

PRELIMINARY

FY 2012

**NON-ROUTINE
MAINTENANCE
LIST**

May 25, 2010

May 2010		Preliminary FY12 List of Hydropower Work Packages for Integrated System														
District	SWPA Region Priority	Project Name	Work Package Description	Totals		FY12		FY13		FY14		FY15		FY16		MW AT RISK
				Pkg Tot (\$1000)	Cum (\$1,000)	Ant. Expend.	Cum (\$1,000)	Ant. Expend.	Cum (\$1,000)	Ant. Expend.	Cum (\$1,000)	Ant. Expend.	Cum (\$1,000)	Ant. Expend.	Cum (\$1,000)	
SWL-01	1	Ozark	FY 2012 Rehabilitation Funding (FY 09 - FY 15 Work Plan)	115,000	115,000	2,300	2,300	7,000	7,000	7,000	7,000	7,000	7,000			100
SWF-01	2	Whitney	Turbine and Generator Rehabilitation (FY 09 - FY 13 Work Plan)	25,000	140,000	1,670	3,970	2,300	9,300		7,000		7,000			30
NWK-01	3	Truman	Inspection and Repair of Draft Tube Bulkheads, Cylinder Hoists, and Liner and Cavitation Damage (FY 05 & FY 06 Consolidated Project)	6,105	146,105	500	4,470		9,300		7,000		7,000			30
SWT-01	4	R.S. Kerr Lock And Dam	Repair Draft Tube Liners (FY 11 Proposed Project)	850	146,955	200	4,670		9,300		7,000		7,000			27
MVK-01	5	Blakely Mountain	Power Tunnel Rehabilitation and Butterfly Valve Rehabilitation (FY 11 Proposed Project)	3,000	149,955	1,500	6,170		9,300		7,000		7,000			75
SWL-02	6	Dardanelle	Intake and Draft Tube Crane Rehabilitation (FY 11 Proposed Project)	6,000	155,955	2,750	8,920	3,000	12,300		7,000		7,000			140
MVS-01	7	Clarence Cannon Dam	Cavitation Repair and Wicket Gate Packing Replacement on Unit 2 (FY 11 Proposed Project)	1,130	157,085	565	9,485		12,300		7,000		7,000			27
SWT-02	8	Webbers Falls	Transformer Oil Containment	450	157,535	450	9,935		12,300		7,000		7,000			20
NWK-02	9	Stockton	Transformer Installation	800	158,335	350	10,285	450	12,750		7,000		7,000			50
SWL-03	10	Ozark	Draft Tube and Intake Gate Structural Repair and Painting	5,500	163,835	2,500	12,785	3,000	15,750		7,000		7,000			20
NWK-03	11	Truman	Intake Gate HSS Inspection/Repair	3,000	166,835	1,000	13,785	1,000	16,750	1,000	8,000		7,000			30
SWT-03	12	R.S. Kerr Lock And Dam	Replace Powerhouse Roof	500	167,335	500	14,285		16,750		8,000		7,000			27
SWL-04	13	Dardanelle	Head Gate Roller Chain Replacement	600	167,935	600	14,885		16,750		8,000		7,000			35
SWL-05	14	Norfork	Rehabilitation of Draft Tube Crane	450	168,385	450	15,335		16,750		8,000		7,000			40
SWT-04	15	R.S. Kerr Lock And Dam	Replace 13.8 KV Breakers	450	168,835	450	15,785		16,750		8,000		7,000			27
NWK-04	16	Stockton	480V Distribution System Replacement	1,745	170,580	1,000	16,785	745	17,495		8,000		7,000			50
SWT-05	17	R.S. Kerr Lock And Dam	Replace CO2 system	300	170,880	300	17,085		17,495		8,000		7,000			55
SWT-06	18	Denison	Replace Motor Control Centers, Lighting Panels and Air Compressors	650	171,530	650	17,735		17,495		8,000		7,000			42
SWL-06	19	Greers Ferry	Fire Detection System Installation & CO2 System Upgrade	600	172,130	600	18,335		17,495		8,000		7,000			96
SWT-07	20	Denison	Rehabilitation of Powerhouse Crane	1,500	173,630	665	19,000	835	18,330		8,000		7,000			42
SWT-08	21	Denison	Turbine & Wicket Gate Rehabilitation; and Transformer, Switchgear and Bus Replacement (Includes Oil Containment for GSU Transformers)	24,150	197,780	2,000	21,000	5,150	23,480	8,500	16,500	8,500	15,500			16

Work/Funding Timeline: Rehabilitate Turbines 1 – 5 from May 2005 through May 2015 for \$115,000,000.

Estimated Losses in Revenue/Benefits/Risk Factor: Eventual failure of the generating units will result if rehabilitation is not completed.

Summary of Funding Argument(s):

- Rehabilitation will result in increased reliability.
- Timely repair with minimal interruption of service.
- Reduced likelihood of major failure.

Photographs: None.

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 30 MW
- 2) Environmental Risk: None
- 3) Cost Savings: Delays in funding of the remaining options will cause possible termination of the contract and increased costs for delays and re-procurement of the contract.
- 4) Other: Eventual failure of the units due to increased age and usage will be the result if the rehabilitation of the turbines and generators are not completed.

Work/Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
Award of base bid	May 07	3,300,000
Award of Option 1	Feb 08	4,300,000
Award of Option 2	Feb 09	4,300,000
Award of Option 3	Feb 10	4,600,000
Award of Option 4	Feb 11	3,600,000
Award of optional items	Feb 08 – Feb11	4,900,000

Estimated Losses in Revenue/Benefits/Risk Factor: Eventual failure of the generating units will result if rehabilitation is not completed.

Summary of Funding Argument(s):

- Units are past their designed life.
- Rehabilitation will result in increased reliability.
- Increased power production due to up-rating of the rehabbed units.
- Increase unit reliability and availability.

Information Data Sheet for Customer Funding

Hydropower Plant: Harry S. Truman **Run of River** X **Storage**
District: Kansas City
No. of Units: 6 **Capacity of Units (MW) (Overload)** 160 (180) MW
Estimated Average Annual (MWH) (SWPA Annual Report) 244,000 MWh

Current Status of Project: All six units are currently available.

Item Proposed for Customer Funding: Inspection and Repair of Draft Tube Bulkheads, Cylinder Hoists, and Liner and Cavitation Damage.

Reason for Item:

- | | |
|---------------------------|---------------------------------------|
| <u> X </u> Reliability | <u> X </u> Environmental |
| <u> </u> Efficiency | <u> </u> Forced Outage |
| <u> X </u> Safety | <u> X </u> Preventative Maintenance |
| <u> X </u> Cost Savings | <u> </u> Obsolete |
| <u> </u> NERC Compliance | |

History of Outages/Deficiency: The draft tube liners are fabricated of carbon steel and are subject to corrosion and cavitation damage. The water at the project is highly corrosive and is detrimental to the liner, turbines, and structural supports resulting in corrosion damage and measurable reductions in unit efficiency. Sand blasting and vinyl painting of the liners will stop or greatly reduce the corrosive effect of the lake water, increase efficiency, and significantly reduce annual outage times by minimizing the amount of future cavitation repair work. Unit 6 was painted in 1993, but some repairs will be required to the existing vinyl paint. In order to perform the liner corrosion and cavitation repair work, the draft tube bulkheads will need to be inspected and repaired (if required) in accordance with Corps of Engineers' (COE) criteria outlined in Engineering Regulation (ER) 1110-2-8157, Responsibility for Hydraulic Steel Structures (HSS). ER 1110-2-8157 requires all HSS (bulkheads, stoplogs, gates, etc.) to receive a full initial inspection and follow-up periodic inspections every 25 years. The purpose of these inspections is to ensure the bulkheads are structurally sound and safe to use before Government or contractor personnel enter a dewatered area to perform maintenance or repair work. To ensure compliance with the ER and provide safety for Government and contractor personnel, a qualified structural engineer must inspect the bulkheads, determine their safety, and document the inspections. Structural and/or weld defects found during the inspections must be repaired before the bulkheads can be certified for use. The hydraulic power units and cylinders will have to be dismantled so the bulkheads can be removed from their slots and placed on the draft tube deck for these inspections. The operating stems and eye ends of the hydraulically operated draft tube bulkhead hoists (total of 12 hydraulic cylinders) are corroding and need to be repaired.

Corrosion is occurring underneath the ceramic coating which protects the operating stems and provides a sealing surface for the cylinders' internal seals and the nickel plating on the eye ends has failed. Continued corrosion of the operating stems will cause the protective ceramic coating to flake off and the hydraulic cylinders will no longer be able to operate and retain hydraulic oil. There is a potential of losing 900 gallons (from one cylinder) of hydraulic oil into the tailrace (Lake of the Ozarks) downstream of the power plant. Cylinder drift and cycling has also become a problem due to leakage past the internal piston seals. The number of cycles per day depends on the individual cylinder and fluid temperature, but some of the cylinders are cycling over 300 times a day to keep the draft tube bulkheads from drifting into the water passageway. Repair of the cylinders and installation of an automatic latching (dogging) mechanism is needed to prevent the bulkheads from drifting into the water passageways.

Solution: The draft tube bulkhead cylinder work will include redesign of the ceramic protective coating system, repair/rebuilding of the hydraulic cylinders with the redesigned ceramic coating system, and design and installation of an automatic dogging mechanism to prevent cylinder drift. **The draft tube bulkheads will be removed from their slots and inspected and repaired in accordance with COE criteria in concurrence with the hydraulic cylinder repair contract to avoid a duplication of work effort.** The anodes on the bulkheads will also be replaced. Cavitation repair and painting of the draft tube liners and turbines will be performed after the draft tube bulkheads cylinders have been repaired and the draft tube bulkheads inspected/repared and certified for service.

Scope of Work: Perform engineering and design to develop a new protective coating system that protects the operating stems and an automatic latching dogging device that prevents cylinder drift. Prepare plans and specifications and advertise/award a contract to repair/rebuild the cylinders and install the dogging devices. COE (Kansas City District) will be responsible for the inspection and repair of the draft tube bulkheads. Work will include a visual inspection of all welds, documentation of inspection results, and repair of any weld and/or structural defects. Inspection and repair work will be performed by contract with COE oversight. Power Plant personnel will be responsible for purchasing and replacing the bulkheads' anodes. Also prepare plans and specifications for cavitation and corrosion repair work, sandblasting, and painting of draft tube liners, discharge rings, turbine runners, blades and wicket gates on all six units. Hired labor will be used to complete cavitation repair work and painting will be completed by contract.

Total Estimated Cost: \$6,105,000 over 7 years (FY 06 - \$1,390,000; FY07 - \$545,000; FY08 - \$1,005,000; FY09 - \$500,000; FY10 - \$1,165,000; FY11 - \$1,000,000; FY12 - \$500,000).

Costs/Impacts if Item is Not Funded:

1) Megawatts and Energy at Risk: Loss of 30 MW/unit of available generating capacity (180 MW total for six units).

- 2) Environmental: High risk of polluting (900 gal/cylinder) the Lake of the Ozarks.
- 3) Cost Savings: Avoid expensive repairs, environmental cleanup costs, and potential fines if repaired before a failure occurs. Major reduction in costs associated with future cavitation repair work.
- 4) Other: Unanticipated failure of bulkheads could lead to the loss of life and/or property damage. Reduces risk of extended unit outages.

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time Frame</u>	<u>Dollars</u>
E&D, Protective Coating & Repair Alternatives	Feb – Aug 07	40,000
P&S, Cyl. Repair/Replacement	May 07 – Sep 08	30,000
Contract Admin. (Cyl. Repair)	Oct 08 – Nov 08	10,000
Cylinder Repair Contract	Dec 08 – Jul 11	3,060,000
S&A (Cyl. Repair)	Dec 08 – Jul 11	160,000
Bulkhead Inspection/Repair Work	Dec 08 – Jul 11	300,000
Anode Replacement	Dec 08 – Jul 11	30,000
P&S, Draft Tube/Turbine Painting	Jan – Jul 11	12,000
Contract Admin. (Paint Contract)	Aug - Oct 11	8,000
Cav. Repair/Blast & Paint 6 Units	Jan 11 – Sep 13	<u>2,455,000</u>
Total =		<u>6,105,000</u>

Duration with/without Customer Funding: Item has been submitted through the Corps' normal budget cycle. Lack of available funding through COE channels appears to be getting worse. Customer funding would prevent failure of the bulkheads and/or hydraulic cylinders resulting in loss of life or property and extended unit outages. Funding of this item would also reduce the likelihood of a significant oil spill into the tailrace water downstream of the power plant resulting in environmental cleanup costs, potential violations and fines, and unit unavailability. Customer funding would also prevent extended outages for cavitation repair work, thereby increasing unit efficiency, availability and reliability. Without customer funding cavitation repair costs will continue to increase and unit efficiency will decrease.

Estimated Losses in Revenue/Benefits/Risk Factor: All units becoming unavailable as the bulkheads and/or hydraulic cylinders failed. Loss of available generation capacity for all six units is 180 MW (30 MW/unit). Loss of generation capability for an average year is 12.6 GWh. Estimated costs for recovering a failed cylinder is \$75,000/bulkhead cylinder. The costs for cleaning up an oil spill would also add to the overall costs of a failed cylinder. All units becoming in need of extensive cavitation repair work on the discharge rings, blades and liner. Annual cost savings for cavitation repair work is estimated at \$110,000. 30 MW of available generating capacity would be lost to perform cavitation repair on each unit.

$$30 \text{ MW/unit} \times 32 \text{ weeks} \times 5 \text{ days/week} \times 3 \text{ hours/day} \times \$62/\text{MWh} \approx \$893,000/\text{unit}$$

Summary of Funding Argument(s):

- Corps funding is not available.
- Prevent loss of control or failure of draft tube bulkhead cylinders.
- Possible loss of life and/or property if a bulkhead would fail.
- Loss of 30 MW/unit of available generating capacity (180 MW total for six units).
- Increased unit reliability and availability.
- Funding needed to reduce cavitation repair costs.
- Extended outage times required for extensive repair work.
- Increased spillway erosion due to the inability to generate.
- Dam Safety risk due to spillway erosion.
- High potential for environmental pollution.
- Extended unit outage times required for extensive repair work.

Photographs:



Funding Year 2011

Information Data Sheet for Customer Funding

Hydropower Plant: RS Kerr

Run of River X Storage

District: Tulsa

No. of Units: 4

Capacity of Units (MW) (Overload) 110 (126.5)

Estimated Average Annual Energy (MWh)

(SWPA Annual Report) 459,000

Current Status of Project: All units are currently available for service.

Item Proposed for Customer Funding: Repair the draft tube liner all four units.

Reason for Item:

 X Reliability

 Environmental

 Efficiency

 Forced Outage

 Safety

 X Preventative Maintenance

 Cost Savings

 Obsolete

 NERC Compliance

History of Outages/Deficiency: The anchorage which hold back the stainless steel plates of the draft tube liner are failing. The Government has been making spot repairs as the problems have been found. The turbine's blades have struck the stainless steel draft tube liners in several places. This condition has increased maintenance and inspection activities as well as resulted in forced outages. Additional significant damage to blade trunion bushings, loss of turbine blades, turbine shaft coupling bolts could cost millions and require a long term outages to effectuate replacements that include turbine blades, hubs, and shafts.

Solution: Repair and replace damage draft tube liner panels. Re-anchor panels into embedded steel structural stiffeners in concrete scroll case structure.

Scope of Work: Develop plans and specs for the repair/replacement of the stainless steel draft tube liner. Contract for the repair/replacement of the stainless steel draft tube liner.

Total Estimated Cost: \$850,000.

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 27.5 MW/unit
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: Potential significant damage to turbine.

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 10 – Jan 11	45,000
Procurement	Feb 11 – May 11	5,000
Contract	June 11 – May 13	800,000

Duration with/without Customer Funding: Customer funding would prevent possible extended outages, thereby increasing unit reliability. Without customer funding, maintenance costs will continue to increase and unit reliability will decrease.

Estimated Losses in Revenue/Benefits/Risk Factor: In case of a failure 27.5 MW of capacity could be lost. Estimated forced outage time would be about 3 weeks. Additionally, potential for significant damage to turbine exists from blade strikes that could possibly cost millions to repair.

$$27.5 \text{ MW} \times 3 \text{ weeks} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$205,000/\text{unit}$$

Summary of Funding Argument(s): The draft tube liner is coming in contact and scrapping the turbine blades resulting in forced outages and significant amount of increased maintenance. Additional significant damage to blade trunion bushings, loss of turbine blades, turbine shaft coupling bolts could cost millions and require a long term outage including replacement of the entire turbine blades, hub, shafts.

Photograph(s):



Picture of Turbine Blade Scrape with Liner
Notice White-Blue Area on Stainless Steel Liner due to Heat

Information Data Sheet for Customer Funding

Hydropower Plant: Blakely Mountain **Run of River** **Storage** X
District: Vicksburg
No. of Units: 2 **Capacity of Units (MW) (Overload)** 75 (86)
Estimated Average Annual Energy (MWh) (SWPA Annual Report) 169,000

Current Status of Project: Two generators operational with the capability to run at 43.0 megawatts each.

Item Proposed for Customer Funding: Repaint Power tunnel and repair Butterfly Valve.

Reason for Item:

<u> X </u> Reliability	<u> </u> Environmental
<u> </u> Efficiency	<u> X </u> Forced Outage
<u> </u> Safety	<u> X </u> Preventative Maintenance
<u> </u> Cost Savings	<u> </u> Obsolete
<u> </u> NERC Compliance	

History of Outages/Deficiency: The power plant is 54 years old and the power tunnel has never been repainted and the tar based material has deteriorated and is beginning to peel off. The Butterfly valves have been inspected through the HSS program and recommendations have been made for repairs needed so work can occur behind the valves.

Solution: Repaint the inside and outside of the power tunnel and make repairs to the Butterfly valves.

Scope of Work: Prepare plans and specifications and advertise/award a contract to repaint the inside and outside of the power tunnel and make repairs as need to the Butterfly valve housing and body.

Total Estimated Cost: \$3,000,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 75 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 11 – Mar 11	15,000
Procurement	Apr 11 – June 11	10,000
Contract	July 11 – Jan 12	2,975,000

Duration with/without Customer Funding: Unknown funding dates from O&M dollars.

Estimated Losses in Revenue/Benefits/Risk Factor: A plant outage is needed each time one of the units needs to be inspected. Estimated that each outage will be approximately three weeks:

$$75 \text{ MW} \times 3 \text{ week} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$419,000$$

Summary of Funding Argument(s):

- Corps funding is not available at this time
- Timely repair with minimal interruption of service
- Minimize the need to take a plant outage
- Repair Butterfly valve as recommended by Engineering under the HSS program

Photograph(s):





Information Data Sheet for Customer Funding

Hydropower Plant: Dardanelle **Run of River** X **Storage** _____
District: Little Rock
No. of Units: 4 **Capacity of Units (MW) (Overload):** 140 (148)
Estimated Average Annual Energy (MWh) (SWPA Annual Report): 613,000

Current Status of Project: The project has all units available for operation. The generators were originally placed in service in 1965 and 1966. Major Rehabilitation of the power plant was completed in August 2000.

Item Proposed for Customer Funding: Rehabilitate intake and draft tube cranes.

Reason for Item:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency Cranes are the original cranes and are 45 years old. The cranes are breaking down and need new wire rope, gears, and intake crane lifting beam (existing beam is bent). Additionally, asbestos and lead based paint abatement is needed. Crane controls are deteriorating and need replacement as well. Intake crane cab windows are glazed over which prevents proper viewing of operations. Little Rock received 2.5 million in O&M funding in FY10; however, this funding will not complete the rehabilitation of the cranes. The draft tube crane is getting minimal retrofit and a engineered lift is required when the crane is operated. Continued deterioration of the cranes will affect the ability to take the unit out of service.

Solution: Rehabilitate intake and draft tube cranes.

Scope of Work: Prepare the necessary equipment specifications, drawings and description of work and contract for the rehabilitation of these cranes.

Total Estimated Cost: \$6,000,000

Cost/Impacts if Item Not Funded:

- 1) Megawatts and Energy at Risk: 140 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 11 – Apr 11	250,000
Procurement	May 11 – Sep 11	25,000
Contract	Sep 11 – Feb 13	5,725,000

Duration with/without Customer Funding: O&M funds will not available for foreseeable future.

Estimated Losses in Revenue/Benefits/Risk Factor: Failure of the intake or draft tube cranes would shut down the entire plant. Assume loss of one month. Assume yearly usage rate at 57%.

$$140 \text{ MW} \times 4 \text{ weeks} \times 5 \text{ days/week} \times 10 \text{ hours/day} \times \$62/\text{MWh} \approx \$1,736,000$$

Summary of Funding Argument(s):

- Corps funding is not available at this time
- Increased reliability

Photograph(s):



Information Data Sheet for Customer Funding

Hydropower Plant: Clarence Cannon **Run of River** _____ **Storage** X
District: St. Louis
No. of Units: 2 **Capacity of Units (MW) (Overload)** 58 MW (70)
Estimated Average Annual (MWH) (SWPA Annual Report) 90,000 MWh

Current Status of Project: Two generators operational with the capability to run at 27 and 31 megawatts.

Item Proposed for Customer Funding: Cavitation repair and wicket gate packing replacement on Unit 2.

Reason for Item:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> Efficiency | <input checked="" type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: Cavitation damage was mapped and repairs were made by contract in October, 1992. The contractor repaired approximately 22,000 square inches of cavitation damage to the runner and discharge ring. In October, 2009, Hydro Consulting & Maintenance Service, Inc reviewed and evaluated the cavitation damage existing on the runner. Cavitation damage has occurred on each of the high pressure side of the blades. The deepest area of damage is about ¼” in depth and usually goes around the area of the stainless steel areas that have been repaired in the past. The cavitation diminishes as it approaches the leading edge of the blade. The wicket gate packing on Unit 2 is the original packing, approximately 25 years old and is in need of replacement to prevent the risk of an extended unit outage. Unit 1 packing was replaced in 1997.

Solution: Repair the cavitated areas around the previously repaired stainless steel areas and replace the wicket gate packing with new Teflon packing.

Scope of Work: Cavitation repair will consist of marking and measuring the areas before removal. Air arc the areas to sound metal and ground to clear any remaining impurities that could be detrimental to welding. Fill weld the excavated areas with proper filler metal material. Upon completion of welding, the weldment shall be ground essentially flush with the surrounding material. Wicket gate packing will consist of removal of all the gate arms and remove the old packing. Clean and dispose of old grease and inspect the top gate bushing. Install new packing as specified.

Total Estimated Cost: \$1,130,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 27 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 10 – Dec 10	5,000
Procurement	Jan 11 – Mar 11	5,000
Contract	Apr 11 – Mar 12	1,120,000

Duration with/without Customer Funding: Funding is not available through the U.S. Army Corps of Engineers. The large number of unfunded maintenance work items grows each year. Only “high priority” items receive funding through budget and ranking process. Funding through normal appropriations is not expected in the next three years.

Estimated Losses in Revenue/Benefits/Risk Factor: Risk factor is aging equipment and necessary preventative maintenance to ensure reliability and forced outage protection.

$$27 \text{ MW} \times 12 \text{ weeks} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$603,000$$

Summary of Funding Argument(s):

- Increase unit reliability and availability
- Significant savings on costs vs. buying new equipment
- Decrease the number of unplanned prolonged facility outages
- Timely replacement of critical generating component

Photograph(s):



Information Data Sheet for Customer Funding

Hydropower Plant: Webbers Falls **Run of River** X **Storage** _____
District: Tulsa
No. of Units: 3 **Capacity of Units (MW) (Overload)** 60 (69)
Estimated Average Annual Energy (MWH) (SWPA Annual Report) 213,000

Current Status of Project: Two generators operational with the capability to run at 46 megawatts. One unit undergoing turbine replacement.

Item Proposed for Customer Funding: Transformer Oil Containment.

Reason for Item:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Reliability | <input checked="" type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input checked="" type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: The transformer is 37 years old and new SPCC regulations require oil containment. If a transformer fails and oil is released into the tailrace, the environmental cleanup would impact the plant availability until cleanup has been completed. This project was identified to be funded in FY 2012 by the Transformer Oil Containment Work Group (TOCWG).

Solution: Construct oil containment.

Scope of Work: Produce plans and specifications for oil containment and construct transformer oil containment system.

Total Estimated Cost: \$450,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 20 MW
- 2) Environmental Risk: Potential of an oil release.
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 12 – Apr 12	40,000
Procurement	May 12 – Aug 12	5,000
Contract	Sep 12 – May 13	405,000

Duration with/without Customer Funding: Customer funding would prevent possible extended outages, thereby increasing unit reliability, efficiency and output.

Estimated Losses in Revenue/Benefits/Risk Factor: In case of a failure that cannot be controlled 20 MW of capacity could be lost. Estimated forced outage time would be about 30 weeks.

$$20 \text{ MW} \times 30 \text{ weeks} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$1,488,000$$

Summary of Funding Argument(s):

- Reduced likelihood of an extended outage due to environmental remediation caused by a transformer failure.
- The TOCWG has reported that this project should be customer funded in FY 2012.

Photograph(s): None.

furnishing and installing the outdoor 15 kV cable bus and relaying and alarm cables/conduits.

Total Estimated Costs: \$800,000

Cost/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: Loss of 50 MW of available generating capacity.
- 2) Environmental: High risk for the introduction of oil into the tailrace (Sac River).
- 3) Cost Savings: Prevent environmental cleanup costs and potential fines.
- 4) Other: Prevents the risk of an extended unit outage.

Work/Funding Timeline:

<u>Activity Item</u>	<u>Time Frame</u>	<u>Dollars</u>
P&S	Oct – Dec 11	30,000
Contract Admin.	Jan – Mar 12	15,000
Transformer Installation Contract	Apr – Sep 12	710,000
S&A (approx. 6.5%)	Apr – Sep 12	45,000

Duration with/without Customer Funding: Without customer funding the new transformer would remain in storage indefinitely and the risk of an oil spill into tailrace would still be present from the existing the main power transformer. Customer funding would allow us to place the new transformer into service and eliminate the risk of costly environmental cleanups, potential EPA and State violations and fines, and extended unit outages.

Estimated Losses in Revenue/Benefits/Risk Factor: Generating unit becoming unavailable due to an oil spill from the main power transformer. 50 MW of available generating capacity would be lost until oil cleanup operations were completed and necessary repairs were made to the transformer. The estimated loss in revenue figure below assumes a catastrophic failure of the transformer and extensive environmental cleanup work.

$$50 \text{ MW} \times 20 \text{ weeks} \times 5 \text{ days/week} \times 3 \text{ hours/day} \times \$62/\text{MWh} = \$930,000$$

Summary of Funding Argument(s):

- Corps funding is not available.
- Increased unit reliability and availability.
- Decreases the risk of oil entering the tailrace preventing costly environmental cleanup costs and fines.
- Loss of 50 MW of available generating capacity.

Photographs:

Information Data Sheet for Customer Funding

Hydropower Plant: Ozark Run of River X Storage
District: Little Rock
No. of Units: 5 Capacity of Units (MW) (Overload): 100 (115)
Estimated Average Annual Energy (MWh) (SWPA Annual Report): 429,000

Current Status of Project: Unit #2 and Unit #4 cracked at shaft and flange connection. Unit #4 is currently being rehabilitated under the major rehabilitation project.

Item Proposed for Customer Funding: Rehabilitation Intake and Draft Tube Gates.

Reason for Item:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: The intake and draft tube gates are the original equipment and will not be rehabilitated as part of the Ozark Major Rehabilitation. Recent HSS inspections indicate the need for immediate refurbishment to include repair of structural members, selected roller chain replacement, side seals, new flapper valve/piping, and painting to prevent further damage. Failure of a roller chain could result in an extended outage at the plant. Existing Paint is Vinyl. Ozark Major Rehabilitation Contract is currently underway, and failure of an inspection of a draft tube of intake gate by structural engineers could result in impacts to the turbine replacement contract.

Solution: Replace intake chains for one gate (the other four have already been replaced), paint old gates, and repair damaged structural members. Install new side seals.

Scope of Work: Prepare the necessary specifications, drawings and description of work and contract for the rehabilitation of the draft tube and intake gates.

Total Estimated Cost: \$5,500,000

Cost/Impacts if Item Not Funded:

- 1) Megawatts and Energy at Risk: 20
- 2) Environmental Risk: N/A
- 3) Cost Savings: The continual maintenance and upkeep of an obsolete system.
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 12 – Apr 12	50,000
Procurement	Apr 12 – Sep 12	15,000
Contract	Sep 12 – Feb 13	5,435,000

Duration with/without Customer Funding: O&M funds not available for foreseeable future.

Estimated Losses in Revenue/Benefits/Risk Factor: Failure of a gate might result in flooding of entire power plant. Time to repair unknown and cost could be hundreds of millions. Assume loss of one unit for one year.

$$20 \text{ MW} \times 52 \text{ weeks} \times 5 \text{ days/week} \times 10 \text{ hours/day} \times \$62/\text{MWh} \approx \$3,224,000$$

Summary of Funding Argument(s):

- Corps funding is not available at this time
- Increased reliability
- Increased safety

Photograph(s):



Information Data Sheet for Customer Funding

Hydropower Plant: Harry S. Truman **Run of River** X **Storage** ____
District: Kansas City
No. of Units: 6 **Capacity of Units (MW) (Overload)** 160 (180) MW
Estimated Average Annual (MWH) (SWPA Annual Report) 244,000 MWh

Current Status of Project: All six units are currently available.

Item Proposed for Customer Funding: Intake Gate Inspection/Repair.

Reason for Item:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: Truman Power Plant has twelve intake gates that have been in service for over 28 years. The Corps of Engineers' (COE) Engineering Regulation (ER) 1110-2-8157, Responsibility for Hydraulic Steel Structures (HSS) requires all HSS (bulkheads, stoplogs, gates, etc.) to receive a full initial inspection and follow-up periodic inspections every 25 years. The purpose of these inspections is to ensure the gates and bulkheads are structurally sound and safe to use before Government or Contractor personnel enter a dewatered area to perform maintenance or repair work. The inspections must be performed by a qualified engineer or certified weld inspector. Structural and/or weld defects found during the inspections must be repaired before the HSS' are certified for use. Follow-up inspections are required all twelve intake gates.

Solution: Inspect and repair the intake gates in accordance with COE criteria outlined in ER 110-2-8157.

Scope of Work: Prepare plans and specifications and advertise/award a contract to inspect and repair the intake gates. Contract work will include the visual inspection of all welds, documentation of the inspection results, repair of identified weld defects, replacement of gate seals, and spot painting of the repaired areas.

Total Estimated Cost: \$3,000,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: Loss of 30 MW/unit of available generating capacity.
- 2) Environmental: N/A
- 3) Cost Savings: N/A
- 4) Other: Routine maintenance and inspections of the intake, draft tube, and turbine runner cannot be made until the gates have been inspected and certified for use. Unanticipated failure of gates could lead to the loss of life and/or property damage. Prevents extended unit outages.

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
P&S	Oct – Dec 11	30,000
Contract Admin.	Jan – Mar 12	20,000
Gate Inspection/Repair Contract	Apr 12 – Apr 14	2,830,000
S&A (approx. 6.5%)	Apr 12 – Apr 14	120,000

Duration with/without Customer Funding: Item has been submitted through the Corps' normal budget cycle. Lack of available funding through the COE budget process appears to be getting worse. Customer funding would prevent failure of the gates, turbine runner, etc. resulting in loss of life or property, extended unit outages, and loss of available generating capacity (30 MW/unit).

Estimated Losses in Revenue/Benefits/Risk Factor: All units becoming unavailable as the gates failed. 30 MW/unit of available generating capacity would be lost until necessary repairs were made to the gates.

$$30 \text{ MW/unit} \times 24 \text{ weeks} \times 5 \text{ days/week} \times 3 \text{ hours/day} \times \$62/\text{MWh} \approx \$670,000$$

Summary of Funding Argument(s):

- Corps funding is not available.
- Possible loss of life and/or property if a gate, draft tube liner, turbine runner would fail.
- Increased unit reliability and availability.
- Extended unit outage times required for extensive repair work.
- Loss of 30 MW/unit of available generating capacity.
- Unable to dewater unit to perform routine inspection and maintenance work.

Information Data Sheet for Customer Funding

Hydropower Plant: RS Kerr Run of River X Storage
 District: Tulsa
 No. of Units: 4 Capacity of Units (MW) (Overload) 110 (126.5)
 Estimated Average Annual Energy (MWh) (SWPA Annual Report) 459,000

Current Status of Project: All units are currently available for service.

Item Proposed for Customer Funding: Replace Powerhouse Roof.

Reason for Item:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: The powerhouse roof was installed in the 1980's and has been leaking over the past few years. Plastic has been placed over the generators housings to keep the water out of the generators until temporary repairs can be made. This occurs every year.

Solution: Replace the powerhouse roof.

Scope of Work: Develop plans and specifications to replace the powerhouse roof.

Total Estimated Cost: \$500,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 27.5 MW/unit
- 2) Environmental Risk: N/A
- 3) Cost Savings: \$1,000/year of O&M Cost
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 11 – Dec 11	10,000
Procurement	Jan 12 – Apr 12	5,000
Contract	May 12 – Jul 12	485,000

Duration with/without Customer Funding: Without customer funding, the roof will continue to leak and repairs will have to be made to seal the leaks. Plastic covering will still need to be placed over the generators to keep the water out of the units.

Estimated Losses in Revenue/Benefits/Risk Factor: \$1,000/yr average savings in O&M costs.

$27.5 \text{ MW} \times 1 \text{ week} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$68,000/\text{unit}$

Summary of Funding Argument(s):

- o Water is leaking through the roof onto the generating units.

PHOTOGRAPHS



Rain Leaking on Electrical Grounding Cubical



Rain Leaking on Generator Housing



Rain Leakage on Floor



Rain Leaking on Generator Housing

Information Data Sheet for Customer Funding

Hydropower Plant: Dardanelle **Run of River** X **Storage** _____
District: Little Rock
No. of Units: 4 **Capacity of Units (MW) (Overload):** 140 (148)
Estimated Average Annual Energy (MWh) (SWPA Annual Report): 613,000

Current Status of Project: All units in service.

Item Proposed for Customer Funding: Head gate roller chain replacement.

Reason for Item:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: The existing head gate roller chains are original equipment and are deteriorating. The roller chains have begun to have significant corrosion and cracks in the linkages and fittings and need to be replaced prior to failure that could result in a long term outage. The head gate roller chains are necessary for the operation of the head gates, and the head gates are required to stop a unit during emergency operations and to perform scheduled maintenance of the turbine when de-watered. The head gate roller chains are essential to the continued operation of these units.

Solution: Purchase and install new head gate roller chains.

Scope of Work: Procurement and installation of new head gate roller chains.

Total Estimated Cost: \$600,000

Cost/Impacts if Item Not Funded:

- 1) Megawatts and Energy at Risk: 35 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan12 – May 12	10,000
Procurement	June 12 – Jul 12	10,000
Contract	Aug 12 – Mar 13	580,000

Duration with/without Customer Funding: O&M funds not available for foreseeable future.

Estimated Losses in Revenue/Benefits/Risk Factor: Failure of the head gate roller chains will result in the inability to perform emergency shut down of the unit and the inability to carry out annual maintenance on the turbines. Assume one head gate roller chain failure at one plant results in the loss of generation of one unit for one year.

35 MW x 52 weeks x 5 days/week x 10 hours/day x \$62/MWh \approx \$5,642,000 annually

Summary of Funding Argument(s):

- Corps funding is not available at this time
- Increased reliability

Photograph(s): None

Funding Year 2012

Information Data Sheet for Customer Funding

Hydropower Plant: Norfolk **Run of River** _____ **Storage** X
District: Little Rock
No. of Units: 2 **Capacity of Units (MW) (Overload):** 80 (92)
Estimated Average Annual Energy (MWh) (SWPA Annual Report): 184,000

Current Status of Project: The project has all units available for operation. The generators were placed in service in 1944 and 1950.

Item Proposed for Customer Funding: Rehabilitate draft tube crane.

Reason for Item:

<input checked="" type="checkbox"/> Reliability	<input type="checkbox"/> Environmental
<input type="checkbox"/> Efficiency	<input type="checkbox"/> Forced Outage
<input type="checkbox"/> Safety	<input checked="" type="checkbox"/> Preventative Maintenance
<input type="checkbox"/> Cost Savings	<input type="checkbox"/> Obsolete
<input type="checkbox"/> NERC Compliance	

History of Outages/Deficiency: The draft tube cranes are the original equipment. Inspections indicate the need for refurbishment to draft tube cranes. The cranes were inundated in the 2008 flood which resulted in significant damage to electrical and control systems. Additionally, the structure needs painting and mechanical systems need repair. Failure of draft tube crane will result in the inability to remove the unit for scheduled and forced outages.

Solution: Issue contract for refurbishment of draft tube crane

Total Estimated Cost: \$450,000

Cost/Impacts if Item Not Funded:

- 1) Megawatts and Energy at Risk: 40
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 12 – Apr 12	40,000
Procurement	Apr 12 – June 12	15,000
Contract	Aug 12 – Aug 13	395,000

Duration with/without Customer Funding: O&M funds not available for foreseeable future.

Estimated Losses in Revenue/Benefits/Risk Factor: Failure of a crane could result in extended outage of a unit for repairs. Assume 14 day extended outage due to failure of draft tube crane.

$$40 \text{ MW} \times 2 \text{ weeks} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$198,000$$

Summary of Funding Argument(s):

- Corps funding is not available at this time
- Increased reliability
- Increased safety

Photograph(s):





Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 27 MW, 4320 MWh (per unit)
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 11 – Jan 12	15,000
Procurement	Feb 12 – May 12	5,000
Contract	Jun 12 – May 13	420,000
Update fault study	Sep 12 – Dec 13	10,000

Duration with/without Customer Funding: Without customer funding, the breakers will remain in service, but with increased inspection and maintenance until funding is available. Federal funds are not anticipated for the next 3 years.

Estimated Losses in Revenue/Benefits/Risk Factor: Possible loss in availability of 27 MW for one month.

$$27 \text{ MW} \times 4 \text{ weeks} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$268,000$$

Summary of Funding Argument(s):

- o Major damage to the generating units is possible if breakers fail to operate timely in response to sudden failure.
- o An extended outage of one month is possible to repair or replace damage equipment.
- o Reduced circuit breaker maintenance required for new vacuum bottle circuit breakers. Existing breakers continue to be problematic because of atmospheric moisture contamination of the arc chutes.
- o Existing station service breakers are marginally rated for the existing duty.

Photograph(s):



Breaker Element

Information Data Sheet for Customer Funding

Hydropower Plant: Stockton Run of River _____ Storage X
District: Kansas City
No. of Units: 1 Capacity of Units (MW) (Overload) 45 (50) MW
Estimated Average Annual (MWH) (SWPA Annual Report) 47,000 MWh

Current Status of Project: Unit is currently unavailable.

Item Proposed for Customer Funding: Replace 480-Volt Distribution System

Reason for Item:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input checked="" type="checkbox"/> Preventative Maintenance |
| <input checked="" type="checkbox"/> Cost Savings | <input checked="" type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: The power plant's 480-Volt distribution system is over 37 years old making it difficult to find replacement parts and resulting in additional maintenance costs. Added loading has resulted in dry-type transformer insulation discolorization, 480-Volt circuit breaker trip mechanism adjustment out of limits resulting in loss of tripping coordination, and lighting panel circuit breaker trip mechanisms are losing the ability to maintain adequate trip characteristics thereby producing nuisance tripping. Power plant personnel have difficulty resetting breakers when tripping occurs due to excessive wear of the switchgear's mechanical components. Resetting these breakers can take as long as 2 to 4 hours and delay the return of service of the generating unit. Direct drop-in panel circuit breaker replacements are no longer available and replacement parts are costly due to special manufacturing requirements.

Solution: Procure and install new 480-Volt distribution equipment

Scope of work: Prepare plans and specifications and advertise/award a contract for the procurement and installation 480-Volt distribution equipment (480-Volt distribution boards, breakers, starters, controls, feeder conductors, conduits, etc.)

Total Estimated Costs: \$1,745,000

Cost/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: Loss of 50 MW of available generating capacity.
- 2) Environmental: N/A.
- 3) Cost Savings: Reduced maintenance and repair costs.
- 4) Other: Prevents the risk of an extended unit outage. Unable to black start the unit or keep critical power plant systems operation during a black out.

Work/Funding Timeline:

<u>Activity Item</u>	<u>Time Frame</u>	<u>Dollars</u>
P&S	Oct – Dec 11	30,000
Contract Admin.	Jan – Mar 12	27,000
Installation Contract	Apr – Jul 12	1,585,000
S&A (approx. 6.5%)	Apr – Jul 12	103,000

Duration with/without Customer Funding: Item has been submitted through the Corps of Engineers' (COE) normal budget cycle and has not been funded due to budget constraints. Lack of available funding through COE budget process appears to be getting worse. Customer funding will permit timely procurement and installation of equipment and prevent costly repair/maintenance work and unit unavailability if these systems would fail.

Estimated Losses in Revenue/Benefits/Risk Factor: Generating unit becoming unavailable due to failure of the 480-Volt station voltage distribution system. 50 MW of available generating capacity would be lost until necessary repairs were made to these systems.

$$50 \text{ MW} \times 24 \text{ weeks} \times 5 \text{ days/week} \times 3 \text{ hours/day} \times \$62/\text{MWh} \approx \$1,116,000$$

Summary of Funding Argument(s):

- Corps funding is not available.
- Increased unit reliability and availability.
- Loss of 50 MW of available generating capacity.
- Unscheduled outage time required for equipment repair/maintenance.

Photograph(s): None.

Information Data Sheet for Customer Funding

Hydropower Plant: RS Kerr

Run of River X **Storage**

District: Tulsa

No. of Units: 4

Capacity of Units (MW) (Overload) 110 (126.5)

Estimated Average Annual Energy (MWh)

(SWPA Annual Report) 459,000

Current Status of Project: All units are currently available for service.

Item Proposed for Customer Funding: Upgrade obsolete CO2 system.

Reason for Item:

 X Reliability

 Environmental

 Efficiency

 Forced Outage

 Safety

 X Preventative Maintenance

 Cost Savings

 X Obsolete

 NERC Compliance

History of Outages/Deficiency: The CO2 systems are used for fire suppression in main generator, oil storage room and oil purification room. The CO2 system is the original system installed in 1971 and is obsolete. Parts are becoming more difficult to obtain. Recent failure of routing valve allowed discharge of some of the CO2 into the incorrect unit. If an actual fire occurred, the CO2 may not have extinguished the fire.

Solution: Upgrade existing CO2 system.

Scope of Work: Prepare the necessary specifications, drawings, and contract for the required materials to upgrade the existing CO2 system.

Total Estimated Cost: \$300,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 55 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
P&S	Jan 12 – May 12	10,000
Procurement	Jun 12 – Sept 12	5,000
Equipment delivery	Sept 12 – Feb 12	270,000
Installation	Feb 12 – Feb 13	15,000

Duration with/without Customer Funding: Without customer funding, two units may be placed into forced outage (two shared systems for the four generators), due to a failure of the CO2 system would result in 55 MW lost.

Estimated Losses in Revenue/Benefits/Risk Factor:

55 MW x 4 weeks x 5 days/week x 8 hours/day x \$62/MWh \approx \$546,000

Summary of Funding Argument(s):

- o Due to the age of existing system and lack of replacement parts, reliability of existing system will only decrease and the unavailability and reduced generating capacity of the hydropower generation units will increase if customer funding is not provided and the items are not replaced.

Photograph(s):



Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 42 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 11 – Feb 12	50,000
Procurement	Mar 12 – Jun 12	5,000
Contract	Jul 12 – Apr 13	400,000
Installation	May 13 – Dec 13	195,000

Duration with/without Customer Funding: Without Customer funding, the MCCs will not be replaced and hazards that exist from underrated equipment will remain at the Denison Powerhouse. Without Customer funding the air compressors will not be replaced.

Estimated Losses in Revenue/Benefits/Risk Factor: Possible loss in availability of dewatering hydropower units for routine maintenance. Possibility of flooding powerhouse.

$$42 \text{ MW} \times 2 \text{ weeks} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$156,000$$

Summary of Funding Argument(s):

- The existing MCCs are underrated and pose a hazard to powerhouse equipment.
- The existing MCCs are obsolete and cannot be properly maintained due to unavailability of spare parts.
- The existing air compressors are original equipment and require more maintenance than the modern design screw type.

Photograph(s):



Denison Wall Mounted MCC

Maintenance Data Sheet for Customer Funding

Hydropower Plant: Greers Ferry **Run of River** _____ **Storage** X
District: Little Rock
No. of Units: 2 **Capacity of Units (MW) (Overload):** 96 (110)
Estimated Average Annual Energy (MWh) (SWPA Annual Report): 189,000

Current Status of Project: Both units currently available for service.

Item Proposed for Customer Funding: Install C02 and Fire Detection system at Greers Ferry power plant.

Reason for Item:

- | | |
|---|---|
| <input checked="" type="checkbox"/> Reliability | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Forced Outage |
| <input type="checkbox"/> Safety | <input type="checkbox"/> Preventative Maintenance |
| <input type="checkbox"/> Cost Savings | <input checked="" type="checkbox"/> Obsolete |
| <input type="checkbox"/> NERC Compliance | |

History of Outages/Deficiency: Upgrade system to meet NFPA 12 requirements and COE safety standard for emergency notification and upgrade replace routing valves, firing heads, and cylinders. This equipment is the original equipment and is nearly 50 years old. This plant does not currently have a fire detection system. An event where a fire is allowed to propagate could result in significant damage to the plant.

Solution: Install new C02 cylinders, firing heads, routing valves, sensors, and replace controls as needed. Install new alert system for powerhouse personnel per NFPA 12.

Scope of Work: Prepare the necessary equipment specifications, drawings and description of work and contract for the purchase and installation of C02 and Fire Detection system.

Total Estimated Cost: \$600,000

Cost/Impacts if Item Not Funded:

- 1) Megawatts and Energy at Risk: 96 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 11 – May 12	50,000
Procurement	June 12 – Aug 12	15,000
Contract	Sep 12 – Sep 13	535,000

Duration with/without Customer Funding: O&M funds not available for foreseeable future.

Estimated Losses in Revenue/Benefits/Risk Factor: Greens Ferry is only occupied for 40 hours per week. If a fire were to break out it could propagate without detection until it caused problems to other systems which would alert the remote operator. Depending on the event, damages could be in the millions of dollars. The plant should have had fire detection systems installed years ago. In the case of a minor failure occurred that cannot be fixed, 96 MW of capacity would be lost. Estimated forced outage time would be 2 weeks.

$$96 \text{ MW} \times 2 \text{ week} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$357,000$$

Summary of Funding Argument(s):

- Corps funding is not available at this time
- Increased reliability
- Reduced likelihood of major failure

Photograph(s):



Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 42 MW
- 2) Environmental Risk: N/A
- 3) Cost Savings: N/A
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Oct 11 – Feb 12	50,000
Procurement	Mar 12 – Jun 12	5,000
Contract	Jul 12 – Apr 13	1,445,000

Duration with/without Customer Funding: If customer funding is not available, the rehab will be delayed until funds are available. Federal funds are not expected in the next 3 years.

Estimated Losses in Revenue/Benefits/Risk Factor: The crane will continue to be used; however failure of the bridge crane could result in additional outage time.

$$42 \text{ MW} \times 8 \text{ weeks} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$625,000$$

Summary of Funding Argument(s):

- o Imprecise controls on the bridge crane makes lifting loads much more difficult and could result in damaged equipment.
- o Failure bridge crane may result in additional outage time for making unit repairs.
- o The possible future replacement of the turbines and wicket gates will require extensive use of the powerhouse bridge crane and its reliability is in question.

Photograph(s): None.

to protect the powerhouse structure. Currently, the generators are limited to 42 MW per unit (even though the existing turbines with the new generators can produce up to 44 MW each) due to underrated switchgear.

Solution: Replace turbine, wicket gates, main power transformers, and switchgear.

Scope of Work: Prepare plans and specifications to replace the turbine runner, wicket gates and repaint the scroll case. Prepare the necessary equipment specifications, drawings and description of work, and contract to replace the transformers and switchgear. The transformers will be relocated from the tailrace deck to the parking lot to eliminate the need for the deluge fire suppression system, and oil containment will be installed with the transformer relocation.

Total Estimated Cost: \$24,150,000

Costs/Impacts if Item is Not Funded:

- 1) Megawatts and Energy at Risk: 42 MW
- 2) Environmental Risk: Potential of an oil release.
- 3) Cost Savings: \$650,000 annually
- 4) Other: N/A

Work / Funding Timeline:

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 12 – Sep 12	150,000
Procurement	Oct 12 – Jan 13	55,000
Contract	Feb 13 – Dec 14	23,945,000

Duration with/without Customer Funding: Without customer funding, the turbine runner and wicket gates will continue to deteriorate. The wicket gates will deteriorate to point where the unit will not be able to be safely shutdown requiring the wicket gates to be rebuilt. This rebuild will require the weld buildup and grinding to correct profile. This will require each unit to be out of service for a minimum 3 months while these repairs are being made at an estimated cost of \$300,000. This repair will provide negligible efficiency improvements over replacement of the entire turbine and will be a continuing repair that will have to occur periodically. Federal funds are not expected in the next 3 years.

Estimated Losses in Revenue/Benefits/Risk Factor: The estimated water lost through the wicket gates when they are closed is approximately 100 cfs. The preliminary estimated lost benefits associated with the leakage through the wicket gates are approximately \$650,000 annually. A replacement of the turbines, wicket gates and main power transformers would allow the project to be reliably operated at approximately 100 MW, an uprate of 16 MW. The new turbine is estimated to have an efficiency improvement of at least five percent.

In case of a failure of a transformer that cannot be controlled, 42 MW of capacity could be lost. Estimated forced outage time would be about 3 weeks.

$$42 \text{ MW} \times 3 \text{ weeks} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$134,000$$

Summary of Funding Argument(s):

- o Replacement of the turbine will provide more efficient use of the water and increase capacity of powerhouse.
- o If the turbine and wicket gates are not replaced, the existing wicket gates will have to be repaired resulting in significant down time and cost for no efficiency gains or capacity increase.
- o Failure of two or more of the main power transformers would involve a unit outage of an estimated nine months. The transformers have been in service 65 years and have significantly exceeded their service life.
- o Installation of oil containment is impracticable while the transformers are located on the tailrace deck.

Photograph(s):



Denison Main Power Transformers

May 2010

Preliminary FY 12 Work Packages													
District	SWPA Region Priority	PROJECT NAME	Work Package Description	RELIABILITY	EFFICIENCY	SAFETY	COST SAVINGS	ENVIRONMENTAL	FORCED OUTAGE	PREVENTATIVE MAINTENANCE	OBSOLETE	NERC COMPLIANCE	MW AT RISK
SWL-01	1	Ozark	FY 2008 Rehabilitation Funding (FY 09 - FY 12 Work Plan)	X	X					X	X		100
SWF-01	2	Whitney	Turbine and Generator Rehabilitation (FY 09 - FY 12 Work Plan)	X	X					X	X		30
NWK-01	3	Truman	Inspection and Repair of Draft Tube Bulkheads, Cylinder Hoists, and Liner and Cavitation Damage (FY 05 & FY 06 Consolidated Project)	X		X	X	X		X			30
SWT-01	4	R.S. Kerr Lock And Dam	Repair Draft Tube Liners (FY 11 Proposed Project)	X						X			27
MVK-01	5	Blakely Mountain	Power Tunnel Rehabilitation and Butterfly Valve Rehabilitation (FY 11 Proposed Project)	X					X	X			75
SWL-02	6	Dardanelle	Intake and Draft Tube Crane Rehabilitation (FY 11 Proposed Project)	X						X			140
MVS-01	7	Clarence Cannon Dam	Cavitation Repair and Wicket Gate Packing Replacement on Unit 2 (FY 11 Proposed Project)	X	X				X	X			27
SWT-02	8	Webbers Falls	Transformer Oil Containment	X				X	X				20
NWK-02	9	Stockton	Transformer Installation	X				X					50
SWL-03	10	Ozark	Draft Tube and Intake Gate Structural Repair and Painting	X						X			20
NWK-03	11	Truman	Intake Gate HSS Inspection/Repair	X						X			30
SWT-03	12	R.S. Kerr Lock And Dam	Replace Powerhouse Roof	X						X			27
SWL-04	13	Dardanelle	Head Gate Roller Chain Replacement	X						X			35
SWL-05	14	Norfolk	Rehabilitation of Draft Tube Crane	X						X			40
SWT-04	15	R.S. Kerr Lock And Dam	Replace 13.8 KV Breakers	X						X	X		27
NWK-04	16	Stockton	480V Distribution System Replacement	X			X			X	X		50
SWT-05	17	R.S. Kerr Lock And Dam	Replace CO2 system	X						X	X		55
SWT-06	18	Denison	Replace Motor Control Centers, Lighting Panels and Air Compressors	X						X	X		42
SWL-06	19	Greers Ferry	Fire Detection System Installation & CO2 System Upgrade	X							X		96
SWT-07	20	Denison	Rehabilitation of Powerhouse Crane	X						X			42
SWT-08	21	Denison	Turbine & Wicket Gate Rehabilitation; and Transformer, Switchgear and Bus Replacement	X	X			X		X	X		16