

RECLAMATION

Managing Water in the West

GLEN CANYON REPLACEMENTS AND MAINTENANCE



U.S. Department of the Interior
Bureau of Reclamation

PLANNING

- **WORK PLAN:** Budgetary information on facility needs and looks out 5 years. 3 years out Budget Justifications are developed and funding is secured.
- Generally large projects have a year for planning and design before contract award and installation.
- Final planning requires coordination with water scheduling and power marketing (Western). Operations and Maintenance is scheduled to meet water flows and power contracts. Contract work has less flexibility due to costs/penalties and length of work.

CURRENT

Unit 6

- **Stator Repair**
- **Replace Generator Excitation System Replace**
- **Generator Excitation System – Unit 6**
- **Commission Testing**

Unit 7

- **Turbine Replacement**

Design

- **Generator & Transformer Relays**
- **Main Step Up Transformers**

2011 PLAN

Unit 1

- Turbine Replacement
- Rebuild Governor Oil Pumps
- Unit 8 – ISO Phase Bushing Repair
- Replace Generator Coolers

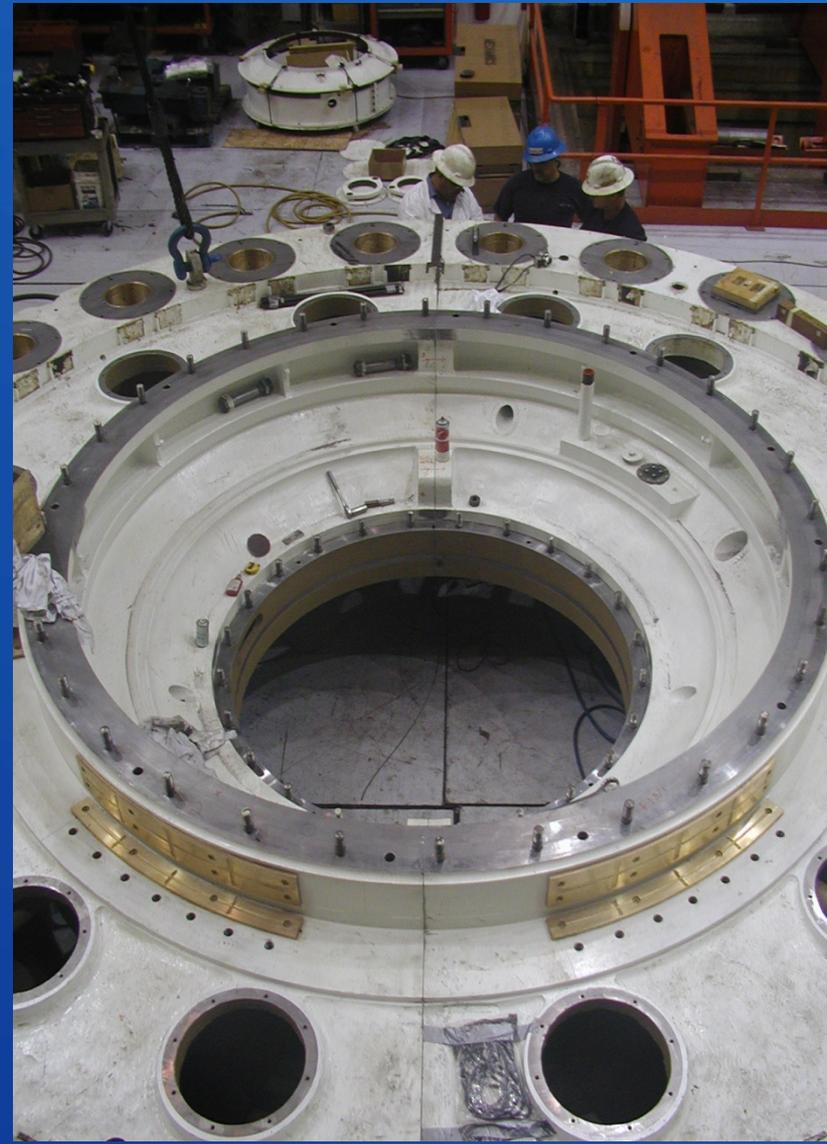
Design

- Replace Station Service Transformers
- Digital Governors

2012 PLAN

- **Rebuild Governor Oil Pumps**
- **Upgrade SCADA Equipment**
- **Replace Generator Coolers**
- **Generator & Transformer Relays**
- **Replace Station Service Transformers**
- **Digital Governors**
- **Replace Main Step Up Transformers (3 of 12)**
- **Unit 8 – ISO Phase Bushing Repair**

Turbine Replacement



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TURBINE REPLACEMENTS

EIGHT YEAR CONTRACT SCHEDULE

- 2010 UNIT 7
- 2011 UNIT 1
- 2012 UNIT 2
- 2013 UNIT 3
- 2014 UNIT 4

PENALTIES FOR DELAY
UNIT 5 WICKET GATE
PROBLEM



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Unit 6 Stator being prepared for half coil splices

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GENERATOR REWINDS

- **UNITS 1,3,5,6**
- **UNIT 6 WINDING FAILURE JULY 2008. PHASE TO GROUND FAULT. CURRENTLY BEING REASSEMBLED. REPAIR EXPECTED TO REDUCE GENERATOR CAPACITY BY 50%.**
- **REWIND CONTRACT EXPECTED TO BE AWARDED BY SEPT 2011.**
- **MANUFACTURE AND DELIVER WINDINGS ONSITE.**
- **WORK REWINDS INTO OUTAGE SCHEDULE BASED ON PRIORITY STARTING IN FALL OF 2012**

TRANSFORMER REPLACEMENT



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Annual Maintenance Program

- **FIXED WHEEL GATES:** Headgate for each unit. One taken out of service every year for maintenance and inspection,
- **TRANSFORMER MAINTENANCE:** Each of the four banks are maintained annually. Work on the associated units are also completed. Replacement work is added to the outages if equipment is ready to install.
- **UNIT ANNUAL MAINTENANCE:** Required maintenance of the units and associated equipment .
- **REPLACEMENTS:** Cooler installation, Governor Oil Pump rebuilds and Protective Relaying.

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Glen Canyon Outage Schedule WY 2010

Unit Number	Oct 2009	Nov 2009	Dec 2009	Jan 2010	Feb 2010	Mar 2010	Apr 2010	May 2010	Jun 2010	Jul 2010	Aug 2010	Sep 2010
1												
2												
3												
4												
5												
6												
7												
8												
Units Available	5	6	6.5	7	5	4	6	5.5	6	6.5	7	5
Capacity (1000-cfs)	19.3	23.4	23.4	27.3	19.7	15.3	23.2	19.7	19.7	25.9	25.9	19.3

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Glen Canyon Outage Schedule WY 2011

Unit Number	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	Jun 2011	Jul 2011	Aug 2011	Sep 2011
1	[Red bar spanning Oct 2010 to Jun 2011]											[Red bar]
2	[Red bar]											[Red bar]
3						[Red bar]						
4						[Red bar]						
5								[Red bar]				
6												
7	[Red bar]				[Red bar]							
8					[Red bar]							
Units Available	6	7	7	7	5	5	7	6	7	8	8	6
Capacity (1000-cfs)	22.3	26.2	26.2	26.2	18.3	18.3	26.2	22.3	26.2	30.2	30.2	22.2

CONCLUSION

- **Plant equipment is aging and programmed to be replaced.**
- **Have some flexibility in when work is scheduled.**
- **Maintenance work needs to be completed on an annual basis.**
- **Strategy is to combine work that is ready to install with other outages.**