

**PROPOSED**

**FY 2011**

**NON-ROUTINE  
MAINTENANCE  
LIST**

**May 25, 2010**





April 2010			Proposed FY10 List of Hydropower Work Packages for Integrated System																									
					Totals		FY10		FY11		FY12		FY13		FY14		FY15											
District		SWPA Region Priority	Project Name	Work Package Description	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)	Ant. Expend.	Cum (\$1,000)	MW AT RISK									
SWL-01		1	Ozark	FY 2008 Rehabilitation Funding (FY 09 - FY 12 Work Plan)	94,000	94,000	23,000	23,000	14,000	14,000	2,300	2,300		0		0		0	100									
SWF-01		2	Whitney	Turbine and Generator Rehabilitation (FY 09 - FY 13 Work Plan)	22,700	116,700	6,000	29,000	4,000	18,000	1,670	3,970		0		0		0	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	122,805	1,165	30,165	1,000	19,000	500	4,470		0		0		0	30									
SWT-01		4	Webbers Falls	Generator Rewind (FY 08 Project)	6,000	128,805	1,000	31,165	1,000	20,000		4,470		0		0		0	6									
SWT-02		5	Webbers Falls	Miscellaneous Electrical & Mechanical Rehabilitation Work (FY 08 Project)	4,000	132,805	1,000	32,165	1,500	21,500		4,470		0		0		0	6									
SWL-02		6	Dardanelle	Replace 15kV Transformer Feeders (FY 09 Appropriation)	2,100	134,905	2,100	34,265		21,500		4,470		0														
MVK-01		7	Blakley Mountain	Rehab Surge Tank / Power Tunnel (FY 09 Appropriation)	1,000	135,905	1,000	35,265		21,500		4,470		0														
MVK-02		8	Blakley Mountain	Gate Rehabilitation (Joint Cost FY 09 Appropriation)	458	136,363	458	35,723		21,500		4,470																
SWL-03		9	Dardanelle	Fire Protection System (FY 09 Appropriation)	350	136,713	350	36,073		21,500		4,470																
SWL-04		10	Bull Shoals	Fire Protection System (FY 09 Appropriation)	350	137,063	350	36,423		21,500		4,470																
SWT-03		11	Fort Gibson	Hydropower Portion Joint Cost Tainter Gate Rehab (2009 Appropriation)	2,000	139,063	2,000	38,423		21,500		4,470		0		0												
NWK-02		12	Truman	Stilling Basin Repair Joint Cost (FY 10 Budget)	920	139,983	920	39,343		21,500		4,470		0		0												
MVK-01		13	DeGray	CO2 Replacement (FY 10 Budget)	150	140,133	150	39,493		21,500		4,470		0		0												
SWL-03		14	Danrdanelle	Intake Crane Rehab (FY 10 Budget)	1,500	141,633	1,500	40,993		21,500		4,470		0		0												
SWT-03		15	Fort Gibson	Transformer Oil Containment	400	142,033	400	41,393		21,500		4,470		0		0		0	11									
NWK-02		16	Harry S. Truman	Transformer Oil Containment	412	142,445	412	41,805		21,500		4,470		0		0		0	90									
NWK-03		17	Stockton	Dive contract to Recover the Broken Turbine Blade from inside the dam to allow testing to determine how to repair the blades and return the turbine to work (2009 Recovery Act)	75	142,520	75	41,880		21,500		4,470		1		0		0	90									
NWK-04		18	Stockton	In-place Blade Repair - ARRA	1,000	143,520	1,000	42,880		21,500		4,470		2		0		0	90									
NWK-05		19	Stockton	HSS Inspection/Repair (Intake & Draft Tube Bulkheads & Intake Gates - \$383K previously accounted for in FY 08) - ARRA	1,500	145,020	1,500	44,380		21,500		4,470		3		0		0	90									
NWK-06		20	Stockton	Power Generation Contract (Gen Rewind, Turbine Replacement, Exciter, Governor, and ancillary equipment) - ARRA	34,000	179,020	34,000	78,380		21,500		4,470		4		0		0	90									
NWK-06		21	Stockton	Transformer Supply Contract - ARRA	1,500	180,520	1,500	79,880		21,500		4,470		4		0		0	90									
NWK-07		22	Stockton	13.8 kV Main & Station Service Bkrs/Station Service Xfmr - ARRA	465	180,985	465	80,345		21,500		4,470		5		0		0	90									
NWK-07		23	Stockton	Repair and maintenance of hydropower equipment including generator breaker retrofill, steel repairs, electrical safety inspection, electrical safety clothing and equipment and load testing of cranes (2009 Recovery Act)	205	181,190	205	80,550		21,500		4,470		5		0		0	90									
NWK-08		24	Stockton	DC & Preferred AC Syst, incl Battery, Battery Chargers, Static Inverters, DC & AC Dist Board & Feeder Conduits - ARRA	840	182,030	840	81,390		21,500		4,470		6		0		0	90									

NWK-09		<b>25</b>	Stockton	PROJECT COMBINED WITH HSS Project		182,030	0	81,390		21,500		4,470		7		0		0	90
NWK-10		<b>26</b>	Harry S Truman	Critical Inspection and welding and painting repair of Hydraulic Steel Structures that hold back water from work areas within the water passages of the dam that will allow maintenance to be performed that will minimize the potential for failure, minimize the cost of future maintenance and improve the reliability of clean hydroelectric power generation. (2009 Recovery Act)	50	182,080	50	81,440		21,500		4,470		8		0		0	90
NWK-11		<b>27</b>	Harry S Truman	Equipment, maintenance and repair of equipment in support of clean Hydroelectric power generation including worker safety evaluation, clothing and equipment, heat exchangers, pumps, switches, relays, heaters, etc. (2009 Recovery Act)	415	182,495	415	81,855		21,500		4,470		9		0		0	90
SWL-01		<b>28</b>	Beaver	Award Construction Contract to repair Powerhouse roof. Replacing the roof would protect the equipment from failure and reduce future maintenance costs. (2009 Recovery Act)	1000	183,495	1,000	82,855		21,500		4,470		10		0		0	90
SWL-02		<b>29</b>	Beaver	Award Construction Contract to repair / replace intake gate roller chains. (2009 Recovery Act)	500	183,995	500	83,355		21,500		4,470		11		0		0	90
SWL-02		<b>30</b>	Dardanelle	Award construction contract to repair powerhouse roof. Replacing the roof would protect the equipment from failure and reduce future maintenance costs. (2009 Recovery Act)	700	184,695	700	84,055		21,500		4,470		11		0		0	90
SWL-03		<b>31</b>	Dardanelle	Award construction contract to purchase secondary gearboxes to replace the existing gearboxes in powerhouse. Failed gearbox renders gate inoperable. Replacement reduces the risk of failure. (2009 Recovery Act)	750	185,445	750	84,805		21,500		4,470		12		0		0	90
SWL-01		<b>32</b>	Greers Ferry	Award Construction Contract to Repair Powerplant Roof and Rehab Elevator to protect the equipment from failure, and to increase safety during operation. (2009 Recovery Act)	1000	186,445	1,000	85,805		21,500		4,470		17		0		0	90
SWL-02		<b>33</b>	Ozark	Award Construction Contract for New Intake and Bulkhead Gates. Reduces future maintenance costs, and provides increased power plant availability and safety. (2009 Recovery Act)	2000	188,445	2,000	87,805		21,500		4,470		18		0		0	90
SWL-04		<b>34</b>	Table Rock	Award Construction Contract to Replace Powerhouse roof. Replacing the roof would protect the equipment from failure and reduces future maintenance costs. (2009 Recovery Act)	765	189,210	765	88,570		21,500		4,470		13		0		0	90
SWT-04		<b>35</b>	Broken Bow	Award Construction Contract to Paint surge tank to reduce future maintenance costs. (2009 Recovery Act)	200	189,410	200	88,770		21,500		4,470		14		0		0	90
SWT-05		<b>36</b>	Broken Bow	Award Construction Contract to Repair butterfly control valves to reduce the risk of failure. (2009 Recovery Act)	100	189,510	100	88,870		21,500		4,470		15		0		0	90
SWT-03		<b>37</b>	Broken Bow	Award Construction Contract to Replace penstock raw water piping in powerhouse. Reduces future maintenance costs. (2009 Recovery Act) - (\$750K Previously Accounted for in FY 07)	850	190,360	100	88,970		21,500		4,470		19		0		0	90

SWT-04		38	Denison	AE contract to prepare plans and specs for turbine replacement to increase efficiency of turbines. (2009 Recovery Act)	400	190,760	400	89,370		21,500		4,470		20		0		0	90
SWT-06		39	Eufaula	Award Construction Contract to Replace disconnecting switches. Reduces risk of failure. (2009 Recovery Act)	100	190,860	100	89,470		21,500		4,470		16		0		0	90
SWT-05		40	Fort Gibson	Award Construction Contract to Replace sump pumps, piping, and valves. Reduces future maintenance costs. (2009 Recovery Act)	300	191,160	300	89,770		21,500		4,470		21		0		0	90
SWT-06		41	Keystone	Award Construction Contract to Replace generator air coolers. Reduces future maintenance costs. (2009 Recovery Act)	350	191,510	350	90,120		21,500		4,470		22		0		0	90
SWT-07		42	RS Kerr	Install automation equipment for centralized control. Increases efficiency of system management. (2009 Recovery Act)	200	191,710	200	90,320		21,500		4,470		23		0		0	90
SWT-08		43	RS Kerr	Rehab intake and draft tube gates. Reduces risk of failure. (2009 Recovery Act) - Proposed FY 10 Project)	1,600	193,310	1,600	91,920		21,500		4,470		24		0		0	90
SWT-09		44	RS Kerr	Repair road to powerhouse, safer driving conditions for employees (2009 Recovery Act)	100	193,410	100	92,020		21,500		4,470		25		0		0	90
		45	Webbers Falls	Award Construction Contract to Replace main power cables and electrical distrobution equipment. Reduces future maintenance costs. (2009 Recovery Act) - (Previously Accounted for in FY 08 - FY 11)	1,500	194,910	0	92,020		21,500		4,470		26		0		0	90
SWT-10		46	Webbers Falls	Award Construction Contract to Replace generator circuit breakers. Reduces future maintenance costs. (2009 Recovery Act) - (Previously Accounted for in FY 08 - FY 11)	500	195,410	0	92,020		21,500		4,470		26		0		0	90
MVK-01		47	Blakely Mountain	Service contract to Replace 115 KVA disconnect switch gear at power plant. Allows the production of more efficient electricity (2009 Recovery Act)	325	195,735	325	92,345		21,500		4,470		27		0		0	90
MVK-01		48	DeGray	Rewind Unit # 2 (2009 Recovery Act) - (Previously Accounted for in FY 08 - FY 09)	5,000	200,735	0	92,345											
MVK-02		49	Narrows	Rehab main power transformer which allows the production of more efficient electricity. (2009 Recovery Act)	400	201,135	400	92,745		21,500		4,470		28		0		0	90
MVK-03		50	Narrows	Service contract to rehab oil containment and crane controls for hydropower. (2009 Recovery Act)	300	201,435	300	93,045		21,500		4,470		29		0		0	90
SWT-11		51	Tulsa District Projects	Hydropower Portion Joint Use Cost at Tulsa District Projects (2009 Recovery Act)	13,000	214,435	13,000	106,045		21,500		4,470		30		0		0	90
SWL-03		52	Little Rock District Projects	Hydropower Portion Joint Use Cost at Little Rock District Projects (2009 Recovery Act)	8,800	223,235	8,800	114,845		21,500		4,470		31		0		0	90
NWK-04		53	Kansas City District Projects	Hydropower Portion Joint Use Cost at Kansas City District Projects (2009 Recovery Act)	280	223,515	280	115,125		21,500		4,470		32		0		0	90

May 2010		Proposed FY11 List of Hydropower Work Packages for Integrated System														
District	SWPA Region Priority	Project Name	Work Package Description	Totals		FY11		FY12		FY13		FY14		FY15		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 2011 Rehabilitation Funding (FY 09 - FY 15 Work Plan)	115,000	115,000	14,000	14,000	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	4,000	18,000	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	1,000	19,000	500	4,470		9,300		7,000		7,000	30
SWT-01	4	Webbers Falls	Generator Rewind (FY 08 Project)	6,000	152,105	1,000	20,000		4,470		9,300		7,000		7,000	6
SWT-02	5	Webbers Falls	Miscellaneous Electrical & Mechanical Rehabilitation Work (FY 08 Project)	4,000	156,105	1,500	21,500		4,470		9,300		7,000		7,000	6
NWK-02	6	Truman	Wicket Gate Servomotor Repair - Emergency Supp Funds (FY 10 Appropriation)	1,500	157,605	1,500	23,000		4,470		9,300		7,000		7,000	
MVK-01	7	Blakely Mountain	Surge Tank Painting (FY 10 Appropriation)	1,200	158,805	1,200	24,200		4,470		9,300		7,000		7,000	
SWT-03	8	Fort Gibson	Motor Control Center Replacement (FY 10 Appropriation)	200	159,005	200	24,400		4,470		9,300		7,000		7,000	
SWT-04	9	Tenkiller	Motor Control Center Replacement (FY 10 Appropriation)	200	159,205	200	24,600		4,470		9,300		7,000		7,000	
SWL-02	10	Dardanelle	Partial Intake Crane Rehabilitation (FY 10 Appropriation)	2,500	161,705	2,500	27,100		4,470		9,300		7,000		7,000	
SWF-02	11	Whitney	Roof Replacement (FY 10 Appropriation)	425	162,130	425	27,525		4,470		9,300		7,000		7,000	
SWT-05	12	Keystone	Transformer Oil Containment	450	162,580	450	27,975		4,470		9,300		7,000		7,000	35
SWT-06	13	R.S. Kerr Lock And Dam	Repair Draft Tube Liners	850	163,430	650	28,625	200	4,670		9,300		7,000		7,000	27
SWT-07	14	R.S. Kerr Lock And Dam	Replace Generator Air Coolers	450	163,880	450	29,075		4,670		9,300		7,000		7,000	27
SWL-03	15	Table Rock	Head Gate Roller Chain Replacement	600	164,480	600	29,675		4,670		9,300		7,000		7,000	50
MVK-02	16	Blakely Mountain	Power Tunnel Rehabilitation and Butterfly Valve Rehabilitation	3,000	167,480	1,500	31,175	1,500	6,170		9,300		7,000		7,000	75
SWL-04	17	Dardanelle	Intake and Draft Tube Crane Rehabilitation	6,000	173,480	250	31,425	2,750	8,920	3,000	12,300		7,000		7,000	140
MVS-01	18	Clarence Cannon Dam	Cavitation Repair and Wicket Gate Packing Replacement on Unit # 2	1,130	174,610	565	31,990	565	9,485		12,300		7,000		7,000	27



**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 =		6,105,000

**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:**



**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:** 2 Units operational with the capability to run at 46 megawatts.

**Item Proposed for Customer Funding:** Generator Rewind of Unit 1, Unit 2 and Unit 3.

**Reason for Item:**

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

**History of Outages/Deficiency:** The generators are the original equipment installed when the powerhouse was built in 1973. One unit has experienced a coil failure which was repaired. The Webbers Falls Powerhouse Major Rehabilitation Report identified the generators as an equipment item that needed to be replaced. With the turbine rehabilitation at Webbers Falls, it is possible that a 6 MW uprate could be realized at the Webbers Falls powerplant.

**Solution:** Rewind the Generators for Unit 1, Unit 2 and Unit 3.

**Scope of Work:** Rewind the units.

**Total Estimated Cost:** \$6,000,000 (FY08 - \$2,000,000; FY09 - \$2,000,000; and FY10 – \$2,000,000)

**Costs/Impacts if Item is Not Funded:**

- 1) Megawatts and Energy at Risk: 23 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>
Rewind Unit 3	Sept 08 – May 09	\$2,000,000
Rewind Unit 1	Sept 09 – May 10	\$2,000,000
Rewind Unit 2	Sept 10 – May 11	\$2,000,000

**Duration with/without Customer Funding:** Without customer funding, the Units will continue to operate at the current rating (23 MW) and the obtainable uprate (2 MW per unit, 6 MW for the powerhouse) will not be realized. Delay in the rewind of the units will result in less power and energy that is available. The work item has been submitted through the Corps' normal budget cycle.

**Estimated Losses in Revenue/Benefits/Risk Factor:** If customer funding is not available, the generator rewind will be delayed until funds are available. Federal funds are not expected in the next 10 years.

$$6 \text{ MW} \times 520 \text{ weeks} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$7,738,000$$

**Summary of Funding Argument(s):**

- Corps funding is not available at this time.
- Increased unit capacity
- Increased reliability and availability.
- Timely replacement with interruption of service timed with turbine rehabilitation outage.
- Reduced likelihood of major failure.

**Photographs:** None.

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:** 2 Units operational with the capability to run at 46 megawatts.

**Item Proposed for Customer Funding:** Remaining Electrical and Mechanical work at the Webbers Falls Powerhouse to complete the powerhouse rehabilitation to increase reliability and to enable the uprate of the units.

**Reason for Item:**

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

**History of Outages/Deficiency:** The Webbers Falls Powerhouse Major Rehabilitation Report identified the turbines and generators as the major equipment items that needed to be replaced. A benefit of replacing the generators is an anticipated 6 MW uprate. For the powerplant to operate with the increased capacity, the main power cables and generator main bus need to be uprated as well. Also, the maintenance elevator, air compressor, clearwell tank for the packing box water, trash racks, electrical distribution centers, HVAC system and powerplant emergency generator need replacement due to their existing condition. The maintenance elevator is unreliable and is required to efficiently and safely move personnel and equipment for maintenance and repair; the clearwell tank, which is used to store the clean water required by the packing boxes, has corroded and is leaking; the station and governor air compressors are existing equipment and are worn out; the trashracks have holes and failing; the electrical distribution centers have breakers that are not properly rated for the duty and the spare parts are difficult to obtain; the HVAC is obsolete and is unable to keep the controlled areas cooled; and the emergency generator is obsolete and not able to provide the necessary load reliably. All of these items need replacement to complete the major rehabilitation at Webbers Falls. In addition, it will be necessary to make electrical control, power, and relaying changes to incorporate the new equipment

**Solution:** Repair / replace the main power cables, main bus, maintenance elevator, air compressors, clearwell tank for the packing box water, trash racks, electrical distribution centers, HVAC system and powerplant emergency generator.

**Scope of Work:** Perform the required electrical and mechanical work needed to replace the main power cables, main bus, maintenance elevator, air compressor, clearwell tank for the packing box water, trash racks, electrical distribution centers, HVAC system and powerplant emergency generator including electrical control, power and relaying changes required for the uprate and new equipment.

**Total Estimated Cost:** \$4,000,000

**Costs/Impacts if Item is Not Funded:**

- 1) Megawatts and Energy at Risk: 23 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>
Remaining Electrical and Mechanical Rehab Work	May 08 – May 11	\$3,500,000

**Duration with/without Customer Funding:** Without customer funding, the needed rehabilitation work will not be repaired which may result in continued frequent forced outages and lost generation. The work item has been submitted through the Corps' normal budget cycle.

**Estimated Losses in Revenue/Benefits/Risk Factor:** If customer funding is not available, the remaining rehabilitation work will be delayed until funds are available. Federal funds are not expected in the next 3 years.

$$6 \text{ MW} \times 156 \text{ weeks} \times 5 \text{ days/week} \times 8 \text{ hours/day} \times \$62/\text{MWh} \approx \$2,321,000$$

**Summary of Funding Argument(s):**

- Corps funding is not available at this time.
- Increased reliability and availability.
- Timely repair with minimal interruption of service.
- Reduced likelihood of major failure.

**Photographs:** None.



**Work / Funding Timeline:**

<u>Activity Item</u>	<u>Time frame</u>	<u>Dollars</u>
E&D/P&S	Jan 11 – Apr 11	40,000
Procurement	May 11 – Aug 11	5,000
Contract	Sep 11 – May 12	405,000

**Duration with/without Customer Funding:** Customer funding would prevent possible extended outages, thereby increasing unit reliability, efficiency and output. 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 that cannot be controlled 35 MW of capacity could be lost. Estimated forced outage time would be about 30 weeks.

$$35 \text{ MW} \times 30 \text{ weeks} \times 5 \text{ days/week} \times 6 \text{ hours/day} \times \$62/\text{MWh} \approx \$1,953,000$$

**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 2009.

**Photographs:** 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:** Repair the draft tube liner all four units.

**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 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 11 – 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, and shafts.

**Photograph(s):**



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

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:** Replace the generator air coolers and provide for one spare cooler.

**Reason for Item:**

  X   Reliability

     Environmental

     Efficiency

     Forced Outage

     Safety

  X   Preventative Maintenance

     Cost Savings

     Obsolete

     NERC Compliance

**History of Outages/Deficiency:** There are eight air coolers in each of the four generator housings. Each cooler is original to generator installation. Corrosion of the water passages in the coolers is causing water leaks into the generator housing. Repairing these leaks is becoming increasingly difficult because of the advanced state of deterioration of the cooler end boxes and tubes. The solution is to replace the coolers.

**Solution:** Replace the 32 generator air coolers with new coolers designed to be corrosion resistant plus one spare.

**Scope of Work:** Develop plans and specs for the replacement of the 32 generator air coolers plus one spare. Contract for the replacement of the of the coolers.

**Total Estimated Cost:** \$450,000

**Costs/Impacts if Item is Not Funded:**

- 1) Megawatts and Energy at Risk: 27.5 MW/unit, 1896 MWh
- 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	10,000
Contract	Apr 11 – Mar 12	435,000

**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:**

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

**Summary of Funding Argument(s):** Cooler failure could result in loss of electrical power during peak requirements in the summer months.

**Photograph(s):**



Generator 3 - Air Cooler No. 2



Generator 3 - Air Cooler No. 1

**Information Data Sheet for Customer Funding**

**Hydropower Plant:** Table Rock                      **Run of River** \_\_\_ **Storage** X  
**District:** Little Rock  
**No. of Units:** 4                      **Capacity of Units (MW) (Overload)** 200 (230)  
**Estimated Average Annual Energy (MWh) (SWPA Annual Report)** 459,000

**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: 50 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	Jan11 – May 11	10,000
Procurement	June 11 – Jul 11	10,000
Contract	Aug 11 – Mar 12	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.

50 MW x 52 weeks x 5 days/week x 8 hours/day x \$62/MWh  $\approx$  \$6,448,000 annually

**Summary of Funding Argument(s):**

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

**Photograph(s):** None

**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:**

<input checked="" type="checkbox"/> Reliability	<input type="checkbox"/> Environmental
<input 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:** 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 the 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 the 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.

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

**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):



