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Nova Scotia
Utility and Review Board

CI 39602

**TRE6 – U&U Boiler Superheater/Reheater
Repairs**

November 24, 2010

NOVA SCOTIA
POWER
An Emera Company

UARB APPROVAL SHEET

Project Title: **TRE6 - U&U Boiler Superheater/Reheater Repairs**

CI Number: 39602

☒ Capital Project Authorization

Head Office Use:

☐ ATO

Project Number:

☐ Final Cost

Date: November 24, 2010

Location:			Division:	
Expenditure Profile			Schedule	
YEAR	Budget Estimate	Project Estimate		
2010		608,704	Start Date	2010-08
			Estimated In-Service Date	2010-09
			Estimated Close Date	2010-10
Total	\$0	\$608,704		

COMMENTS

This item is submitted pursuant to section 35

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Approved on behalf of NOVA SCOTIA UTILITY AND REVIEW BOARD

M/S [Signature]

Nov 22/2010

[Signature] December 20, 2010

Authorized Signatory

DATE

DATE

Mark Savory

VP Technical and Construction

CI Number : 39602

- TRE6 - (UU) Boiler Superheater/Reheater Repairs

Project Number

Parent CI Number :

-

Cost Centre : 345

- 345-Trenton unit 6 Capital

Budget Version - 2010 07/05 Forecast

	<u>Forecast</u>
Start :	08/01/2010
Operational :	09/30/2010
Final Cost :	10/31/2010
2010	\$608,704.38
Total :	\$608,704.38
Original Cost :	\$430,000.00

The purpose of this project is to ensure reliable performance of Trenton #6 boiler by replacement and repair of selected components in superheater and reheat sections of the boiler. The project was driven by inspection results during the outage. The repairs and replacements included 15 tube replacements in the reheat section, design modifications and replacement of bifurcate shields, and pad repairs to tubes exhibiting low wall thickness or evidence of notching from flyash and sootblower erosion. Additional straight shields were added to previously unshielded areas, and shields requiring replacement were replaced. A leaking thermowell in the vicinity of the secondary inlet header was also replaced. This work has been completed.

Summary of Related CI's +/- 2 years.

38854 - TRE6 - 6A Boiler Feed Pump Oil Cooler Upgrade \$77,080

CI Number : 39602

- TRE6 - (UU) Boiler Superheater/Reheater Repairs

Project Number

Parent CI Number :

Approved Date

Cost Centre : 345

- 345-Trenton unit 6 Capital

Budget Version 2010 07/05 Forecast

Capital Item Accounts

Acct	Actv	Account	Activity	Forecast Amount	Amount	Variance
094		094 - Interest Capitalized		7,970	0	7,970
095		095-Thermal & Hydro Contracts AO		34,976	0	34,976
012	013	012 - Materials	013 - SGP - Boiler	31,773	0	31,773
013	013	013 - POWER PRODUCTION Contracts	013 - SGP - Boiler	419,713	0	419,713
013	087	013 - POWER PRODUCTION Contracts	087 Field Super.& Ops.	114,272	0	114,272
			Total Cost:	608,704	0	608,704
			Original Cost:	430,000		

CI Number : 39602 - TRE6 - (UU) Boiler Superheater/Rehe
Parent CI Number : -
Cost Centre : 345 - 345-Trenton unit 6 Capital

Project Number

Approved Date

Capital Item Justification

Justification Criteria : Thermal

Sub-Criteria : Maintenance

Name of Report :

Document Location :

Person Responsible :

Why do this project?

Non destructive examination (NDE) performed on the boiler indicated that there were several locations in the boiler superheater and reheater that required attention due to flyash and sootblower erosion. The replacement and/or protection scope must be completed to mitigate the risk of un-planned outages and associated repair and replacement energy costs.

Why do this project now?

Due to the NDE results during the planned outage, selective replacement and/or protection work was completed in the superheater and reheat areas of the boiler through removal of thinned tube sections and pad welding was required in order to avoid un-planned outages. Not performing the repairs would result in forced outages with replacement energy purchases before the next planned unit outage in 2012.

This work was not identified until after ACE 2010 was finalized. These repairs can not wait until 2011 to be included in NSPI's next ACE Plan.

Why do this project this way?

Completing this project now and minimizing forced outages related to boiler tube failures is the most cost effective option and positively impacts unit availability, reliability, and potential replacement energy costs.

TRENTON GENERATING STATION - PROJECT COST ESTIMATE (2010)							
FP# :	39602						
Title :	TRE6 - (UU) Boiler Superheater/Reheater Repairs						
Item	Description	Acct	Actv	Unit	Quantity	Unit Price	Total
1	Supply of Materials						
1.1	Tubing	012	013	Lot	1	\$ 3,618.00	\$ 3,618.00
1.2	Thermowell	012	013	Lot	1	\$ 530.00	\$ 530.00
1.3	Shields- I Matheson	012	013	Lot	1	\$ 17,600.00	\$ 17,600.00
1.4	Shields D&M	012	013	Lot	1	\$ 8,543.00	\$ 8,543.00
1.5	Inventory- shields (30)	012	013	Lot	1	\$ 1,482.16	\$ 1,482.16
1.6							\$ -
						Sub-Total	\$ 31,773.16
4	Contractor Labour						
4.1	Alstom-Boilermakers	013	013	Lot	1	\$ 350,053.00	\$ 350,053.00
4.2	Alstom- Inspection	013	013	Lot	1	\$ 66,108.75	\$ 66,108.75
4.3	X-ray	013	013	Lot	1	\$ 3,551.24	\$ 3,551.24
4.4							\$ -
4.5							\$ -
4.6							\$ -
4.7							\$ -
						Sub-Total	\$ 419,712.99
5	Engineering & Project Management						
5.1	Alstom Supervision-BM	013	087	Lot	1	\$ 88,313.94	\$ 88,313.94
5.2	Alstom Supervision /Qa Inspectors	013	087	Lot	1	\$ 25,958.50	\$ 25,958.50
5.3							\$ -
5.7							\$ -
						Sub-Total	\$ 114,272.44
6	Indirect Costs						
6.1	Interest Capitalized	094		Lot	1	\$ 7,969.74	\$ 7,969.74
6.2	Thermal & Hydro Contracts AO	095		Lot	1	\$ 34,976.05	\$ 34,976.05
6.3							\$ -
6.6							\$ -
						Sub-Total	\$ 42,945.79
Project Cost Estimate						Total	\$ 608,704.38
7	Retirement Costs						
7.1	Retirement Costs	097	013	Lot	1	\$ 430,000.00	\$ 430,000.00



IRE6 (UU) Boiler Superheater/Reheater Repairs Summary of Alternatives

Budget Year :

2010

Division :

Power Production

Department :

Trenton Generating Station

Originator :

Date :

23-Aug-10

CI Number:

39602

Project No. :

	Alternative	After Tax WACC	PV of EVA / NPV	Rank	IRR	Disc Pay
A	Repairs during 2010 Outage	6.55%	843,444	1	34.23%	4.2 Years
B	Test 2	6.55%	0	2	#NUM!	0.0 years
C	Test 3	6.55%	0	2	#NUM!	0.0 years
D	Test 4	6.55%	0	2	#NUM!	0.0 years

Recommendation :

It is recommended to perform the necessary repairs to the superheater and reheater. Performing these repairs is necessary to mitigate the risk of un-planned Unit outages and replacement energy costs. This project is economically feasible with an NPV of \$843K, an IRR of 34.2%, and a discounted payback of 4.2 years, based on the assumptions detailed below.

Notes/Comments :

Cost of Repairs During 2010 Outage vs Replacement Energy Costs Associated With Failure

Based on inspection results, not performing these repairs would expose the Unit #5 boiler to a high risk of failure in the near future. It is assumed that the boiler would experience two outages annually, with an estimated duration of 48 hours. Replacement energy costs would be \$82,252 in 2010 and \$262,730 in 2011.

Test 2

Test 3

Test 4

TRE6 (UU) Boiler Superheater/Reheater Repairs

Cost of Repairs During 2010 Outage vs Replacement Energy Costs Associated With Failure

Year	Total Revenue	Operating Costs	Capital	CCA	UCC	CFBT	Applicable Taxes	CFAT	Discount Factor	PV of CF	CNPV
2010	82,252.0	-	(608,704.0)	24,348.2	584,355.8	(526,452.0)	(20,169.4)	(546,621.4)	1.000	(546,621.4)	(546,621.4)
2011	262,730.0	-	-	46,748.5	537,607.4	262,730.0	(70,466.2)	192,263.8	0.939	180,444.7	(366,176.7)
2012	267,984.6	-	-	43,008.6	494,598.8	267,984.6	(69,827.9)	198,156.7	0.881	174,542.8	(191,633.9)
2013	273,344.3	-	-	39,567.9	455,030.9	273,344.3	(72,470.7)	200,873.6	0.827	166,059.0	(25,574.9)
2014	278,811.2	-	-	36,402.5	418,628.4	278,811.2	(75,218.9)	203,592.3	0.776	157,960.1	132,385.3
2015	284,387.4	-	-	33,490.3	385,138.1	284,387.4	(77,778.1)	206,609.3	0.728	150,446.7	282,831.9
2016	290,075.1	-	-	30,811.1	354,327.1	290,075.1	(80,371.9)	209,703.3	0.683	143,312.6	426,144.6
2017	295,876.7	-	-	28,346.2	325,980.9	295,876.7	(82,934.5)	212,942.2	0.641	136,580.1	562,724.7
2018	301,794.2	-	-	26,078.5	299,902.4	301,794.2	(85,471.9)	216,322.3	0.602	130,218.8	692,943.5
2019	307,830.1	-	-	23,992.2	275,910.3	307,830.1	(87,989.7)	219,840.3	0.565	124,201.3	817,144.8
2020	-	-	-	22,072.8	253,837.4	-	6,842.6	6,842.6	0.530	3,628.1	820,773.0
2021	-	-	-	20,307.0	233,530.4	-	6,295.2	6,295.2	0.498	3,132.7	823,905.7
2022	-	-	-	18,682.4	214,848.0	-	5,791.6	5,791.6	0.467	2,704.9	826,610.6
2023	-	-	-	17,187.8	197,660.2	-	5,328.2	5,328.2	0.438	2,335.5	828,946.2
2024	-	-	-	15,812.8	181,847.3	-	4,902.0	4,902.0	0.411	2,016.6	830,962.8
2025	-	-	-	14,547.8	167,299.6	-	4,509.8	4,509.8	0.386	1,741.2	832,704.0
2026	-	-	-	13,384.0	153,915.6	-	4,149.0	4,149.0	0.362	1,503.5	834,207.5
2027	-	-	-	12,313.2	141,602.3	-	3,817.1	3,817.1	0.340	1,298.2	835,505.6
2028	-	-	-	11,328.2	130,274.2	-	3,511.7	3,511.7	0.319	1,120.9	836,626.5
2029	-	-	-	10,421.9	119,852.2	-	3,230.8	3,230.8	0.300	967.8	837,594.3
2030	-	-	-	9,588.2	110,264.0	-	2,972.3	2,972.3	0.281	835.7	838,430.0
2031	-	-	-	8,821.1	101,442.9	-	2,734.5	2,734.5	0.264	721.5	839,151.5
2032	-	-	-	8,115.4	93,327.5	-	2,515.8	2,515.8	0.248	623.0	839,774.5
2033	-	-	-	7,466.2	85,861.3	-	2,314.5	2,314.5	0.232	537.9	840,312.5
2034	-	-	-	6,868.9	78,992.4	-	2,129.4	2,129.4	0.218	464.5	840,776.9
2035	-	-	-	6,319.4	72,673.0	-	1,959.0	1,959.0	0.205	401.1	841,178.0
2036	-	-	-	5,813.3	66,859.2	-	1,802.3	1,802.3	0.192	346.3	841,524.3
2037	-	-	-	5,348.7	61,510.4	-	1,658.1	1,658.1	0.180	299.0	841,823.3
2038	-	-	-	4,920.3	56,589.6	-	1,525.5	1,525.5	0.169	258.2	842,081.5
2039	-	-	-	4,527.2	52,062.4	-	1,403.4	1,403.4	0.159	222.9	842,304.4
2040	-	-	-	4,165.3	47,897.4	-	1,291.1	1,291.1	0.149	192.5	842,496.8
2041	-	-	-	3,831.3	44,065.6	-	1,187.9	1,187.9	0.140	166.2	842,663.0
2042	-	-	-	3,525.3	40,540.4	-	1,092.8	1,092.8	0.131	143.5	842,806.5
2043	-	-	-	3,243.2	37,297.2	-	1,005.4	1,005.4	0.123	123.9	842,930.4
2044	-	-	-	2,983.3	34,313.4	-	925.0	925.0	0.116	107.0	843,037.4
2045	-	-	-	2,745.1	31,568.3	-	851.0	851.0	0.109	92.4	843,129.8
2046	-	-	-	2,525.5	29,042.8	-	782.9	782.9	0.102	79.8	843,209.5
2047	-	-	-	2,323.4	26,719.4	-	720.3	720.3	0.096	68.9	843,278.4
2048	-	-	-	2,137.6	24,581.9	-	662.6	662.6	0.090	59.5	843,337.9
2049	-	-	-	1,966.5	22,615.3	-	609.6	609.6	0.084	51.3	843,389.2
2050	-	-	-	1,809.2	20,806.1	-	689.7	689.7	0.079	54.5	843,443.7
Total	2,645,085.5	-	(608,704.0)	587,897.9	7,065,178.0	2,036,381.5	(643,488.0)	1,392,893.6	15.1	843,443.7	27,773,083.7

