Fern Ridge Dam, Oregon

Seepage and Piping Concerns
(Internal Erosion)
SPRA Training – 25 May 2005
2002 and 2003 OBSERVATIONS

Location of Depressions
Sinkholes on D/S face

September 2002
Station 44+00

February 2003
Sinkholes on D/S face

February 2003
Station 16+00

Sinkhole on D/S face

February 2003
Plan View (Sta. 0+00 – 25+00)

- Main Drain
- Lateral Drain at Sta 16
- Lateral Drain at Sta 22
- Depressions at Sta 16 & 20
- Piezometers at Sta 20
Plan View (Sta. 25+00 – 50+00)

Lateral Drain at Sta 27

Lateral Drain at Sta 32

Lateral Drain at Sta 37

Lateral Drain at Sta 40

Lateral Drain at Sta 45

Lateral Drain at Sta 50

Piezometers at Sta 30

Piezometers at Sta 39

Depression at Sta 44
Plan View (Sta. 50+00 – 70+00)

- Lateral Drain at Sta 45
- Lateral Drain at Sta 50
- Lateral Drain at Sta 55
- Lateral Drain at Sta 60
- Lateral Drain at Sta 65
- Piezometers at Sta 59
Fern Ridge Cross Section

Clay Blanket 0.25 miles u/s

TOP OF DAM EL. 381.5
MAX. POOL EL. 373.5

DAM AXIS

8" DRAIN

8" LATERAL DRAIN

ACCESS VAULT

Silt, Silty Sand, and Fine Sand

FOUNDATION CLAY
FOUNDATION SILT
FOUNDATION GRAVEL

Clayey Gravel

Gravel

Piezometric pressure influenced by pool and D/S pond.
Details of D/S Embankment Structure

- **Axis of Dam**: Crushed stone
- **Elev 381.5**: Granular fill
- **1' Top soil facing**: 2:1 slope
- **Disposal Zone**: 6.5:1 slope

- **Zone 3**
- **Laterals at 500' centers**
Drain System Details

**Drain and Filter**

Scale: 1/8"=1'-0"

Note:
Pipe shall be 6"-14 gauge corrugated metal with bituminous coating. Main shall be perforated bottom 120° with 3/8" holes @ 1/8 centers in valley of corrugations except at joints. Joints shall be % circle band, 7" width, riveted to pipe for 1 corrugation. Joints shall be locked by means of an angle iron riveted to abutting sections and bolted. After bolting all parts of joint shall be coated with same bituminous material as pipe. Connections to laterals shall be made with standard tee sections.

**Section A-A**

Scale: 1/4"=1'-0"

Note:
On the crest of the dam between stations 9+0775 and 68+80 and stations 2+80 and 5+905 a 4" thick top course (4") shall be placed.
Sediment Deposition Rate and Drain Flow versus Time

- **Sediment Accumulation Rate (lb/day)**
- **Weir Flow (gpm)**

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Gradation Graph

- Foundation
- Silty Sand
- Foundation Clays
- Granular Drains

Percent Finer by Weight

Grain Size in Inches
Fern Ridge – Original filter and drain versus New filter and drain design.
Continuation of Piping Failure

Fern Ridge Current Conditions

- Disposal Zone (El. 355.0)
- 2.5:1 Slope
- Zone 3
- El. 379.5
- 20'-0'
- Zone 2
- Riprap
- Zone 1
- 3:1 Slope
- Min pool El. 353.0
- Max conservation pool El. 373.5
- Original ground
- Stripped surface
- Laterals at 500' centers
- 50'
- Laterals at 500' centers
Questions?