

2011 Lock Maintenance Workshop

Review of 2010 Lock Closures

Successes & Challenges

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Mobile District

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Black Warrior & Tombigbee / AL-Coosa Project

February 15, 2011



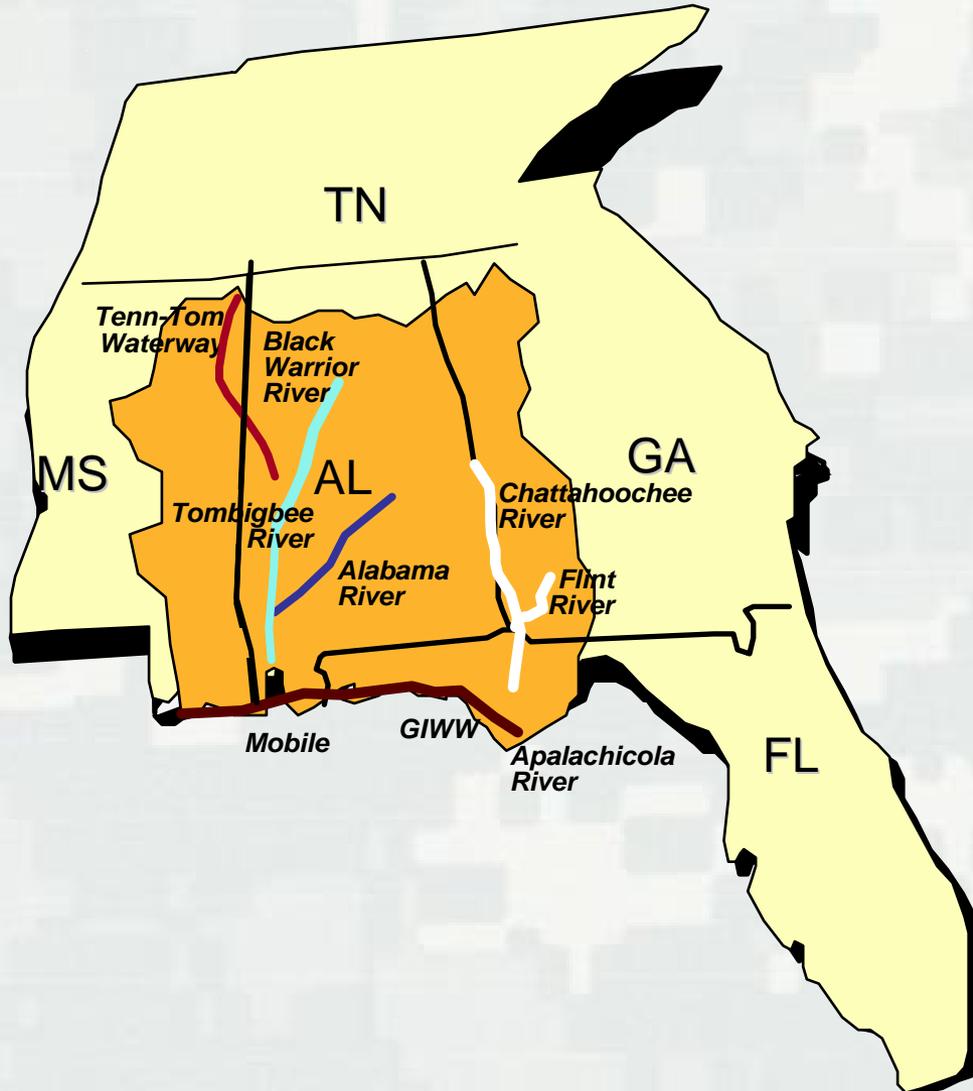
US Army Corps of Engineers
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Mobile District



Mobile District Waterways

Black Warrior & Tombigbee / Alabama-Coosa Project



Holt Lock & Dam

Black Warrior River



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Oliver Lock & Dam

Black Warrior River



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Coffeeville Lock & Dam

Tombigbee River



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Lock Closures – last 2-1/2 years

Black Warrior & Tombigbee Waterway:

Holt: 2010 – 30 days

Oliver: 2010 – 25 days

Coffeeville: 2010 – 25 days

Selden: 2009

Bankhead: 2009

Demopolis: 2008

Selden: 2008



Holt Lock Closure

July 6 – August 4 2010



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Challenges

- **Heat**
 - **Cooling Stations – liquids & mist fans**
 - **Coordination of work tasks**
- **Known cracking issue with lower gates**
 - **Planning – more welders on site**
 - **Welding inspectors for documenting & certifying weld repairs**
- **Repair damaged upper miter gate**
- **Cathodic Protection issues**
 - **Restoring CP & adding additional CP rods in high corrosion areas**



Holt Lock – Lower Miter Gates



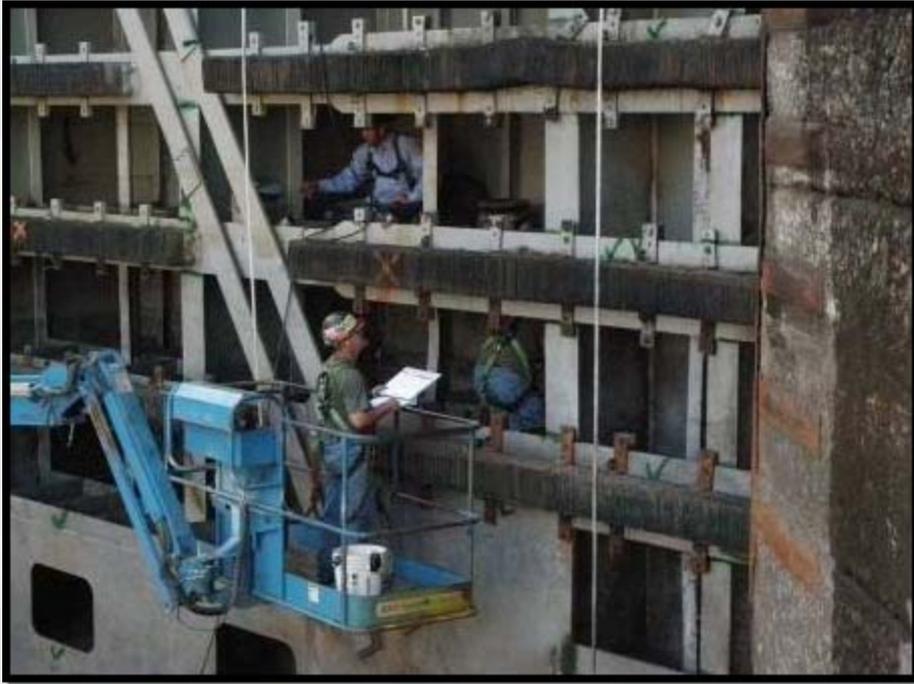
Anticipated numerous crack repairs based on previous closures and inspections



- **Lock Closure 2000: Several hundred cracks repaired.**
- **Lock Closure 2010: Over 400 cracks repaired, some in critical high stress areas.**



Holt Lock – Lower Miter Gates



All cracks repaired and documented; however, due to continued fatigue cracking, which increases gate failure risk, new miter gates are being designed for replacement.





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Upper Miter Gate Repair – Damage from Barge.



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New corrosion protection rods



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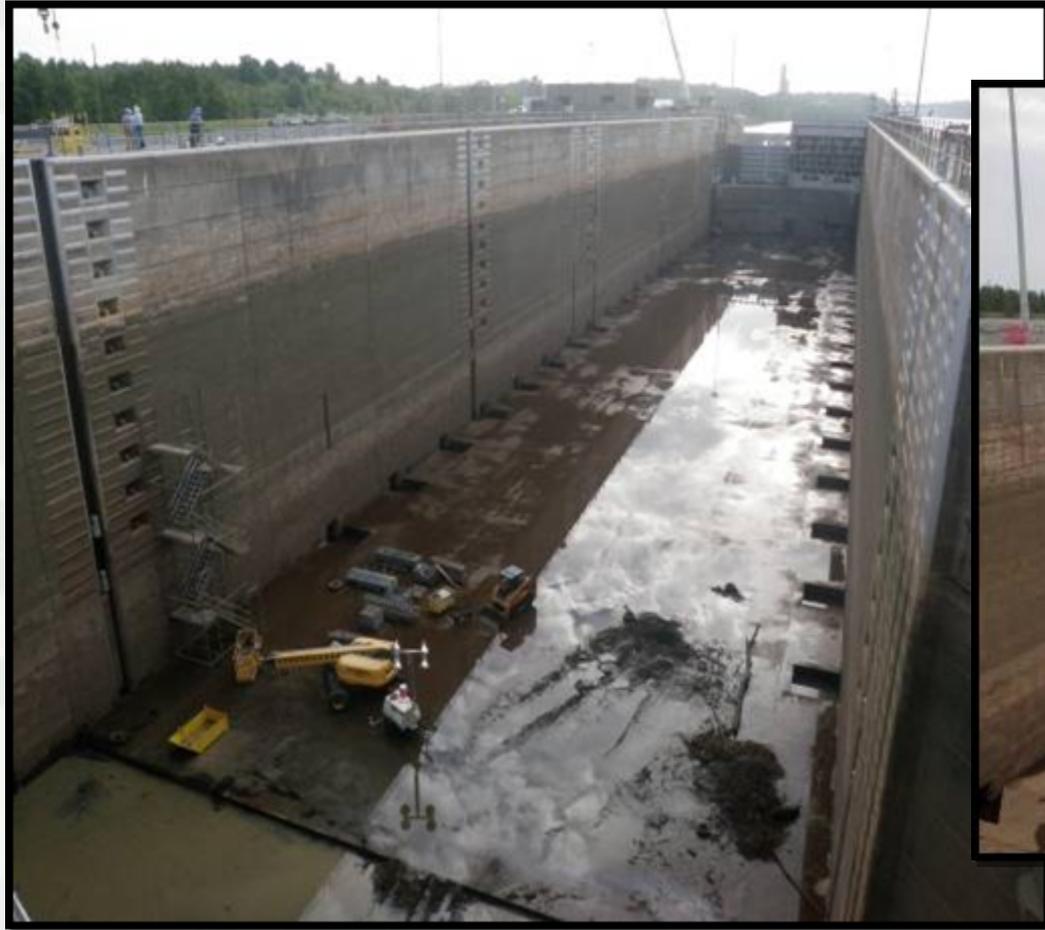
Painting & Timber Replacement



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Oliver Lock Closure

July 8 – August 6 2010



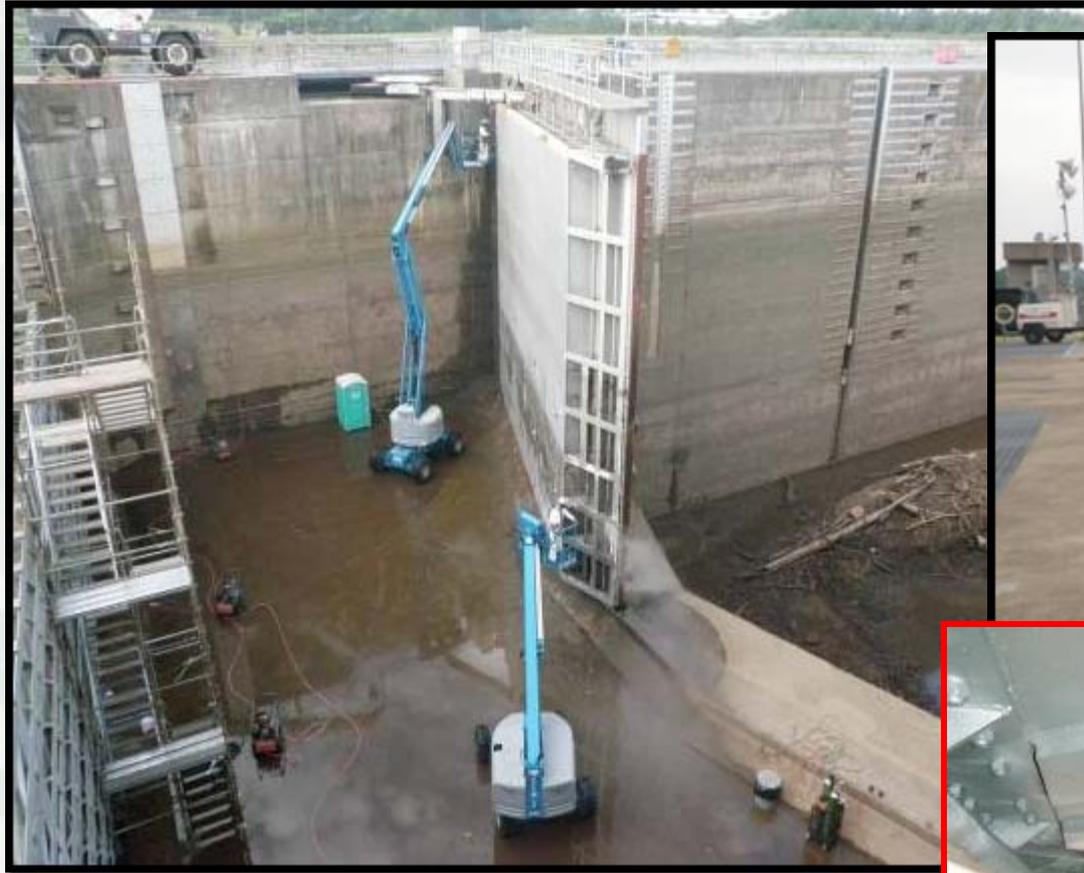
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Challenges

- **Heat**
 - **Cooling Stations – liquids & mist fans**
 - **Coordination of work tasks**
- **Heavily corroded contact blocks**
 - **Re-surfacing contact blocks with Belzona**
- **Cathodic Protection**
 - **Additional CP rods in high corrosion areas**



Oliver Lock Closure



Overall, miter gate structural steel and components, pintle assy., in very good condition.



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Oliver Lock Closure

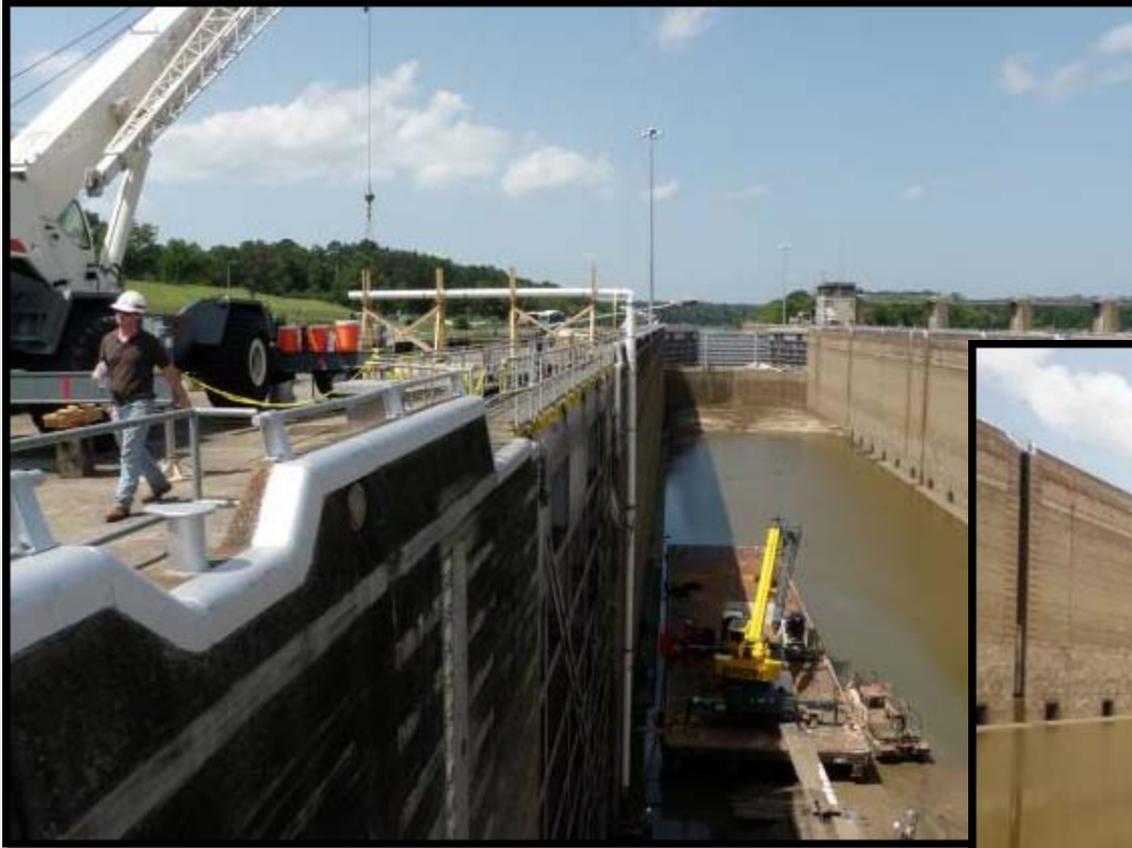


Found severe corrosion on miter gate contact blocks. Maintenance crews mixed and applied Belzona (metal compound) to re-surface contact blocks. Belzona re-surfaced blocks is a proven, long lasting repair.



Coffeeville Lock Closure

July 9 – August 6 2010



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Challenges

- **Heat**
 - **Cooling Stations – liquids & mist fans**
 - **Coordination of work tasks**
- **High Water**
- **Repair of damaged lower miter gate pintle sockets**
 - **Gate seal & miter sill embedded seal**
- **Re-surfacing of lower miter gate contact blocks – Belzona**
- **Cathodic Protection**
 - **Additional CP rods**



Coffeeville Lock Closure

- Paint miter gates
- Inspection & misc. maintenance



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Lower Miter Gate – Seals & Pintle Socket



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Coffeeville Lock Closure



Crack



Cracking and loose bolts on Lower Miter Gate Pintle Sockets. Pintle assemblies were repaired and bolts replaced; however, due to severity of cracks, pintle sockets are planned for replacement at next Lock Closure (2014).



Repair Pintle Socket:

- Pre-Heat of socket
- Gouge out cracks and weld repair
- Additional plate added for new bolts
- Inspect and paint



Demopolis Emptying Valve Repair

- Currently repairing lower land valve; therefore operating on only river side emptying valve.
- Work includes repair of operating machinery (links & pins), support beams, seals and complete painting.
- Once repairs are complete on land valve, repair crew will move to river valve for same overhaul work.



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Demopolis Valve Repair – cont.



Operating (strut) arm & pin for lifting valve to open – heavily worn



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Demopolis Valve Repair – cont.





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Alabama-Coosa Waterway

R.F. Henry Lock & Dam and Jones Bluff Powerhouse

Alabama River



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Millers Ferry Lock & Dam, and Powerhouse Alabama River



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Claiborne Lock and Dam

Alabama River



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2010 Lock Closures



Alabama River:

Millers Ferry: May 4 – June 3, 2010 (30 days)

Claiborne: September 8 – October 7, 2010 (30 days)

RF Henry: October 18 – November 19, 2010 (30 days)

Major Work Items – Inspection/repair of lock gate and valve components, replaced gate timbers, repaired cathodic protection, prep & painting of miter gages

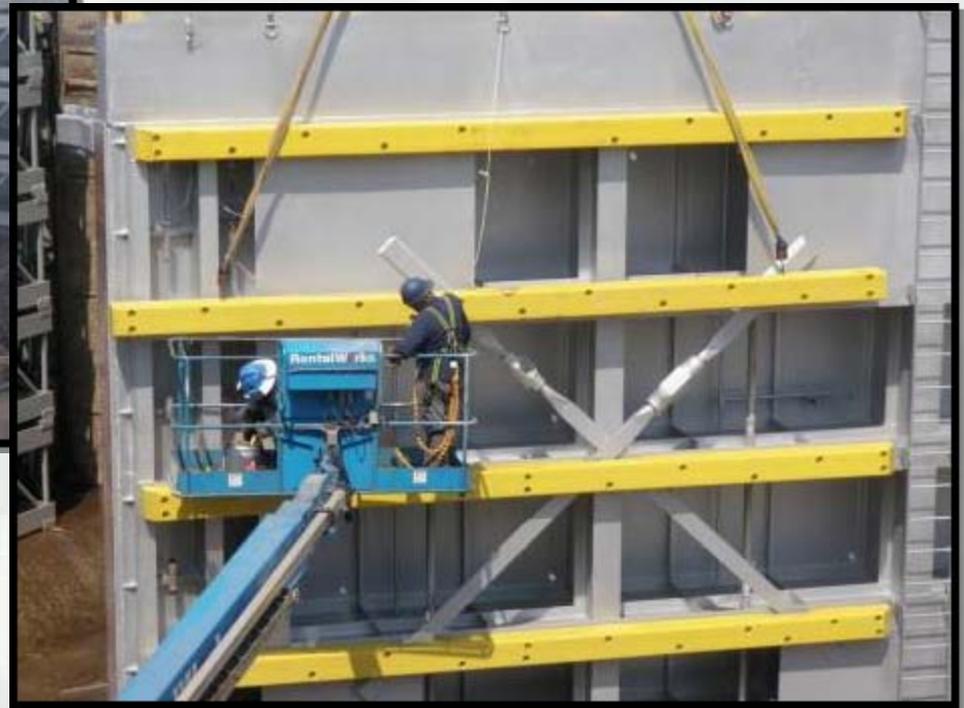


Lock Closure – Timber Replacement



Damaged / Rotten timbers

New Timbers – High Visibility recycled plastic

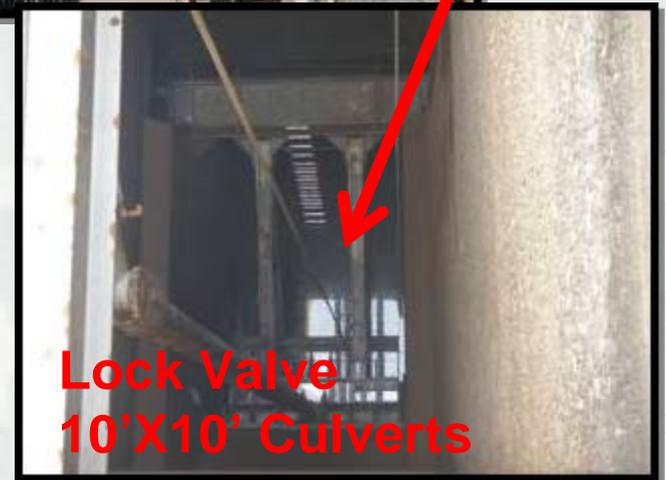


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Lock Closure – Emptying/Filling Valves



Lock Valve Equip. & Cylinder



While Locks were de-watered, maintenance/repair was performed on all four lock valves. **Not normally done during routine lock closure.*



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Lock Closure – Cathodic Protection



Cathodic Protection anodes
(upstream and downstream
sides of gates)



Inspected and repaired damaged cathodic protection anodes for corrosion protection (along with newly painted surfaces).



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Lock Closure – Painting Gates



Work included water blasting and applying new coating on miter gates. The vinyl coating is four coat system; primer (red), intermediate (white) and top coat (grey, 2)



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Millers Ferry Lock



- Repaired lock emptying/filling valves
- Minor repairs and painting of miter gates
- Re-surfaced miter gate contact blocks
- * Large amounts of mud and silt had to be removed prior to inspection and repair.



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Millers Ferry Lock



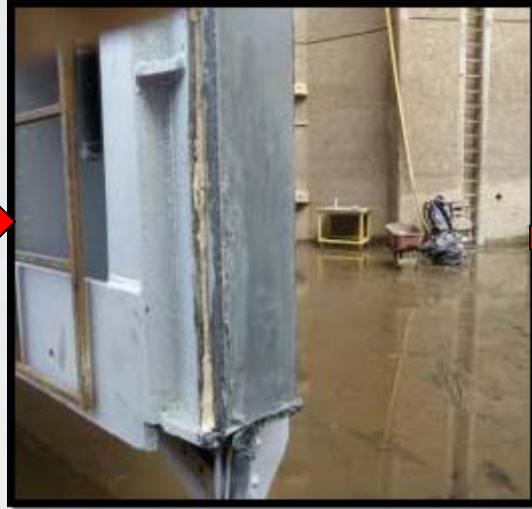
- All four lock valves required replacement of connection pins and support beams along with repairs to machinery and full painting.
- Operating components were disassembled and repaired.
- Broken grease lines were replaced



Millers Ferry – re-surface blocks



Contact block- Before



After - resurfaced



Mixing Belzona



Applying Belzona



Claiborne Lock



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Claiborne Lock

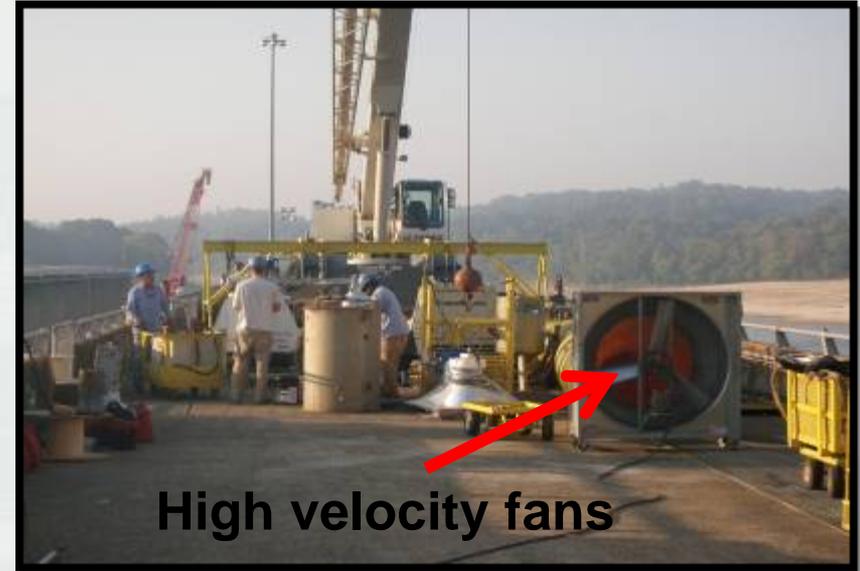


- Repaired lock emptying/filling valves
- Minor repairs and painting of miter gates
- * Large amounts of mud and silt had to be removed prior to inspection and repair.



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Claiborne Lock



Lock valve repairs and painting required special ventilation and lighting due to location deep inside lock walls



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Robert F. Henry Lock

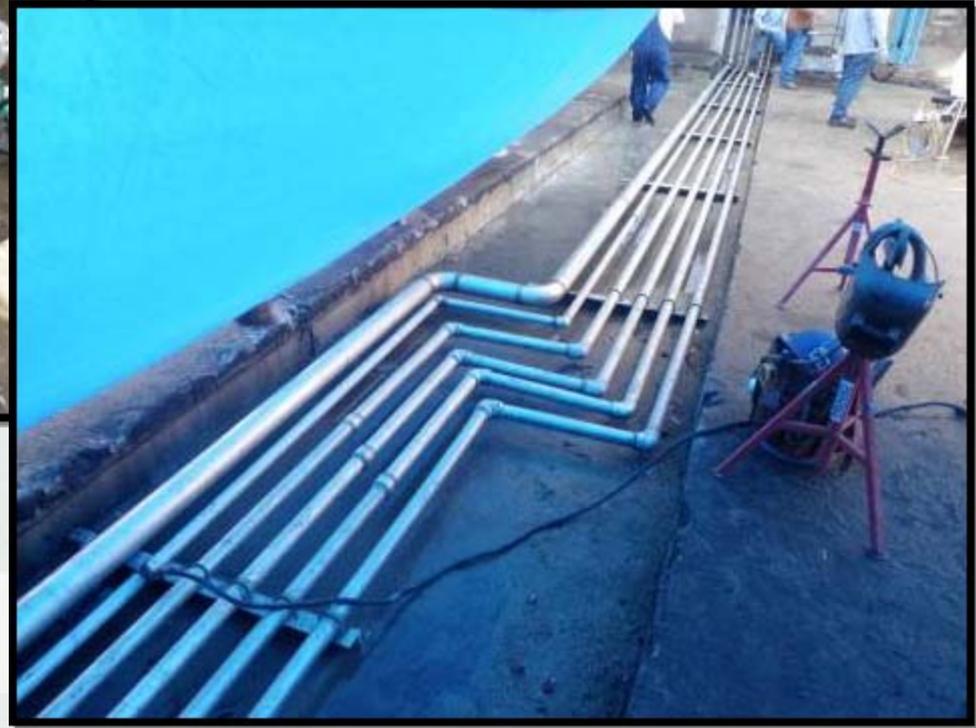


- Repaired lock emptying/filling valves
- Minor repairs and painting of miter gates
- Re-surfaced miter gate contact blocks
- Repaired corroded embedded piping (in bottom of lock chamber)
- Repaired lower miter gate top connection pin (gudgeon pin)
- * Large amounts of mud and silt had to be removed prior to inspection and repair.



Robert F. Henry Lock

Repair piping –
hydraulic, water & air



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Robert F. Henry Lock



Removed pin from top connection assembly of miter gate (12" dia). Pin was seized in bushing – cleaned pin and re-cut new grease grooves in bushing.





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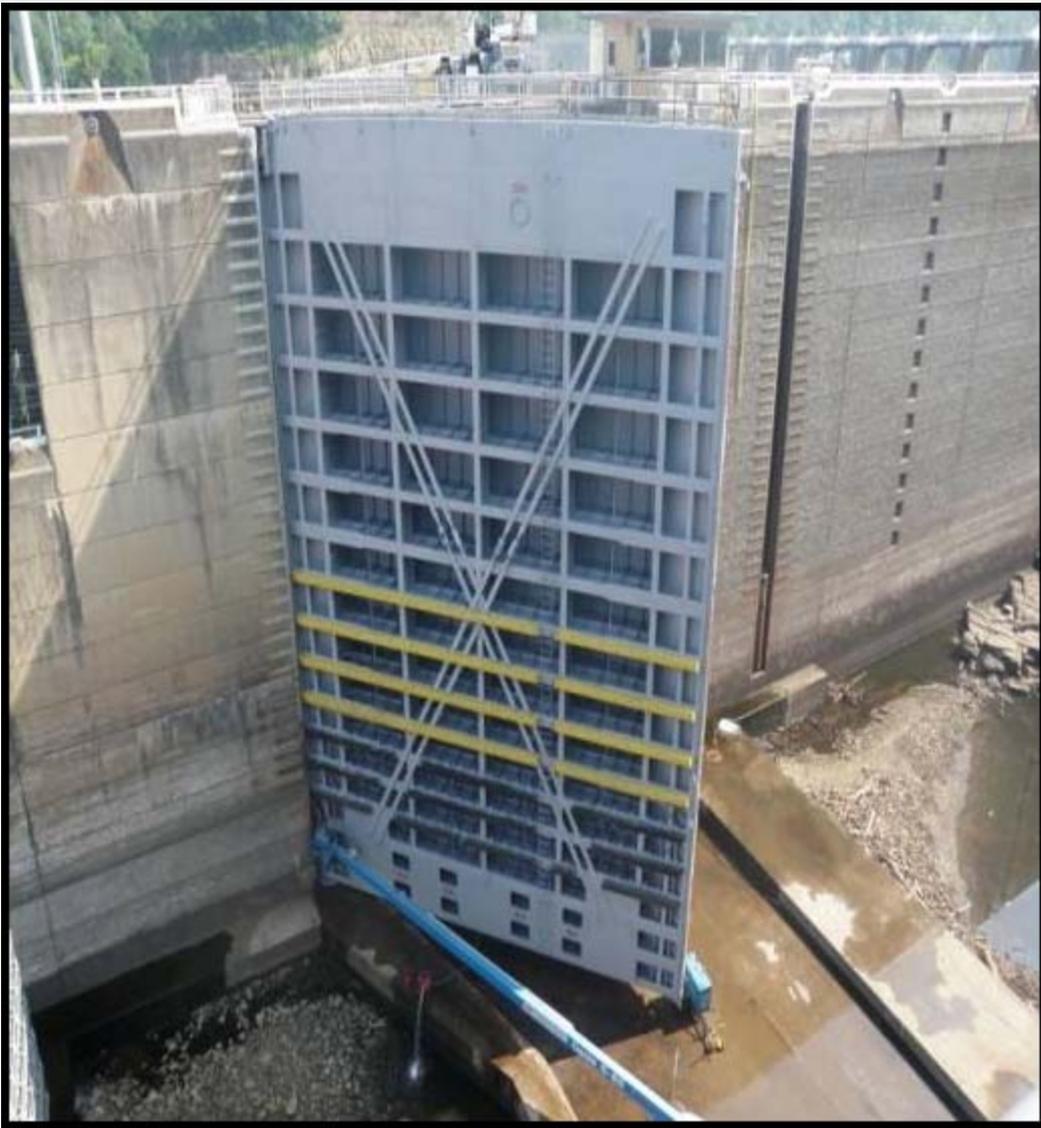
2010 Lock Closure Incidents

- **Flash Fire in Miter Gate Bay – Holt Lock**
- **Stoplog & Lifting Beam Damage During Removal at RF Henry Lock.**



Flash Fire inside lower miter gate bay





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Flash Fire Lessons Learned:

- **Equipment used at the work site must be serviceable and appropriate for job or removed for use.**
- **Safety Plans must be detailed in nature, reviewed for sufficiency by safety professionals, trained to the workers, and supervised by those responsible for the work effort.**

Path Forward:

- **Do not use electrical devices near spray painting operations or other flammable accumulations unless the device is rated as intrinsically safe for use in combustible and explosive atmospheres.**
- **Adequate ventilation must be provided for painters inside confined spaces. In the absence of adequate ventilation, provide breathing air to painters using air-line or self-contained breathing systems.**
- **Identify the miter gate bay compartment, and similar locations, as permit-required confined spaces (PRCS) and amend the Safety Plan to provide procedures and policies for the conduct of work within the PRCS.**



Stoplog Incident – Damaged Lifting Beam & logs.



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Pick-Up Beam/Stoplog Lessons Learned:

- **Only properly trained personnel will be used during setting and removal of stoplogs.**
- **Safety Plans must be detailed in nature, reviewed for sufficiency by safety professionals, trained to the workers, and supervised by those responsible for the work effort.**

Path Forward:

- **Do not attempt lifting of stoplog until proper connection of lifting beam hooks to stoplog are verified by experienced and properly trained employee.**



R.F. Henry – Spillway – Trunnion Rods

RF Henry Lock & Dam



Trunnion Rod Inspections / Testing
National Team formed to study
spillway trunnion rod failures



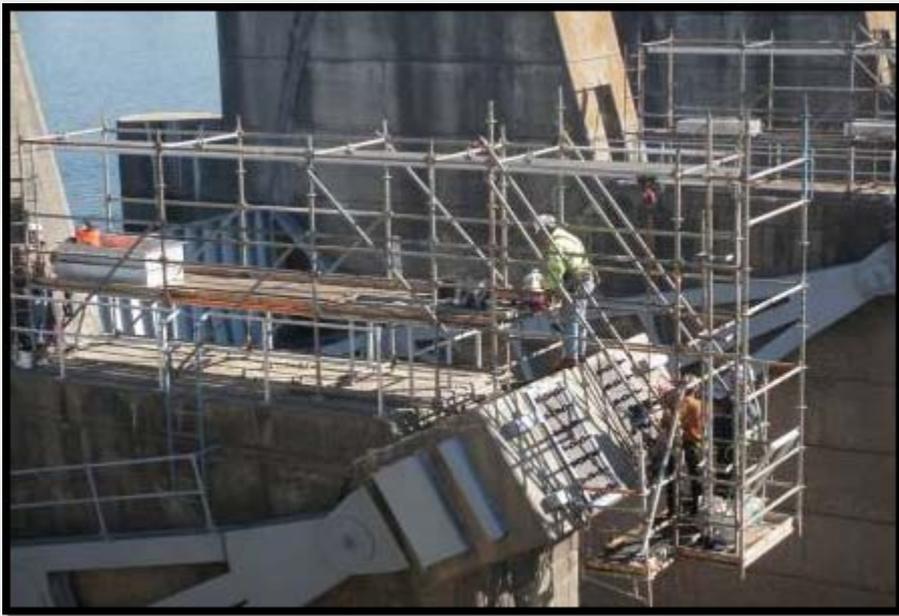
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Robert F. Henry Spillway



Spillway gate trunnion rods being load tested. Scaffolding installed for safety and jacks attached to test tension on rods.

New removal galvanized cover boxes were installed to aid in future inspections.





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Questions ?



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