

**CI 28866**

**TRE – Unit #6 Low Nox Combustion Firing  
System**

**July 30, 2010**

*NOVA SCOTIA*  
**POWER**  
An Emera Company

## UARB APPROVAL SHEET

Project Title: **TRE-Unit #6 Low Nox Combustion Firing System**

CI Number: 28866

☐ Capital Project Authorization

Head Office Use:

☐ ATO

Project Number: S265

☒ Final Cost

Date: July 30, 2010

| Location:           |                    |                    | Division:       |         |
|---------------------|--------------------|--------------------|-----------------|---------|
| Expenditure Profile |                    |                    | Schedule        |         |
| YEAR                | Budget Estimate    | Project Estimate   |                 |         |
| 2007                |                    | 424,022            | Start Date      | 2007-11 |
| 2008                | 5,607,640          | 3,668,171          | In-Service Date | 2008-09 |
| 2009                |                    | 14,420             | Close Date      | 2009-02 |
| <b>Total</b>        | <b>\$5,607,640</b> | <b>\$4,106,621</b> |                 |         |

### COMMENTS

Approved Amount 5,607,640  
Actual Spending 4,106,621  
Variance (\$1,501,019)

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Approved on behalf of NOVA SCOTIA UTILITY AND REVIEW BOARD

Authorized Signatory

Mark Savory

VP Technical and Construction

DATE

DATE

CI Number : 28866-S265 - TRE-UNIT#6 LOW NOX COMBUSTION FIRING SYTEM

Project Number S265

Parent CI Number :

Cost Centre : 345 - 345-Trenton unit 6 Capital

Budget Version - 2010 06/06 Forecast

|                 | Forecast       |
|-----------------|----------------|
| Start :         | 11/01/2007     |
| Operational :   | 09/30/2008     |
| Final Cost :    | 02/28/2009     |
| 2007            | \$424,021.76   |
| 2008            | \$3,668,170.64 |
| 2009            | \$14,429.02    |
| Total :         | \$4,106,621.42 |
| Original Cost : | \$0.00         |

The purpose of this project is to install a low NOx combustion firing system on Trenton Unit 6.

The scope of the work includes:

- Pre-outage baseline performance testing;
- Installation of low NOx combustion firing system, including an overfire air system, burner and windbox modifications and associated control equipment and instrumentation;
- Adjustment and tuning of existing burner automation and boiler modulating systems;
- Installation of waterwall offset corner tube panel assemblies for the new overfire air port openings in the furnace waterwalls;
- Modification of platforms, stairs, grating, and structural steel required for access to the equipment;
- Installation of Continuous Emission Monitors for NOx and carbon monoxide;
- Staff training on the new equipment;
- Calibration and testing of field equipment and instrumentation;
- Commissioning and tuning of the Low NOx Combustion Firing System; and
- Post outage performance testing of the Low NOx Combustion Firing System.

CI Number : 28866-S265 - TRE-UNIT#6 LOW NOX COMBUSTION FIRING SYTEM

Project Number S265

Parent CI Number : - - Approved Date 11/8/2007

Cost Centre : 345 - 345-Trenton unit 6 Capital

Budget Version 2010 06/06 Forecast

## Capital Item Accounts

| Acct           | Actv | Account                          | Activity           | Forecast Amount | Amount | Variance  |
|----------------|------|----------------------------------|--------------------|-----------------|--------|-----------|
| 001            |      | 001 - Regular Labour (No AO)     |                    | 31,887          | 0      | 31,887    |
| 001            |      | 001 - THERMAL Regular Labour     |                    | 72,384          | 0      | 72,384    |
| 002            |      | 002 - Overtime Labour (No AO)    |                    | 4,277           | 0      | 4,277     |
| 002            |      | 002 - THERMAL Overtime Labour    |                    | 350             | 0      | 350       |
| 011            |      | 011 - Travel Expense             |                    | 49,754          | 0      | 49,754    |
| 012            |      | 012 - Materials                  |                    | (15,519)        | 0      | (15,519)  |
| 028            |      | 028 - Consulting                 |                    | 101,703         | 0      | 101,703   |
| 041            |      | 041 - Meals & Entertainment      |                    | 7,227           | 0      | 7,227     |
| 042            |      | 042 - Employee Benefits          |                    | 4,868           | 0      | 4,868     |
| 094            |      | 094 - Interest Capitalized       |                    | 116,850         | 0      | 116,850   |
| 095            |      | 095-COPS Contracts AO            |                    | (1,101)         | 0      | (1,101)   |
| 095            |      | 095-Thermal & Hydro Contracts AO |                    | 90,909          | 0      | 90,909    |
| 095            |      | 095-Thermal Term Labour AO       |                    | 17,080          | 0      | 17,080    |
| 095            |      | 095 - Admin. Overheads           |                    | 4,051           | 0      | 4,051     |
| 095            |      | 095-Thermal Overtime Labour AO   |                    | 3,762           | 0      | 3,762     |
| 095            |      | 095-Thermal Regular Labour AO    |                    | 17,854          | 0      | 17,854    |
| 001            | 013  | 001 - Regular Labour (No AO)     | 013 - SGP - Boiler | 2,169           | 0      | 2,169     |
| 001            | 013  | 001 - THERMAL Regular Labour     | 013 - SGP - Boiler | 37,408          | 0      | 37,408    |
| 002            | 013  | 002 - THERMAL Overtime Labour    | 013 - SGP - Boiler | 43,905          | 0      | 43,905    |
| 002            | 013  | 002 - Overtime Labour (No AO)    | 013 - SGP - Boiler | 5,062           | 0      | 5,062     |
| 004            | 013  | 004 - THERMAL Term Labour        | 013 - SGP - Boiler | 100,469         | 0      | 100,469   |
| 004            | 013  | 004 - Term Labour (NO AO)        | 013 - SGP - Boiler | 284             | 0      | 284       |
| 011            | 013  | 011 - Travel Expense             | 013 - SGP - Boiler | 400             | 0      | 400       |
| 012            | 013  | 012 - Materials                  | 013 - SGP - Boiler | 1,431,421       | 0      | 1,431,421 |
| 013            | 013  | 013 - POWER PRODUCTION Contracts | 013 - SGP - Boiler | 1,978,838       | 0      | 1,978,838 |
| 041            | 013  | 041 - Meals & Entertainment      | 013 - SGP - Boiler | 330             | 0      | 330       |
| Total Cost:    |      |                                  |                    | 4,106,621       | 0      | 4,106,621 |
| Original Cost: |      |                                  |                    |                 |        |           |

CI Number : 28866-S265      - TRE-UNIT#6 LOW NOX COMBUSTION FIRIN      Project Number      S265  
 Parent CI Number :      -      Approved Date      11/8/2007  
 Cost Centre : 345      -      345-Trenton unit 6 Capital

#### Capital Item Justification

Justification Criteria : ENVIRONMENT

Sub-Criteria :

Name of Report :

Document Location :

Person Responsible :

#### Why do this project?

As specified in Schedule C of the Air Quality Regulations (N.S. Reg. 28/2005), NSPI has a regulatory requirement to limit annual NOx emissions to 21,365 tonnes starting in 2009. Installation of Low NOx Combustion Firing Systems on NSPI solid fuel generating units is the lowest cost option that will achieve the required NOx reduction.

The installation of a Low NOx Combustion Firing systems on Trenton Unit 6 is part of the third year of projects of a four year program. Three prior LNCFS installations have been approved by the UARB and are nearing completion. Performance achieved to date has reinforced the original NOx reductions forecast for this program.

#### Why do this project now?

The project planned for 2008 on Trenton Unit 6 is required for NSPI to comply with provincial regulations in 2009. Continuing the NOx reduction program in 2008 allows NSPI to align this installation with planned maintenance outages and assess the performance of completed retrofits to determine whether further investment in this program is required and refine processes as appropriate.

#### Why do this project this way?

Low NOx Combustion Firing Systems incorporating low NOx burners and separated overfire air systems have been evaluated as the least cost technology capable of meeting the legislated NOx reduction, effective 2009. The installed LNCFS on Lingan Unit 3 is approaching one year of service and the performance has been consistent with expected NOx reduction levels. The results on Unit 3 confirm the NOx reduction approach taken is capable of meeting the required NOx reduction.

|                        |                                       |                |           |
|------------------------|---------------------------------------|----------------|-----------|
| CI Number : 28866-S265 | - TRE-UNIT#6 LOW NOX COMBUSTION FIRIN | Project Number | S265      |
| Parent CI Number :     | -                                     | Approved Date  | 11/8/2007 |
| Cost Centre : 345      | - 345-Trenton unit 6 Capital          |                |           |

Reason for Variance / Over Expenditure / Final Costing

13604899

Please see the detailed variance explanation sheet.

|                                         |                  |               |                 |                                                                                                                                                                       |  |
|-----------------------------------------|------------------|---------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Trenton- Unit #6</b>                 |                  |               |                 |                                                                                                                                                                       |  |
| <b>Low Nox Combustion Firing System</b> |                  |               |                 |                                                                                                                                                                       |  |
| <b>CI #28866-S265</b>                   |                  |               |                 |                                                                                                                                                                       |  |
| <b>Account</b>                          | <b>Activated</b> | <b>Actual</b> | <b>Variance</b> | <b>Explain Variance</b>                                                                                                                                               |  |
| 001 - Labour                            | \$310,000        | \$143,848     | (\$166,152)     | Less regular plant trades and engineering resources required. Some of the work was completed by term employees.                                                       |  |
| 002 - Overtime Labour                   | \$20,000         | \$53,594      | \$33,594        | Large amounts of other work took place during the maintenance outage, causing additional overtime to be required.                                                     |  |
| 004 - Term Labour                       | \$20,000         | \$100,753     | \$80,753        | More work was completed by term employees than initially estimated.                                                                                                   |  |
| 011 - Travel Expense                    | \$30,000         | \$50,155      | \$20,155        | More travel for due diligence activities was completed because this was a new supplier to NSPI.                                                                       |  |
| 012 - Materials                         | \$2,353,500      | \$1,415,903   | (\$937,597)     | The supply contract for materials was budgeted prior to the procurement process being complete. The contract awarded was substantially less than initially estimated. |  |
| 013 - Contracts                         | \$2,450,000      | \$1,978,838   | (\$471,162)     | The installation contract was budgeted prior to the procurement process being complete. The contract awarded was substantially less than initially estimated.         |  |
| 028 - Consulting                        | \$115,000        | \$101,703     | (\$13,297)      | Consultant savings due to testing work completed by NSPI resources.                                                                                                   |  |
| 041 - Meals & Entertainment             | \$6,000          | \$7,557       | \$1,557         |                                                                                                                                                                       |  |
| 042 - Employee Benefits                 | \$0              | \$4,868       | \$4,868         |                                                                                                                                                                       |  |
| 094 - Interest                          | \$132,630        | \$116,850     | (\$15,780)      |                                                                                                                                                                       |  |
| 095 - AO                                | \$170,510        | \$132,555     | (\$37,955)      | AO is reduced due to lower labour and contract costs.                                                                                                                 |  |
|                                         | \$5,607,640      | \$4,106,624   | (\$1,501,016)   |                                                                                                                                                                       |  |



## UARB APPROVAL SHEET

Project Title: TRE Unit #6 Low Nox Combustion Firing System

CI Number: 28866

☒ Capital Project Authorization

Head Office Use:

☐ ATO

Project Number: 5265

☐ Final Cost

Date: September 21, 2007

| Location:           |                    |                    | Division:                 |         |
|---------------------|--------------------|--------------------|---------------------------|---------|
| Expenditure Profile |                    |                    | Schedule                  |         |
| YEAR                | Budget Estimate    | Project Estimate   |                           |         |
| 2008                | 5,607,640          | 5,607,640          | Estimated Start Date      | 2007-10 |
|                     |                    |                    | Estimated In-Service Date | 2008-07 |
|                     |                    |                    | Estimated Close Date      | 2008-12 |
| <b>Total</b>        | <b>\$5,607,640</b> | <b>\$5,607,640</b> |                           |         |

## COMMENTS

If U&amp;U Note: This item is submitted pursuant to section 35A (3)

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Approved on behalf of NOVA SCOTIA UTILITY AND REVIEW BOARD

Authorized Signatory

William Hattie

VP Generation Planning &amp; Infrastructure

DATE

Sept 22/07

Margaret A.M. Shears

Vice-Chair

DATE

31/10/07

NSPI  
CMS7155

Capital Management System  
Capital Item Detail  
Forecast

Date: 2007/09/21  
Page: 1 of 4

CI Number: 28866 - TRE-UNIT#6 LOW NOX COMBUSTION FIRING SYTEM  
Parent CI Number: -  
Responsibility: 05270000 - GENERATION SERVICES  
Cost Centre: 345 - Trenton unit 6 Capital

Project Number:  
Parent Project Number:  
Activated ACE Year:  
Current ACE Year: 2008

Capital Item Summary

Created by/on: AF339 2007/07/27  
Last Updated by/on: AD738 2007/09/20  
Recommended by/on:  
Activated by/on:  
Operational by/on:  
Ato Recommended by/on:  
Ato Granted by/on:  
Final Costed by/on:

Forecast

Start: 2007/10  
Operational: 2008/07  
Final Cost: 2008/12

Routine/Special: Special  
Interest Type: Cumulative  
Integrated Resource: No  
PCR Controlled: No

2008 5,607,640 0

Capital Contribution: 0 0

Total: 5,607,640 0

Original Cost: 0 0

The purpose of this project is to install a low NOx combustion firing system on Trenton Unit 6.

The scope of the work includes:

- Pre-outage baseline performance testing;
- Installation of low NOx combustion firing system, including an overfire air system, burner and windbox modifications and associated control equipment and instrumentation;
- Adjustment and tuning of existing burner automation and boiler modulating systems;
- Installation of waterwall offset corner tube panel assemblies for the new overfire air port openings in the furnace waterwalls;
- Modification of platforms, stairs, grating, and structural steel required for access to the equipment;
- Installation of Continuous Emission Monitors for NOx and carbon monoxide;
- Staff training on the new equipment;
- Calibration and testing of field equipment and instrumentation;
- Commissioning and tuning of the Low NOx Combustion Firing System; and
- Post outage performance testing of the Low NOx Combustion Firing System.

NSPI

## Capital Management System

Date: 2007/09/21

CMS7155

## Capital Item Detail

Page: 2 of 4

## Forecast

CI Number: 28866 - TRE-UNIT#6 LOW NOX COMBUSTION FIRING SYTEM  
 Parent CI Number: -  
 Responsibility: 05270000 - GENERATION SERVICES  
 Cost Centre: 345 - Trenton unit 6 Capital

Project Number:  
 Parent Project Number:  
 Activated ACE Year:  
 Current ACE Year: 2008

## Capital Item Accounts

| Acct        | Actv | Div  | Account                 | Activity                     | Forecast<br>Amount | Amount | Variance |
|-------------|------|------|-------------------------|------------------------------|--------------------|--------|----------|
| 094         | 005  | 0527 | INTEREST CAPITALIZED    | 005 Indirect Costs           | 132,630            | 0      | 0        |
| 095         | 005  | 0527 | CONSTRUCTION OVERHEAD   | 005 Indirect Costs           | 170,510            | 0      | 0        |
| 001         | 013  | 0527 | REGULAR LABOUR          | 013 Boiler                   | 150,000            | 0      | 0        |
| 002         | 013  | 0527 | OVERTIME LABOUR         | 013 Boiler                   | 20,000             | 0      | 0        |
| 004         | 013  | 0527 | TERM LABOUR             | 013 Boiler                   | 20,000             | 0      | 0        |
| 011         | 013  | 0527 | TRAVEL                  | 013 Boiler                   | 2,000              | 0      | 0        |
| 012         | 013  | 0527 | MATERIALS               | 013 Boiler                   | 2,350,000          | 0      | 0        |
| 013         | 013  | 0527 | CONTRACTS               | 013 Boiler                   | 2,450,000          | 0      | 0        |
| 041         | 013  | 0527 | MEALS AND ENTERTAINMENT | 013 Boiler                   | 1,000              | 0      | 0        |
| 001         | 085  | 0527 | REGULAR LABOUR          | 085 Design                   | 160,000            | 0      | 0        |
| 011         | 085  | 0527 | TRAVEL                  | 085 Design                   | 28,000             | 0      | 0        |
| 012         | 085  | 0527 | MATERIALS               | 085 Design                   | 3,500              | 0      | 0        |
| 028         | 085  | 0527 | CONSULTING              | 085 Design                   | 115,000            | 0      | 0        |
| 041         | 085  | 0527 | MEALS AND ENTERTAINMENT | 085 Design                   | 5,000              | 0      | 0        |
| 066         | BGT  | 0527 | OTHER GOODS & SERVICES  | BGT Budget Only Capital Act: | 0                  | 0      | 0        |
| Total Cost: |      |      |                         |                              | 5,607,640          | 0      | 0        |

NSPI

## Capital Management System

Date: 2007/09/21

CMS7155

## Capital Item Detail

Page: 3 of 4

## Forecast

CI Number: 28866 - TRE-UNIT#6 LOW NOX COMBUSTION FIRING SYTEM  
 Parent CI Number: -  
 Responsibility: 05270000 - GENERATION SERVICES  
 Cost Centre: 345 - Trenton unit 6 Capital

Project Number:  
 Parent Project Number:  
 Activated ACE Year:  
 Current ACE Year: 2008

## Capital Item Justification

|                         |                |                |       |            |
|-------------------------|----------------|----------------|-------|------------|
| Justification Criteria: | ENVIRONMENT    | Created by/on: | AF339 | 2007/07/27 |
| Sub-Criteria:           |                | Updated by/on: | AD738 | 2007/09/20 |
| Name Of Report:         |                |                |       |            |
| Document Location:      |                |                |       |            |
| Person Responsible:     | DEBRA MCLELLAN |                |       |            |

## Justification Memo: 1. Why Do This Project?

As specified in Schedule C of the Air Quality Regulations (N.C. Reg. 28/2005), NSPI has a regulatory requirement to limit annual NOx emissions to 21,365 tonnes starting in 2009. Installation of Low NOx Combustion Firing Systems on NSPI solid fuel generating units is the lowest cost option that will achieve the required NOx reduction.

The installation of a Low NOx Combustion Firing systems on Trenton Unit 6 is part of the third year of projects of a four year program. Three prior LNCFS installations have been approved by the UARB and are nearing completion. Performance achieved to date has reinforced the original NOx reductions forecast for this program.

## 2. Why Do This Project Now?

The project planned for 2008 on Trenton Unit 6 is required for NSPI to comply with provincial regulations in 2009. Continuing the NOx reduction program in 2008 allows NSPI to align this installation with planned maintenance outages and assess the performance of completed retrofits to determine whether further investment in this program is required and refine processes as appropriate.

## 3. Why Do the Project This Way?

Low NOx Combustion Firing Systems incorporating low NOx burners and separated overfire air systems have been evaluated as the least cost technology capable of meeting the legislated NOx reduction, effective 2009. The installed LNCFS on Lingan Unit 3 is approaching one year of service and the performance has been consistent with expected NOx reduction levels. The results on Unit 3 confirm the NOx reduction approach taken is capable of meeting the required NOx reduction.

NSPI  
CMS7155

Capital Management System  
Capital Item Detail  
Forecast

Date: 2007/09/21  
Page: 4 of 4

CI Number: 28866 - TRE-UNIT#6 LOW NOX COMBUSTION FIRING SYTEM  
Parent CI Number: -  
Responsibility: 05270000 - GENERATION SERVICES  
Cost Centre: 345 - Trenton unit 6 Capital

Project Number:  
Parent Project Number:  
Activated ACE Year:  
Current ACE Year: 2008

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Reason for Variance / Over Expenditure / Final Costing

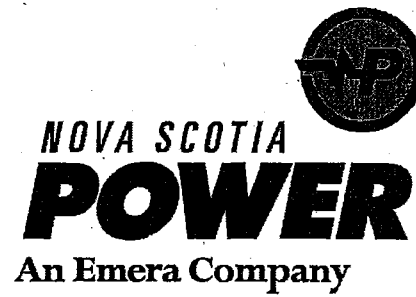
Created by/on:  
Updated by/on:

# ORIGINAL

**LOW NO<sub>x</sub> COMBUSTION FIRING SYSTEMS**

**LINGAN 1 (CI 28867), Pt. Tupper 2 (CI 28865) and Trenton 6 (CI 28866)**





## 2008 NO<sub>x</sub> REDUCTION PROGRAM

**RECEIVED**  
SEP 25 2007

Nova Scotia  
Utility and Review Board

September 2007

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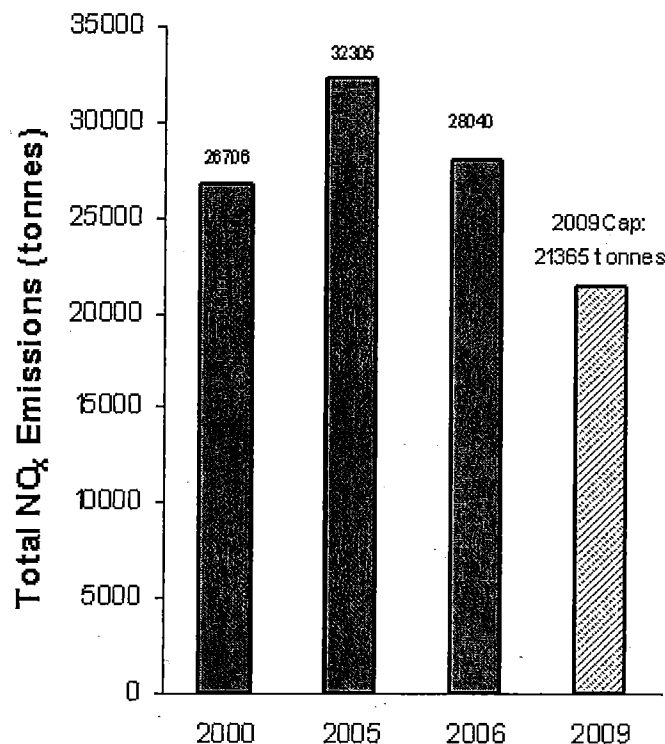
## APPENDICES

- I. Air Quality Regulations (N.S. Reg. 28/2005), Schedule C
- II. Project Cost Estimates
- III. CMS Documentation

## Background

By 2009, Nova Scotia Power Inc. (NSPI) nitrogen oxides (NO<sub>x</sub>) emissions must be reduced to 20% below Year 2000 levels. This is required by an amendment to the Nova Scotia *Environment Act* (S.N.S. 1994-1995, c.1) (see Appendix I).

The Year 2000-based reduction is in addition to that necessary to offset the increase in annual NO<sub>x</sub> production since 2000. The increase since 2000 is due to increased thermal generation and changes in fuel blends since that time (see figure below). 2006 reflects a major customer not operating.



**Figure 1 NSPI Annual NO<sub>x</sub> Emissions and 2009 Cap**

In 2005, NSPI developed a NO<sub>x</sub> reduction program to ensure compliance with the Province's Regulations. The program calls for the installation of Low NO<sub>x</sub> Combustion Firing Systems (LNCFS) on seven of NSPI's eight solid fuel generation units. The program includes Lingan Units 1-4, Point Tupper 2 and Trenton Units 5 and 6. Point Aconi was not included in the program because it was constructed with NO<sub>x</sub> reduction technology.

As the first step in this program, in 2005 NSPI filed a work order application with the Nova Scotia Utility and Review Board (UARB, the Board) requesting approval to install a Low NO<sub>x</sub> Combustion Firing System (LNCFS) on Lingan Unit 3. The Lingan Unit 3 work order was approved by the UARB in 2006, with the direction that NSPI undertake a program of combustion optimization and complete an assessment of the Lingan Unit 3 LNCFS installation, prior to additional applications under this program.

The Lingan Unit 3 retrofit was completed in 2006. NSPI also complied with the Board's directives concerning the combustion optimization and Lingan 3 assessment. This information was filed with the Board. As well the results were incorporated within the applications filed with the Board in 2006 to complete additional LNCFS retrofits on Lingan Units 2 and 4 in 2007. These projects were approved by the Board in 2007. The two retrofits, the second and third in the NO<sub>x</sub> reduction program, are to be completed in the fall of 2007.

The enclosed provides for the execution of Year 3 of the Low NO<sub>x</sub> program. LNCFS installations are proposed for 2008 for Lingan Unit 1, Point Tupper Unit 2 and Trenton Unit 6.

### **NO<sub>x</sub> Reduction Multi-Year Plan**

The table below summarizes NSPI's NO<sub>x</sub> Reduction Program. The program incorporates low NO<sub>x</sub> combustion technology, combined with associated combustion optimization to enable NSPI to meet its NO<sub>x</sub> cap in 2009. Annual LNCFS installations are presented for the years 2005 to 2009, along with the forecast reduction for 2009, and gap from that required by Nova Scotia Regulations.

The Program has not changed materially from that presented in the previous applications to the UARB. NSPI continues to forecast that installations for six solid fuel fired units are required to meet the 2009 target by a small margin. A decision with respect to the requirement for a subsequent 2009 installation will be made in 2008.

**Table 1 Multi Year NO<sub>x</sub> Reduction Program**

| <b>Emission Point</b>              | <b>2009 Forecast<sup>1</sup></b> |                                            |                                                   |                                                                       |                                        |
|------------------------------------|----------------------------------|--------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------|
|                                    | <b>2005<br/>No<br/>Retrofits</b> | <b>2006<br/>Program<br/>(Lingan<br/>3)</b> | <b>2007<br/>Program<br/>(Lingan 2<br/>&amp;4)</b> | <b>2008<br/>Program<br/>(Lingan 1<br/>Trenton 6<br/>Pt. Tupper 2)</b> | <b>2009<br/>Program<br/>(Trenton5)</b> |
| Lingan 1                           | 3705                             | 3705                                       | 3705                                              | 1720                                                                  | 1720                                   |
| Lingan 2                           | 3769                             | 3769                                       | 1749                                              | 1749                                                                  | 1749                                   |
| Lingan 3                           | 4135                             | 1725                                       | 1725                                              | 1725                                                                  | 1725                                   |
| Lingan 4                           | 4185                             | 4185                                       | 1745                                              | 1745                                                                  | 1745                                   |
| Point Tupper                       | 3559                             | 3559                                       | 3559                                              | 1761                                                                  | 1761                                   |
| Trenton 5                          | 4266                             | 4266                                       | 4266                                              | 4266                                                                  | 3631 <sup>2</sup>                      |
| Trenton 6                          | 4421                             | 4421                                       | 4421                                              | 2010                                                                  | 2010                                   |
| Other NSPI <sup>3</sup>            | 5522                             | 5522                                       | 5522                                              | 5522                                                                  | 5522                                   |
| NO <sub>x</sub> Emissions (tonnes) | 33561                            | 31151                                      | 26691                                             | 20497                                                                 | 19862                                  |
| Delta from 2009 cap (21365 t)      | 12196                            | 9786                                       | 5326                                              | -868                                                                  | -1503                                  |
| % reduction from 2000              | -                                | -                                          | 0.1%                                              | 23.2%                                                                 | 25.6%                                  |

Summaries of the annual programs are provided below:

**2006 – Lingan Unit 3** – The 2006 work scope included the installation of a Low NO<sub>x</sub> Combustion Firing System on Lingan Unit 3 and a program of combustion optimization. This project is to be final-costed in 2007. The current estimate is \$3.8 million. Unit 3 has maintained good performance since commissioning, with NO<sub>x</sub> emissions intensity reduction of greater than 50%.

<sup>1</sup> Each of the columns projects 2009 NO<sub>x</sub> emissions that will result from the completion of that year's NO<sub>x</sub> reduction retrofits.

<sup>2</sup> Based on September 2009 maintenance outage.

<sup>3</sup> Includes emissions from Point Aconi, Tufts Cove, and Combustion Turbines.

**2007 - Lingan Units 2 and 4** - The 2007 work scope includes the installation of Low NO<sub>x</sub> Combustion Firing Systems on Lingan Units 2 and 4. The work is to be completed in the fall of 2007.

Current estimates for the cost of the retrofits for Lingan Units 2 and 4 are \$4.1 million and \$4.4 million respectively. Combustion optimization and tuning is being completed for the new equipment. Completion of these projects will enable NO<sub>x</sub> emissions to be reduced to approximately the levels produced by NSPI in 2000.

**2008 - Lingan Unit 1, Point Tupper Unit 2 and Trenton Unit 6** - The 2008 work scope includes the installation of Low NO<sub>x</sub> Combustion Firing Systems on Lingan Unit 1, Point Tupper Unit 2 and Trenton Unit 6. Combustion optimization and tuning of the new equipment will be included.

This work scope is forecast to provide a nominal reduction of 868 tonnes below the 2009 NO<sub>x</sub> emissions cap, providing a small margin to accommodate changes in operating conditions resulting from fuels and seasonal variation.

**2009 - Trenton Unit 5** - The current 2009 work scope includes the installation of a Low NO<sub>x</sub> Combustion Firing System on Trenton Unit 5. Combustion optimization and tuning of the new equipment will be included. This project will be considered in 2008 and a work order application for Unit 5 will be prepared and submitted to the UARB at that time if appropriate.

The forecast NO<sub>x</sub> reduction from this unit in 2009 to 3,631 tonnes assumes installation of LNCFS equipment in September, 2009.

## Summary

NSPI will shortly complete Year 2 of the four-year NO<sub>x</sub> Reduction Program. Within the coming weeks the third retrofit will be completed. This will leave three units to be retrofitted, in 2008 and, it's expected, one unit to be completed in 2009. NSPI's evaluation to date confirms the NO<sub>x</sub> reductions originally forecast for the retrofitted units are being achieved.

NSPI's four year plan is unchanged from previous work order filings. To meet the requirement for a total reduction of 20% below 2000 levels, Low NO<sub>x</sub> Combustion Firing System retrofits for Lingan 1, Trenton 6 and Point Tupper 2 will be required in 2008. This work is forecast to provide the required system-wide NO<sub>x</sub> reduction by a small margin. A determination as to whether additional investment in this program will be necessary is planned for 2008.

### **Work Order Requests**

Pending UARB approval, in 2008 NSPI will undertake the third year of its four year NO<sub>x</sub> Reduction program. Three low NO<sub>x</sub> retrofits are required for Lingan Unit 1 (CI 28867), Point Tupper Unit 2 (CI 28865), and Trenton Unit 6 (CI 28866) at an estimated cost of \$4.1 million, \$4.5 million, and \$5.6 million respectively.

Project budget estimates have been prepared based on costs provided by the Original Equipment Manufacturers and actual costs incurred during the low NO<sub>x</sub> retrofit projects on Lingan Units 2, 3, and 4.

The Lingan 3 project is estimated at \$3.8 million. The approved cost for Lingan 2 is \$4.1 million and \$4.4 million for Lingan 4. The higher estimate provided in the Trenton 6 application is due to the boiler construction and burner design for this unit which will require more extensive modifications than prior LNCFS installations. Market prices for materials and labour is also generally affecting the costs of these projects.

Cost detail and Capital Management System documentation for the three projects is provided in Appendices II and III respectively.

The scope of the work includes:

- Pre-outage baseline performance testing;
- Installation of low NO<sub>x</sub> combustion firing system, including an overfire air system, burner and windbox modifications and associated control equipment and instrumentation;
- Adjustment and tuning of existing burner automation and boiler modulating systems;

- Installation of waterwall offset corner tube panel assemblies for the new overfire air port openings in the furnace waterwalls;
- Modification of platforms, stairs, grating, and structural steel required for access to the equipment;
- Installation of Continuous Emission Monitors for NO<sub>x</sub> and carbon monoxide;
- Staff training on the new equipment;
- Calibration and testing of field equipment and instrumentation;
- Commissioning and tuning of the Low NO<sub>x</sub> Combustion Firing System; and
- Post outage performance testing of the Low NO<sub>x</sub> Combustion Firing System.

## **Justification**

### **1. Why Do This Project?**

As specified in Schedule C of the Air Quality Regulations (N.S. Reg. 28/2005), NSPI has a regulatory requirement to limit annual NO<sub>x</sub> emissions to 21,365 tonnes starting in 2009. Installation of Low NO<sub>x</sub> Combustion Firing Systems on NSPI solid fuel generating units is the lowest cost option that will achieve the required NO<sub>x</sub> reduction.

The installation of Low NO<sub>x</sub> Combustion Firing systems on Lingan Unit 1, Point Tupper Unit 2, and Trenton Unit 6 comprise the third year of a four year program. Three prior LNCFS installations have been approved by the UARB and are nearing completion. Performance achieved to date has reinforced the original NO<sub>x</sub> reductions forecast for this program.

### **2. Why Do This Project Now?**

The projects planned for 2008 on Lingan Unit 1, Point Tupper Unit 2, and Trenton Unit 6 are required for NSPI to comply with provincial regulations in 2009. Continuing the NO<sub>x</sub> reduction program in 2008 allows NSPI to align these installations with planned maintenance outages and assess the performance of completed retrofits to determine

whether further investment in this program is required and refine processes as appropriate.

### 3. **Why Do the Project This Way?**

Low NO<sub>x</sub> Combustion Firing Systems incorporating low NO<sub>x</sub> burners and separated overfire air systems have been evaluated as the least cost technology capable of meeting the legislated NO<sub>x</sub> reduction, effective 2009. The installed LNCFS on Langan Unit 3 is approaching one year of service and the performance has been consistent with expected NO<sub>x</sub> reduction levels. The results on Unit 3 confirm the NO<sub>x</sub> reduction approach taken is capable of meeting the required NO<sub>x</sub> reduction.

Implementation of these systems over a four year period allows alignment with maintenance schedules and refinement to installation processes as the program moves forward.

## **Business Drivers**

### **Project Justification Criteria - Environmental**

Low NO<sub>x</sub> retrofits to Langan 1, Point Tupper 2 and Trenton 6 comprise Year 3 of NSPI's four year NO<sub>x</sub> Reduction Program. The installations are required to enable NSPI to reduce NO<sub>x</sub> to the levels required by provincial regulations by 2009.

Success will be measured by:

1. Completion of low NO<sub>x</sub> retrofits on Langan Unit 1, Point Tupper Unit 2, and Trenton Unit 6 in accordance with established safety performance targets and within schedule and budget; and
2. Performance demonstration testing that confirms the specified performance guarantees have been achieved.

### Schedule and Project Implementation

The following table provides a summary of the schedule of work included in the three capital projects.

| <b>Task</b>                 | <b>Lingan Unit 1</b> | <b>Pt Tupper Unit 2</b> | <b>Trenton Unit 6</b> |
|-----------------------------|----------------------|-------------------------|-----------------------|
| Submission to UARB          | September 2007       |                         |                       |
| Authorize vendor to proceed | November 2007        |                         |                       |
| Delivery to Site            | August 2008          | June 2008               | April 2008            |
| Start of Outage             | September 2008       | July 2008               | May 2008              |
| Completion of Work          | October 2008         | August 2008             | June 2008             |
| Guarantee Testing           | November 2008        | September 2008          | July 2008             |

This consolidation is unofficial and is for reference only. For the official version of the regulations, consult the original documents on file with the Registry of Regulations, or refer to the Royal Gazette Part II.

Regulations are amended frequently. Please check the list of Regulations by Act to see if there are any recent amendments to these regulations filed with the Registry that are not yet included in this consolidation.

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## Air Quality Regulations

made under Section 112 of the  
*Environment Act*

S.N.S. 1994-95, c. 1

O.I.C. 2005-87 (February 25, 2005, effective March 1, 2005), N.S. Reg. 28/2005

### Citation

1 These regulations may be cited as the *Air Quality Regulations*.

### Definitions

2 In these regulations,

- (a) "Act" means the *Environment Act*;
- (b) "Administrator" means a person appointed by the Minister under subsection 21(1) of the Act to administer these regulations, and includes an acting Administrator;
- (c) "averaging period" in Schedule A means that period of time over which an arithmetic mean or geometric mean, as the case may be, is calculated;
- (d) "designated material" means a material described in Schedule B to these regulations;
- (e) "facility" includes a petroleum refinery;
- (f) "heavy fuel oil" means petroleum residual fuel that is used in liquid-fuel-burning equipment;
- (g) "Minister" means the Minister of Environment and Labour.

### Ambient air quality criteria

3 (1) The criteria for ambient air quality throughout the Province are prescribed in Schedule A and are expressed as maximum permissible ground level concentrations.

(2) An approval issued by the Minister or an Administrator must contain provisions to ensure that the maximum permissible ground level concentrations prescribed in Schedule A are not exceeded.

**Burning offences**

4 (1) Except as provided in subsection (2) and except as provided in the *Used Oil Regulations*, a person must not carry out, cause, permit or be responsible for the burning of a designated material without prior written authorization from the Minister or an Administrator.

(2) Subsection (1) does not apply to burning conducted by a person or organization that is authorized by the Province to conduct courses to train fire-fighting personnel.

**Gasoline volatility limit**

5 (1) In this Section, "motor gasoline" means gasoline intended for use as motor fuel.

(2) The volatility limit for the vapour pressure of motor gasoline is 72 kPa.

(3) During the period from May 15 to September 15 in each year, both dates inclusive,

(a) a person who refines motor gasoline must not cause or permit any motor gasoline intended for use in the Province to leave the refinery if the motor gasoline's vapour pressure exceeds the volatility limit; and

(b) a person who imports into the Province any motor gasoline that has a vapour pressure that exceeds the volatility limit must not cause or permit

(i) the transfer of possession of the motor gasoline; or

(ii) the transfer of the motor gasoline from one container to another.

(4) The vapour pressure of motor gasoline must be determined in accordance with

(a) procedure *D 5191--01 Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method)* prepared by the American Society for Testing Materials, as amended from time to time; or

(b) a procedure approved in writing by the Minister or an Administrator.

**Provincial emission cap**

6 (1) The Provincial annual sulphur dioxide emission cap is

(a) effective April 11, 1995, 189 000 t;

(b) effective March 1, 2005, 141 750 t.

(2) A person who owns, operates or is responsible for facilities that release emissions in excess of 90 tonnes of sulphur dioxide per year in the aggregate must, not later than February 15 of each year or as otherwise directed by an Administrator, in a form specified by the Administrator, submit a report to the Minister or an Administrator on the sulphur throughput, noting the fuel usage, sulphur content and corresponding sulphur dioxide emissions for the previous calendar year from each facility owned or operated by, or under the responsibility of, the person.

(3) Subject to subsection (4), annual sulphur dioxide, nitrogen oxide and mercury emission allocations are assigned to persons listed in Schedule C in the amounts set out in that Schedule.

(4) For the purposes of achieving environmental quality standards and objectives in a cost-effective manner, compliance with an annual emission allocation assigned in Schedule C may be achieved by the inclusion of permits or allowances obtained under any emissions trading program established by the Minister under Section 15 of the Act or by an Administrator to whom the Minister has delegated the appropriate authority under Section 17 of the Act.

(5) If the annual emission allocation assigned in Schedule C for a substance is exceeded, the person responsible must, unless exempted in writing by the Minister because of unusual and unavoidable circumstances,

(a) within the 3 years following the calendar year in which the excess emissions occurred, compensate for the excess emissions by reducing annual emissions of the substance to a level below the annual allocation assigned for the substance in order to result in a total reduction of emissions of the substance equal to the amount of the excess emissions, in accordance with a plan submitted under clause (b) and approved by the Minister or an Administrator; and

(b) not later than February 15 of the year following the calendar year in which the excess emissions occurred, submit a plan indicating how the excess emissions will be recovered to the Minister or an Administrator for approval.

#### **Emission reduction plans**

7 (1) A person who owns, operates or is responsible for facilities that existed in 2001 and that release emissions in excess of 90 tonnes of sulphur dioxide per year in the aggregate must submit to an Administrator an emission reduction plan demonstrating the proposed means to achieve sulphur dioxide emission reductions of 25% from 2001 levels by 2010 for facilities owned or operated by, or under the responsibility of, the person.

(2) An emission reduction plan must be submitted not later than December 31, 2007, in accordance with specifications issued by the Minister or an Administrator.

#### **Sulphur content of heavy fuel oil consumed in a facility other than a petroleum refinery**

8 (1) Effective July 1, 2005, the sulphur content of heavy fuel oil consumed in a facility other than a petroleum refinery must not exceed

(a) 2.2% by mass; and

(b) 2.0% on an annual basis.

(2) A person who owns, operates or is responsible for a facility that consumes heavy fuel oil must make available to an Administrator, upon request, a report noting fuel type and usage, sulphur content and corresponding average sulphur levels for heavy fuel oil consumed in the previous calendar year at each facility owned or operated by, or under the responsibility of, the person.

**Sulphur content of total fuel consumed in a petroleum refinery**

**9 (1)** Effective July 1, 2005, the sulphur content of the total fuel consumed in a petroleum refinery must not exceed

(a) 2.2% by mass; and

(b) 2.0% on an annual basis.

(2) A person who owns, operates or is responsible for a petroleum refinery that consumes heavy fuel oil must make available to an Administrator, upon request, a report noting fuel type and usage, sulphur content and corresponding average sulphur levels for total fuel consumed in the previous calendar year at each refinery owned or operated by, or under the responsibility of, the person.

**Reporting and records**

**10 (1)** A person who is required to report under subsection 8(2) or subsection 9(2) must maintain all records of reported details for 5 years.

(2) A person who acquires a facility that consumes heavy fuel oil must obtain and maintain the records retained under subsection (1) from the person from whom the facility was transferred.

### Schedule A

#### Maximum Permissible Ground Level Concentrations

| Contaminant                         | Averaging Period | Maximum Permissible Ground Level Concentration |      |
|-------------------------------------|------------------|------------------------------------------------|------|
|                                     |                  | $\mu\text{g}/\text{m}^3$                       | pphm |
| Carbon Monoxide (CO)                | 1 hour           | 34 600                                         | 3000 |
|                                     | 8 hours          | 12 700                                         | 1100 |
| Hydrogen Sulfide (H <sub>2</sub> S) | 1 hour           | 42                                             | 3    |
|                                     | 24 hours         | 8                                              | 0.6  |
| Nitrogen Dioxide (NO <sub>2</sub> ) | 1 hour           | 400                                            | 21   |
|                                     | Annual           | 100                                            | 5    |
| Ozone (O <sub>3</sub> )             | 1 hour           | 160                                            | 8.2  |
| Sulphur Dioxide (SO <sub>2</sub> )  | 1 hour           | 900                                            | 34   |
|                                     | 24 hours         | 300                                            | 11   |

|                          |          |     |   |
|--------------------------|----------|-----|---|
|                          | Annual   | 60  | 2 |
| <b>Total Suspended</b>   | 24 hours | 120 | - |
| <b>Particulate (TSP)</b> | Annual   | 70* | - |

\* - geometric mean

$\mu\text{g}/\text{m}^3$  - micrograms per cubic metre

pphm - parts per hundred million

### Schedule B Designated Materials

- (1) a tire
- (2) waste dangerous goods as defined in the *Dangerous Goods Management Regulations*
- (3) used oil as defined in the *Used Oil Regulations*
- (4) a railway tie or other wood treated with wood preservative
- (5) a material containing rubber or plastic
- (6) an asphalt shingle

### Schedule C Annual Sulphur Dioxide, Nitrogen Oxide and Mercury

Emission Allocations for Nova Scotia Power Incorporated

#### 1 Sulphur dioxide

- (1) Commencing in 1995, and in each year thereafter until March 1, 2005, the annual emissions of sulphur dioxide from fossil fuel-fired thermal power generating stations owned or operated by Nova Scotia Power Incorporated and affiliated companies must not in any calendar year exceed, in the aggregate, 145 000 t.
- (2) Effective March 1, 2005, and in each calendar year thereafter until December 31, 2009, the annual emissions of sulphur dioxide from fossil fuel-fired thermal power generating stations owned or operated by Nova Scotia Power Incorporated and affiliated companies must not in any calendar year exceed, in the aggregate, 108 750 t.
- (3) For the year 2005 only, the annual sulphur dioxide emissions cap allocated under item

(2) may be prorated on the basis of the effective date of these regulations, as authorized in writing by the Minister.

(4) Commencing in 2010, and in each calendar year thereafter, the annual emissions of sulphur dioxide from fossil fuel-fired thermal power generating stations owned or operated by Nova Scotia Power Incorporated and affiliated companies must not in any calendar year exceed, in the aggregate, 72 500 t.

## 2 Nitrogen oxide

(1) Commencing in 2009, and in each calendar year thereafter, the annual emissions of nitrogen oxides (NOx) from fossil fuel-fired thermal power generating stations owned or operated by Nova Scotia Power Incorporated and affiliated companies must not in any calendar year exceed, in the aggregate, 21 365 t.

(2) Commencing in 2010, and in each calendar year thereafter, a report must be submitted to the Minister or an Administrator noting the nitrogen oxide (NOx) emissions for the previous calendar year from each fossil fuel-fired thermal power generating station owned or operated by Nova Scotia Power Incorporated and affiliated companies. The report must be submitted not later than February 15 of each calendar year, or as otherwise directed by an Administrator, in a form specified by the Administrator.

## 3 Mercury

(1) Commencing March 1, 2005, and in each calendar year thereafter, the annual emissions of mercury from coal-fired thermal power generating stations owned or operated by Nova Scotia Power Incorporated and affiliated companies must not in any calendar year exceed, in the aggregate, 168 kg.

(2) Commencing January 1, 2006, and in each calendar year thereafter, a report must be submitted to the Minister or an Administrator noting the mercury emissions for the previous calendar year from each coal-fired thermal power generating station owned or operated by Nova Scotia Power Incorporated and affiliated companies. The report must be submitted not later than February 15 of each year, or as otherwise directed by Administrator, in a form specified by the Administrator.

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Last updated: 10-08-2005

Appendix II

## Capital Project Estimate Sheet

|                                                                                          |                                               |  |                                 |
|------------------------------------------------------------------------------------------|-----------------------------------------------|--|---------------------------------|
| Name of Project: Lingan Unit 1 - Low NOx Combustion Firing System- JULY 20,2007 ESTIMATE |                                               |  |                                 |
| Project No.                                                                              | Division Power Production Generation Services |  | Estimated Completion Date: 2008 |
| Capital Item No.                                                                         | Responsibility Code 05130000                  |  | Function                        |
| Estimated By: Bill Small                                                                 | Approved by: Doug Campbell                    |  | Date: Sept 10, 2007             |

| COO | ACCT | ACTIV | CO  | PROJ | Description                                                                                                                                                                                                                                                  | Total Cost            | Quantity | Unit |
|-----|------|-------|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|------|
|     |      |       |     |      | <b>Activity 005 - Indirect Costs</b><br>Includes administrative and financing costs of construction.                                                                                                                                                         |                       |          |      |
| 2   | 094  | 005   | 301 |      | Interest Capitalized                                                                                                                                                                                                                                         | \$104,000.00          |          |      |
| 2   | 095  | 005   | 301 |      | Construction Overhead                                                                                                                                                                                                                                        | \$134,620.00          |          |      |
|     |      |       |     |      | <b>Total Activity 005 Indirect Costs =</b>                                                                                                                                                                                                                   | <b>\$238,620.00</b>   |          |      |
|     |      |       |     |      | <b>Activity 013 - Boiler</b><br>Will include the design, supply, erection, commissioning and testing of a low NOx combustion firing system for Lingan Unit 3.                                                                                                |                       |          |      |
| 2   | 001  | 013   | 301 |      | Regular Labour                                                                                                                                                                                                                                               | \$130,000.00          |          |      |
| 2   | 002  | 013   | 301 |      | Overtime Labour                                                                                                                                                                                                                                              | \$20,000.00           |          |      |
| 2   | 004  | 013   | 301 |      | Term Labour                                                                                                                                                                                                                                                  | \$20,000.00           |          |      |
| 2   | 011  | 013   | 301 |      | Travel                                                                                                                                                                                                                                                       | \$3,000.00            |          |      |
| 2   | 012  | 013   | 301 |      | Materials                                                                                                                                                                                                                                                    | \$1,710,800.00        |          |      |
| 2   | 013  | 013   | 301 |      | Contracts                                                                                                                                                                                                                                                    | \$1,725,000.00        |          |      |
| 2   | 041  | 013   | 301 |      | Meals                                                                                                                                                                                                                                                        | \$1,000.00            |          |      |
|     |      |       |     |      | <b>Total Activity 013 Boiler =</b>                                                                                                                                                                                                                           | <b>\$3,609,800.00</b> |          |      |
|     |      |       |     |      | <b>Activity 085 - Design</b><br>Includes the costs of salaries, travel and living expenses of all NSPI regular and casual staff including project management, design, CADD, plant, procurement, legal, scheduling, cost control, etc assigned to the Project |                       |          |      |
| 2   | 001  | 085   | 301 |      | Regular Labour                                                                                                                                                                                                                                               | \$165,000.00          |          |      |
| 2   | 011  | 085   | 301 |      | Travel                                                                                                                                                                                                                                                       | \$15,000.00           |          |      |
| 2   | 012  | 085   | 301 |      | Materials                                                                                                                                                                                                                                                    | \$1,500.00            |          |      |
| 2   | 028  | 085   | 301 |      | Consulting                                                                                                                                                                                                                                                   | \$115,000.00          |          |      |
| 2   | 041  | 085   | 301 |      | Meals and Entertainment                                                                                                                                                                                                                                      | \$5,000.00            |          |      |
|     |      |       |     |      | <b>Total Activity 085 Design =</b>                                                                                                                                                                                                                           | <b>\$301,500.00</b>   |          |      |
|     |      |       |     |      | <b>Total Project</b>                                                                                                                                                                                                                                         | <b>\$4,149,920.00</b> |          |      |

**Capital Project Estimate Sheet**

|                                                                                           |                                               |                                 |  |
|-------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------|--|
| Name of Project: Pt. Tupper Unit 2 - Low NOx Combustion Firing System JUNE, 2007 ESTIMATE |                                               |                                 |  |
| Project No.                                                                               | Division Power Production Generation Services | Estimated Completion Date: 2008 |  |
| Capital Item No.                                                                          | Responsibility Code 05130000                  | Function                        |  |
| Estimated By: Bill Small                                                                  | Approved by: Doug Campbell                    | Date: Sept 10, 2007             |  |

| Accounting Flexfield |      |       |     |      | Description                                                                                                                                                                                                                                                  | Total Cost            | Quantity | Unit |
|----------------------|------|-------|-----|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|------|
| CO                   | ACCT | ACTIV | ACC | PROJ |                                                                                                                                                                                                                                                              |                       |          |      |
|                      |      |       |     |      | <b>Activity 005 - Indirect Costs</b><br>Includes administrative and financing costs of construction.                                                                                                                                                         |                       |          |      |
| 2                    | 094  | 005   | 301 |      | Interest Capitalized                                                                                                                                                                                                                                         | \$111,400.00          |          |      |
| 2                    | 095  | 005   | 301 |      | Construction Overhead                                                                                                                                                                                                                                        | \$142,630.00          |          |      |
|                      |      |       |     |      | <b>Total Activity 005 Indirect Costs =</b>                                                                                                                                                                                                                   | <b>\$254,030.00</b>   |          |      |
|                      |      |       |     |      | <b>Activity 013 - Boiler</b><br>Will include the design, supply, erection, commissioning and testing of a low NOx combustion firing system for Pt. Tupper Unit 2.                                                                                            |                       |          |      |
| 2                    | 001  | 013   | 301 |      | Regular Labour                                                                                                                                                                                                                                               | \$160,000.00          |          |      |
| 2                    | 002  | 013   | 301 |      | Overtime Labour                                                                                                                                                                                                                                              | \$21,000.00           |          |      |
| 2                    | 004  | 013   | 301 |      | Term Labour                                                                                                                                                                                                                                                  | \$20,000.00           |          |      |
| 2                    | 011  | 013   | 301 |      | Travel                                                                                                                                                                                                                                                       | \$2,000.00            |          |      |
| 2                    | 012  | 013   | 301 |      | Supply of low NOx combustion firing system and associated equipment                                                                                                                                                                                          | \$1,936,800.00        |          |      |
| 2                    | 013  | 013   | 301 |      | Contracts                                                                                                                                                                                                                                                    | \$1,805,000.00        |          |      |
| 2                    | 041  | 013   | 301 |      | Meals                                                                                                                                                                                                                                                        | \$1,000.00            |          |      |
|                      |      |       |     |      | <b>Total Activity 013 Boiler =</b>                                                                                                                                                                                                                           | <b>\$3,945,800.00</b> |          |      |
|                      |      |       |     |      | <b>Activity 085 - Design</b><br>Includes the costs of salaries, travel and living expenses of all NSPI regular and casual staff including project management, design, CADD, plant, procurement, legal, scheduling, cost control, etc assigned to the Project |                       |          |      |
| 2                    | 001  | 085   | 301 |      | Regular Labour                                                                                                                                                                                                                                               | \$160,000.00          |          |      |
| 2                    | 011  | 085   | 301 |      | Travel                                                                                                                                                                                                                                                       | \$19,500.00           |          |      |
| 2                    | 012  | 085   | 301 |      | Materials                                                                                                                                                                                                                                                    | \$4,000.00            |          |      |
| 2                    | 028  | 085   | 301 |      | Consulting                                                                                                                                                                                                                                                   | \$115,000.00          |          |      |
| 2                    | 041  | 085   | 301 |      | Meals and Entertainment                                                                                                                                                                                                                                      | \$6,100.00            |          |      |
|                      |      |       |     |      | <b>Total Activity 085 Design =</b>                                                                                                                                                                                                                           | <b>\$304,600.00</b>   |          |      |
|                      |      |       |     |      | <b>Total Project</b>                                                                                                                                                                                                                                         | <b>\$4,504,430.00</b> |          |      |

**Capital Project Estimate Sheet**

|                                                                                        |                                               |                                 |  |
|----------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------|--|
| Name of Project: TRENTON Unit 6 - Low NOx Combustion Firing System JULY, 2007 ESTIMATE |                                               |                                 |  |
| Project No.                                                                            | Division Power Production Generation Services | Estimated Completion Date: 2008 |  |
| Capital Item No.                                                                       | Responsibility Code 05130000                  | Function                        |  |
| Estimated By: Bill Small                                                               | Approved by: Doug Campbell                    | Date: Sept 10, 2007             |  |

| Accounting Flexfield |      |       |     |      | Description                                                                                                                                                                                                                                                   | Total Cost            | Quantity | Unit |
|----------------------|------|-------|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|------|
| CO                   | ACCT | ACTIV | CC  | PROJ |                                                                                                                                                                                                                                                               |                       |          |      |
|                      |      |       |     |      | <b>Activity 005 - Indirect Costs</b><br>Includes administrative and financing costs of construction.                                                                                                                                                          |                       |          |      |
| 2                    | 094  | 005   | 301 |      | Interest Capitalized                                                                                                                                                                                                                                          | \$132,630.00          |          |      |
| 2                    | 095  | 005   | 301 |      | Construction Overhead                                                                                                                                                                                                                                         | \$170,510.00          |          |      |
|                      |      |       |     |      | <b>Total Activity 005 Indirect Costs =</b>                                                                                                                                                                                                                    | <b>\$303,140.00</b>   |          |      |
|                      |      |       |     |      | <b>Activity 013 - Boiler</b><br>Will include the design, supply, erection, commissioning and testing of a low NOx combustion firing system for Trenton Unit 5.                                                                                                |                       |          |      |
| 2                    | 001  | 013   | 301 |      | Regular Labour                                                                                                                                                                                                                                                | \$150,000.00          |          |      |
| 2                    | 002  | 013   | 301 |      | Overtime Labour                                                                                                                                                                                                                                               | \$20,000.00           |          |      |
| 2                    | 004  | 013   | 301 |      | Term Labour                                                                                                                                                                                                                                                   | \$20,000.00           |          |      |
| 2                    | 011  | 013   | 301 |      | Travel                                                                                                                                                                                                                                                        | \$2,000.00            |          |      |
| 2                    | 012  | 013   | 301 |      | Supply of low NOx combustion firing system and associated equipment                                                                                                                                                                                           | \$2,350,000.00        |          |      |
| 2                    | 013  | 013   | 301 |      | Contracts                                                                                                                                                                                                                                                     | \$2,450,000.00        |          |      |
| 2                    | 041  | 013   | 301 |      | Meals                                                                                                                                                                                                                                                         | \$1,000.00            |          |      |
|                      |      |       |     |      | <b>Total Activity 013 Boiler =</b>                                                                                                                                                                                                                            | <b>\$4,993,000.00</b> |          |      |
|                      |      |       |     |      | <b>Activity 085 - Design</b><br>Includes the costs of salaries, travel and living expenses of all NSPI regular and casual staff including project management, design, CADD, plant, procurement, legal, scheduling, cost control, etc assigned to the Project. |                       |          |      |
| 2                    | 001  | 085   | 301 |      | Regular Labour                                                                                                                                                                                                                                                | \$160,000.00          |          |      |
| 2                    | 011  | 085   | 301 |      | Travel                                                                                                                                                                                                                                                        | \$28,000.00           |          |      |
| 2                    | 012  | 085   | 301 |      | Materials                                                                                                                                                                                                                                                     | \$3,500.00            |          |      |
| 2                    | 028  | 085   | 301 |      | Consulting                                                                                                                                                                                                                                                    | \$115,000.00          |          |      |
| 2                    | 041  | 085   | 301 |      | Meals and Entertainment                                                                                                                                                                                                                                       | \$5,000.00            |          |      |
|                      |      |       |     |      | <b>Total Activity 085 Design =</b>                                                                                                                                                                                                                            | <b>\$311,500.00</b>   |          |      |
|                      |      |       |     |      | <b>Total Project</b>                                                                                                                                                                                                                                          | <b>\$5,607,640.00</b> |          |      |