CENTER HILL DAM SAFETY UPDATE

Linda Adcock, Project Manager
27 March 2018
Center Hill Dam Safety Project

- Reinforcing Berm In Progress $50M

- MRER approved 2006
  Main Dam Grouting 2007-2010
  Main Dam Barrier Wall 2009-2015
- Supplemental MRER & RA1 2011-2015
  Saddle Dam RCC Berm 2016-2019
  Total Project Est. $353M

- PIE & RA2 2016: Residual Risk Gates:
  Dam Safety Modification Study
- Status of Dam Safety Modification Study (for Gate Operability)
- Status of Saddle Dam RCC Berm Construction
- Update of Interim Risk Reduction Measures (IRRM) and O&M Action Item
Tailwater inundates service station

Thruster brakes that hold the gates open will be inundated during extreme events.

The catwalk from which gate operations are made will be inundated prior to the gates being fully lifted, rendering it unsafe for personnel.

<table>
<thead>
<tr>
<th>Gate Scenario</th>
<th>Probability of Fuse Plug Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Operation Schedule (Gates Operate as Intended)</td>
<td>1/100,000</td>
</tr>
<tr>
<td>Powerhouse and Catwalk Inundation (Gates Partially Open)</td>
<td>1/3,500</td>
</tr>
<tr>
<td>Power Failure (All Gates Closed for the Duration of the Flood Event)</td>
<td>1/500</td>
</tr>
<tr>
<td>Combination of All Scenarios</td>
<td>1/1,500</td>
</tr>
</tbody>
</table>
## Dam Safety Modification Study Array of Measures

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Raise gate machinery &amp; controls up to the road level <em>(require elevated road OR new road &amp; bridge downstream)</em></td>
</tr>
<tr>
<td>2</td>
<td>Replace spillway gate machinery with hydraulic machinery intended to operate under water</td>
</tr>
<tr>
<td>3</td>
<td>Mechanically open the gates from the top of the dam</td>
</tr>
<tr>
<td>4</td>
<td>Replace Fuse Plug w/ fuse gates or active gates on RCC Berm</td>
</tr>
<tr>
<td>5</td>
<td>Water Control Manual update: Open Gates Sooner during extreme flood events</td>
</tr>
</tbody>
</table>
Dam Safety Mod Study Next Steps:

- Tentatively Recommended Plan - July
- Draft Report - Fall 2018
- NEPA - EA or EIS?
Existing Saddle Dam and Fuse Plug

Proposed RCC Berm

Plan View
RCC Berm Next Steps:

• Prepare the Foundation- March to June
  — Finish Cleaning/Mapping & Dental Concrete
  — Place Leveling Layer of Concrete
  — Consolidation Grouting

• Concrete Test Section & Report- Apr to June

• Start the RCC Placement- July
Lake Level Reduction is an Interim Risk Reduction Measure (IRRM)

- Update current IRRM Plan - June 2018
- Approval of IRRMP - Aug 2018
- Recommendations:
  - Interim Raise of Lake, in increments, back to normal operating levels
  - dependent upon Modification Study Risk Estimates
- Gate Electrical & Rehab Work- FY20