Fixing the Crack in Wanapum Dam

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VP Engineering
Location

Wanapum Dam
Project Team

Grant PUD

MWH

Kuney Construction

Nicholson

JV
Wanapum Dam

- Built 1959-1963
- Named after Wanapum Native Americans
- One of 14 dams along Columbia River
- 1,095 MW power generation

> 8,300 ft long
Up to 185 ft high
Geology
The Story Begins
1. As built in 1960 (original design).

2. February 27, 2014. Fracture discovered.


4. Date TBD. Anticipated monolith repairs.
The Risks

Hanford Site
Reservoir Drawdown Impacts

- Power Generation
- Salmon Migration
- Recreation
  - Fishing, Boating, Camping, Hiking
- Archeological Preservation
- Wildlife Habitats
Sequence of Activities

- **Investigations (April 1, 2014)**
  - Exploration program from gallery
  - Crack mapping
  - Pressure/water relief holes.

- **Design – MWH w/ NCC input on constructability**

- **Monolith 4 repairs begin (May 2014)**

- **Anchor remaining piers (June 2014)**

- **First Milestone – raise pool (Nov. 2014)**

- **Second Milestone – expose ogee (Jan. 2015)**
Gallery Work

130-ft

90-ft
Cold Joint Drains
Chemical Grouting
Pier Tendons

130-ft

90-ft
Plan View of Anchors
The Drilling and Testing Process

[Diagram of drilling and testing process]
The Drilling and Testing Process
Pier Anchors

- Drill HQ (3.8 in OD) cored hole to bedrock ~130 feet
- Gyro survey alignment every 10 feet
- Ream HQ to 10” diameter hole, then 16” diameter ~250 feet
Downhole Survey
Spoils Containment
Sheath Water Tests
Sheath Installation
Tendon Installation
Tendon Installation
Tendon Installation
Tendon Uncoiler
Stressing Anchor
Stressing Anchors
Grout Plant
Ogee Anchors
Plan View of Anchors
Ogee Anchors Installation Process
Ogee Anchors Installation Process
Ogee Anchors Installation Process
Upstream
Downstream
Underwater Stressing
Bulkheads Installed for Ogee Repair
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Fish Ladder
Fish Ladder Intake and Outlet
Summary Comments

- Mapping and grouting of cracks in dam.
- Installed thirty-five, 61 strand anchors.
- Installed sixty-four ogee anchors w/ most under water.
- Intense effort of two, 12 shifts per day, six and seven days a week.
- Helped client meet milestones for raising pool to increase power supply.
- Incredible level of simultaneous activity.
Some Differences with the approach at the TVA's Cherokee Dam

Jefferson City, TN
Near Jefferson City, TN
Scope of Work

Non-Overflow
32ea. – 54 strand

Spillway
18ea. – 54 strand

Training Wall
27ea. – Bar Anchors
400-ft Boom to Place Anchors
Single Stage Grouting
Training Wall Bar Anchors
TVA Dams

• Major works completed at five TVA dams:
  • Cherokee
  • Douglas
  • Ft. Loudoun
  • Tellico
  • Watts Bar
Questions