

- **Erosion of Canal Bottom**
  - Slow velocity when draining
  - High water levels in the canals

- **Erosion of Canal Banks**
  - Vegetation in canals banks
  - Gentle slope in canal banks

- **Floating Aquatic Vegetation (FAV)**
  - Canal Cleaning Program
Particule Phosphorus

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