

# Stockton Power Plant Major Equipment Repair and Replacement

Southwestern Federal Regional  
Hydropower Conference  
Kansas City, MO

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13 June 2012



# General Plant Information

- Rated 45 MW, Operated @ 50 MW capacity
- Single vertical axis Kaplan unit
- Peaking plant
- Average annual energy production of 55,000,000 KWH
- Plant placed in service in 1973
- Remote operated from Truman Power Plant
- Located on the Sac River near Stockton, MO



# ARRA Project Scope

- Failed Blade Section Recovery (*Completed*)
- Hydraulic Steel Structures (HSS) Inspection/Repair (*Completed*)
- In-place Turbine Blade Repair (*Completed*)
- Blade Placement in Draft Tube (*Completed*)
- 13.8 kV GM and Station Service Breakers and Station Service Transformer Replacement (*Completed*)
- AC/DC Preferred Systems Replacement (*Completed*)
- Transformer Pad and Secondary Containment Construction (*Completed*)
- Main Power Transformer Replacement (*Completed*)
- Generator Rewind and Turbine Runner, Governor, and Exciter Replacement (*Contract Ongoing*)



# Project Funding

- ARRA funds were authorized for this project.
- \$42.73M in ARRA funds have been programmed for this project.



# Total ARRA Cost Summary

Work Item	Cost
Failed Blade Section Recovery	\$69,487
Hydraulic Steel Structures (HSS) Inspection/Repair	\$1,156,834
In-place Turbine Blade Repair	\$1,134,857
Blade Placement in Draft Tube	\$13,520
AC/DC Preferred Systems Replacement	\$469,964
13.8 kV GM and Station Service Breakers and Station Service Transformer Replacement	\$334,850
Transformer Pad and Secondary Containment Construction	\$527,554
Main Power Transformer Replacement	\$1,134,560
Generator Rewind and Turbine Runner, Governor, and Exciter Replacement	\$31,157,662
EDC, S&A, and Contingency	\$5,103,342
<b>Total</b>	<b>\$41,102,630</b>

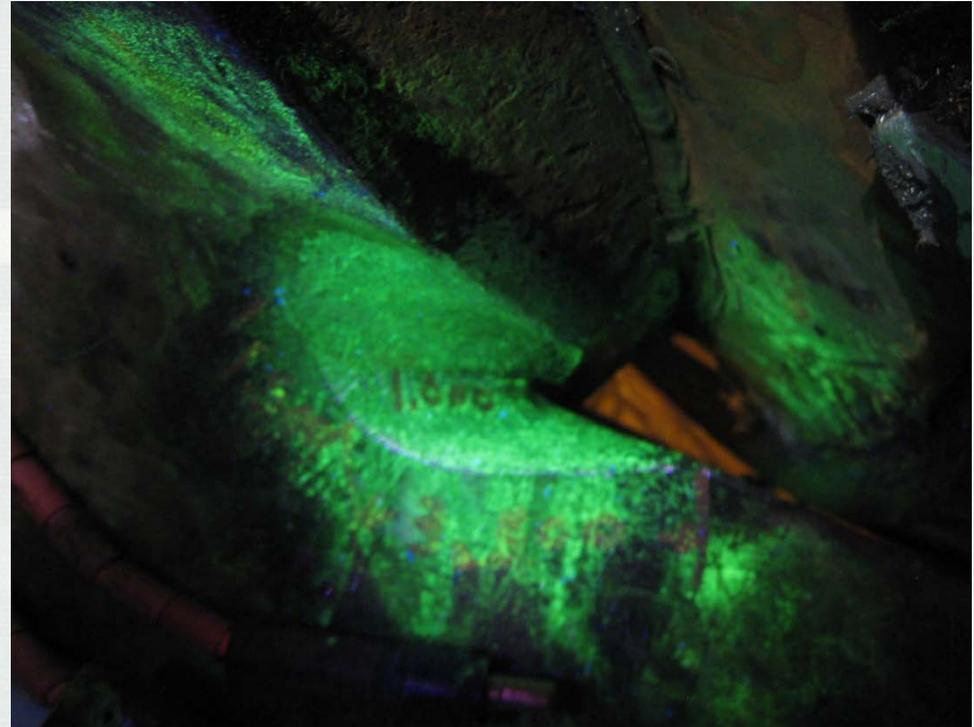


# In-Place Blade Repair

- Contract Awarded: 15 May 2010
- Contractor: Peak Hydro
- Contract Completion: 30 August 2010
- Contract Amount: \$1,134,857
- Summary
  - ▶ Laser alignment technology (first-time use in Corps projects)
  - ▶ Weld wire deposited – 600 lbs
  - ▶ Thickness of weld ranged from 3 – 10 inches thick
  - ▶ Weight of blade – 9,000 lbs
  - ▶ Hours worked – 6,400 (2 -12 hour shifts)
  - ▶ Unit back in service: 3 Sep 2010



# In-Place Blade Repair Photos



- Magnetic Particle Testing on Crack Repairs (Above)
- Rigging, placement, and preheating of the broken blade (Left)



# Why Repair the Blade?

- Estimated Lost Power Generation
  - ▶ 82,500 MWH (Feb 2009 thru Aug 2010)
  - ▶ \$7.6 Million in energy benefits
- Since 3 Sept 10 completion of the blade repair
  - ▶ Generated 42,191 MWH through 12 June 2011
  - ▶ Approximately \$4.2 million in energy benefits



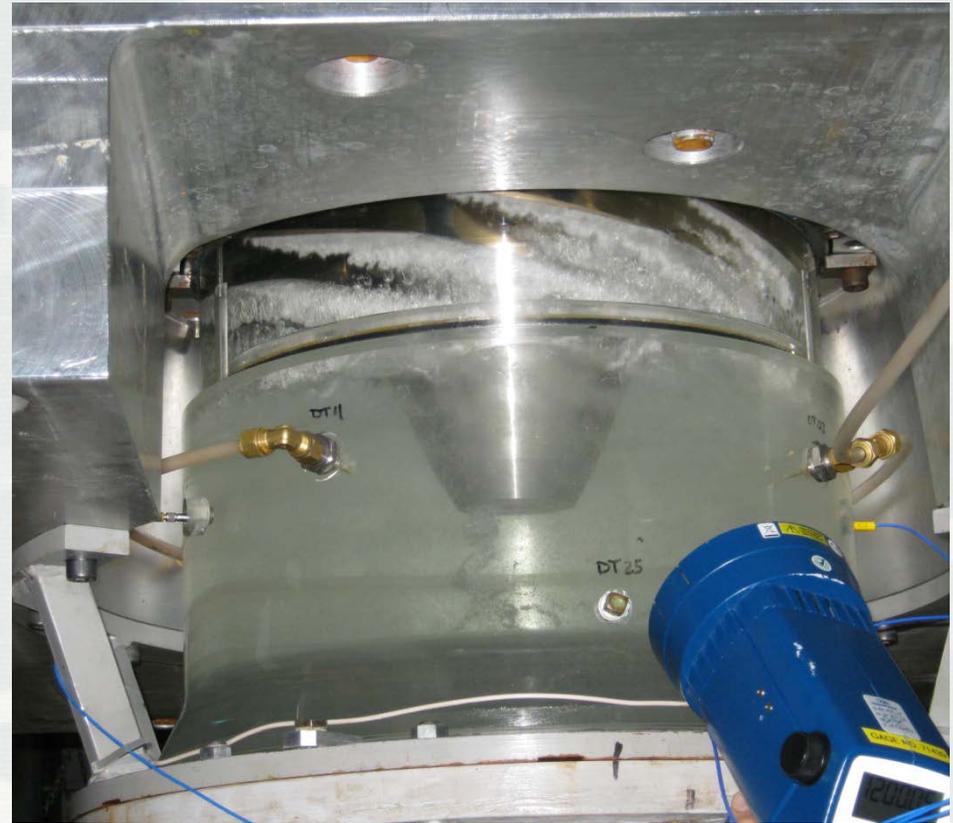
# Main Power Transformer Replacement

- Contract Awarded: 8 Mar 2010
- Contractor: National Electrical Systems
- Manufacturer: CG Power Systems Canada Inc.
- Contract Amount: \$1,134,560
- Schedule
  - ▶ Design: Complete
  - ▶ Manufacturing: 80% Complete
  - ▶ Pre-Vapor Phase Inspection this week at the Plant
  - ▶ Factory Acceptance Testing: August 2011
  - ▶ Delivery: August/September 2011
  - ▶ Field Assembly/Testing: August /September 2011
  - ▶ Contract Completion Date: Jan 2012



# Generator Rewind and Turbine Runner, Governor, and Exciter Replacement

- Contract Awarded: 8 Apr 2010
- Current Contract Amount: \$31,157,662
- Contractor: Voith Hydro
- What has been completed:
  - ▶ Turbine model test and delivery of the model complete May 2011
  - ▶ Prototype coil test completed: Apr 2012
- Challenges
  - ▶ Hysteresis (Cause of the rough operation since 1970)
- Modifications
  - ▶ Eliminate Turbine Rough Operation (+\$338,722)
  - ▶ Vibration Monitoring Equipment (RFP)



# Generator Rewind and Turbine Runner, Governor, and Exciter Replacement

## ■ Schedule:

- ▶ Prototype coil test completed: Apr 2012
- ▶ Stator winding delivery: Jan 2013
- ▶ **Generator-turbine unit disassembly: Jan – Feb 2013**
- ▶ Unit reassembly: Jun – Dec 2013
- ▶ Commissioning: Dec 13 – Jan 14
- ▶ **Unit placed into service: Feb 14**



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# Turbine Hub Casting Photos at the Foundry



2011 12 20

Turbine Component Engineering continues  
The generator coils, turbine blades, and turbine  
hub are currently being fabricated.



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2012 2 22

# AC/DC Preferred Systems Replacement



- Contract Award: 13 Jul 10
- Current Contract Amount: \$469,964
- Contractor: Koontz Electric Company, Inc.
- Schedule
  - ▶ Design/Manufacture: Aug10 – Feb 11
  - ▶ Delivery/Installation: Mar – Apr 11
  - ▶ Contract Completion: Jun 11



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# 13.8 kV GM and Station Service Breakers and Station Service Transformer Replacement

- Contract Award: 29 Jul 2010
- Current Contract Amount: \$334,850
- Contractor: C.E. Power
- Schedule
  - ▶ Design/Manufacture: Completed in Mar 2011
  - ▶ Delivery/Installation: Completed in May 2011
  - ▶ Closeout Documents: Jun 2011
  - ▶ Contract Completion: Jul 2011
- The new 3,000 amp breaker has allowed the plant to be operated at full capacity of 50 MW.



# Main Power Transformer Replacement Supply Contract & Transformer Pad and Secondary Containment Construction



## Transformer Pad

- Contract Cost: \$527,554
- Contractor: Caman/Strickland Construction
- Contract Completed Sept 2011

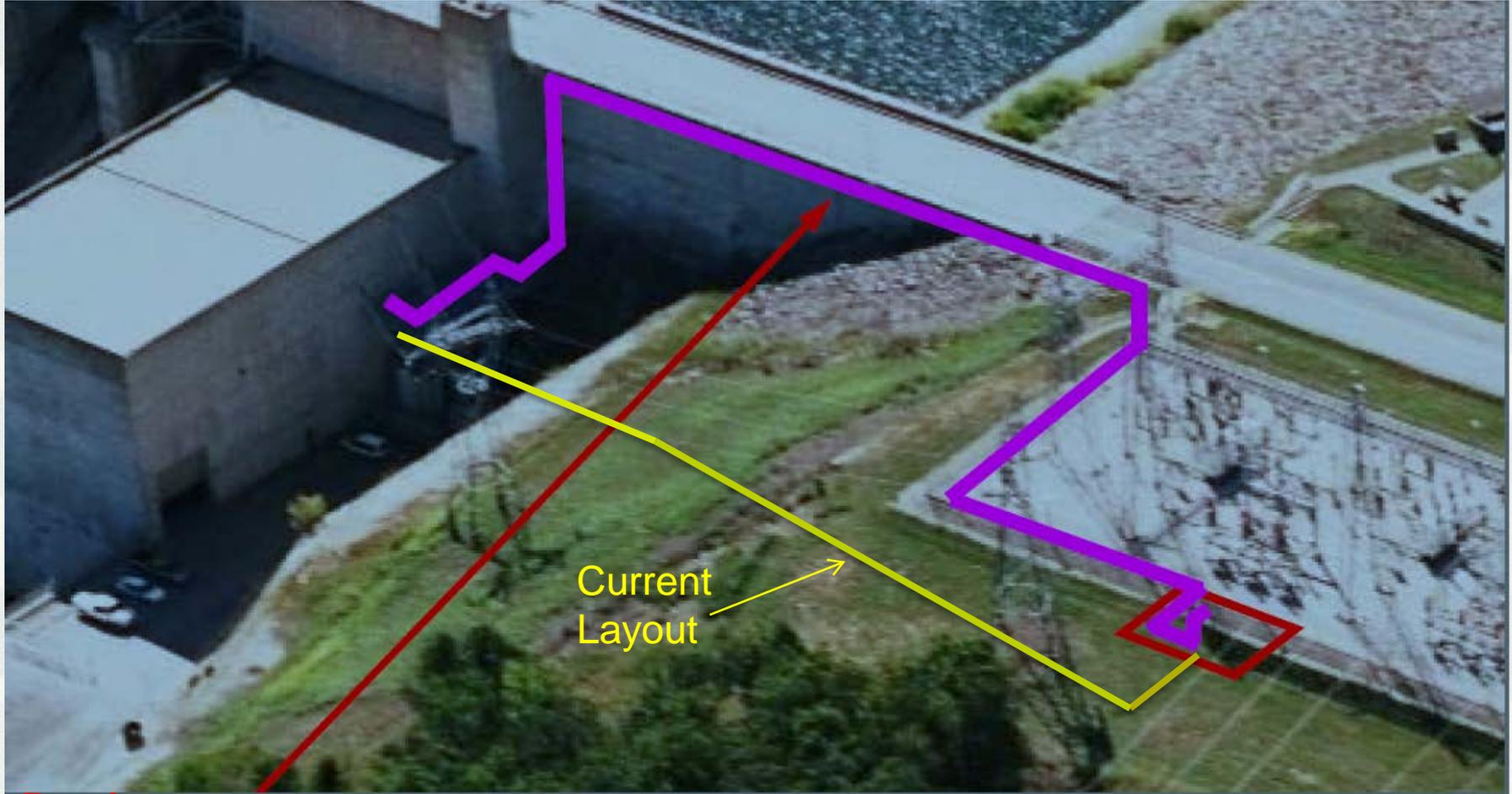
## Transformer

- Contract Cost: \$1,134,560
- Contractor: National Electric Systems
- Contract Completed Oct 2011



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# Transformer Location & Cable BUS Layout



**Previous  
Layout**

**Current  
Layout**

# Project Impacts/Issues

- Potential Impact: asbestos abatement and lead paint removal may impact schedule for Feb 2014 unit back in service.
- Change in the ARRA funding regulations in October 2010 rescinds any funds not expended by 30 Sep 2012.



# Upcoming Projects/Funding to Support the ARRA

- FY12
  - ▶ Emergency Generator - \$350K (already funded)
  - ▶ Transformer install \$880K
    - (includes Main Unit BUS & Cable)
  - ▶ Asbestos Abatement \$250K



# Upcoming Projects/Funding to Support the ARRA

- FY13
  - ▶ EDC, S&A and Contingency - \$1.5M
    - (need by 1 Oct 2012)



# Upcoming Projects/Funding to Support the ARRA

- FY14
  - ▶ EDC, S&A and Contingency - \$500K
  - ▶ 480V Distribution System - \$1.745M
    - Includes Main & Aux. Control Boards



**Questions?**

**Happy Hour**



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