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An SAIC Company

July 20, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Initial IE Project Review Report - As of October 2009**

Attached is the Independent Engineer's Initial Project Review Report (the "Initial Report"). The Initial Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"), a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The Initial Report documents the IE's review of the background and history of the Project prior to the start of this assignment in October 2009.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm  
cc: Distribution



## Merrimack Clean Air Project Initial IE Project Review Report Page 2

### Background

#### Merrimack Generating Station

PSNH owns and operates Merrimack Generating Station (“MK”). PSNH is a wholly-owned electric operating subsidiary of NU. PSNH is New Hampshire’s largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire’s population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts (“MW”) and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. Both units incorporate Babcock and Wilcox cyclone combustion technology and are equipped with selective catalytic reduction (“SCR”) and electrostatic precipitator (“ESP”) pollution control devices. MK currently controls sulfur emissions by burning lower sulfur coal.

#### Merrimack Clean Air Project

In June 2006, the State of New Hampshire (“NH”) passed a law requiring PSNH’s coal generation facilities to reduce mercury emissions on an annual basis no later than July 1, 2013, by 80 percent of the aggregated mercury content of the coal burned at all the PSNH coal-fired plants. The legislation amended the NH Clean Power Act (“NHCPA”) (also known as the Multiple Pollutant Reduction Program, RSA 125-O), which was enacted in July 2002. The law states that, “To accomplish this objective, the best known commercially available technology shall be installed at Merrimack Station no later than July 1, 2013.” Wet flue gas desulfurization (“FGD”) technology is considered “best known commercial available technology” for this application.

The Project is being designed to over-collect mercury emissions from MK to compensate for mercury emissions from the two 50 MW coal-fired units at PSNH’s Schiller Station. The Project will need to capture approximately 83 percent of the mercury from the baseline input to meet the requirements set forth in the June 2006 amendment to the NHCPA. This reduction will be accomplished primarily by the FGD system, but will also include the co-benefits from the SCR system on each unit.

#### FGD Process

The wet FGD process was selected for mercury control at the Project. Figure 1 is a graphic diagram of the overall FGD process. In the FGD process, crushed limestone is mixed with water and pulverized to form a limestone slurry that is fed into the absorber reaction tank that forms the bottom section of the FGD absorber. Following the removal of flyash, the hot flue gas from the boiler(s) enters the absorber spray tower section where it contacts dilute calcium carbonate and calcium sulfate/sulfite slurry that is recycled from the reaction tank and sprayed down, counter to the upward gas flow, in multiple stages up the absorber. Sulfur dioxide (“SO<sub>2</sub>”) from the flue gas reacts with the calcium carbonate in solution and the slurry drains

## Merrimack Clean Air Project Initial IE Project Review Report

Page 3

back into the integral absorber reaction tank. The  $\text{SO}_2$  reaction with calcium carbonate initially forms calcium sulfite (“ $\text{CaSO}_3$ ”). Air is sparged into the reaction tank to oxidize the  $\text{CaSO}_3$  to calcium sulfate (“ $\text{CaSO}_4$ ”) commonly known as gypsum. The gypsum is removed from the absorber and dewatered before being sent to the gypsum storage area. The Project’s gypsum byproduct will be sold as commercial grade gypsum. Wastewater from the process is sent to the wastewater treatment (“WWT”) system before being discharged.

Mercury emissions are controlled by co-benefit absorption of the ionic form of mercury (“ $\text{Hg}^{++}$ ”), predominantly in the form of mercuric chloride (“ $\text{HgCl}_2$ ”), in the scrubber liquor. Provisions are incorporated in the process to limit the chemical reduction of the absorbed mercury back to the elemental form (“ $\text{Hg}^0$ ”). This would result in the readmission of mercury back into the gaseous phase, since  $\text{Hg}^0$  is nearly insoluble in water. The key systems associated with the FGD process are: a limestone storage and handling system, a reagent preparation system, an absorber slurry system and gypsum dewatering systems. In addition, there are several ancillary systems associated with the process that help to maintain the process efficiency for removal of mercury and  $\text{SO}_2$ .

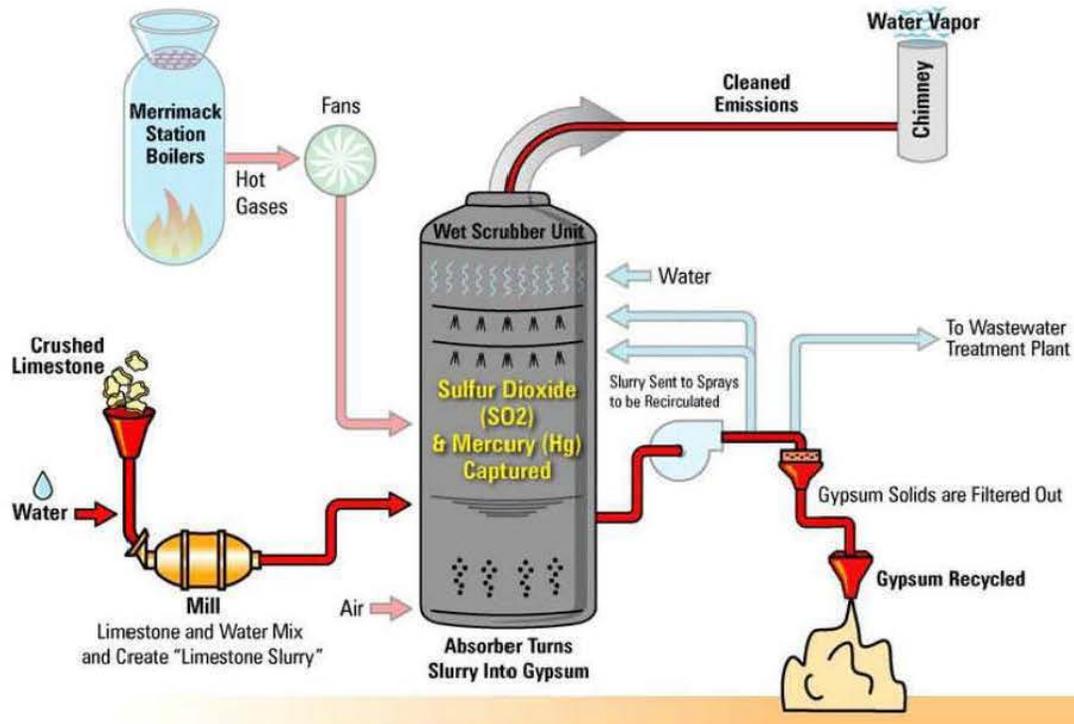


Figure 1. Wet Flue Gas Desulfurization Process

## Merrimack Clean Air Project Initial IE Project Review Report

Page 4

# Merrimack Clean Air Project

## Overview

The Project involves the installation of a single wet FGD system to treat the flue gas from both Unit 1 and Unit 2. The Project primarily consists of four major work areas or “Islands.” Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed, except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a Reinforced Concrete Chimney Island, and a FGD WWT Island. The Project also includes all related site work, new support systems, integration and tie-in facilities, modifications to the Balance of Plant (“BOP”) and all island interconnections necessary to make a complete and functioning FGD system. Figure 2 is a graphic representation of the Project at completion.

The Main FGD Project includes the majority of the new systems and equipment that are required for the overall, integrated FGD process. It is being built using an engineering, procurement, construction management (“EPCM”) contracting approach, as discussed later in this Initial Report, in which the EPCM contractor, also called the Program Manager, acts as agent for the owner (PSNH), and is responsible for engineering design, procurement, and construction management of the project. URS is the Main FGD Project’s Program Manager. Other major contractors on the Main FGD Project are Siemens Environmental Systems and Services (“SESS”), the FGD Island contractor; Dearborn Midwest (“DMW”), the Material Handling Island contractor; Hamon-Custodis (“HC”), the Reinforced Concrete Chimney Island contractor; Siemens Water Technology and Northern Peabody, LLC (joint venture) (“SWT/NP”), the FGD WWT Island contractor; and Francis Harvey & Sons (“FH”), the contractor for the major Project foundations. In addition to overseeing the Main FGD Project being managed by URS, PSNH is separately managing the contracts for the new electric power systems required by the Project, including the FGD Substation, upgrades to the 115 kilovolt (“kV”) switchyard and other requirements for the integration of the new Main FGD Project into the MK.

## Clean Air Project Work Areas (Islands)

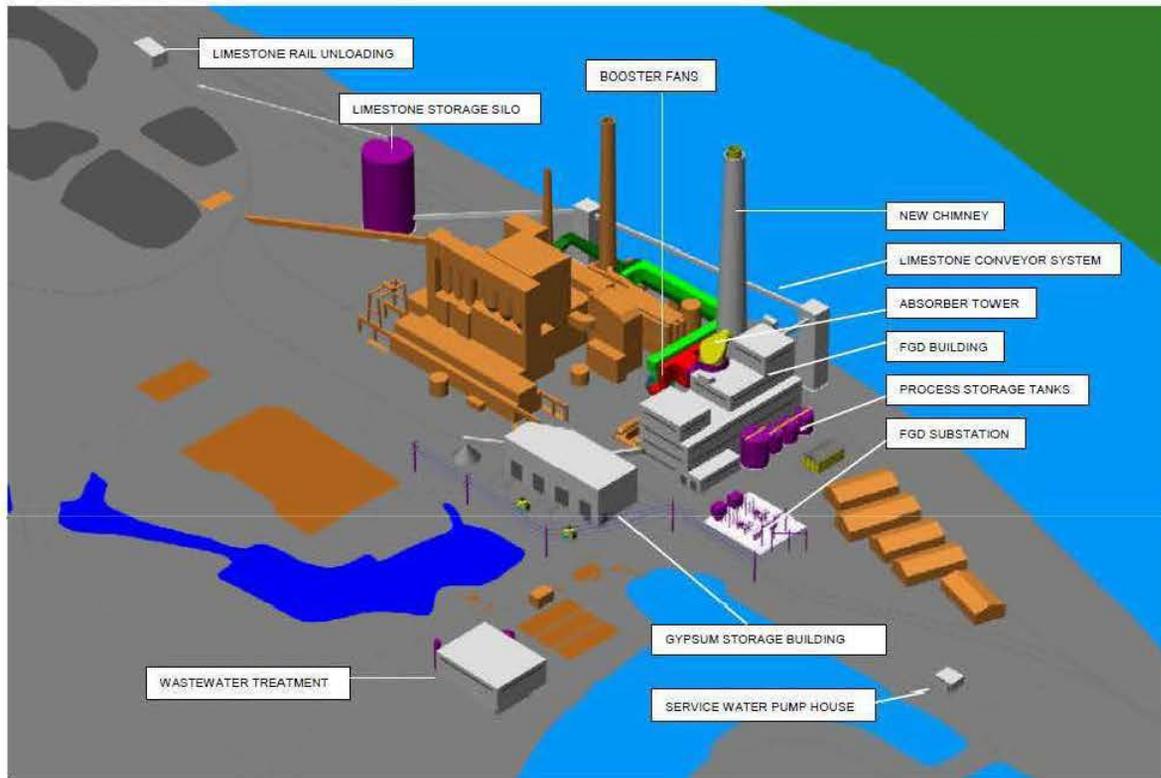
The Project is divided into four major work areas or “Islands.” Each of the islands is essentially independently designed, supplied and constructed except for the required interconnections. These islands included:

### FGD Island

The FGD Island includes the limestone preparation, absorber, and gypsum dewatering systems with all auxiliary support equipment from the day silo inlet, absorber vessel (to chimney breeching), recycle pumps, oxidation air blowers, process tanks, and dewatering equipment discharge. All interconnecting piping systems, electrical system (downstream of switchgear/motor control center (“MCCs”), and buildings were part of the complete system. The Program Manager, URS, is responsible for the design and oversight of the construction of the foundations based on criteria provided by the FGD Island Contractor, SESS.

## Merrimack Clean Air Project Initial IE Project Review Report

Page 5



**Figure 2. Merrimack Clean Air Project**

### Material Handling Island

The Material Handling Island includes the limestone rail unloading, reclaim, transfer conveyors/towers, bents, gypsum conveyors, bents, and stack-out systems along with all auxiliary support equipment/systems. All dust suppression, water, air, electrical system (downstream of switchgear/MCCs), complete buildings etc. were part of the complete system. The Program Manager, URS, is responsible for the design and oversight of the construction of the foundations based on criteria provided by the Material Handling Island Contractor, DMW.

### Reinforced Concrete Chimney Island

The Reinforced Concrete Chimney Island includes the complete reinforced concrete, fiber-reinforced plastic (“FRP”) lined chimney from the absorber outlet (breaching inlet) and all appurtenances such as aircraft lighting, lighting protection, platforms, electrical supply, etc. The Program Manager, URS, is responsible for the design and oversight of the construction of the foundations based on criteria provided by the Reinforced Concrete, FRP Lined Chimney contractor, HC.

## Merrimack Clean Air Project Initial IE Project Review Report

Page 6

### Wastewater Treatment Island

The FGD WWT system is designed to treat the FGD absorber chloride purge stream, which contains miscellaneous dissolved solids (gypsum, chlorides, other salts, and heavy metals) and miscellaneous suspended solids (gypsum, limestone, flyash, heavy metals, and other inerts). It includes all treatment equipment/systems to comply with the discharge limits established for National Pollutant Discharge Elimination System (“NPDES”) requirements. The WWT system includes foundations, building and accessories, components, interconnecting piping, electrical systems (downstream of switchgear/MCCs), and appurtenances required to provide a complete and operable system.

## Process Studies and Initial Engineering Phases of the Project

In 2004, PSNH contracted sole source with Burns & McDonnell to perform a study (Phase 0) to evaluate different alternatives for addressing stack emission requirements at MK, with an emphasis on mercury reduction. This study included an assessment of the relative advantages and disadvantages of the use carbon injection compared to FGD technology.

In 2005, PSNH contracted with Sargent and Lundy (“S&L”) to perform Phase I and Phase II engineering studies. The Phase I engineering included confirming the Phase 0 recommendation with mercury as the primary controlled pollutant, as well as refining the scope for a FGD project at MK. The Phase I work concluded that a limestone-based FGD system was the best option for MK.

Phase II engineering included writing the technical specifications for the FGD Island, the Material Handling System Island, and the Reinforced Concrete Chimney Island. The Phase II work included project definition studies and various cost estimates, as well as development of a Level 1 schedule and a capital budget estimate for a FGD system. The FGD system would have one absorber vessel for both MK Unit 1 and Unit 2. The FGD system would produce commercial grade gypsum, and would utilize booster fans rather than converting the two units to balanced draft. It was also determined that the Unit 2 air heater would remain a tubular style, and would not be changed to a regenerative style. The sulfur trioxide (“SO<sub>3</sub>”) emission control technology would involve changing the SCR catalyst to a lower SO<sub>3</sub> conversion type and utilizing sorbent injection. It was also determined that a wet FGD system provided sufficient mercury capture to meet the requirements of the 2006 amendment to the NH NHCPA law.

## Contracting Strategy

PSNH retained an independent consultant (R. W. Beck) to evaluate various potential contracting models within the context of the existing marketplace for these services. Alternative contract approaches were identified, along with critical factors and sensitivities to be considered in evaluating the alternatives. At the time of the evaluation, there were an unprecedented number of scrubber retrofit projects being executed in order to comply with the Clean Air Interstate Rule (“CAIR”). These market conditions had significant implications for the Project’s contracting strategy.

## Merrimack Clean Air Project Initial IE Project Review Report

Page 7

The EPCM contracting structure was a common form of contract being used in the scrubber retrofit market. In this form of contract, the EPCM contractor typically acts as agent for the owner and is responsible for the engineering, design, procurement, and construction management of the project. Multiple supply and erect or design and supply subcontracts, including schedule and performance liquidated damages (“LDs”), are used to reduce the owner’s risk. Contracts are prepared and managed by the EPCM contractor, but the contracts are with the owner. While overall project cost, schedule, and performance risks remain with the owner, the EPCM contracting model provides the owner with the control and flexibility to manage the project in a cost-effective and efficient manner. The evaluation concluded that the EPCM contracting structure had many advantages, under the existing market conditions for such services, and was recommended as the best approach for the Project.

The results of this analysis were first presented to the NU Risk Management Council (“RMC”), followed by the NU Executive Risk Management Council (“ERMC”). Authorization was sought and received for issuance of a Request for Proposal (“RFP”) for program management services and a RFP for the FGD Island contractor. This contracting strategy was documented by PSNH in the “Merrimack Station Clean Air Project Strategic Sourcing Plan,” issued June 15, 2007.

### Selection of Program Manager

Bids for the Project Management services (the EPCM contractor) were received from the following four contractors:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- URS Corporation (formerly the Washington Group International)

PSNH assembled internal cross-functional teams to evaluate the bids and to negotiate the contract with the selected bidder. The proposals were evaluated for commercial, technical, and project management compliance with the RFP, using pre-determined and pre-weighted evaluation criteria. URS was judged to be more responsive and flexible in meeting the expectations of PSNH. On September 21, 2007, PSNH entered into a contract with URS.

### Selection of the Four Major Island Contractors

The four major Island contracts include the following:

- FGD Island - engineering, supply, construction and testing of the FGD system, including the limestone silos through gypsum dewatering with all mechanical and electrical installation, as well as all architectural/structural work above the foundations.

## Merrimack Clean Air Project Initial IE Project Review Report

Page 8

- Material Handling Island- supply and installation of the limestone rail unloading system, limestone storage silo and conveyor transfer system, as well as the gypsum conveyor transfer and storage building.
- Reinforced Concrete Chimney Island - supply and installation of the chimney shell and FRP flue liner.
- Wastewater Treatment Island - supply and installation of the FGD WWT system, including all equipment, piping, tanks, electrical and instrument and control (“I&C”) systems.

### FGD Island

The RFP for the FGD Island was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- SESS

[REDACTED] declined to bid. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. Based on the evaluations, authorization was sought and received from the ERMC to proceed with detailed contract negotiations with SESS, leaving [REDACTED] as the fallback.

On July 10, 2008, NU authorized the start of engineering in advance of final contract execution in order to preserve the ability to maintain the project schedule. Contract negotiations with SESS resulted in a final contract price of [REDACTED] with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. NU executed the full FGD Island contract with SESS on October 20, 2008.

### Material Handling Island

The RFP for the Material Handling Island was issued to the following potential bidders:

- DMW
- [REDACTED]
- [REDACTED]

Bids were received from DMW and [REDACTED] [REDACTED] declined to bid. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC and ERMC. Approval was requested and received to proceed with detailed negotiations with DMW (with [REDACTED] as a fallback choice).

On November 14, 2008, NU authorized the start of engineering in advance of final contract execution in order to preserve the ability to maintain the project schedule. Ongoing negotiations with DMW resulted in final terms and conditions on all legal, commercial and risk management

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
Page 9

issues that were acceptable to NU/PSNH. On December 19, 2008, NU executed the Material Handling Island contract with DMW for [REDACTED]

### **Reinforced Concrete, FRP Lined Chimney**

The RFP for the Reinforced Concrete, FRP Line Chimney was issued to the following potential bidders:

- [REDACTED]
- Hamon-Custodis (“HC”)
- [REDACTED]

The solicitation process for the reinforced concrete chimney suppliers proceeded in parallel with the process described earlier to evaluate FGD Island bids. The bidders were asked to provide proposals for reinforced concrete, FRP lined chimneys that would interface with each potential FGD technology supplier. The RFP allowed each bidder to propose a base bid using the “slip form” method of construction and to provide an alternate bid based on using the “jump form” method of construction.

Bids were received from all three potential bidders. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with HC, leaving [REDACTED] as the fallback.

On July 17, 2008, NU authorized the start of engineering in advance of final contract execution in order to preserve the ability to maintain the project schedule. Negotiations with HC resulted in a final contract price of \$12,614,364, with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On December 9, 2008, NU executed the full Reinforced Concrete, FRP Lined Chimney contract with HC.

### **FGD Wastewater Treatment Island**

The RFP for the supply and installation of the WWT Island was issued to the following potential bidders:

- [REDACTED]
- Siemens Water Technology Corporation (“SWT”)

[REDACTED] alone and SWT in consortium with Northern Peabody, Inc, (SWT/NP) submitted proposals. The proposals were evaluated in accordance with predetermined evaluation criteria and weighting. The results of the evaluation were presented to the RMC. Authorization was requested and granted to negotiate with SWT/NP.

In order to preserve the ability to maintain the project schedule, on September 30, 2008, NU executed a limited release, including engineering and computer-aided design (“CAD”) activities, procurement activities in support of major components, and project management activities. On December 5, 2008 NU executed the FGD WWT Island contract with SWT/NP for [REDACTED]

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
Page 10

## Other Major Contracts

### Phase I Site Preparation (Pre-Construction)

The Phase I Pre-Construction Site Preparation contract covers a range of site preparation and construction activities required to prepare the site for the start of construction. These activities include site clearing; modifications; demolition; relocation of existing facilities; construction of temporary facilities; grubbing; striping topsoil; grading; fertilize, seed and mulch; crushed stone surfacing of roadway areas; installation of fencing and gates; sedimentation and erosion control; dust control in specified areas and other activities and services to support construction.

On November 17, 2008, NU executed the Phase I Site Preparation contract for \$6,352,240 with George Cairns & Sons, Inc.

### FGD Substation

The scope of work for the FGD Substation included engineering, design, development of protection and control settings, procurement of materials, and the installation, testing, and commissioning of a complete 115 kV – 4.16 kV two transformer substation. Bids were received from the following bidders:

- Eaton Electric
- [REDACTED]
- [REDACTED]

The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with Eaton Electric (“Eaton”) for the award of the FGD Substation contract. Negotiations with Eaton resulted in a final contract price of \$6,091,005, with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On January 9, 2009, NU executed the FGD Substation contract with Eaton.

### Concrete Foundation Installation

The initial scope of work for the Concrete Foundation Installation included foundations for the following equipment:

- Chimney
- Absorber Vessel
- Booster Fans (one for Unit 1 and two for Unit 2)
- FGD Building
- Ball Mills (FGD Building)

Merrimack Clean Air Project  
Initial IE Project Review Report

Page 11

- FGD Building Tanks
- Gypsum Storage Enclosure (including exterior slab)
- FGD Service Water House
- Two Limestone Storage Silos
- Duct Supporters
- Truck Wash Building
- Utility Bridge from FGD Substation to FGD Building
- Limestone Conveyor Transfer Towers
- Limestone Receiving Chute
- Gypsum Conveyor Belts
- Limestone Bucket Elevator and Emergency Reclaim Dozer Trap

The RFP for the Concrete Foundation Installation was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- Francis Harvey & Sons Inc.
- [REDACTED]
- [REDACTED]
- [REDACTED]

The inquiry requested lump sum pricing in three defined areas: Chimney, Absorber Vessel and FGD building. The pricing was based on preliminary foundation designs and URS’ estimated quantities. Firm unit prices were also requested to address additions or deletions to the foundation work.

Five bids were submitted. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with Francis Harvey & Sons Inc (“FH”) for the award of the Concrete Foundation Installation contract. Negotiations with FH resulted in a final contract price of \$9,998,703 with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On February 6, 2009, NU executed the Concrete Foundation Installation contract with FH.

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
 Page 12

### **Booster Fans and Motors Contractor**

The scope of work for the Booster Fans and Motors contract includes the design, fabrication, inspection, test, and delivery of the Unit 1 and Unit 2 booster fans and motors. The RFP was issued to the following potential bidders:

- FlaktWoods

- [REDACTED]
- [REDACTED]
- [REDACTED]

Bids were to include pricing and technical descriptions of fans, motors, lube skids, variable inlet vanes (“VIV”) and all components necessary for fan operation. Three bids were received. Each bidder’s offering was evaluated based on the initial capital cost, life cycle operating costs, and potential site impacts with respect to the fan physical arrangements. A second evaluation examined each bidder’s offering for the selected base scenarios from a detailed technical and commercial review.

The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with FlaktWoods. On May 5, 2009, the contract for the Booster Fans and Motors for [REDACTED] was awarded to FlaktWoods.

### **Phase II Site Preparation Contractor (Construction)**

The scope of work for the Phase II Site Preparation (Construction) contract includes the site development and construction activities necessary to support ongoing construction. It is a continuation of the general types of tasks that were performed under the Phase I Pre-Construction Site Development contract. It includes site clearing; modifications; demolition; relocation of existing facilities; trenching, installation of new permanent facilities; grubbing; striping topsoil; grading; fertilize, seed and mulch; crushed stone surfacing of roadway areas; sedimentation and erosion control; dust control in specifies areas and other activities and services to support construction.

The RFP for the Phase II Site Preparation services was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- Daniel O’Connell’s Sons
- [REDACTED]
- [REDACTED]

The inquiry requested lump sum pricing for the site preparation scope of work, along with unit pricing for additions or deletions for future work. All of the bidders submitted bids. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting.

**Merrimack Clean Air Project  
Initial IE Project Review Report**  
Page 13

The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with Daniel O’Connell’s Sons (“DOC”). Negotiations with DOC resulted in a final contract price of \$3,775,687 with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On June 8, 2009, NU executed the Phase II Site Preparation contract with DOC.

**Ductwork Steel Fabrication**

The scope of work for the Ductwork Steel Fabrication includes detailing, material procurement, fabrication, shop testing, and delivery of doors, support legs, slide bearing assemblies and flue gas ductwork, including coordination with the ductwork erector. The RFP for the Ductwork Steel Fabrication was issued to the following potential bidders:

- [REDACTED]
- Merrill Iron & Steel
- [REDACTED]
- [REDACTED]

Lump sum pricing for Unit 1 and Unit 2 duct sections, unit pricing for design development growth or deletions to the ductwork steel fabrication work and option pricing were requested.

Eight bidders submitted bids. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with Merrill Iron and Steel, Inc (“MIS”). Negotiations with MIS resulted in a final contract price of \$2,954,017, with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On August 5, 2009, NU executed the Ductwork Steel Fabrication contract with MIS. A separate contract with a price of \$1,361,335 for the supply of the structural steel was also executed with MIS on August 5, 2009.

**Ductwork and Structural Steel Erection**

The scope of work for the Ductwork and Structural Steel Erector includes the field fabrication and erection of ductwork; ductwork support steel; ductwork expansion joints and dampers; utility bridges; booster fan framing and enclosure steel; and the supply and installation of thermal insulation and lagging for ductwork, booster fans, expansion joints, and dampers. The

**Merrimack Clean Air Project  
Initial IE Project Review Report**

Page 14

RFP for the Ductwork and Structural Steel Erection was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- Merrill Iron & Steel Inc.
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

The inquiry requested lump sum pricing for the ductwork and structural steel erection scope of work along with unit pricing for additions or deletions for future work. Option pricing for the supply of the Service Water Pumphouse and the Truck Wash, pre-engineered buildings was also requested.

Four bids were received. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with MIS. Negotiations with MIS resulted in a final contract price of \$12,873,777, with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On December 9, 2009, NU executed the Ductwork and Structural Steel Erection contract with MIS.

**BOP Mechanical Erection**

The scope of the work for the BOP Mechanical Erection included the supply of all materials, labor, equipment, assembly, installation, erection/construction, testing and the related services for all BOP mechanical work including the installation of the Unit 1 and Unit 2 booster fans, installation of the service water pumphouse equipment, installation of the truck wash system, installation of above and below grade piping, pipe supports and fittings and the supply and installation of all balance of plant instruments and tubing. The RFP for the BOP Mechanical Erection was issued to the following potential bidders:

- AZCO, Industrial Construction & Fabrication
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

**Merrimack Clean Air Project  
Initial IE Project Review Report**

Page 15

- [REDACTED]
- [REDACTED]

The inquiry requested lump sum pricing for the BOP Mechanical Erection scope of work, along with unit pricing for additions or deletions for future work. Four bids were received. The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with AZCO for the award of the BOP Mechanical Erection contract. Negotiations with AZCO resulted in a final contract price of [REDACTED] with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On March 25, 2010, NU executed the BOP Mechanical Erection contract with AZCO.

**BOP Electrical Erection**

The scope of the work for the BOP Electrical Erection contact includes supply of all materials, labor, equipment, fabrication, assembly, installation, erection/construction, testing and the related services for completion of all balance of plant electrical work. The RFP for the BOP Electrical Erection was issued to the following potential bidders:

- E.S. Boulos
- [REDACTED]

The inquiry requested lump sum pricing for the BOP Electrical Erection scope of work along with unit pricing for additions or deletions for future work. Five bids were received.

The bids were evaluated in accordance with the pre-determined bid evaluation criteria and weighting. The results of that evaluation were presented to the RMC. Authorization was sought and received to proceed with detailed contract negotiations with ESB for the award of the BOP Electrical Erection contract. Negotiations with ESB resulted in a final contract price of [REDACTED] with final terms and conditions on all legal, commercial and risk management issues that were acceptable to NU/PSNH. On April 23, 2010, NU executed the BOP Electrical Erection contract with ESB.

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
Page 16

## Schedule

### Major Activities Completed Prior to the Start of Monitoring

The start of the execution phase of the Project began on September 24, 2007, when PSNH issued the Notice to Proceed (“NTP”) to URS. The following is a brief list of actions and activities performed through the first half of 2009 prior to the time that R. W. Beck was engaged to monitor the construction of the Project. The list contains selected actions and activities to show how the Project progressed during this period. It is not intended to be, nor is it, a comprehensive record of the sequence of the many activities performed during this period.

#### 2007

The initial focus of URS was on overall project planning and management, engineering, and the procurement of long lead systems and equipment. Preliminary planning for the construction phase of the Project was also begun. It was decided to break down the Project into four major Island packages:

- FGD supplier and erector
- Chimney subcontract
- Material Handling (“MH”) subcontract
- Wastewater Treatment subcontract

In November, the PSNH Project Manager and the Project Engineer visited five scrubber systems under construction in Pennsylvania and West Virginia.

In December, budgetary pricing was received for each of the four major Island packages. Based upon this information, a preliminary cost estimate was issued to PSNH with the four major Islands being executed on a turnkey basis.

#### 2008

In January, PSNH and URS team members participated in a Project Risk Assessment Workshop facilitated by the NU Enterprise Risk Management Group. Project risks were identified and evaluated for likelihood and impact.

In March, URS reviewed the BOP Cost Estimate with PSNH management and Power Advocate Consultants and in May URS submitted the revised Project cost estimate to PSNH.

On June 25<sup>th</sup>, the NU Risk and Capital Committee (“RaCC”) approved the Project with an estimated cost of \$457 million and a mid-2012 in-service date. The NU Board of Directors approved the Project on July 14<sup>th</sup>.

In July, NU authorized the start of engineering on the FGD Island by SESS in advance of final contract execution in order to preserve the ability to maintain the projected master schedule. HC received a Limited Notice to Proceed (“LNTP”) for the Reinforced Concrete, FRP Lined

## Merrimack Clean Air Project Initial IE Project Review Report

Page 17

Chimney. PSNH and URS Project team members traveled to Pleasant Prairie, Wisconsin, to tour a recently completed FGD project with a Siemens FGD and WWT system.

In September, PSNH and Project management attended the Pre-job Conference with local building trades and URS to discuss the Project and the National Maintenance Agreement. SWT/NP was issued a LNTP to begin the initial Project activities on the WWT Facility.

In October, the full contract with SESS was executed and the FGD construction substation switchgear and transformer were delivered to the site. The Phase I Site Preparation Contract with Cairns was executed.

In November, DMW received a LNTP to cover activities prior to the execution of formal contract documents.

In December, Cairns mobilized and began land clearing activities and work on the new north access gate area. NU executed contracts with SWT/NP for the WWT and DMW for the Material Handling Island.

### 2009

SESS continued engineering and procurement activities on the FGD Island. Specifications and RFQs were prepared and issued for various equipment, services and materials. DMW continued to work on the engineering of the material handling system. During February, a final decision was made on the design for spanning the railroad tracks and the access road.

In February, the Foundation Installation Contract was executed with FH.

In March, PSNH received a final temporary permit from the New Hampshire Department of Environmental Services ("NHDES"), which completed all the necessary approvals to begin full construction of the Project. Also in March, FH mobilized to the site and began excavation of the Chimney area. This was the first permanent construction activity associated with the Project.

In April, FH placed the Chimney foundations and the Absorber Vessel foundation. From April to June 2009, HF excavated the FGD building area, placed the mud mat, and worked on the foundation and structural piers. FH also completed placement of the FRP building foundation and worked on the foundations for the six storage tanks along the south side of the FGD building.

In May, HC mobilized to the site and then began setting reinforcing steel and formwork. Shell construction on an around the clock basis began in June. By the end of June, the shell concrete placement was completed at a height of 434 feet. In June, HC also began constructing the Stack Liner Fabrication building which was completed in July. By mid-August, the fabrication of the first FRP liner can was completed.

During May, SWT/NP engineering and procurement continued. Purchase orders for clarifier internals, chemical feed skids, on-skid control panels, lime silo, FRP tanks, air compressor and various valves and instruments were issued. In June, SWT/NP mobilized to the Project site.

Also in June, the contract with O'Connell's for Phase II site preparation was executed.

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
 Page 18

In July, DMW was nearing completion of procurement for the major equipment. Also in July, Cairns de-mobilized from the site following completion of the Phase I Site Preparation construction activities.

In August, the SESS Construction Manager arrived on site to initiate mobilization activities.

### Project Milestone Schedule - October 2009

The Project Milestone Schedule, progressed through October 2009, is shown in Table 1. The Level 1 Schedule is included in Attachment 1. The planned (Early Target) Substantial Completion of the WWT Island is the last milestone on the Project Schedule. It is scheduled to occur on March 31, 2012. PSNH reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning.

**Table 1**  
**Milestone Schedule**

	Planned (Target)
Contract Award	9/24/2007(A) <sup>(1)</sup>
Award FGD Contract	07/11/2008(A)
Award Stack Contract	07/18/2008(A)
Award Material Handling Contract	11/14/2008(A)
Award WWT Contract	09/30/2008(A)
Mobilize Construction (Site Work)	12/01/2008(A)
Award Foundations Contract	02/04/2009(A)
Start Foundation Work	03/11/2009(A)
Stack Foundation Complete	04/29/2009(A)
Stack Shell Complete	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/7/2009(A)
Mobilize Material Handling	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009
Award Steel and Duct Erection Subcontract	12/21/2009

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
 Page 19

**Table 1**  
**Milestone Schedule**

	<b>Planned (Target)</b>
Award BOP Mechanical Contract	01/05/2010
Award Elect Subcontract (includes power and control)	02/05/2010
Release Booster Fan Area for Foundation	03/01/2010
Complete Conveyor L-4 Erection	03/01/2010
Mobilize BOP Electrical Contractor	04/15/2010
Release Electrical Room for BOP Electrical	06/01/2010
Complete SWPH Foundation	06/01/2010
Absorber and Internals Complete	08/11/2010
Stack Complete	09/13/2010
Enclose FGD Building	11/01/2010
Complete Duct Erection	11/01/2010
Absorber Outlet Duct Set	11/01/2010
Power to WWT Area	12/31/2010
PSNH FGD Substation Complete	02/11/2011
Power Available to Islands	03/1/2011
Service Water Available	03/1/2011
Milestone: WWT Mechanical Complete	06/1/2011
FGD System Ready for Gas	08/1/2011
MK-1 Tie-in Outage End	10/5/2011
MK-2 Tie-in Outage End	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012
Declare Substantial Completion (WWT)	03/31/2012

(1) (A) indicates the actual date. Other dates are planned or target dates.

**Merrimack Clean Air Project**  
**Initial IE Project Review Report**  
Page 20

## Project Cost Summary

The budget for the Project is \$457 million with \$29 million in contingency (the “Project Budget”). At the end of November 2009, the Total Projected Cost was \$457 million with \$29 million in contingency and \$12 million in reserves. Reserves are the accumulated costs savings (variance) that are currently (through November 2009) projected in the different cost accounts. These are appropriate funds for contingency and reserves.

Table 2  
Project Budget and Estimated Projected Costs Through November 2009

Description	Total Projected Cost November 2009	Project Budget
Direct Costs	345,239,416	367,500,000
Indirect Costs	7,901,562	5,500,000
AFUDC <sup>(1)</sup>	62,859,022	55,000,000
Reserve	12,000,000	0
Contingency	29,000,000	29,000,000
Total	457,000,000	457,000,000

## Conclusions

Set forth below are the principal opinions we have reached following our initial review of the Project. These opinions are subject to change as more information becomes available and as a result of our ongoing due diligence and monitoring responsibilities on the Project. For a complete understanding of the basis for these opinions this Report should be read in its entirety. On the basis of our initial review of the Project we are of the opinion that:

1. Based on our review of the documents available on the preliminary stages of the Project, including process studies and the initial engineering and design phases, PSNH has acted in a reasonable and prudent manner in developing the information required to make informed decisions related to the design and execution of the Project.
2. PSNH has previously demonstrated the capability to manage the execution of complex power generation projects.
3. URS has previously demonstrated the capability to be EPC or EPCM contractor on FGD projects of similar size, technology and complexity.
4. The contractors for the four Islands, including SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), for the FGD Island; DMW for the Material Handling Island; HC for the Reinforced Concrete Chimney Island; and SWT/NP for the FGD WWT Island have previously demonstrated the capability to



**Merrimack Clean Air Project  
Initial IE Project Review Report**

Page 21

provide similar systems, equipment and services on FGD and other power generation projects.

5. The estimates which serve as the basis for the Project Budget were developed in accordance with generally accepted engineering practices and methods of estimation. Further, the estimated Project cost at completion, based on the scope of work and schedule, as assumed in the development of the Project Budget, is achievable.
6. In the absence of events such as material and equipment delivery delays, transportation and labor difficulties, unusually adverse weather conditions, the discovery of hazardous materials or waste not previously known, acts of war directly affecting the Project, or other abnormal events that are prejudicial to normal construction or installation, the completion date reported by PSNH of July 1, 2012, is achievable and within the previously demonstrated capabilities of the major contractors using generally accepted construction and project management practices.

REDACTED



An SAIC Company

March 4, 2010

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for October 2009**

Attached is the Independent Engineer's Monthly Report (the "Report") for October 2009 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). This is the first Report prepared by R. W. Beck under this assignment. It is based on visits to the Project on October 28, 2009 and on November 18, 2009.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The IE has also reviewed the history of the Project. This historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant  
RJG/dm

Attachment 1: Project Photographs – November 18, 2009

Attachment 2: Cheswick FGD Project Lessons Learned

ec: Distribution



## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on October 28, 2009 and on November 18, 2009. During these site visits we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and the Washington Division of URS ("URS"), the Program Manager, followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPM. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through October 2009 (the "Period"), URS reported that overall the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path remained through the SESS contract for the FGD island. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed though Mobilization of the Material Handling Contractor. This last milestone was scheduled for November 23, 2009, but occurred ahead of schedule on October 28, 2009.

Through October 2009, Projected Costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

### Conclusions and Recommendations

Set forth below are the principal opinions we have reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. All of the major participants in the Project are keenly aware of the safety issues and have experience building similar facilities at other operating coal-fired power plants. PSNH and URS have identified priority safety topics and areas of emphasis and have acted to achieve improvements in ongoing safety results. This issue requires ongoing attention by Project personnel.
2. An integrated Project schedule is critical for Project management to be able to identify and address potential problems in a timely manner. This is particularly important on the Project because the work has been broken down into several major island contracts that

## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

Page 3

need to be integrated together. PSNH has made it very clear that an integrated Project schedule is critical to the success of the Project. It will become even more critical as the Project transitions from area-based to system-based tracking, as the Project prepares for commissioning, start-up and the tie in to Units 1 and 2. At the November 18, 2009 MPM, significant progress was reported on the integrated schedule; however, it was noted that more work was needed, especially with integrating all of the SESS schedule logic.

3. The Project was on schedule to achieve the Substantial Completion date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year from the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through October 2009, Projected Costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of the extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 452-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the Balance of Plant ("BOP") and all island interconnections necessary to make

## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

Page 4

a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete, FRP Lined Chimney supplier; Siemens Water Technology and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; and Francis Harvey & Sons ("FH"), the contractor for the major Project foundations. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

The Merrimack Station includes two operating units and routinely receives train deliveries of coal and anhydrous ammonia. In addition, the Project site is congested and there are construction activities occurring throughout the Merrimack Station site. Special care and attention to safety is critical when major construction activities occur on the site of an operating power plant.

Safety is the highest priority on the Project. All of the major participants in the Project are keenly aware of the safety issues and have experience building similar facilities at other operating coal-fired power plants.

At the October 28, 2009 MPM, PSNH reported that it had observed some instances of poor safety practices where workers were not wearing approved safety glasses and noted that the safety culture on site needed to receive continued attention. PSNH indicated that it would be adding an additional, part-time person to monitor safety practices on site. URS agreed with PSNH's observations and indicated that it was considering various enforcement options to send a message.

At the November 18, 2009 MPM, PSNH confirmed that it had added an additional part-time safety person. URS reported that its' corporate Safety Director had toured the site in October 2009 and that it had reinforced the disciplinary plan for safety non-conformance.

As an example of the Project's safety focus, all contractors with more than 25 workers are required to have a dedicated person on site responsible for safety. There were now six of these individuals on site.

### Environmental and Permitting

No significant environmental events were reported during the month. Permit lead times continue to be an issue that requires monitoring.

Independent Engineer's Report for October 2009  
Merrimack Clean Air Project  
Page 5

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The most critical path remained through the SESS contract for the FGD island. The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the Project Milestones through the Period. All of the Project Milestones had been completed though Mobilization of the Material Handling Contractor. This last milestone was schedule for November 23, 2009, but occurred ahead of schedule on October 28, 2009.

The performance of SESS will be a major determinant of whether the Project meets the Substantial Completion Date of April 1, 2012. "Lessons Learned" from a similar FGD project at the Cheswick Generating Station (the "Cheswick FGD Project") in Springdale, Pennsylvania, for which SESS was the FGD system supplier and URS provided detailed engineering, procurement assistance and construction management services, suggests that SESS has experienced project management and execution failures in the past. PSNH and URS have visited the Cheswick FGD Project on a number of occasions to obtain "Lessons Learned" and to identify potential risk areas. This information has been required reading for all PSNH and URS staff. These points of focus are being used as a means to avoid such problems on the Project.

PSNH has directed URS to integrate the SESS schedule into the overall Project schedule. This is a critical activity that needs to be an ongoing area of management attention.

Another critical activity was the fabrication and erection of the limestone silos. DMW changed the contractor for the limestone silos, resulting in a change in the erection method, sequence and schedule. As a consequence, the limestone silos were behind DMW's original schedule due to significant foundation redesign. The Project Milestone, "Install Limestone Silo Foundation," had slipped from November 24, 2009 to February 12, 2010, but with a corrective action plan should be ready in January 2010 and should not impact the overall Project schedule.

Independent Engineer's Report for October 2009  
 Merrimack Clean Air Project  
 Page 6

Table 1  
 Status of Project Milestones  
 October 2009

	Planned (Target)	Forecast (Actual)
Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Misc. Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	02/12/2010
Award Steel and Duct Erection Subcontract	12/21/2009	11/20/2009
Award BOP Mechanical Contract	01/05/2010	01/28/2010
Award Elect Subcontract (includes power and control)	02/05/2010	02/05/2010
Release Booster Fan Area for Foundation	03/01/2010	03/01/2010
Complete Conveyor L-4 Erection	03/01/2010	03/01/2010
Mobilize BOP Electrical Contractor	04/15/2010	04/15/2010
Release Electrical Room for BOP Electrical	06/01/2010	06/01/2010
Complete SWPH Foundation	06/01/2010	06/01/2010
Absorber and Internals Complete	08/11/2010	11/15/2010
Stack Complete	09/13/2010	06/30/2010
Enclose FGD Building	11/01/2010	11/01/2010
Complete Duct Erection	11/01/2010	11/01/2010
Absorber Outlet Duct Set	11/01/2010	11/01/2010
Power to WWT Area	12/31/2010	12/31/2010
PSNH FGD Substation Complete	02/11/2011	08/01/2010
Power Available to Islands	03/01/2011	03/01/2011

**Independent Engineer's Report for October 2009**  
**Merrimack Clean Air Project**  
 Page 7

**Table 1**  
**Status of Project Milestones**  
**October 2009**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Service Water Available	03/01/2011	03/01/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD System Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/05/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune & Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was reported to be 35.1 percent versus a plan of 36.3 percent.

The Project also measures progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. Note that the Project will soon change to measuring the SPI using quantities installed, as a better measure of performance during construction. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.97. This compares with 0.94 last Period. This is relatively good performance and suggests that there were no major problems in the management and execution of the Project.

Overall, the Project remained on schedule. Engineering work had shifted focus to the electrical and instrumentation work associated with the packages. Work also continued on the delivery of the major equipment to support the follow-on engineering and construction schedules.

## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

Page 8

### Integrated Project Schedule

An integrated Project schedule is critical for management to be able to identify and address potential problems on a project in a timely manner. This is particularly important on the Project, because the work has been broken down into several major island contracts that need to be integrated together. The tendency of the island contractors is to concentrate on their own scope of work, which is understandable; however, the success of the Project is dependent on the timely completion of the overall, integrated Project. It is URS's responsibility as Program Manager to produce a integrated Project schedule that accurately describes the integrated schedule logic.

This is an area that needs to be tracked closely. As PSNH clearly indicated during these meetings, an accurate, real-time, integrated schedule is critical to the management of a large project. This will become even more critical when the Project transitions from area- to system-based tracking as it prepares for commissioning, start-up and the tie in to Units 1 and 2.

### Pert Schedule Format

At the October 28, 2009 MPM, PSNH indicated a strong preference to see the schedule using a PERT Network format, in addition to the Gantt Chart format currently being used by URS. The PERT format shows the schedule logic as a network diagram making it easier to see the flow and relationship of activities with time. For best results on a complex project, the PERT Network is often printed out using large, long rolls of paper. The PERT Network format does not lend itself to letter-size paper printouts or computer displays. The Gantt Chart format is adequate for tracking individual activities or groups of activities, but is extremely limited in its ability to show more complex relationships or to identify problems with logic. It is adequate for smaller projects and has the advantage of being more compact so that it can be printed out on letter- or legal-size paper or for computer displays. PSNH has requested that the integrated schedule be made available in a PERT Network format for their use, in addition to the normal Gantt format.

## Major Project Contractors

### URS (Program Manager)

Overall, URS earned progress was ahead of their plan.

### Siemens Environmental Systems and Services (FGD Island)

#### Schedule

The overall Project critical path was through the FGD building activities, including fabrication and erection of steel for the dewatering area, erection of steel for the absorber area, and installation of electrical items like cable tray and conduit.

## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

Page 9

At the October 28, 2009 MPM, SESS identified turnover of the FGD Electrical Room as a milestone activity that needed to be closely monitored. This opinion was voiced by everyone at the meeting with SESS and again later at the separate PSNH-URS meeting. At the November 18, 2009 SESS MPM, SESS reported that the delivery of FGD building steel had started, Sequences 1 and 2 (partial) early. This may relieve some of the concern for the critical path through the release of FGD Electrical Room (see the Release Electrical Room for BOP Electrical Milestone in Table 1). Other deliveries of materials and equipment appeared to be going well. SESS may be benefiting from the dramatic slowdown in new FGD projects across the country.

SESS reported that it will be adding a second absorber fabrication table. This will permit parallel fabrication of absorber module sections at a second location, potentially reducing overall absorber erection time. This is an important and positive action by SESS, since its original schedule was based on a single table. SESS was assessing if this will improve its overall schedule, in any case, it will provide it with greater flexibility.

At the end of the SESS MPM on November 18, 2009, the SESS PM stated "In general things seem to be progressing well."

URS worked to integrate the SESS schedule with the overall Project schedule. At the first MPM with SESS, URS indicated that there had been a detailed schedule logic review meeting with SESS and that the results had been incorporated into the schedule. SESS was reported to be close to a baseline schedule, but the details of the piping and electrical activities were still being developed. SESS indicated that it would have a baseline schedule, including piping and electrical activities by the end of November 2009.

### Cheswick Station Lessons Learned

The Cheswick Generating Station ("CGS") is a single-unit, coal-fired generation station that is owned by Reliant Energy. It is located in Springdale, Pennsylvania, approximately 18 miles northeast of Pittsburgh. CGS has a net demonstrated capacity of 580 MW and began commercial operation in 1970. SESS (with Sterling Boiler as the erector) was awarded the FGD contract and URS was awarded the Engineering, Procurement and Construction ("EPC") services contract for the Cheswick FGD Project. The Cheswick FGD Project went into commercial operation in 2009. PSNH and URS have visited the CGS on several occasions, most recently on July 22, 2009, to meet with Reliant Energy and to review the performance of SESS on the Cheswick FGD Project. The notes from this meeting are included in Attachment 2 to this Report. Several of these "Lessons Learned" are of particular note at this time in the Project, along with the response of Project Management, including PSNH, URS and SESS:

1. SESS schedule was never fully integrated with construction and start-up and the lack of logic relationships made the schedule difficult to manage/assess progress.

Project Response: PSNH and URS have made an integrated schedule a high priority, and have been working closely with SESS. This should not be a problem for the Project.

Independent Engineer's Report for October 2009  
Merrimack Clean Air Project

Page 10

2. Material (Quantity) tracking performance was a problem. Construction status could not be adequately identified.

Project Response: SESS has improved the implementation of its material tracking, expediting and shop inspection procedures. They have greater resources available now that the number of ongoing FGD projects have substantially reduced. URS has audited the SESS program to confirm compliance. This should not be a problem on the Project.

3. SESS did not have a quality assurance ("QA") representative on site full time; only provided audit inspections.

Project Response: SESS has a full-time person on site responsible for QA.

4. SESS/Sterling Boiler had major problems with on-site material receipt, inspection, storage, maintenance, and management of material releases to construction.

Project Response: SESS/Sterling Boiler have implemented an on-site materials management program, including the management of the receipt, storage, maintenance and release of materials. URS has audited the SESS/Sterling Boiler materials management program to confirm compliance. This should not be a problem on the Project.

5. Craft Supervision and Management was a problem.

Project Response: SESS/Sterling Boiler have experienced craft supervision and management on the Project. This should not be a problem on the Project.

6. Project Management was a problem.

Project Response: SESS/Sterling Boiler have experienced project management on the Project. This should not be a problem on the Project.

## Dearborn Midwest (Material Handling Systems)

The next critical path, following the critical paths through the SESS schedule, was through the fabrication and erection of the limestone silos, completion of the conveyors, electrical, test and start-up. DMW changed the contractor for the design and erection of the limestone silos, resulting in a change in the erection method, sequence and schedule. The erection of the limestone silos was behind DMW's original schedule, but still on track to meet the overall Project schedule requirements. The Project Milestone, "Install Limestone Silo Foundation," in Table 1 had slipped from November 24, 2009 to January 5, 2010.

## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

Page 11

### **Hamon-Custodis (Reinforced Concrete Chimney and FTP Liner)**

HC was ahead of schedule. URS did not anticipate any negative impact to the schedule caused by the work performed by HC. The "Stack Complete" Project Milestone, shown in Table 1, was improved from the original date of September 13, 2010 to June 30, 2010.

### **Siemens Water Technology (Wastewater Treatment Facility)**

One of the Project's critical paths was through the final testing and mechanical completion of the Wastewater Treatment System. During the November 18, 2009 MPM, URS reported that the SWT schedule was slipping significantly. There had been delays in the delivery of steel and tanks, and as a result, steel erection was slipping into winter. URS noted that there was still plenty of time in the schedule to complete the WWT facilities; however, the execution of the work by SWT will be closely monitored.

### **Francis Harvey and Sons Inc. (Major Foundations)**

FH's critical path was related to the booster fan foundations. FH was working on the foundations for the limestone silos and indicated that it will revise its schedule to incorporate the modifications to the design of the silos.

FH continued to perform very well. It had met or beat all of its scheduled dates through October 2009.

### **Daniel O'Connell's Sons Inc. (Site Preparation - Phase II)**

The critical path on Phase II of the site preparation work was going through the completion of the piping activities followed by the demolition of the existing (old) utility trench and final civil works to backfill and prepare the area. Daniel O'Connell ("DOC") had revised its contract milestones to match the new sequence of work approved by URS and PSNH.

At the November 18, 2009 MPM, it was noted that there had been issues with the Site Preparation Contract II, including poor planning, management, and staffing. DOC had replaced its superintendent to address the issues.

## **Merrimack Clean Air Project Cost Summary**

Table 2 is a summary of the Project's projected costs compared with the original budget, along with the variance from the budget. The data was updated through November 2009. The estimated cost at completion was unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

**Independent Engineer's Report for October 2009**  
**Merrimack Clean Air Project**  
 Page 12

**Table 2**  
**Project Budget versus Projected Costs**  
**Complete through November 2009**

	<b>Total (Projected)</b>	<b>Budget Total</b>	<b>Variance</b>
NU Labor - Total	\$6,937,506	\$7,500,000	\$(562,494)
Material - Total	\$21,523,463	\$35,000,000	\$(13,476,537)
Contractor Labor	\$304,480,172	\$310,000,000	\$(5,519,828)
Outside Services	\$4,307,996	\$3,000,000	\$1,307,996
Emp. Expenses	\$124,183	\$150,000	\$(25,817)
Vehicles - Total	\$16,901	\$1,000	\$15,901
Fees and Payments	\$7,724,441	\$11,820,000	\$(4,095,559)
Rents and Leases	\$124,754	\$29,000	\$95,754
Indirect Costs	\$7,901,562	\$5,500,000	\$2,401,562
AFUDC	\$62,859,022	\$55,000,000	\$7,859,022
Contingency, Reserves, Other	\$41,000,000	\$29,000,000	\$12,000,000
<b>TOTAL</b>	<b>\$457,000,000</b>	<b>\$457,000,000</b>	<b>\$0.00</b>

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009



Figure 1. Looking South

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 2

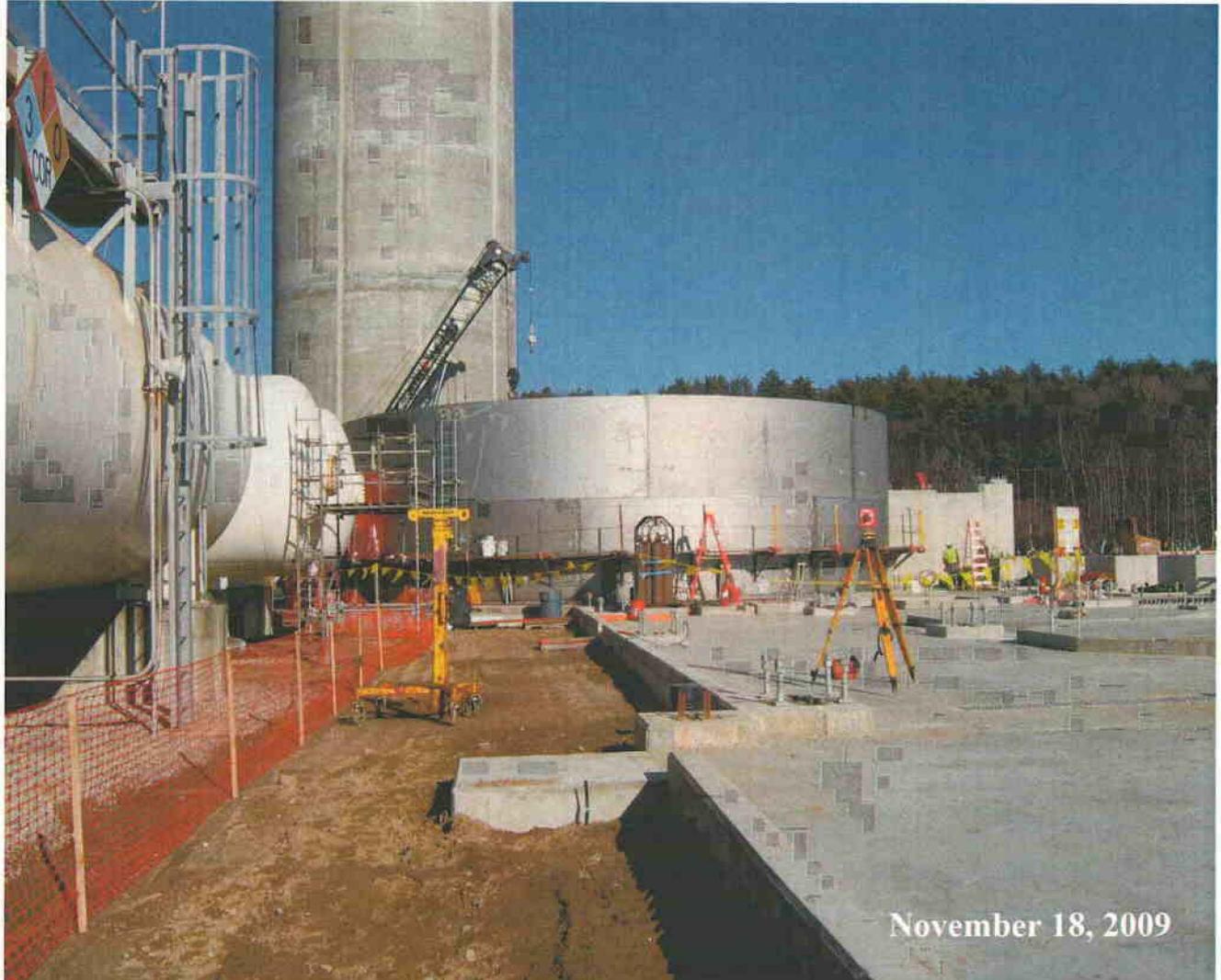


Figure 2. Absorber Vessel Looking East

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 3



Figure 3. Absorber Fabrication Table

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 4

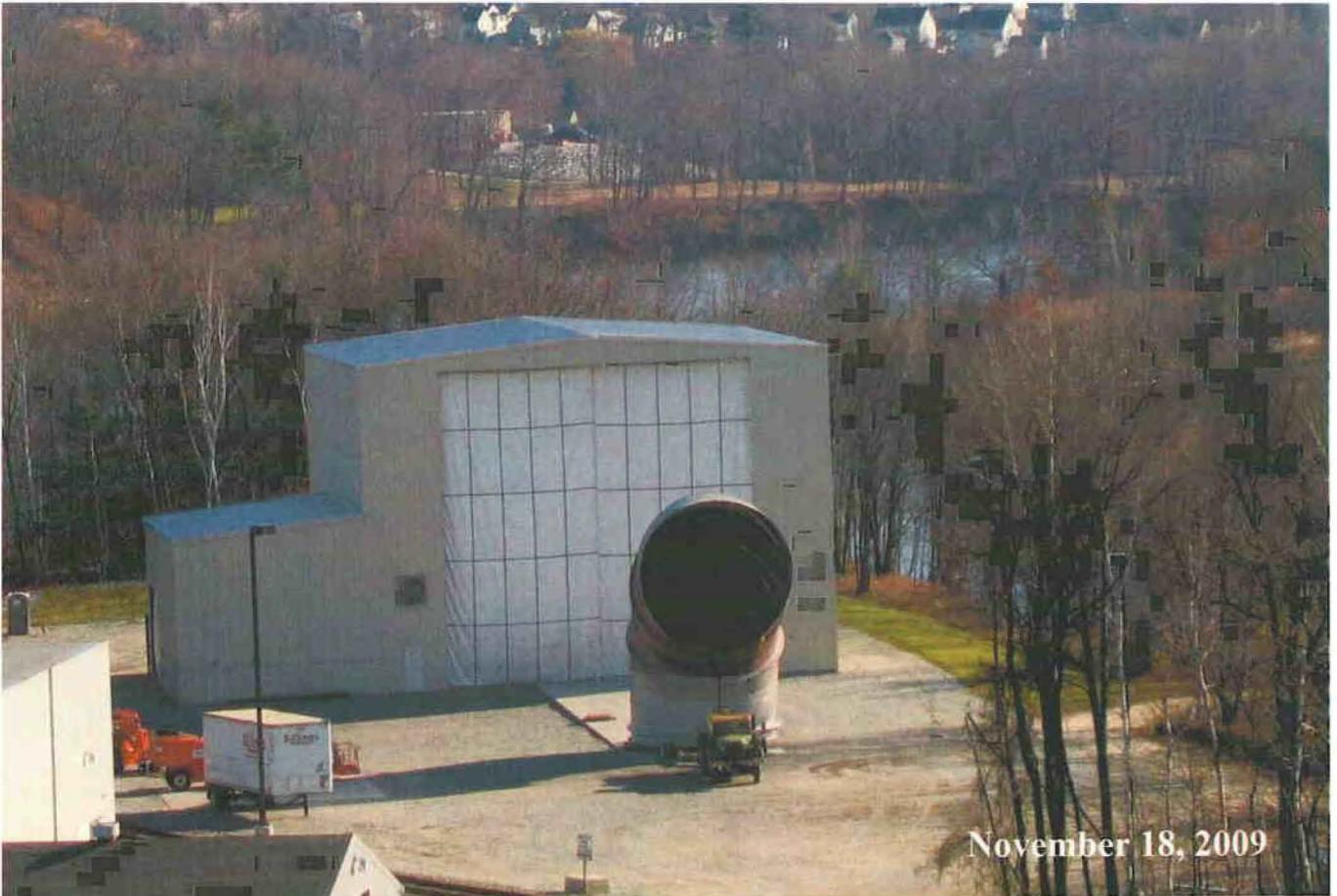


Figure 4. Chimney Liner Elbow

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 5



Figure 5. Chimney Showing Liner Can Installation

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 6



Figure 6. Wastewater Treatment Gravity Filters

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 7



Figure 7. FGD Substation Area

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 8

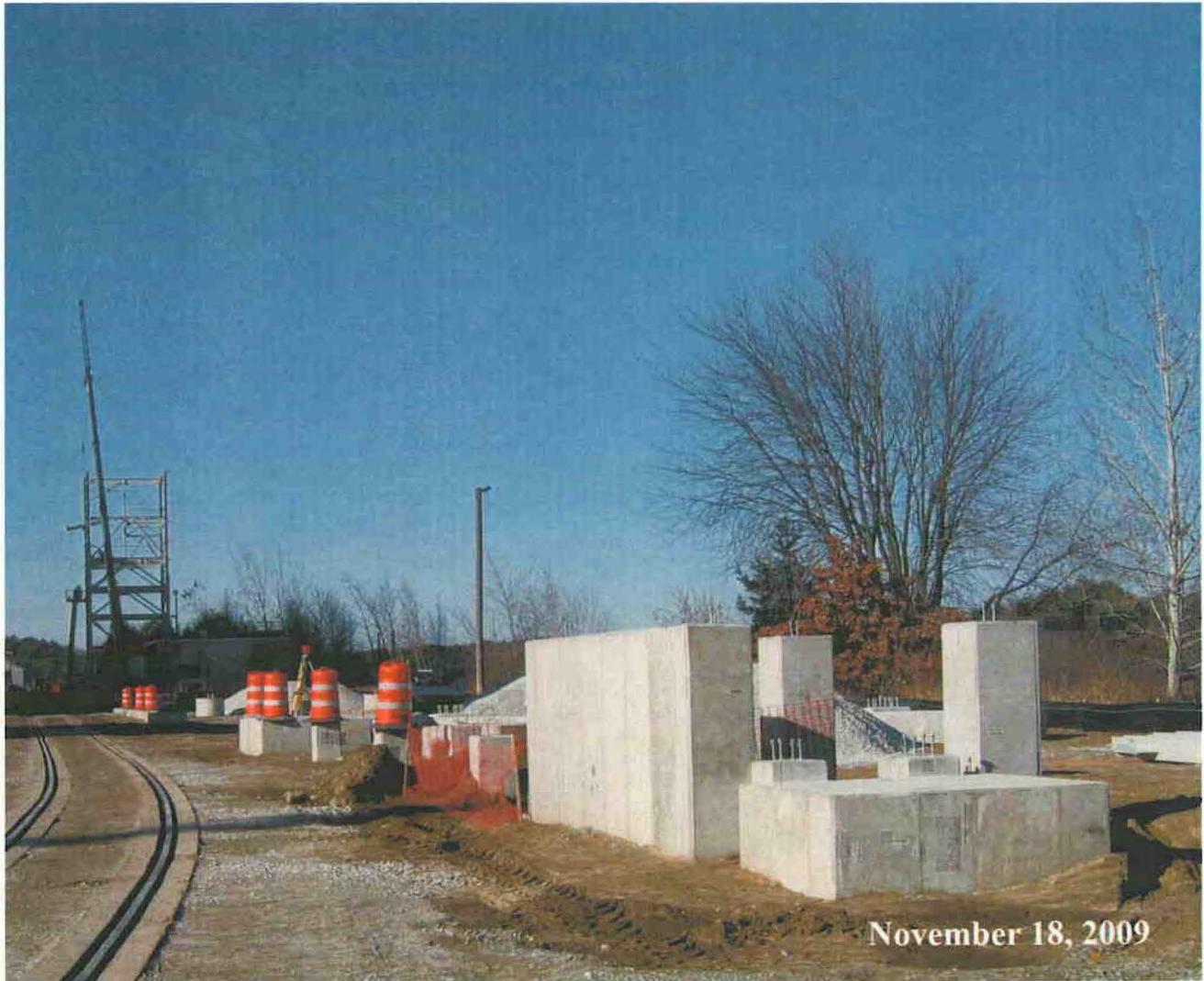


Figure 8. Limestone Conveyor System

Merrimack Clean Air Project  
Attachment 1  
Site Photographs - November 18, 2009  
Page 9



Figure 9. Foundation for Limestone Silos

**Merrimack Clean Air Project  
Attachment 2  
Cheswick FGD Project Lessons Learned**

**Public Service of New Hampshire  
Clean Air Project  
Cheswick Site Visit  
Minutes of Meeting**

**Subject:** Lessons Learned - SESS/Sterling Boiler FGD Contract (Cheswick Station)  
**Date:** July 22, 2009

**Location:** Cheswick Station

**ATTENDEES:**

**Public Service of New Hampshire  
(PSNH)**

Bill Smagula, Director Generation  
Mike Hitchko, Project Manager  
Richard Roy, Project Engineer

**Reliant Energy**

Joe Cavello, Project Manager

**URS-Washington Division (URS-WD)**

Ray McLaughlin, Project Manager –  
Cheswick FGD

Dennis Penline, Project Manager –  
Merrimack FGD

Tom Shannahan, Project Engineering  
Manager – Merrimack FGD

Hector Cramer, Construction Manager –  
Cheswick FGD

**Discussion:**

The following discussions, comments and action items resulted from the meeting:

**Schedule** – The Cheswick FGD SESS/Sterling Boiler project schedule had many deficiencies:

1. Engineering deliverables were late from the beginning of the project. The result was late procurement, material delivery, construction, and start up.
2. SESS schedule was never fully integrated with construction and start up and the lack of logic relationships made the schedule difficult to manage/assess progress.
3. Material (Quantity) tracking performance was a problem. Construction status could not be adequately identified.
4. Subcontracts were never fully detailed in the schedule, specifically development of bid package, award, procurement and deliveries of material.
5. Make sure you manage using key metrics such as linear feet installed for large and small bore pipe, cable tray, etc.

**QA/QC** - Several major issues with the SESS QA/QC Program:

1. SESS did not have a QA representative on site full time; only provided auditory inspections. This was a major problem in that URS-Washington Division ended up performing the oversight role during construction i.e. weld quality, procedures and weld details, etc.

**Merrimack Clean Air Project**  
**Attachment 2**  
**Cheswick FGD Project Lessons Learned**  
 Page 2

Subject: Lessons Learned – SESS/Sterling Boiler FGD Contract (Cheswick Station)  
 Date: July 22, 2009

2. The RFI and NCR process was poorly managed. Best to require SESS/Sterling Boiler submit all RFIs and NCRs for information. Visibility of all such issues is critical. Errors must be acknowledged and addressed.
3. Problem examples: Carbon steel welds to absorber: welding rod not heated.
4. Perform critical shop visits/audits for key equipment during fabrication, testing, and shipping preparation.
5. Maintain on-site QA after equipment is delivered to site: Example: Energize strip heaters in motors. This was poorly managed.

**Material Management**

1. SESS/Sterling Boiler had major problems with material receipt, inspection, storage, maintenance, and management of material release to construction.

**Craft Supervision and Management**

1. Craft Supervision and Management was poorly handled. In addition, the lack of SESS oversight to the construction efforts was not managed appropriately. Little direction or involvement by SESS. Home office support from SESS was deficient and not provided in a timely manner, even with the close proximity of the plant to SESS office.

**SESS Management**

1. Reliant Energy (Joe Cavello) noted that new V.P. of Operations for SESS, Deborah Terscak, was very helpful in addressing critical issues which required immediate attention. She was one who could make things happen when problems arose.
2. Must use LDs, if triggered, impose/notify immediately upon becoming effective.
3. Electrical – roles and responsibilities was not clearly defined-SESS or Sterling?

**Lock Out/Tag Out**

1. Coordination and execution of process must be closely and adequately managed (much work, many edits, include station over one year ahead of activities).

**Commissioning and Start-Up**

1. Start-Up must be involved early in the process. SESS never did integrate a system turnover approach and URS-Washington Division had to do more than expected.
2. The start up activities were not adequately detailed: system turnovers were not identified.

**Merrimack Clean Air Project**  
**Attachment 2**  
**Cheswick FGD Project Lessons Learned**  
Page 3

Subject: Lessons Learned – SESS/Sterling Boiler FGD Contract (Cheswick Station)  
Date: July 22, 2009

**General Items**

1. Final P&IDs were late. This evolved into problems with piping design, logic development, etc.
2. Piping and pipe supports were not managed properly: deliveries were very late; systems were tested with temporary pipe supports (chains) in place.
3. Electrical work was good due to good local contractor (design and drawing issues were late).
4. Labor issues can arise. National Elevator agreements must be addressed and managed ahead of being on site.
5. Absorber rigging and lifting of rings is a critical issue. Must have multiple QA checks. Need the proper, qualified people to direct this work.

**Site Walkdown**

1. Conducted Site Walkdown tour of entire facility.

**URS-Washington Division/PSNH Follow-up Discussions**

*Follow-up discussions were held to plan path forward and identification of major issues:*

1. Hold preliminary discussions with SESS/Sterling Boiler Merrimack Project Team to review issues noted.
2. Forward major issues to SESS for purpose of follow-up discussions.
3. Hold follow-up discussions with SESS Management/Executive personnel to address major concerns with progress to date.
4. Plan frequent meetings with vendors and their management. Minutes are very valuable.
5. Insure proper/complete testing, as built, etc. are done ahead of system tie-ins.
6. Insure that the DCS logic, durations, interlocks etc. are debugged and rung-out ahead of delivery to site. Accurate Factory Acceptance Testing is critical.

Notes prepared by:

D. Pemline

REDACTED

March 2, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for November 2009**

Attached is the Independent Engineer's Monthly Report (the "Report") for November 2009 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Project on December 16, 2009.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads "Richard J. Gendreau". The signature is written in black ink on a white background.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – December 16, 2009  
ec: Distribution



**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
Page 2

## Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on December 16, 2009. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and the Washington Division of URS ("URS"), the Program Manager, followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. We also attended a separate meeting held with SESS, after the MPM, to specifically discuss the development and integration of the SESS schedule. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPM. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through November 2009 (the "Period"), URS reported that overall the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path remained through the SESS contract for the FGD island. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed though Mobilization of the Material Handling Contractor. This last milestone was scheduled for November 23, 2009, but occurred ahead of schedule on October 28, 2009.

Through November 2009, Projected Costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS have identified priority safety topics and areas of emphasis and have acted to achieve improvements in ongoing safety results. They have addressed the "safety-culture" issues raised during previous MPM.
2. Progress was being made on the integrated Project Master Schedule. PSNH and URS continued to focus significant resources on this critical task.

## Independent Engineer's Report for November 2009 Merrimack Clean Air Project

Page 3

3. The Project was on schedule to achieve the Substantial Completion date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year from the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through November 2009, Projected Costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. .
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 452-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the Balance of Plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD island supplier; Dearborn Midwest ("DMW"), the Material

**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
Page 4

Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete, FRP Lined Chimney supplier; Siemens Water Technology and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; and Francis Harvey & Sons ("FH"), the contractor for the major Project foundations. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

There was one reportable injury during November 2009 (the Period) and no Lost Time Incidents. The injury (finger cut/fracture) was the result of a hand becoming caught in a snatch block. Fabricated guards were subsequently added to the blocks. There was a serious near miss when a 4,160-volt ("V") underground line was contacted during the forming of the foundation for the limestone silo foundation. Fortunately the contacting element was made of fiberglass, thus avoiding any injury. The underground line was not identified on drawings, but prior to the work the location of the line was identified and marked. There were safety stand-down meetings following each of these events.

For safety reasons, during the limestone conveyor installation, the on-site train will always be manned, even though it is normally remotely operated.

PSNH indicated that URS has addressed the "safety-culture" issues raised during previous MPMs.

## Environmental and Permitting

No significant environmental events were reported during the Period.

URS continued to effectively manage the process of obtaining local permits so that there was no impact on the Project Schedule.

Wastewater Effluent Permit: PSNH and URS were evaluating various options for limiting the discharge of small quantities of various elements in the Project's wastewater.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The most critical path remained through the SESS FGD island Mechanical Completion scheduled for August 1, 2011 (see Table 1). The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the Project Milestones through the Period. All of the Project Milestones had been completed though Mobilization of the Material Handling Contractor. This last milestone was schedule for November 23, 2009, but occurred ahead of schedule on October 28, 2009.

**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
 Page 5

Critical deliveries of SESS' steel and other components were being made to the site. SESS had improved absorber and FGD Building steel deliveries. This allowed the erection to start earlier than planned to support the release of the electrical rooms by the critical milestone date of June 1, 2010. Some finished materials and equipment were being stored off site at manufacturer's and other facilities. These deliveries were making it possible for SESS to stay on schedule.

The second critical path was through the availability of the Distributed Control System ("DCS"). It is normal for the availability of the DCS to be on the critical path, because all of the major systems interface with this system. The DCS was awarded to Emerson this Period. PSNH, URS and the other island contactors were working diligently with Emerson to facilitate the exchange of critical design data.

The fabrication and erection of the limestone silos was no longer on the second critical path as a result of actions taken to mitigate the impact of the redesign of the limestone silos.

**Table 1**  
**Status of Project Milestones**  
**November 2009**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Misc. Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/7/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010
Award Steel and Duct Erection Subcontract	12/21/2009	12/09/2009
Award BOP Mechanical Contract	01/05/2010	02/26/2010
Award Elect Subcontract (includes power and control)	02/05/2010	03/09/2010

**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**November 2009**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Release Booster Fan Area for Foundation	03/01/2010	04/14/2010
Complete Conveyor L-4 Erection	03/01/2010	02/02/2010
Mobilize BOP Electrical Contractor	04/15/2010	04/15/2010
Release Electrical Room for BOP Electrical	06/01/2010	05/12/2010
Complete SWPH Foundation	06/01/2010	06/01/2010
Absorber and Internals Complete	08/11/2010	11/15/2010
Stack Complete	09/13/2010	04/14/2010
Enclose FGD Building	11/01/2010	11/01/2010
Complete Duct Erection	11/01/2010	11/01/2010
Absorber Outlet Duct Set	11/01/2010	11/01/2010
Power to WWT Area	12/31/2010	12/31/2010
PSNH FGD Substation Complete	02/11/2011	08/01/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
FGD Mechanical Completion	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/05/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was reported to be 38 percent versus a plan of 38 percent.

The Project also measures progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. Note that the Project will soon change to measuring the SPI using quantities installed, as a better measure of performance during construction. This is a widely used project management tool. An SPI

**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
Page 7

score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.00. This compares with 0.97 and 0.94 the previous two periods. This is excellent performance and indicates that there were no major problems in the management and execution of the Project.

Overall, the Project remained on schedule. Engineering has shifted focus to the electrical and instrumentation and controls ("I&C") areas. Work also continued on the delivery of the major equipment to support the follow-on engineering and construction schedules.

### **Integrated Project Schedule**

Continued refinement is being made on the integrated Project Master Schedule. SESS and DMW have been added to the schedule. URS continued to work with SESS to develop greater schedule detail and to have the schedule better reflect SESS' work plan. URS was working with the other contractors to integrate their activities. PSNH and URS continued to focus significant resources on this critical task.

The Project Schedule in the Pert format has been issued by URS.

## **Major Project Contractors**

### **URS (Program Manager)**

URS reports that through the Period, the earned percent complete for engineering and procurement services was 76 percent versus a plan of 75 percent and for construction management and start-up services the earned value was 21 percent versus a plan of 16 percent. They were not reporting any significant issues.

### **Siemens Environmental Systems and Services (FGD Island)**

SESS has made progress with the delivery of steel and other components. The delivery of materials and equipment were supporting the schedule. The erection of the absorber rings was on schedule. The addition of the second fabrication table may improve the current absorber erection schedule.

URS had added the SESS' schedule into the overall Project Schedule; however, they would like more subcontractor detail, including more piping and electrical installation logic. URS was working with SESS to improve its schedule logic and to have the schedule better reflect how the work was actually being executed.

Through the Period, SESS had an earned percent complete of 34 percent versus a plan of 37 percent.

Management continued to focus on major equipment and materials deliveries, resolution of SESS schedule logic and turnover of the electrical room to the BOP electrical contractor. The

**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
Page 8

schedule milestones: Release Electrical Room for BOP Electrical and FGD Mechanical Completion continued to be on schedule.

### **Dearborn Midwest (Material Handling Systems)**

Overall DMW's engineering was 89 percent complete with the majority of remaining work in the electrical and I&C areas. All major components were in fabrication or being delivered. Completion of Transfer Towers TT-1 and TT-2 and Conveyor L-4 are forecast to be complete almost one month ahead of the milestone schedule date. This will free up the area for the erection of the ductwork steel.

Through the Period, DMW had an earned percent complete of 75 percent versus a plan of 70 percent.

The fabrication and erection of the limestone silos was no longer on the second critical path as a result of actions taken to mitigate the impact of the redesign. While the Project Milestone, "Install Limestone Silo Foundation," had slipped from November 24, 2009 to January 15, 2010; it had been improved by almost one month since the October 2009 forecast. Due to the actions taken by management, the redesign of the limestone silos should not impact the Project Schedule.

### **Hamon-Custodis (Reinforced Concrete Chimney and FTP Liner)**

During this Period, HC completed the installation of the chimney liner sections and prepared to install the liner elbow. Through the Period, HC had an earned percent complete of 81 percent versus a plan of 67 percent.

HC was ahead of schedule. The "Stack Complete" Project Milestone, shown in Table 1, had improved from the original date of September 13, 2010 to April 14, 2010.

### **Siemens Water Technology and Northern Peabody (WWT Facility)**

Overall, SWT/NP's engineering/procurement was 90 percent complete with the majority of remaining work in the electrical and I&C areas. During the Period, they placed several FRP tanks and continued installing underground conduit.

Through the Period, SWT/NP had an earned percent complete of 75 percent versus a plan of 70 percent. However, the earned value was skewed by excellent procurement progress (+19%) offsetting poor construction progress (-25%).

There were a number of concerns with the performance of SWT/NP that were being monitored closely. SWT/NP remained on schedule to meet its critical schedule milestone dates, including Air System Available, Mechanical Completion and Substantial Completion.

**Independent Engineer's Report for November 2009**  
**Merrimack Clean Air Project**  
Page 9

### **Francis Harvey and Sons Inc. (Major Foundations)**

During the Period, FH placed the foundation for the limestone silos, completed the duct support steel foundation and started the Gypsum Storage Building foundation. Through the Period, FH had an earned percent complete of 67 percent versus a plan of 65 percent.

FH continued to perform very well. It met or beat all of its scheduled dates through November 2009. URS was working with FH to identify and resolve winter weather impacts and costs associated with completing the limestone silos and Gypsum Storage Building foundations by early January 2010.

### **Daniel O'Connell's Sons Inc. (Site Preparation - Phase II)**

URS reported that DOC's performance has been poor, due to poor planning, management and staffing of the work. In accordance with the contract, liquidated damages have been assessed against the contractor. Management plans to reduce DOC's scope of work and to close out the contract as soon as possible. The DOC work scope will be distributed to other contractors in a cost effective manner.

### **Merrimack Clean Air Project Cost Summary**

Table 2 is a summary of the Project's projected costs compared with the original budget, along with the variance from the budget. The data is updated through November 2009. The estimated cost at completion was unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for November 2009  
Merrimack Clean Air Project  
Page 10

Table 2  
Merrimack CAP Budget versus Projected Costs  
Complete through November 2009

	Total (Projected)	Budget Total	Variance
NU Labor - Total	\$6,937,506	\$7,500,000	\$(562,494)
Material - Total	\$21,523,463	\$35,000,000	\$(13,476,537)
Contractor Labor	\$304,480,172	\$310,000,000	\$(5,519,828)
Outside Services	\$4,307,996	\$3,000,000	\$1,307,996
Emp. Expenses	\$124,183	\$150,000	\$(25,817)
Vehicles - Total	\$16,901	\$1,000	\$15,901
Fees and Payments	\$7,724,441	\$11,820,000	\$(4,095,559)
Rents and Leases	\$124,754	\$29,000	\$95,754
Indirect Costs	\$7,901,562	\$5,500,000	\$2,401,562
AFUDC	\$62,859,022	\$55,000,000	\$7,859,022
Contingency, Reserves, Other	\$41,000,000	\$29,000,000	\$12,000,000
<b>TOTAL</b>	<b>\$457,000,000</b>	<b>\$457,000,000</b>	<b>\$0.00</b>

Independent Engineer's Report for November 2009  
Merrimack Clean Air Project Photographs - December 16, 2009  
Attachment 1

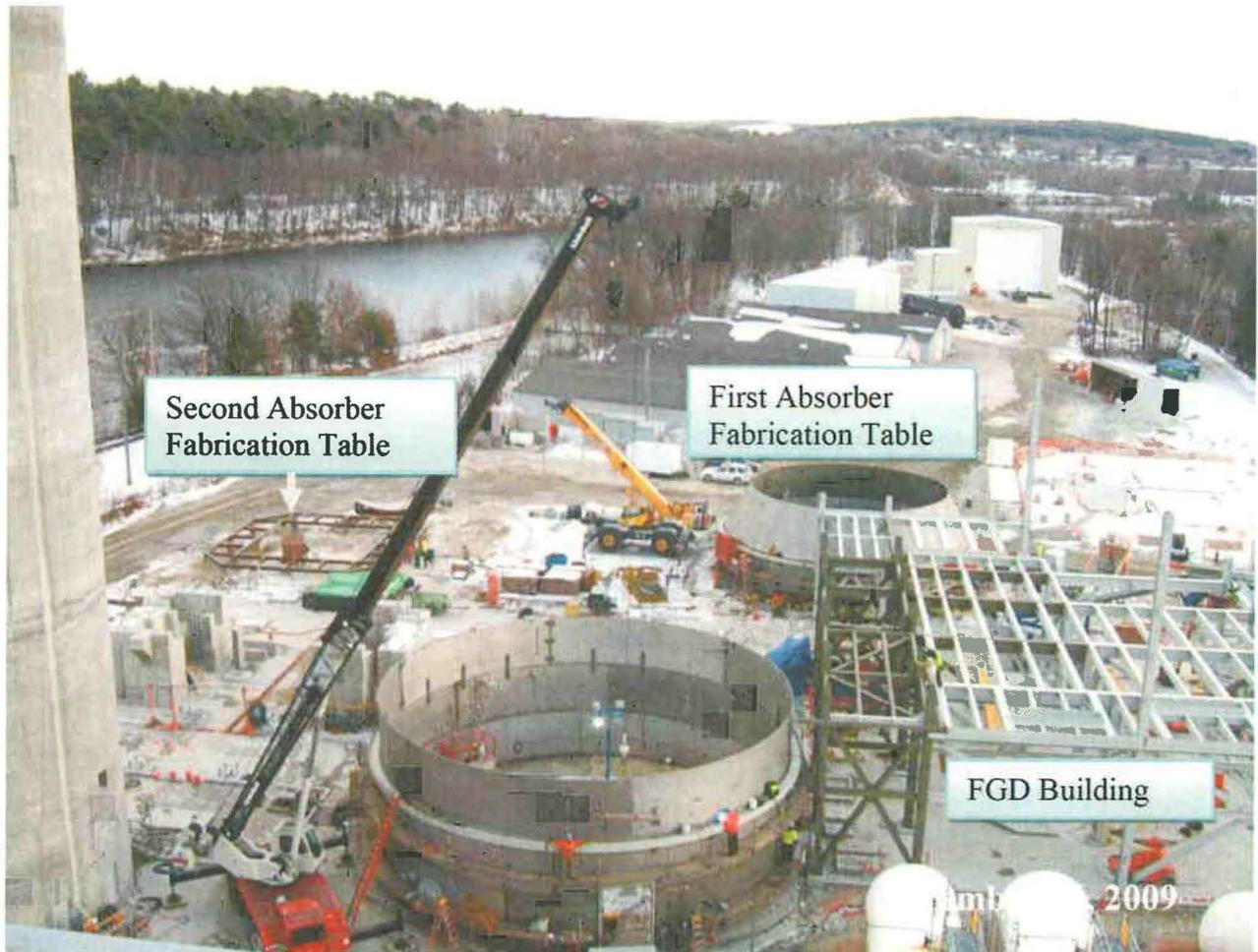


Figure 1. Looking South



Independent Engineer's Report for November 2009  
Merrimack Clean Air Project  
Attachment 1  
Page 2



Figure 2. Background WWT – Foreground Gypsum Storage Building

Independent Engineer's Report for November 2009  
Merrimack Clean Air Project  
Attachment 1  
Page 3

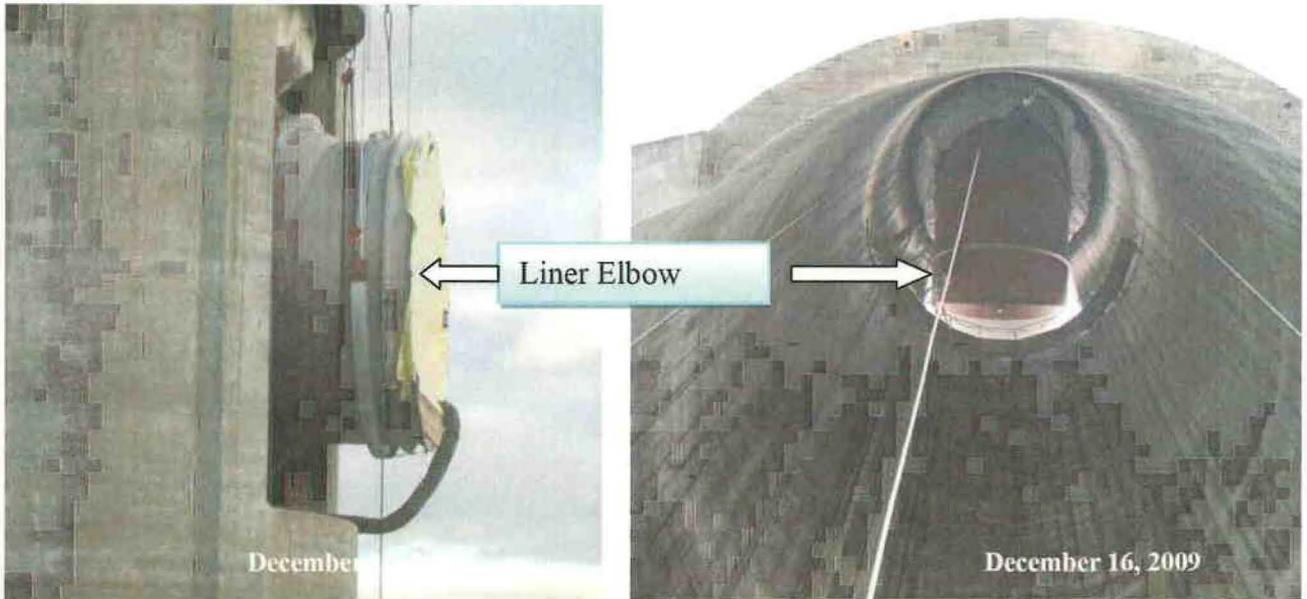


Figure 3. Two Views of Installed Chimney FRP Liner Elbow



Figure 4. Recycle Pumps

Independent Engineer's Report for November 2009  
Merrimack Clean Air Project  
Attachment 1  
Page 4



Figure 5. Limestone Transfer Tower 1 (foreground) and 2 (background)

**Independent Engineer's Report for November 2009  
Merrimack Clean Air Project  
Attachment 1  
Page 5**



**Figure 6. Limestone Silos Foundation Getting Ready for Concrete Placement**

April 29, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for December 2009**

Attached is the Independent Engineer's Monthly Report (the "Report") for December 2009 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Project on January 20, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – January 20, 2010  
c: Distribution

## Independent Engineer's Report for December 2009 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on January 20, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and the Washington Division of URS ("URS"), the Program Manager, followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPM. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through December 2009 (the "Period"), URS reported that overall the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path remained through the SESS contract for the FGD island. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed through mobilization of the Material Handling Contractor.

Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope-of-work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the

## Independent Engineer's Report for December 2009 Merrimack Clean Air Project

Page 3

Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis and acted to achieve improvements in ongoing safety results.
2. Progress was made on the integrated Project Master Schedule. PSNH and URS continued to focus significant resources on this critical task.
3. The Project was on schedule to achieve the Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 452-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and

## Independent Engineer's Report for December 2009

### Merrimack Clean Air Project

Page 4

modifications to the Balance of Plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier, Siemens Water Technology and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; and Francis Harvey & Sons ("FH"), the contractor for the major Project foundations. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

There were no recordable injuries during the Period and no Lost Time Incidents.

## Environmental and Permitting

No significant environmental events were reported during the Period.

URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") Permit continued. PSNH and URS were evaluating various treatment options for limiting the discharge of small quantities of various elements in the Project's wastewater, in concert with the New Hampshire Department of Environmental Services ("NHDES") requirements.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The most critical path remained through the SESS FGD island mechanical completion scheduled for August 1, 2011 (see Table 1), through procurement and delivery of FGD Building steel. This was the same as last Period. This Period a secondary path was identified through the air compressor located in the WWT Building. This path was delivery dependent through the equipment. A recovery plan will be implemented if it becomes necessary.

## Independent Engineer's Report for December 2009 Merrimack Clean Air Project

Page 5

The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the Project Milestones through December 2009. The Project Milestone, "Award Steel and Duct Erection Subcontract" was completed during the Period. With the exception of "Install Limestone Silo Foundation," all of the Project Milestones had been completed though the Period.

**Table 1  
Status of Project Milestones  
December 2009**

	Planned (Target)	Forecast (Actual)
Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Misc. Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009
Award BOP Mechanical Contract	01/05/2010	02/26/2010
Award Elect Subcontract (includes power and control)	02/05/2010	03/09/2010
Release Booster Fan Area for Foundation	03/01/2010	04/14/2010
Complete Conveyor L-4 Erection	03/01/2010	02/02/2010
Mobilize BOP Electrical Contractor	04/15/2010	04/15/2010
Release Electrical Room for BOP Electrical	06/01/2010	05/12/2010
Complete SWPH Foundation	06/01/2010	06/01/2010
Absorber and Internals Complete	08/11/2010	11/15/2010
Stack Complete	09/13/2010	04/14/2010
Enclose FGD Building	11/01/2010	11/01/2010

**Independent Engineer's Report for December 2009**  
**Merrimack Clean Air Project**  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**December 2009**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Complete Duct Erection	11/01/2010	11/01/2010
Absorber Outlet Duct Set	11/01/2010	11/01/2010
Power to WWT Area	12/31/2010	12/31/2010
PSNH FGD Substation Complete	02/11/2011	08/01/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
FGD Mechanical Completion	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/05/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 41 percent versus a plan of 41 percent.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. Note that the Project will soon change to measuring the SPI using quantities installed, as a better measure of performance during construction. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.02. This compares with 1.00 and 0.97 the previous two Periods. This is excellent performance and indicates that the administration and execution of the Project are being well managed.

## Integrated Project Schedule

Continued refinement was being made on the integrated Project Schedule. URS continued the integration of all major contractor schedules into the Project Master Schedule. They were

## Independent Engineer's Report for December 2009

### Merrimack Clean Air Project

Page 7

working with SESS to develop greater schedule detail and to have the schedule better reflect SESS' work plan. URS was also expanding the BOP mechanical and electrical activities and incorporating the detailed Start-Up Plan into the Project Schedule. PSNH and URS continued to focus significant resources on this critical task.

## Major Project Contractors

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 78 percent versus a plan of 76 percent and for construction management and start-up services the earned value was 22 percent versus a plan of 21 percent. No significant issues were reported.

### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had an earned percent complete of 39 percent versus a plan of 38 percent. SESS awarded the electrical installation subcontract, completed erection of absorber rings 3 and 4, continued the erection of rings 5, 6 and 7 on the first fabrication table, started to erect the dewatering area structural steel and started to set the absorber recycle pumps. The delivery of materials and equipment was supporting the schedule.

URS continued to review the SESS' schedule and to resolve comments. Management was focused on major equipment and materials deliveries, resolution of SESS schedule logic and turnover of the Electrical Room to the BOP electrical contractor. While the schedule milestones, Release Electrical Room for BOP Electrical and FGD Mechanical Completion were reported to be on schedule, the uncertainty with the SESS schedule logic and critical materials deliveries remained an area of focus.

### Dearborn Midwest (Material Handling Systems)

Through the Period, DMW had an earned percent complete 30 percent versus a plan of 26 percent. Overall DMW's engineering was 89 percent complete with the majority of the remaining work in the electrical and I&C areas. All major components were reported to be in fabrication or being delivered. Completion of Transfer Towers TT-1 and TT-2 and Conveyor L--4 were forecasted to be completed almost one month ahead of the milestone schedule date. This will free up the area for the erection of the ductwork steel.

The fabrication and erection of the limestone silos was no longer on the second critical path as a result of actions taken to mitigate the impact of the redesign. While the Project Milestone, "Install Limestone Silo Foundation," had slipped from November 24, 2009 to January 15, 2010; it had been improved by almost one month, since the October 2009 forecast. Due to the actions taken by management, the redesign of the limestone silos should not impact the Project Schedule.

**Independent Engineer's Report for December 2009****Merrimack Clean Air Project**

Page 8

**Hamon-Custodis (Reinforced Concrete Chimney and FTP Liner)**

Through the Period, HC had an earned percent complete of 81 percent versus a plan of 67 percent. During this Period, HC completed the installation of the chimney liner elbow and fiberglass joint.

HC was ahead of schedule. The "Stack Complete" Project Milestone, shown in Table 1, had improved from the original date of September 13, 2010 to April 14, 2010.

The schedule for the removal of the chimney hoist was becoming a concern, due to delays in receipt of the chimney elevator. Removal of the chimney erection hoist is necessary to free up the area for the installation of the booster fan foundation; however, the removal of the hoist cannot occur until the chimney elevator is installed.

**Siemens Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 76 percent versus a plan of 78 percent. However, the earned value is skewed by good procurement progress (+7%) offsetting poor construction progress (-29%).

Overall, SWT/NP's engineering/procurement is 86 percent complete with the majority of remaining work in the electrical and I&C areas. During the Period, they completed placing all large FRP tanks, completed setting the lime silo and started to erect building steel.

There were a number of concerns with the performance of SWT/NP that were being monitored closely; however, they remained on schedule to meet their critical schedule milestone dates, including Air System Available, Mechanical Completion and Substantial Completion.

It should be noted that SWP/NP mobilized earlier than was required by the original URS Project Schedule. Therefore, although there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the Project Schedule.

**Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 72 percent versus a plan of 70 percent. During the Period, FH placed the foundation for the east limestone silo and continued work on the Gypsum Storage Building foundation.

FH continued to perform well. URS continued to work with FH to identify and resolve winter weather impacts and costs associated with completing the limestone silos and Gypsum Storage Building foundations by early January 2010.

**Daniel O'Connell's Sons Inc. (Site Preparation - Phase II)**

Through the Period, Daniel O'Connell's Sons Inc. ("DOC") had an earned percent complete of 89 percent versus a plan of 95 percent. During the Period, DOC installed the north/south road

  
**Independent Engineer's Report for December 2009****Merrimack Clean Air Project**

Page 9

asphalt paving, completed process piping installation to the new WWT Building and continued to install the sanitary system.

URS reported that DOC's performance has been unsatisfactory, due to poor planning, management and staffing of the work. In accordance with the contract, liquidated damages have been assessed against the contractor. Management plans to reduce DOC's scope of work and to close out the contract as soon as possible. The DOC work scope will be distributed to other contractors in a cost-effective manner.

**Merrimack Clean Air Project Cost Summary**

For the Period, the estimated cost at completion was unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for December 2009  
Merrimack Clean Air Project Photographs – January 20, 2010  
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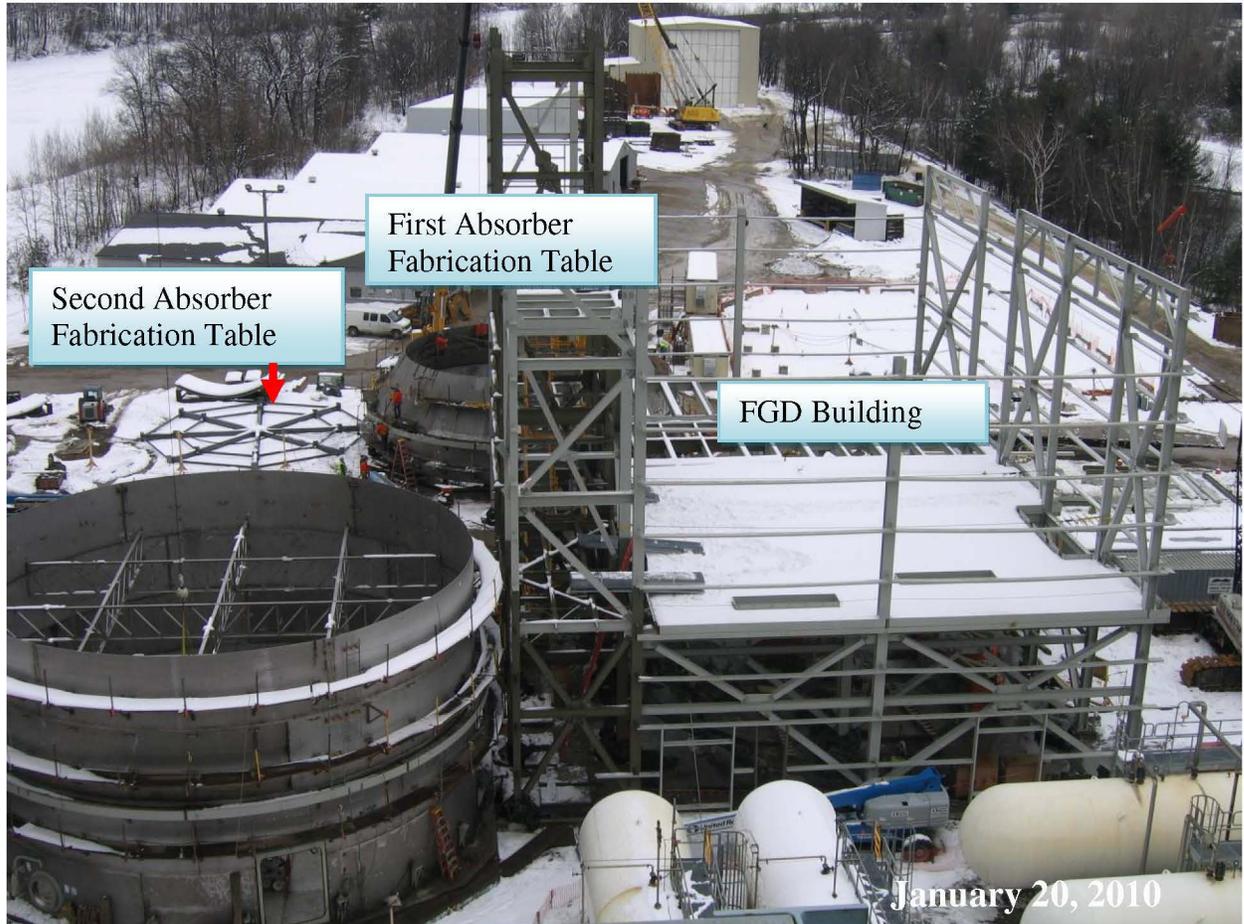


Figure 1 Looking South



Independent Engineer's Report for December 2009  
Merrimack Clean Air Project Photographs – January 20, 2010  
Attachment 1  
Page 2



Figure 2 Recycle Pumps

**Independent Engineer's Report for December 2009**  
**Merrimack Clean Air Project Photographs – January 20, 2010**  
**Attachment 1**  
Page 3



**Figure 3 Repairing Limestone Ball Mill Foundation**

Independent Engineer's Report for December 2009  
Merrimack Clean Air Project Photographs – January 20, 2010  
Attachment 1

Page 4



Figure 4 Background WWT – Foreground Gypsum Storage Building

Independent Engineer's Report for December 2009  
Merrimack Clean Air Project Photographs – January 20, 2010  
Attachment 1  
Page 5



Figure 5 Wastewater Treatment Building

Independent Engineer's Report for December 2009  
Merrimack Clean Air Project Photographs – January 20, 2010  
Attachment 1  
Page 6



Figure 6 Limestone Conveyor L-4 and Transfer Towers 1 (left) and 2 (right)

**Independent Engineer's Report for December 2009  
Merrimack Clean Air Project Photographs – January 20, 2010  
Attachment 1  
Page 7**



**Figure 7 Limestone Silos Foundation After Concrete Placement**

April 29, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for January 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for January 2010 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Project on February 19, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

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If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – February 19, 2010

c: Distribution

## Independent Engineer's Report for January 2010

### Merrimack Clean Air Project

Page 2

## Summary

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## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions

## Independent Engineer's Report for January 2010 Merrimack Clean Air Project

Page 3

upon which these opinions are based, this "Report" should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis to achieve improvements in ongoing safety results.
2. Progress was made on the integrated Project Master Schedule. PSNH and URS continued to focus significant resources on this critical task.
3. The Project was on schedule to achieve the Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year from the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 452-foot high Reinforced Concrete Chimney with a

## Independent Engineer's Report for January 2010 Merrimack Clean Air Project

Page 4

fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the Balance of Plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier, Siemens Water Technology and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; and Francis Harvey & Sons ("FH"), the contractor for the major Project foundations. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

There were no recordable injuries during the Period and no Lost Time Incidents.

### Environmental and Permitting

No significant environmental events were reported during the Period.

URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") Permit continued. Preparation was begun on a request for proposal for providing additional FGD WWT systems to limit the discharge of small quantities of various elements in the Project's wastewater effluent.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the critical Project Milestones through January 2010. All of the critical Project Milestones had been completed though the Period.

The most critical path remained through SESS FGD island Mechanical Completion scheduled for August 1, 2011 (see Table 1), through procurement and delivery of FGD Building steel, followed by bulk materials installation. The critical path continued though the cable tray,

## Independent Engineer's Report for January 2010 Merrimack Clean Air Project

Page 5

conduit and terminations necessary to support the power supply for the testing and start-up of the process systems. The SESS schedule reflected a negative nine days impact to their critical path through the installation of the Ball Mills. This work was partially impacted by modifications necessary in the inbed bolt locations.

**Table 1  
Status of Project Milestones  
January 2009**

	Planned (Target)	Forecast (Actual)
Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Misc. Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/16/2010
Award Elect Subcontract (includes power and control)	02/05/2010	03/22/2010
Release Booster Fan Area for Foundation	03/01/2010	04/14/2010
Complete Conveyor L-4 Erection	03/01/2010	02/02/2010
Mobilize BOP Electrical Contractor	04/15/2010	04/15/2010
Release Electrical Room for BOP Electrical	06/01/2010	05/12/2010
Complete SWPH Foundation	06/01/2010	06/01/2010
Absorber and Internals Complete	08/11/2010	11/15/2010
Stack Complete	09/13/2010	07/06/2010
Enclose FGD Building	11/01/2010	11/01/2010
Complete Duct Erection	11/01/2010	11/01/2010

**Independent Engineer's Report for January 2010**  
**Merrimack Clean Air Project**  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**January 2009**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Absorber Outlet Duct Set	11/01/2010	11/01/2010
Power to WWT Area	12/31/2010	12/31/2010
PSNH FGD Substation Complete	02/11/2011	08/01/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
FGD Mechanical Completion	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/05/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 46 percent versus a plan of 44 percent.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. Note that the Project will soon change to measuring the SPI using quantities installed, as a better measure of performance during construction. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.05. This compares with 1.02 and 1.00 the previous two Periods. This is excellent performance and indicates that the administration and execution of the Project are being well managed.

## Integrated Project Schedule

Continued refinement was being made on the integrated Project Schedule. URS continued the integration of all major contractor schedules into the Project Schedule. They were working with SESS to develop greater schedule detail and to have the schedule better reflect SESS' work plan.

## Independent Engineer's Report for January 2010

### Merrimack Clean Air Project

Page 7

PSNH and URS continued to focus significant resources on this critical task. This is an ongoing effort with additional details being developed each month.

## Major Project Contractors

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 81 percent versus a plan of 79 percent and for construction management and start-up services the earned value was 25 percent versus a plan of 21 percent. No significant issues were reported.

During the Period, URS started the evaluation of the BOP Mechanical Installation Contract bids, started the evaluation of the BOP Electrical Installation Contract bids, issued P&IDs, logic diagrams, functional descriptions and I/O lists to DCS supplier and performed a number of activities in support of the DCS schedule.

### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had an earned percent complete of 44 percent versus a plan of 40 percent. During the Period, SESS completed ground assembly of rings 5, 6 and 7 and started to fabricate rings 8, 9 and 10 on the second fabrication table. They continued to erect the FGD Building (dewatering area) structural steel, and set the absorber recycle pumps and the vacuum pump skids. The delivery of materials and equipment was supporting the schedule.

URS continued to review the SESS' schedule and to resolve comments. Management was focused on major equipment and materials deliveries, resolution of SESS schedule logic and turnover of the Electrical Room to the BOP electrical contractor. While the schedule milestones, Release Electrical Room for BOP Electrical and FGD Mechanical Completion, were reported to be on schedule, the uncertainty with the SESS schedule logic and critical materials deliveries remained an area of management focus.

The URS Vice President of Construction toured the site and commented on the high quality of the absorber erection work.

### Dearborn Midwest (Material Handling Systems)

Through the Period, DMW had an earned percent complete of 33 percent versus a plan of 27 percent. During the Period, DMW completed setting Conveyor L-4 bents and tube sections and started to install cable tray and conduit in Conveyor L-4 and conduit in Transfer Towers 1 and 2. All major components were reported to be in fabrication or being delivered. Procurement and construction were reported to be ahead of schedule.

URS continued to work with DMW to integrate their schedule into the Project Schedule. Erection of transfer towers and Conveyor L-4 were completed early in mid-January, rather than March 2010, to support the erection of the steel flue gas ductwork.

**Independent Engineer's Report for January 2010****Merrimack Clean Air Project**

Page 8

**Hamon-Custodis (Reinforced Concrete Chimney and FTP Liner)**

Through the Period, HC had an earned percent complete of 85 percent versus a plan of 76 percent. During this Period, HC started to close the chimney's construction openings and mobilized the electrical subcontractor.

HC was ahead of schedule. The "Stack Complete" Project Milestone, shown in Table 1, had improved from the original date of September 13, 2010 to July 6, 2010. However, the completion date had slipped from the April 14, 2010 date reported last month, due to a delay in the receipt and installation of the chimney elevator.

A one-month delay in the mobilization of the chimney elevator subcontractor was reported, delaying the removal of the chimney construction hoist and the start of the foundations for the booster fans. The hoist is necessary (preferable method) for the installation of the chimney elevator. URS is working with FH on a contingency plan for the installation of the foundations.

**Siemens Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 82 percent versus a plan of 86 percent. However, the earned value is skewed by good procurement progress (+2%) offsetting poor construction progress (-27%).

Overall, SWT/NP's engineering/procurement is 91 percent complete with the majority of remaining work in the electrical and I&C areas. During the Period, they completed the erection of the building steel and started to install the building siding.

There were a number of concerns with the performance of SWT/NP that were being monitored closely. The Air System Available Milestone date has slipped almost one month; while the Mechanical Completion and Substantial Completion milestone dates are unchanged.

It should be noted that SWP/NP mobilized earlier than was required by the original URS Project Schedule. Therefore, although there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the Project Schedule.

**Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 86 percent versus a plan of 84 percent. During the Period, FH completed placing the limestone silo and Gypsum Storage Building foundations and completed installing the sheet piling for the service water pump house.

FH continued to perform well. URS continued to work with FH to identify and resolve winter weather impacts and costs associated with completing the limestone silos and Gypsum Storage Building foundations by early January 2010.

**Independent Engineer's Report for January 2010**  
**Merrimack Clean Air Project**  
Page 9

### **Daniel O'Connell's Sons Inc. (Site Preparation - Phase II)**

Through the Period, Daniel O'Connell's Sons Inc. ("DOC") had an earned percent complete of 90 percent versus a plan of 95 percent. During the Period, DOC continued to install the sanitary system and completed the installation of process piping.

URS reported that DOC's performance has been unsatisfactory, due to poor planning, management and staffing of the work. In accordance with the contract, liquidated damages have been assessed against the contractor. Management plans to reduce DOC's scope of work and to close out the contract as soon as possible. The DOC work scope will be distributed to other contractors in a cost-effective manner.

### **Merrill Iron and Steel Inc. (Ductwork & Structural Steel Erection)**

In December, Merrill Iron and Steel Inc. ("MIS") was awarded the ductwork and iron and steel erection contract. The contract work includes the receiving and unloading of all materials for erection, management oversight of structural steel and ductwork, field fabrication, touch-up painting, testing, and erection of structural steel, ductwork, insulation and miscellaneous steel for the Project. The work also includes coordination with the fabrication contractors.

MIS mobilized to the site in December 2009.

Through the Period, MIS had an earned percent complete of 3 percent versus a plan of 3 percent. During the Period, they completed mobilization, continued to receive ductwork and steel and started to ground assemble duct sections for Units 1 and 2 ductwork.

### **Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through January 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1

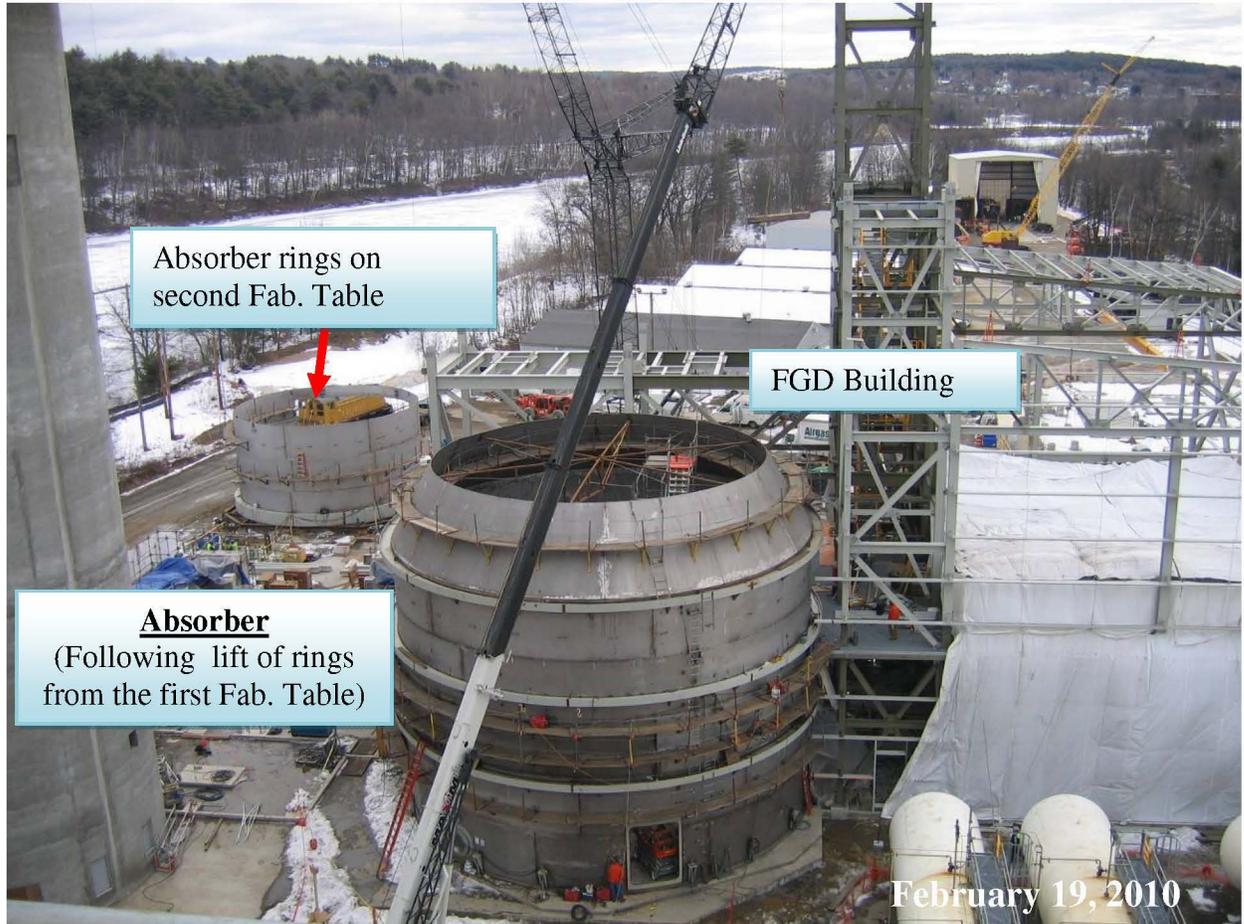


Figure 1 Looking South



Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1  
Page 2



Figure 2 Steel Ductwork Fabrication

Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1

Page 3

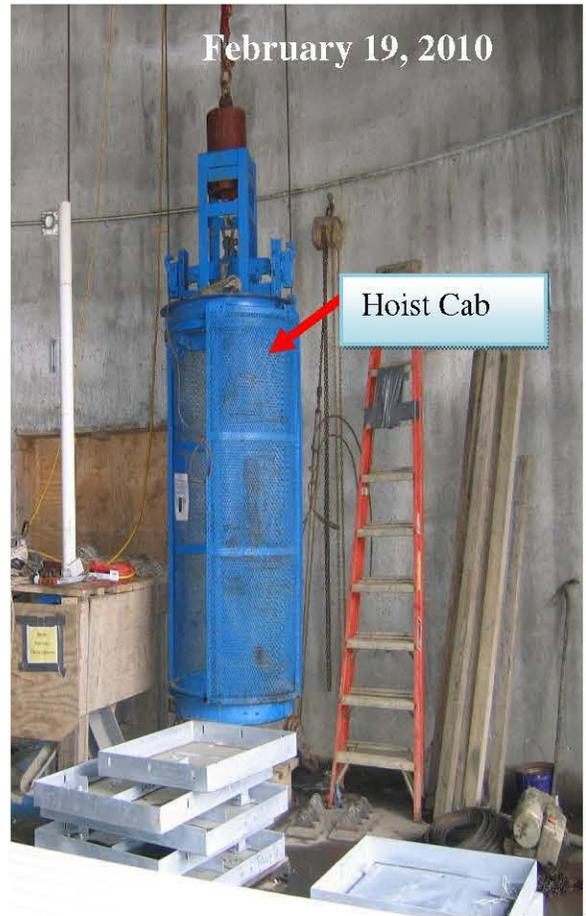
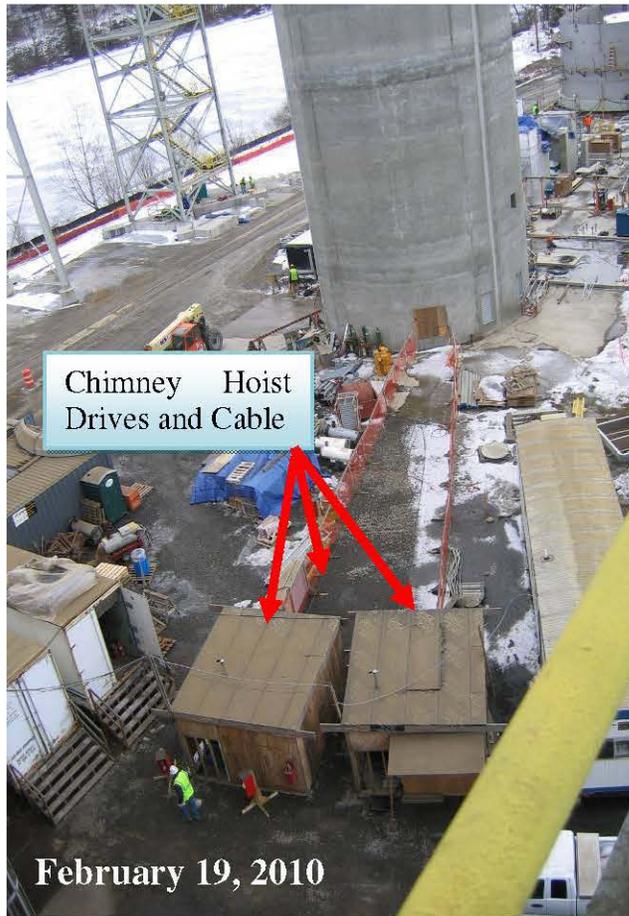


Figure 3 Chimney Hoist Drives and Cab (must be removed to install Booster Fan Foundation)

**Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1**

Page 4



**Figure 4 Chimney Enclosure Installation**

Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1  
Page 5



Figure 5 Background WWT – Foreground Gypsum Storage Building Foundation

Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1  
Page 6



Figure 6 Absorber and Recycle Nozzles

Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1  
Page 7



Figure 7 Dewatering Area Elevated Slab

**Independent Engineer's Report for January 2010  
Merrimack Clean Air Project Photographs – February 19, 2010  
Attachment 1  
Page 8**



**Figure 8 Limestone Silos Foundation**

June 8, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for February 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for February 2010 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Project on March 17, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – March 17, 2010  
c: Distribution

## Independent Engineer's Report for February 2010 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on March 17, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and the Washington Division of URS ("URS"), the Program Manager, followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through February 2010 (the "Period"), URS reported that overall the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the Wastewater Treatment ("WWT") Facility on April 1, 2012. The critical path remained through the SESS contract for the FGD island. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed through Award Steel and Duct Erection Subcontract.

Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope-of-work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the

## Independent Engineer's Report for February 2010 Merrimack Clean Air Project

Page 3

Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis to achieve improvements in ongoing safety results.
2. Progress was made on the integrated Project Master Schedule. PSNH and URS continued to focus significant resources on this critical task.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period (note: the cost data is based on results through March 2010) projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 452-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also

## Independent Engineer's Report for February 2010 Merrimack Clean Air Project

Page 4

includes all related site work, support systems and equipment, existing station integration and modifications to the Balance of Plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier, Siemens Water Technology and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; and Francis Harvey & Sons ("FH"), the contractor for the major Project foundations. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

There were two recordable injuries (knee sprains) during the Period and no Lost Time Incidents ("LTI"). This brings the job-to-date total to three recordable injuries and no LTIs. Safety was emphasized in preparation for the increase in construction activities with the improving weather.

### Environmental and Permitting

Thirteen Storm Water Pollution Prevention Plan ("SWPPP") items were identified, following a major rain event, where approximately 2 inches of rain fell in a 24-hour period accompanied by extremely high winds. The inclement weather resulted in numerous sections of silt fence damage. A previous rain event also occurred resulting in approximately 1.5 inches of precipitation. In all, greater than 4 inches of rain fell during the period of February 23 through 26, 2010. Results of the February 26, 2010 walkthrough were reported to the contractors on March 1, 2010.

URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") Permit continued. Specifications and drawings were prepared for the request for proposal for the "Enhanced Wastewater Treatment System" (Additional Mercury and Arsenic Removal).

  
**Independent Engineer's Report for February 2010****Merrimack Clean Air Project**

Page 5

**Project Status****Overall Project**

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the critical Project Milestones through February 2010. The awards of the BOP Mechanical Contract and the BOP Electrical Subcontract have been delayed because of the redesign of the Service Water Pump House ("SWPH") and the Truck Wash.

The most critical path remains through the SESS contract for the FGD Island. The SESS path is construction dependent through the installation of the steel for the absorber and reagent preparation portions of the building. The path continues through the installation of the limestone silos and then into the process/electrical systems. This Period a secondary path developed which is engineering dependent through the completion of the electrical engineering necessary to support the bulk electrical installation. The path then ties into the most critical path above. Both paths tie through the completion of the process systems and then into the start-up and turnover necessary to support the FGD Mechanical Completion (August 8, 2011).

**Independent Engineer's Report for February 2010**  
**Merrimack Clean Air Project**  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**February 2010**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
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Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
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Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/22/2010
Award Elect Subcontract (includes power and control)	02/05/2010	03/30/2010
Stack Complete	09/13/2010	07/06/2010
PSNH FGD Substation Complete	02/11/2011	08/01/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/05/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for February 2010

### Merrimack Clean Air Project

Page 7

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 50 percent versus a plan of 48 percent.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.04. This compares with 1.05 and 1.02 the previous two Periods. This is excellent performance and indicates that the administration and execution of the Project are being well managed.

## Integrated Project Schedule

Continued refinement was being made on the integrated Project Schedule. URS continued the integration of all major contractor schedules into the Project Master Schedule. Significant progress was reported in the development of the SESS schedule. The revised SESS schedule showed substantial improvements in logic and level of detail. URS and PSNH acknowledged SESS's significant improvement in this area.

## Major Project Contractors

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 82 percent versus a plan of 81 percent and for construction management and start-up services the earned value was 28 percent versus a plan of 24 percent. No significant issues were reported.

During the Period, major engineering activities included: URS issued the BOP Mechanical Installation Contract bid evaluation for PSNH approval, continued finalization of all BOP Piping for contract award, started the evaluation of the BOP Electrical Installation Contract bids, issued instrument data sheets, instrument location plans and installation details to construction, and finalized and issued all control input/output ("I/O") lists with information needed to support hardware partitioning.

### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had an earned percent complete of 52 percent versus a plan of 45 percent. During the Period, SESS completed assembly of Absorber rings 5, 6 and 7 and set rings 8, 9 and 10 in place to begin fit up and weld out; continued to erect the FGD Building

## Independent Engineer's Report for February 2010

### Merrimack Clean Air Project

Page 8

(dewatering area) structural steel; continued to set the Absorber Recycle Pumps; and started to erect the Ball Mills. The delivery of materials and equipment continued to improve and was supporting the schedule. The critical milestone, Electrical Rooms released to BOP Electrical Subcontractor, was forecasted for May 19, 2010, which is several weeks ahead of the June 1, 2010 target date. Steel erection was reported to be going very well and the high quality of the absorber erection work was noted.

Significant progress was reported in the development of the SESS schedule. The revised schedule showed substantial improvements in logic and level of detail. URS and PSNH acknowledged SESS's significant improvement in this area.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had an earned percent complete of 32 percent versus a plan of 32 percent. During the Period, DMW continued the installation of cable tray and conduit in Conveyor L-4 and conduit in Transfer Towers 1 and 2. All major components were reported to be in fabrication or being delivered. Procurement and construction were reported to be ahead of schedule. The limestone silo erection contractor was mobilized.

URS continued to work with DMW to integrate its schedule into the Project Schedule.

### **Hamon-Custodis (Reinforced Concrete Chimney and FTP Liner)**

Through the Period, HC had an earned percent complete of 85 percent versus a plan of 77 percent. During this Period, HC continued to close the chimney's construction openings; install electrical conduit and cable tray; and install platform closures. HC continued to receive high marks for its performance and quality of work.

HC was ahead of schedule. The "Stack Complete" Project Milestone, shown in Table 1, remains July 6, 2010. A further delay in the delivery of the chimney elevator was reported and without a clear delivery schedule for the elevator, it was decided to remove the chimney construction hoist so that the installation of the foundations for the booster fans could begin.

### **Siemens Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 78 percent versus a plan of 90 percent. There were a number of concerns with the performance of SWT/NP that were being monitored closely. URS was still waiting for SWT/NP resource curves to integrate into the Project Schedule and it was reported that the schedule needed to be better sequenced.

It should be noted that SWP/NP mobilized earlier than was required by the original URS Project Schedule. Therefore, although there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the Project Schedule.

**Independent Engineer's Report for February 2010****Merrimack Clean Air Project**

Page 9

**Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 88 percent versus a plan of 87 percent. During the Period, FH completed punchlist items on the limestone silo foundation. FH continued to perform well.

**Daniel O'Connell's Sons Inc. (Site Preparation - Phase II)**

Daniel O'Connell's Sons Inc. ("DOC") has completed all physical work and has demobilized from the site. Contract close out negotiations remain.

**Ductwork & Structural Steel Erection**

In February, Merrill Iron and Steel Inc. ("MIS") continued to ground assemble duct sections.

Through the Period, MIS had an earned percent complete of 4 percent versus a plan of 9 percent. Performance is skewed since MIS changed its construction plan, but progress was being reported against the proposed cash flow that was based on MIS's original construction plan.

**Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through March 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1**



**Figure 1 - Looking East**



**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1**

Page 2



**Figure 2 - Absorber**

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1  
Page 3**



**Figure 3 - FGD Building with Belt Filters Installed**

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1**

Page 4



**Figure 4 - Wastewater Treatment (Background) and Gypsum Storage Building (Foreground)**

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1**

Page 5



**Figure 5 - Steel Ductwork Fabrication**

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1  
Page 6**



**Figure 6 - Installation of Unit 1 Flue Gas Steel Ductwork**

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1  
Page 7**



**Figure 7 - Ball Mill Foundations**

**Independent Engineer's Report for February 2009**  
**Merrimack Clean Air Project Photographs – March 17, 2010**  
**Attachment 1**  
Page 8



**Figure 8 - Limestone Silo Erection**

**Independent Engineer's Report for February 2009  
Merrimack Clean Air Project Photographs – March 17, 2010  
Attachment 1  
Page 9**



**Figure 9 - FGD Building Looking North**

REDACTED

June 11, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for March 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for March 2010 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Project on April 21, 2010.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Merrimack Clean Air Project (the "Project"). The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – April 21, 2010  
c: Distribution



## Independent Engineer's Report for March 2010 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on April 21, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, the Program Manager, followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through March 2010 (the "Period"), URS reported that overall the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path remained through the SESS contract for the FGD island. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed though Award BOP Mechanical Contract.

Through the Period, Projected Costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope-of-work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the

## Independent Engineer's Report for March 2010 Merrimack Clean Air Project

Page 3

Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis to achieve improvements in ongoing safety results.
2. Progress was made on the integrated Project Master Schedule. PSNH and URS continued to focus significant resources on this critical task.
3. The Project was on schedule to achieve the planned Substantial Completion date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, Projected Costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also

## Independent Engineer's Report for March 2010 Merrimack Clean Air Project

Page 4

includes all related site work, support systems and equipment, existing station integration and modifications to the Balance of Plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier, Siemens Water Technology and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; and Francis Harvey & Sons ("FH"), the contractor for the major Project foundations. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

There were two first aid injuries during the Period; an aggravated knee injury (the original injury was one of the recordable injuries last month) and foreign object in the eye. There was also a serious near miss, due to the failure of a sling during a pipe lift. PSNH and URS noted the increase in safety incidents, especially with one subcontractor for SESS. A safety meeting was scheduled with SESS management later in the day to address the issue.

### Environmental and Permitting

Twenty three Storm Water pollution Prevention Plan ("SWPPP") items were identified, with seven outstanding. Five of the seven were related to the newly created Island Laydown Area.

PSNH and URS continue to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") Permit continued. The request for proposal for the "Enhanced Wastewater Treatment System" (Additional Mercury and Arsenic Removal) was issued and a pre-bid meeting was held.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the critical Project Milestones through March 2010. The

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project**

Page 5

BOP Mechanical Contract was awarded during the Period. The award of the BOP Electrical Subcontract was delayed.

The critical path for the last many months has been through the FGD construction logic. For this Period, this path was reported to have several days of float. The current critical path for the Project is engineering dependent through the activities associated with the DCS system. The path continues through the delivery of the DCS, cable terminations, loop checks, and DCS turn over. The critical path then continues through the start up and commissioning portions of both the FGD and SWT components prior to Project Completion. DCS activities are frequently on the critical path of projects, because they cut across the engineering, design, startup and commissioning of all major systems and require the cooperation and integration of all of the major contractors and subcontractors on a project. PSNH and URS are fully aware of the criticality of these activities. These activities have been integrated into the Project Master Schedule with a high degree of detail and are being closely monitored.

The second critical path is through the DMW contract for the Material Handling Systems. The DMW path is construction dependent through the erection of the Limestone Storage Silos. There is still time to complete these activities prior to the start-up and checkout of the entire Project.

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project**  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**March 2010**

	Planned (Target)	Forecast (Actual)
Program Manager Contract Award		9/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Misc. Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/7/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award [BOP] Elect Subcontract (includes power and control)	02/05/2010	05/10
Stack Complete	09/13/2010	07/06/2010
PSNH FGD Substation Complete	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/02/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for March 2010 Merrimack Clean Air Project

Page 7

### Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 57 percent versus a plan of 54 percent.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.06. This compares with 1.04 and 1.05 the previous two Periods. This is excellent performance and indicates that the administration and execution of the Project are being well managed.

### Integrated Project Schedule

URS continued the integration of all major contractor schedules into the Project Master Schedule.

### Major Project Contractors

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 85 percent versus a plan of 84 percent and for construction management and start-up services the earned value was 36 percent versus a plan of 34 percent. No significant issues were reported.

During the Period, major activities included, award of the BOP Mechanical Erection Contract and the purchase order for the Truck Wash Equipment. The RFP for the Enhanced Wastewater Treatment System was issued, along with the "Best and Final" bid addendum for the BOP Electrical Subcontract. URS attended the factory acceptance test ("FAT") for the Material Handling control panels at the DMW panel shop and held the joint Hardware Partitioning Review Meeting in the DCS supplier's (Emerson) offices and released the hardware for manufacture.

Through the Period, the earned percent complete for URS construction management was 31 percent versus a plan of 27 percent.

#### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had an earned percent complete of 63 percent versus a plan of 53 percent. This is a substantial increase over the earned value last month of 52 percent. During

## Independent Engineer's Report for March 2010 Merrimack Clean Air Project

Page 8

the Period, SESS completed fit up and weld out of Absorber rings 8, 9, and 10; started ground assemble of rings 11 and 12 and rings 13 and 14; completed erection of the FGD Building Dewatering area structural steel; continued to erect the Absorber area structural steel (Tiers 2 and 3); and continued to erect the Ball Mills and set the Vacuum Filters. The SESS piping and electrical subcontractors were mobilized and started work.

The critical milestone, Electrical Rooms released to BOP Electrical Subcontractor, was forecasted to be achieved by the June 1, 2010 target date. Steel erection was reported to be going very well.

PSNH and URS acknowledged the significant progress made by SESS in the development of the FGD Island schedule. The revised schedule showed substantial improvements in logic and level of detail.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had an earned percent complete of 35 percent versus a plan of 35 percent. During the Period, DMW continued the installation of cable tray and conduit in Conveyor L-4 and Transfer Towers 1 & 2. The Limestone Storage Silo subcontractor was mobilized and started erection of the east silo. Duct erection is no longer a constraint to the installation of Limestone Conveyor L-5.

URS continued to work with DMW to integrate its schedule into the Project Master Schedule.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

Through the Period, HC had an earned percent complete of 92 percent versus a plan of 79 percent. During this Period, HC completed closure of the Chimney's construction openings; continued to install electrical conduit and cable tray; and completed installation of platform closures. The installation of the chimney elevator was started. HC continued to receive high marks for its performance and quality of work.

HC is expected to complete all construction activities in July 2010.

### **Siemens Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 85 percent versus a plan of 93 percent. During the Period, SWT/NP continued to install building siding and roofing and started to install building floor slabs. While SWT/NP has been continuously behind its plan, it should be noted that SWP/NP mobilized earlier than was required by the original URS Project Schedule. Therefore, although there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the Project Schedule.

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project  
Page 9

### **Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 91 percent versus a plan of 85 percent. During the Period, FH started the Unit 2 Booster Fan foundations and dewatering for the SWPH. FH has experienced problems with dewatering of the area for the SWPH foundations; this will likely result in a delay in completing these foundations.

### **Daniel O'Connell's Sons Inc. (Site Preparation – Phase II)**

DOC has completed all physical work and has demobilized from the site. Contract close out negotiations remain.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, Merrill Iron and Steel Inc. ("MIS") had an earned percent complete of 18 percent versus a plan of 18 percent. During the Period, MIS continued to ground assemble and insulate steel work duct sections and started to erect the Unit 1 duct support steel and duct work sections. MIS is finalizing its baseline schedule.

### **Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through March 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs - April 21, 2010  
Attachment 1



Figure 1 - Looking East at West Side of Absorber and FGD Building

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 2



Figure 2 – Looking South at North Side of Absorber and FGD Building

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 3



Figure 3 – Looking West at East Side of FGD Building and Absorber

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 4



Figure 4 – Looking North at South Side of the FGD Building

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 5

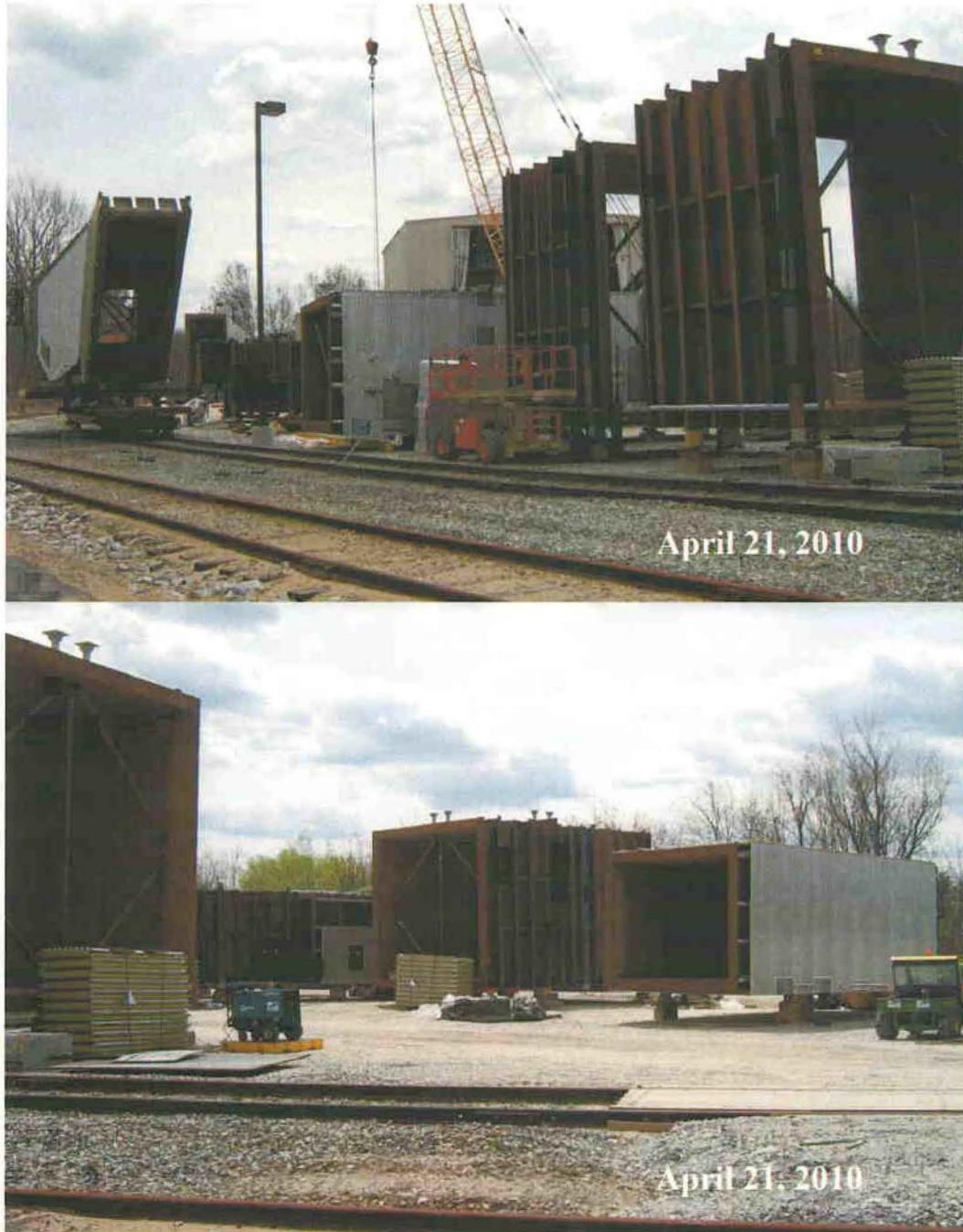


Figure 5 – Steel Duct Work Ground Fabrication

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 6



Figure 6 – Excavation for the Service Water Pump House Foundations

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 7



Figure 7 – Foundations for the Booster Fans and Enclosure

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 8



Figure 8 – Absorber Recycle Fiberglass Piping

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 9



Figure 9 – Limestone Silo Erection and Limestone Conveyor L-3

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 10



Figure 10 – Limestone Conveyor L-3 and Flue Gas Steel Ductwork

**REDACTED**

An SAIC Company

August 9, 2010

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for April 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for April 2010 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a review of various reports documenting the status of the Merrimack Clean Air Project (the "Project") through the Period and discussions with Project Management. A visit to the Project site was not made for this Report.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm  
c: Distribution

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**

Page 2

## Summary

R. W. Beck reviewed various reports documenting the status of the Project through the Period and discussed the status with Project Management. A visit to the Project site was not made for this Report. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites), the Program Manager, and others as applicable in preparing this Report.

Through April 2010 (the "Period"), URS reported that overall the Project remained on schedule to achieve Substantial Completion of the flue gas desulfurization ("FGD") on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path was construction dependent through the start of the balance of plant ("BOP") Electrical Work and the installation of the cable tray and cable bus. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed though the award of the BOP Electrical Erection Subcontract on April 19, 2010.

Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the reporting Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis to achieve improvements in ongoing safety results.

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**

Page 3

2. The Project was on schedule to achieve the planned Substantial Completion date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
3. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
4. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
5. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the BOP and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**

Page 4

The Project is being built using an Engineering, Procurement, Construction Management (“EPCM”) contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project’s Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD Island supplier; Dearborn Midwest (“DMW”), the Material Handling Island supplier; Hamon-Custodis (“HC”), the Reinforced Concrete Chimney supplier, Siemens Water Technology (“SWT”) and Northern Peabody, LLC (joint venture) (“SWT/NP”), the supplier of the FGD WWT facility; Francis Harvey & Sons (“FH”), the contractor for the major Project foundations; and Merrill Iron and Steel Inc. (“MIS”), the steel ductwork subcontractor. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

There were six first aid and no recordable or lost-time injuries during the Period. There was also a serious near miss, due to the failure of a sling during a pipe lift. Four of the six first aid injuries and the near miss were all associated with the piping subcontractor for SESS, Northern Peabody Inc. (“NPI”). PSNH and URS noted the increase in safety incidents, especially with the noted subcontractor. They met with SESS to discuss safety trends with the number of first aid injuries and the near miss.

## Environmental and Permitting

An Occupational Safety and Health Administration (“OSHA”) complaint letter was received, regarding dust control on the Project. In response, the use of a full-time water truck for dust suppression was reinstated and a periodic dust monitoring program was initiated.

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System (“NPDES”) Permit continued. Proposals for the “Enhanced Wastewater Treatment System” (Additional Mercury and Arsenic Removal) were received from Infilco-Degremont (“IDI”) and SWT/NP.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the critical Project Milestones through April 2010.

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**  
Page 5

The BOP Electrical Erection Subcontract was awarded to E. S. Boulos (“ESB”) during the Period.

The current most critical path is construction dependent through start of the BOP Electrical Erection work and the installation of the cable tray and cable bus. The path continues through the installation of the 4,000 ampere (“A”) cable. The tie in of the 4,000A cable bus follows in November 2010 prior to the turnover of the SWGR-001B switchgear on November 19, 2010. The path then becomes start-up dependent through the distributed control system (“DCS”) loop checks and the Permanent Power Available Milestone on March 1, 2011. The path continues into the testing, mechanical completion and start-up prior to the SESS Substantial Completion on January 31, 2012. The parties that are responsible for the critical activities include ESB, SWT; and SESS.

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**

Page 6

**Table 1**  
**Status of Project Milestones**  
**March 2010**

	Planned (Target)	Forecast (Actual)
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award WWT Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Misc. Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award [BOP] Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Stack Complete	09/13/2010	07/06/2010
PSNH FGD Substation Complete	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/02/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**  
Page 7

## **Project Percent Complete and Performance**

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 61 percent versus a plan of 60 percent.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.02. This is a drop in performance compared with 1.06, 1.04 and 1.05 in the previous three Periods. While this was still good performance and indicates that the administration and execution of the Project was being appropriately managed, the trend will be monitored closely.

## **Project Schedule Status**

A revised baseline Project Schedule was developed and reviewed by PSNH. This document will be the basis for reporting progress and for project management for the remainder of the Project.

## **Major Project Contractors**

### **URS (Program Manager)**

URS reported that through the Period, the earned percent complete for engineering and procurement services was 92 percent versus a plan of 90 percent and for construction management and start-up services the earned value was 35 percent versus a plan of 30 percent. No significant issues were reported.

Through the Period, the earned percent complete for URS construction management was 40 percent versus a plan of 37 percent.

The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

### **Siemens Environmental Systems and Services (FGD Island)**

Through the Period, SESS had an earned percent complete of 62 percent versus a plan of 61 percent. Note that these values have been adjustment to correct an error made by SESS in reporting its progress for the Period. During the Period, SESS completed fit-up and weld-out of Absorber Rings 11 and 12, including installation of trays and spray header; continued ground

**Independent Engineer's Report for March 2010**  
**Merrimack Clean Air Project Photographs – April 21, 2010**  
**Attachment 1**

Page 8

assemble of Absorber Rings 13 and 14, the absorber inlet duct and the limestone day silos; and continued to erect absorber area Structural Tiers 3 and 4 and started to install fireproofing on the Switchgear Room steel and to install siding in the dewatering and absorber areas.

Achievement of the critical milestone, Electrical Rooms released to BOP Electrical Erection Subcontractor, was expected by June 1, 2010.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had an earned percent complete of 40 percent versus a plan of 42 percent. During the Period, DMW erected Conveyor L-3C from the storage silo to Transfer Tower No. 1, erected Conveyor L-2 drive tower steel, placed the east limestone storage silo shell through Lift 10 and erected Electrical Equipment Room at Transfer Tower No. 1.

While DMW was forecasted to be behind in some milestone activities, these activities were not on the critical path.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

Through the Period, HC had an earned percent complete of 94 percent versus a plan of 81 percent. During this Period, HC continued installation of the elevator and conduit and cable tray. It was reported that HC was expected to complete all site work in May 2010.

### **Siemens Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 85 percent versus a plan of 94 percent. During the Period, SWT/NP completed installation of building siding and roofing, continued installation of building floor slabs and started to set equipment skids.

While SWT/NP has been continuously behind its plan, it should be noted that SWP/NP mobilized earlier than was required by the original URS Project Schedule. Therefore, although there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the Project Schedule.

### **Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 92 percent versus a plan of 87 percent. During the Period, FH placed the booster fan foundations for Units 1 and 2, installed fan pedestals for the Unit 2 fans, started to install forms and rebar for the booster fan enclosure foundation and completed the excavation and placed all footings for Service Water Pump House.

Completion of the SWPH foundation is forecasted for June 19<sup>th</sup>, several weeks late. FH is working overtime to improve this date. This activity is not on the critical path.

Independent Engineer's Report for March 2010  
Merrimack Clean Air Project Photographs – April 21, 2010  
Attachment 1  
Page 9

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, Merrill Iron and Steel Inc. ("MIS") had an earned percent complete of 26 percent versus a plan of 32 percent. During the Period, MIS continued to ground assemble duct sections for Units 1 and 2, insulate duct sections and erect Unit 1 duct support steel and duct sections. MIS completed installation of the cable bus support structure.

### **Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through April 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

REDACTED

September 14, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for May 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for May 2010 (the "Period"). This Report was prepared by R. W. Beck Inc. ("R. W. Beck") under our assignment as the Independent Engineer ("IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project ("Project") on June 16, 2010.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "Initial Project Review Report" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – June 16, 2010

c: Distribution



## Independent Engineer's Report for May 2010 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on June 16, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, the Program Manager, followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through the Period, URS reported that overall the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path was through the distributed control system ("DCS") engineering followed by the path reported last month through construction dependent balance of plant ("BOP") electrical work. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project Milestones had been completed though the award of the BOP Electrical Subcontract on April 19, 2010.

Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project, as of the Period. For a complete understanding of the review, analysis and assumptions upon which

## Independent Engineer's Report for May 2010 Merrimack Clean Air Project

Page 3

these opinions are based, this "Report" should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis to achieve improvements in ongoing safety results.
2. PSNH and URS continued to focus significant resources on the Project Schedule.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a

## Independent Engineer's Report for May 2010 Merrimack Clean Air Project

Page 4

fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the BOP and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement, Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. URS is the Project's Program Manager. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier, Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

There were three first aid and no recordable or lost-time injuries during the Period.

### Environmental and Permitting

An Occupational Safety and Health Administration ("OSHA") complaint letter was received in April, regarding dust control on the Project. In response, the use of a full-time water truck for dust suppression was reinstated and a periodic dust monitoring program was initiated. URS conducted air monitoring for total dust in May with all samples being below the OSHA limit.

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") Permit continued. Bid evaluations were started for the "Enhanced Wastewater Treatment System" (additional mercury and arsenic removal). Proposal review meetings were held with Infilco-Degremont ("IDI") and SWT/NP.

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project  
Page 5

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. The schedule had 30 calendar days of float before the Merrimack Station tie-in outages. Table 1 shows the status of the critical Project Milestones through May 2010.

The most critical path was DCS engineering dependent through the graphics and software required by the DCS and then into ESB's BOP electrical erection construction schedule. This included installation of the DCS hardware and the control cable pulling and terminations required at the cabinets. It then interfaced with the start-up and turnover of the switchgear and motor control centers ("MCC") which were tied to permanent power available on March 1, 2011. The logic then defaulted through the installation and turnover of the SESS FGD systems in preparation for the Unit 1 outage. The SESS path terminated with the August 1, 2011 Mechanical Completion Date. The secondary critical path is SWT fabrication dependent through the delivery of the piping for the instrument air system. The path continued through the Mechanical Completion Date for the instrument air system ("IAS") on February 11, 2011 before tying into the SESS utility systems available milestone date of March 1, 2011.

Independent Engineer's Report for May 2010  
 Merrimack Clean Air Project  
 Page 6

Table 1  
 Status of Project Milestones  
 March 2010

	Planned (Target)	Forecast (Actual)
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
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Install Transfer House and Conveyor Caissons	10/12/2009	10/7/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award [BOP] Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010
Stack Complete	09/13/2010	07/06/2010
PSNH FGD Substation Complete	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/02/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

**Independent Engineer's Report for May 2010**  
**Merrimack Clean Air Project**  
Page 7

## **Project Percent Complete and Performance**

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 66 percent versus a plan of 65 percent.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.03. This compares with 1.02, 1.06 and 1.04 in the previous three periods. This was good performance and indicates that the administration and execution of the Project was being appropriately managed.

## **Project Schedule**

A URS Independent Review Team ("IRT") performed a review of the Project Schedule. The major objective of this effort was to determine if the major Project contractors, SESS, DSW, SWT/NP, MIS and AZCO had properly identified, progressed, and forecasted completion of their activities. The IRT also confirmed whether interfaces were properly identified, logically tied, and understood by each of the contractors. The IRT found no significant deficiencies with the Project Schedule.

## **Major Project Contractors**

### **URS (Program Manager)**

URS reported that through the Period, the earned percent complete for engineering and procurement services was 95 percent versus a plan of 93 percent and for construction management and start-up services the earned value was 38 percent versus a plan of 33 percent. No significant issues were reported.

URS issued the utility rack structure from the FGD building to the booster fan enclosure; the conduit and cable list ("CCL") and the associated conduit layout drawings for construction; the limestone truck delivery system specification and general arrangement drawing for review; the service water pump house HVAC drawings for permitting and the proposed WWTS chemical lab layout to PSNH. They attended the MCC final inspections and the four--day FGD logic review meeting at the DCS supplier Emerson's Facility.

URS issued the RFP for the Start-up Electrical Testing.

**Independent Engineer's Report for May 2010**  
**Merrimack Clean Air Project**  
Page 8

Through the Period, the earned percent complete for URS construction management was 46 percent versus a plan of 44 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

### **Siemens Environmental Systems and Services (FGD Island)**

Through the Period, SESS had an earned percent complete of 68 percent versus a plan of 65 percent. In general, the SESS work was reported to be going well. The high quality of the absorber erection was noted again. During the Period, SESS erected the absorber inlet duct and the vessel through rings 12. Rings 13 and 14 were ground assembled and the spray headers were being installed. Ring 15 ground assembly was in progress. The absorber erection was several weeks ahead of schedule. FGD building steel and siding erection continued. This was reported to be going very well. Fireproofing was underway, but behind schedule. This may delay roofing and siding in some areas. The ball mill erection continued with the shells and bull gears in place. This was taking longer than expected. Equipment continued to be set throughout the FGD building as the areas were available. Large bore pipe installation continued in the dewatering and absorber areas. Cable tray and conduit installation continued.

The critical milestone, electrical rooms released to BOP Electrical Subcontractor, was forecasted to be achieved by the June 1, 2010 target date.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had an earned percent complete of 58 percent versus a plan of 55 percent. DMW was reported to be doing a good job and ahead of schedule in most areas. It was noted that DMW was not reporting all progress and needed to revise its schedule based on the actual sequence of work. During the Period, DMW completed the shell on Limestone Storage Silo No. 1 and started to erect Limestone Silo No. 2. Conveyor L-2 was erected up to the coal pile runoff pond. The tail of L-3 was installed and various chute work continued to be installed. DMW erected the emergency unloading conveyor and bucket elevator at Transfer Tower No. 2. The Transfer Tower No. 1 electrical room was erected and the electrical equipment was installed.

The gypsum storage building framing was erected.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed the elevator installation and inspection and the electrical installation and inspection. They have demobilized from site.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 92 percent versus a plan of 94 percent. Because of the way SWT/NP weighted its activities, URS indicated that, in its

**Independent Engineer's Report for May 2010**  
**Merrimack Clean Air Project**  
Page 9

opinion, SWT/NP construction was only 65 percent complete. Since all of the Project's instrument air is being supplied by equipment that is in the WWT Facility, progress in this area was being closely monitored. During the Period, SWT/NP completed installation of the building floor slabs, continued to set equipment skids, started to install the electrical rooms and continued to install conduit.

While SWT/NP has been continuously behind its plan, it should be noted that SWP/NP mobilized earlier than was required by the original URS Project Schedule. Therefore, although there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the Project Schedule.

### **Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 93 percent versus a plan of 89 percent. During the Period, FH completed the booster fan and fan enclosure foundations. The SWPH foundation work continued. The SWPH deep well and retaining wall installation was completed. Sheet pile removal was in progress.

The SWPH is expected to be completed on June 19th.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an earned percent complete of 32 percent versus a plan of 32 percent. During the Period, MIS continued to ground assemble and insulate steel work duct sections and continued to erect Unit Nos. 1 and 2 duct support steel and duct work sections. MIS started to install the booster fan outlet duct in place.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

During the Period, AZCO mobilized to site and rough set the Unit 2A booster fan. They also provided a base line schedule for review and continued to receive/maintain engineered equipment.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

During the Period, ESB mobilized to the site and started to erect the cable bus on the steel from the substation to the FGD building. They also began procurement of electrical materials and continued to receive/maintain engineered equipment.

## **Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through May 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1



Figure 1 – Service Water Pump House



Figure 2 – Gypsum Storage Building

**Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1**

Page 2



**Figure 3 – North Side of Absorber and FGD Building**

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1  
Page 3



Figure 4 –Unit 2 Booster Fan Foundations and Ductwork

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1  
Page 4



Figure 5 – Booster Fan Rotor



Figure 6 –Limestone Ball Mill

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1

Page 5



Figure 7 – Recycle Pumps and Piping

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs - June 16, 2010  
Attachment 1  
Page 6



Figure 8 - Units 1 and 2 Flue Gas Ductwork

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1  
Page 7



Figure 9 – Limestone Conveyors L-2 and L-3

Independent Engineer's Report for May 2010  
Merrimack Clean Air Project Photographs – June 16, 2010  
Attachment 1

Page 8



Figure 10 – Limestone Silos

REDACTED

October 5, 2010

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for June 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for June 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on July 21, 2010.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/jwm

Attachment 1: Project Photographs – July 21, 2010

c: Distribution

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project  
Page 2

## Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on July 21, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Pictures from this site visit are included in Attachment 1.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path was through the release of the WWT electrical room and distributed control system ("DCS") engineering followed by the path reported last month through construction dependent balance of plant ("BOP") electrical work. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project milestones had been completed though electrical rooms released to the BOP electrical subcontractor on June 1, 2010 and chimney complete scheduled for July 6, 2010 but completed on May 28, 2010 (except for the state elevator inspection).

Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project  
Page 3

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS identified priority safety topics and areas of emphasis to achieve improvements in ongoing safety results.
2. PSNH and URS continued to focus significant resources on the Project Schedule.
3. The Project was on schedule to achieve the planned substantial completion date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

**Independent Engineer's Report for June 2010**  
**Merrimack Clean Air Project**  
Page 4

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the BOP and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

There were six first aid injuries, two Occupational Safety and Health ("OSHA") recordable injuries and no lost-time injuries during the Period. The Project celebrated reaching 500,000 work hours without a lost time injury. However, due to the upward trend in first aids and recordables, PSNH and URS stepped up efforts to increase safety awareness at all levels of the staff, from craft, through supervision to management.

## Environmental and Permitting

URS reported that initial response actions completed in May 2010 to remediate the impacts of the April 29, 2010 hydraulic oil release were successful, and in June 2010 a Remedial Response Action Report was submitted to the New Hampshire Department of Environmental Services ("NHDES").

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") permit continued. The bid evaluation and recommendation, which included capital and life-cycle cost evaluations,

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project  
Page 5

was issued to PSNH for the "Enhanced Wastewater Treatment System" (additional mercury and arsenic removal). URS continued to obtain additional information from Infilco-Degremont ("IDI") and SWT/NP to make final evaluations of metals removal, performance, reliability, operations and maintenance (O&M) requirements, warranties, and commercial basis of guarantees.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve substantial completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through June 2010.

The most critical path was DCS engineering dependent through the graphics and software required by the DCS and then into ESB's BOP electrical erection construction schedule. This included installation of the DCS hardware and the control cable pulling and terminations required at the cabinets. It then interfaced with the start-up and turnover of the switchgear and motor control centers ("MCC") which were tied to permanent power available on March 1, 2011. The logic then defaulted through the installation and turnover of the SESS FGD systems in preparation for the Unit 1 outage. The SESS path terminated with the August 1, 2011 mechanical completion date. The secondary critical path is SWT fabrication dependent through the delivery of the piping for the instrument air system. The path continued through the mechanical completion date for the instrument air system ("IAS") on February 11, 2011 before tying into the SESS utility systems available milestone date of March 1, 2011.

Independent Engineer's Report for June 2010  
 Merrimack Clean Air Project  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**March 2010**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award [BOP] Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Stack Complete	09/13/2010	05/28/2010(A) <sup>(1)</sup>
PSNH FGD Substation Complete	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/02/2011
MK-2 Tie-in Outage End	11/16/2011	11/16/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project  
Page 7

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 73 percent versus a plan of 69 percent. The earned percent complete for construction was 55 percent versus a plan of 49 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.05. This compares with 1.03, 1.02 and 1.06 in the previous three periods. This was good performance and indicates that the administration and execution of the Project was being appropriately managed.

## Project Schedule

A URS Independent Review Team ("IRT") performed a review of the Project Schedule. The major objective of this effort was to determine if the major Project contractors, SESS, DSW, SWT/NP, MIS and AZCO had properly identified, progressed, and forecasted completion of their activities. The IRT also confirmed whether interfaces were properly identified, logically tied, and understood by each of the contractors. The IRT found no significant deficiencies with the Project schedule, but recommended some action items for all parties with emphasis on adding details for start-up activities, further definition of interface points, increased awareness of schedule impacts between contractors, and stressing the importance of commodity tracking and manpower analysis. The IRT also noted that plans should be made for a follow up review when the AZKO and ESB schedules had been fully integrated into the overall Project schedule.

## Major Project Contractors

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 96 percent versus a plan of 96 percent and for construction management and start-up services the earned value was 42 percent versus a plan of 37 percent. No significant issues were reported.

URS issued the project execution plan for site finalization and paving, issued the truck wash building drawings for construction, incorporated PSNH comments and issued the feasibility study for truck delivery of limestone, completed and submitted the bid evaluation for the

**Independent Engineer's Report for June 2010**  
**Merrimack Clean Air Project**  
Page 8

enhanced wastewater treatment system to PSNH, and issued schematic/connection wiring diagrams for construction. They also attended the medium voltage switchgear inspection in North Carolina, and a three-day WWT logic review meeting at the DCS supplier Emerson's facility.

### **Siemens Environmental Systems and Services (FGD Island)**

Through the Period, SESS had an earned percent complete of 75 percent versus a plan of 70 percent. In general, the SESS work was reported to be going well. During the Period, SESS erected the absorber vessel through rings 14. Rings 15 and 16, along with the wash water spray headers were being ground assembled. The absorber erection continued on schedule. FGD building steel and siding erection continued. This was reported to be going very well, with the absorber area steel complete except for leave-out steel around the absorber itself. Fireproofing was underway, but continued behind schedule. Metal siding installation continued in the dewatering, absorber, and reagent prep areas. The ball mill erection continued with alignment of the drive trains and setting the mill product tanks. SESS also set the cones for the limestone silos and continued to fabricate the remainder of the silos on the ground. However, this work was going slow and it appeared that release of the limestone day silo area to DMW for their work would be delayed. Equipment continued to be set throughout the FGD building as the areas were available. Large bore pipe installation continued in the dewatering and absorber areas. Cable tray and conduit installation continued.

The critical milestone, electrical rooms released to BOP electrical subcontractor, was achieved by the June 1, 2010 target date.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had an earned percent complete of 69 percent versus a plan of 60 percent. DMW was reported to be doing a good job and ahead of schedule in most areas. During the Period, DMW completed the shell on Limestone Storage Silo No. 2 and the roof slab on Limestone Silo No. 1. Siding and roofing was installed on the gypsum storage building and detailing (including installation of flashing, trim and penetration closures) continued. Siding was also installed on the conveyor L-2 drive tower and transfer tower number one. The framing and conveyors for GS-1A and B and the framing for the gypsum transfer tower were also installed. Erection of the GS-3A and B framing and conveyors continued. The electrical subcontractor continued to install tray and conduit in the conveyor tubes and transfer towers and lights in the gypsum storage building.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because the permanent power supply is not yet in

**Independent Engineer's Report for June 2010**  
**Merrimack Clean Air Project**  
Page 9

place, the state elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had an earned percent complete of 94 percent versus a plan of 92 percent. Since all of the Project's instrument air is being supplied by equipment that is in the WWT Facility, progress in this area was being closely monitored. During the Period, SWT/NP completed coating the sump in the building, continued to set equipment skids, continued to install the electrical rooms, continued to install conduit and started to install interconnecting piping. As of the date of our site visit, SWT/NP had turned over the electrical rooms to ESB to support the required dates for setting of the electrical equipment.

While SWT/NP has been continuously behind its plan, it should be noted that SWP/NP mobilized earlier than was required by the original URS project schedule. Therefore, although they are working with a small crew and there are delays in some activities in SWP/NP's schedule, completion of its work is well ahead of what is required by the project schedule.

### **Francis Harvey and Sons Inc. (Major Foundations)**

Through the Period, FH had an earned percent complete of 94 percent versus a plan of 91 percent. During the Period, FH completed the foundation and underground piping work at the SWPH.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an earned percent complete of 40 percent versus a plan of 40 percent. During the Period, MIS continued to ground assemble and insulate steel work duct sections and continued to erect Unit Nos. 1 and 2 duct support steel and duct work sections. MIS continued to install the booster fan outlet duct in place.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an earned percent complete of 6 percent versus a plan of 13 percent. During the Period, AZCO continued to rough set the Unit 2A booster fan. Their base line schedule provided earlier for review was approved. They also continued to receive/maintain engineered equipment. The Unit 1 booster fan rotor delivery was delayed due to the need to make some repairs on the rotor and repeat the over speed test at the factory.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an earned percent complete of 10 percent versus a plan of 16 percent. During the Period, ESB continued to erect the cable bus on the steel from the substation to the FGD building. They also set the medium and low voltage switchgear in the

**Independent Engineer's Report for June 2010**  
**Merrimack Clean Air Project**  
Page 10

FGD electrical room, motor control centers in the FGD DCS room, and switchgear in the WWT electrical room. ESB continued procurement of bulk electrical materials and continued to receive/maintain engineered equipment. ESB started cable tray installation in the FGD switchgear room and dewatering area.

### **Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through June 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project Photographs – July 21, 2010  
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Figure A-1 - Service Water Pump House



Figure A-2 - Gypsum Storage Building

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project Photographs – July 21, 2010  
Attachment 1  
Page 2



Figure A-3 - South Side of FGD Building



Figure A-4 - North Side of Absorber and FGD Building

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project Photographs – July 21, 2010  
Attachment 1  
Page 3



Figure A-5 - Unit 2 Booster Fan Foundations, Casings and Ductwork



Figure A-6 - Limestone Ball Mill

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project Photographs - July 21, 2010  
Attachment 1  
Page 4



Figure A-7 - Absorber Erection Progress - Inlet



Figure A-8 - Flue Gas Ductwork Fabrication Area

Independent Engineer's Report for June 2010  
Merrimack Clean Air Project Photographs – July 21, 2010  
Attachment 1

Page 5



Figure A-9 - Limestone Day Silo in FGD Building



Figure A-10 - Limestone Silos

**REDACTED**

An SAIC Company

December 10, 2010

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for July 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for July 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on August 18, 2010.

The IE is responsible to provide objective, third party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – August 18, 2010

c: Distribution



# Independent Engineer's Report for October 2009

## Merrimack Clean Air Project

Page 2

### Summary

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Pictures from this site visit are included in Attachment 1.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path was through the distributed control system ("DCS") engineering followed by the path reported last month through construction dependent balance of plant ("BOP") electrical work. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project milestones had been completed though electrical rooms released to the BOP electrical subcontractor on June 1, 2010 and chimney complete scheduled for July 6, 2010, but completed on May 28, 2010 (except for the state elevator inspection).

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Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this "Report" should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. Due to a continued upward trend in first aid and recordable incidents, PSNH and URS stepped up efforts to increase safety awareness at all levels of the staff, from craft, through supervision to management and this effort continues.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned substantial completion date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station

## Independent Engineer's Report for October 2009 Merrimack Clean Air Project

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Page 4

consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the BOP and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

There were eight first aid injuries, four Occupational Safety and Health ("OSHA") recordable injuries and no lost-time injuries during the Period. One of the recordables was a first aid incident from June 2010 that now needs physical therapy and prescription medication, but is still at work on light duty. The Project celebrated reaching 500,000 work hours without a lost-time injury on July 21, 2010. As reported last month, due to the continued upward trend in first aid and recordable incidents, PSNH and URS stepped up efforts to increase safety awareness at all levels of the staff, from craft, through supervision to management and this effort continues.

## Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System ("NPDES") permit continued. For the "Enhanced Wastewater Treatment System" (additional mercury and arsenic removal) URS continued to obtain additional information from Infilco-Degremont ("IDI") and SWT/NP to make final evaluations of metals removal, performance, reliability, operations and maintenance ("O&M") requirements, warranties, and the commercial basis of the guarantees. URS reported that it expected to be able to issue the final bid evaluation and recommendation to PSNH in August. At the review meeting on August 18, 2010 URS stated that it was ready to make an award and notification of engineering release upon receipt of a best and final offer from the recommended bidder. PSNH is working with the state and federal authorities regarding the discharge permit.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve substantial completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through July 2010.

The most critical path remained essentially the same this month as last and was DCS engineering dependent through the graphics and software necessary to support the DCS factory acceptance testing ("FAT") scheduled for September 2010 and then once the DCS equipment is delivered to the site the path is construction dependent through ESB's BOP electrical erection construction schedule. This includes installation of the DCS hardware and the control cable pulling and terminations required at the cabinets. It then interfaces with the start-up and turnover of the switchgear and motor control centers ("MCC") which ties to permanent power available on March 1, 2011. The logic then defaults through the installation and turnover of the SESS FGD systems in preparation for the Unit 1 tie-in outage. The SESS path terminates with the August 1, 2011 mechanical completion date. The secondary critical path is SWT fabrication dependent through the delivery of the piping for the instrument air system. The path continues through the mechanical completion date for the instrument air system ("IAS") on February 11, 2011 before tying into the most critical path at the SESS utility systems available milestone date of March 1, 2011.

Independent Engineer's Report for October 2009  
Merrimack Clean Air Project  
Page 6

REDACTED

Table 1  
Status of Project Milestones  
July 2010

	Planned (Target)	Forecast (Actual)
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award [BOP] Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/19/2010(A)
Stack Complete	09/13/2010	05/28/2010(A) <sup>(1)</sup>
PSNH FGD Substation Complete	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 77 percent versus a plan of 73 percent. The earned percent complete for construction was 62 percent versus a plan of 56 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.05. This compares with 1.05, 1.03 and 1.02 in the previous three periods. This was good performance and indicates that the administration and execution of the Project was being appropriately managed.

## Project Schedule

With engineering and procurement nearing completion the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor; is also reporting installed quantities, in units of thousands of pounds of steel ductwork (Kips). Various other methods are being used by the smaller contractors including AZCO, the BOP Mechanical Erection Subcontractor; and ESB, the BOP Electrical Erection Subcontractor. The measured quantities are converted into a percent complete by the contractors. PSNH/URS checked the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

During the Period, all parties with action items continued to review and update the status of their tasks, and the AZKO and ESB schedules were fully integrated into the overall Project Schedule.

## Major Project Contractors

### Progress Reporting

To more clearly focus on the execution of the remaining activities on the Project, the reporting of earned versus planned percent complete for the Major Project Contractors in this and future Reports, will be based on the progress of construction and testing activities, unless otherwise indicated. Therefore, care must be taken when comparing the earned versus planned percent complete in past Reports to this and future Reports. It should be noted that the transition to

**Independent Engineer's Report for October 2009  
Merrimack Clean Air Project****REDACTED**

Page 8

quantity-based measurement has resulted in a period of adjustment to the total earned versus planned percent complete for some of the Major Project Contractors.

**URS (Program Manager)**

URS reported that through the Period, the earned percent complete for engineering and procurement services was 98 percent versus a plan of 98 percent and for construction management and start-up services the earned value was 44 percent versus a plan of 40 percent. No significant issues were reported.

URS issued the site finalization Phase 1 drawings and specifications to PSNH for review, issued the truck wash building foundation and ramp heat tracing drawings for PSNH review, issued the inquiry package for bids on the truck delivery of limestone, continued negotiations with the bidders for the enhanced WWT system particularly on guarantees, issued updated conduit and cable lists and conduit drawings to release remaining cables for construction, and issued the prefabricated electrical enclosure for bids. They also held a two-day DCS logic and graphics review and noted that the DCS hardware FAT was completed and all variances were closed out by Emerson. However, they noted that the DCS software FAT had to be pushed back one week to September 7-24, 2010.

**Siemens Environmental Systems and Services (FGD Island)**

Through the Period, SESS had a construction/testing earned percent complete of 56 percent versus a plan of 63 percent. This compares with 49 percent and 52 percent last month. While the SESS work was reported to be progressing reasonably well, concerns were raised that piping (large bore pipe) and electrical (conduit) quantities were falling behind the planned curves. During the Period, SESS erected the absorber vessel through Ring 14 and completed ground assembly of Rings 15 and 16, along with the wash water spray headers. The absorber erection continued on schedule. FGD building steel erection continued along with placement of elevated concrete slabs. Fireproofing was underway, but continued behind schedule. Metal siding installation continued in the dewatering, absorber, and reagent prep areas and for the elevator. The ball mill erection continued with completion of the alignment of the drive trains and installation of the liners. SESS also set the limestone day silos and released the area (on August 2, 2010) to DMW for their work. Equipment continued to be set throughout the FGD building as the areas were available. Large bore pipe installation continued in the dewatering and absorber areas. Cable tray and conduit installation continued. The elevator subcontractor mobilized and began installation of guide brackets.

**Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 57 percent versus a plan of 50 percent. This compares with 49 percent and 42 percent last month. DMW was reported to be doing a good job and ahead of schedule in most areas. During the Period, DMW completed the roof slab on Limestone Storage Silo No. 2 and started erection of the

conveyor head house on top of Limestone Silo No. 1. Siding and roofing detailing (including installation of flashing, trim and penetration closures) continued on the gypsum storage building and was also working on installation of lighting. Installation continued on conveyor GS-3A and B framing and conveyor hardware. The GS-2 conveyor tube was installed. The framing and conveyors for GS-1A and B and the framing for the gypsum transfer tower was completed. Conveyor belts were pulled and spliced on several conveyors, including L-3C, L-4, GS-1A and GS-1B. The electrical subcontractor continued to install tray and conduit in the conveyor tubes and transfer towers and the mechanical subcontractor continued piping installation throughout the system.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because the permanent power supply is not yet in place, the State elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 83 percent versus a plan of 67 percent. This compares with 83 percent and 65 percent last month. Since all of the Project's instrument air is being supplied by equipment that is in the WWT Facility, progress in this area was being closely monitored. During the Period, SWT/NP released the switchgear room to ESB, and continued to set equipment skids and install the electrical rooms, conduit and interconnecting piping.

While SWT/NP has been continuously behind its plan, it should be noted that SWP/NP mobilized earlier than was required by the original URS project schedule. URS has suggested that SWT should update and re-baseline its schedule based on its actual plan and staffing.

Although they are working with a small crew and there are delays in some activities in SWP/NP's schedule, completion of its work is ahead of what is required by the Project Schedule and SWT did add some craft this Period.

### **Francis Harvey and Sons Inc. (Major Foundations)**

FH is nearing the end of its contracted work. No update was provided for the Period. During the Period, FH completed the drilled pier foundations for the cable tray supports from the gypsum storage building to the SWPH.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had a construction/testing earned percent complete of 52 percent versus a plan of 50 percent. This compares with 40 percent and 40 percent last month. During the Period, MIS continued to ground assemble and insulate steel work duct sections and continued to

**Independent Engineer's Report for October 2009  
Merrimack Clean Air Project****REDACTED**

Page 10

erect Unit Nos. 1 and 2 duct support steel and duct work sections. MIS also completed erection of the structural steel for the SWPH. MIS continued to install the booster fan outlet duct and started installation of the duct support steel in this same area. MIS also continued installation of expansion joints and dampers.

**AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had a construction/testing earned percent complete of 17 percent versus a plan of 34 percent. This compares with 6 percent and 14 percent last month. During the Period, AZCO completed rough set of the Unit 2B (west) booster fan and continued to rough set the Unit 2A (east) booster fan. They also installed the underground piping to the SWPH and truck wash and set the service water pumps. The Unit 1 booster fan rotor delivery was delayed earlier due to the need to make some repairs on the rotor and repeat the over-speed test at the factory. This is delaying booster fan erection. At the time of our site visit, the rotor was due on August 19, 2010.

**E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had a construction/testing earned percent complete of 20 percent versus a plan of 11 percent. This compares with 18 percent and 1 percent last month. During the Period, ESB continued to erect the cable bus on the steel from the substation to the FGD building; once at the building, this work was suspended pending completion of the cable bus support steel inside the FGD building. ESB continued to assemble the medium- and low-voltage switchgear in the FGD electrical room and MCCs in the FGD DCS room. ESB installed the batteries and chargers in the FGD DCS room. They also continued cable tray installation in the FGD switchgear room and dewatering area. ESB completed the switchgear in the WWT electrical room and started to install cable tray in the WWT building. They continued procurement of bulk electrical materials and to receive/maintain engineered equipment.

**Start-Up**

Start-up meetings were held at the job site and via telephone. The Start-up Plan was issued to PSNH for review.

**Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through July 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for July 2010  
Merrimack Clean Air Project Photographs - August 18, 2010  
Attachment 1

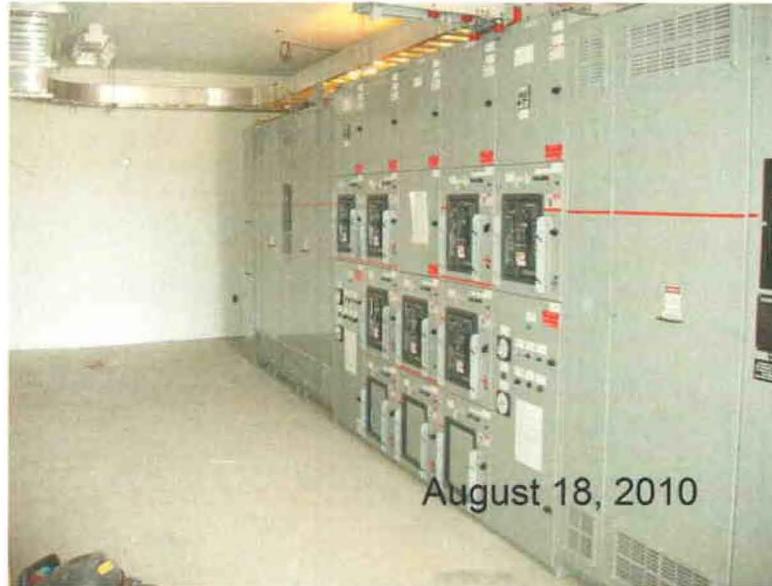


Figure A-1

Figure A-1 - WWT Electrical Room



Figure A-2 - Service Water Pump House

Independent Engineer's Report for July 2010  
Merrimack Clean Air Project Photographs – August 18, 2010  
Attachment 1  
Page 2

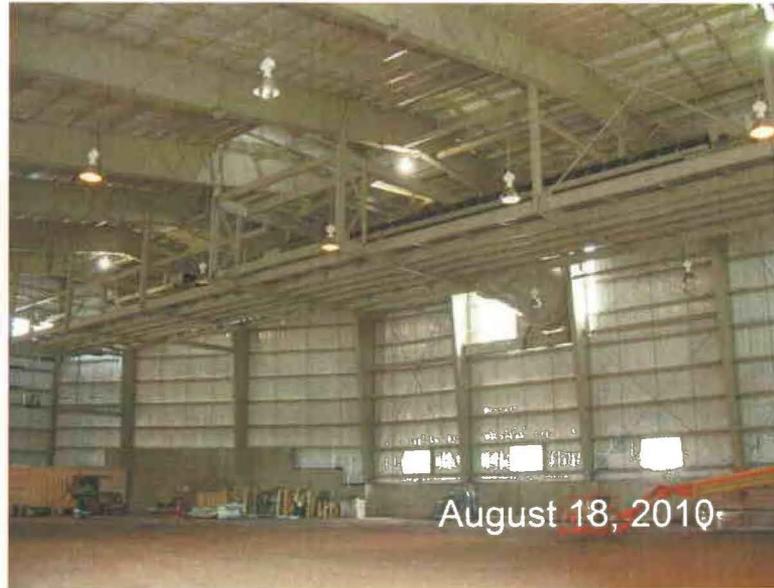


Figure A-3 - Gypsum Building - Stackout Conveyors



Figure A-4 - South Side of the FGD Building

Independent Engineer's Report for July 2010  
Merrimack Clean Air Project Photographs - August 18, 2010  
Attachment 1  
Page 3



Figure A-5 - Booster Fan Enclosure - East End



Figure A-6 - Booster Fan and Enclosure - West End

Independent Engineer's Report for July 2010  
Merrimack Clean Air Project Photographs - August 18, 2010  
Attachment 1  
Page 4



Figure A-7 - Limestone Ball Mills

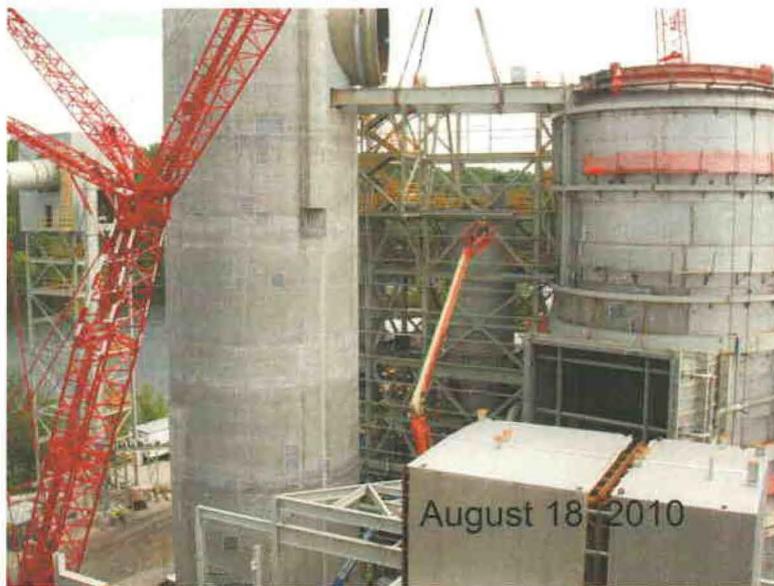


Figure A-8 - North Side of Stack/Absorber

Independent Engineer's Report for July 2010  
Merrimack Clean Air Project Photographs – August 18, 2010  
Attachment 1  
Page 5



Figure A-9 - Flue Gas Steel Ductwork

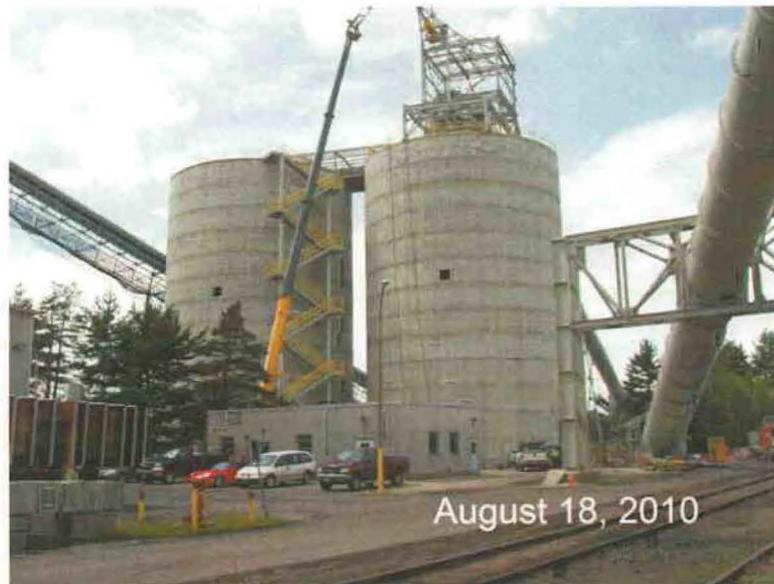


Figure A-10 - Limestone Silos

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An SAIC Company

December 10, 2010

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for August 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for August 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on September 15, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – September 15, 2010

c: Distribution



Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 2

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## Summary

Representatives of R. W. Beck, Inc. (“R. W. Beck”) visited the Merrimack Clean Air Project (the “Project”) site on September 15, 2010. During this site visit we attended the Monthly Project Meeting (“MPM”) between Public Service of New Hampshire (“PSNH”) and URS, (the “Program Manager”), followed by the MPM with Siemens Environmental Systems and Services (“SESS”), the Flue Gas Desulfurization (“FGD”) System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment (“WWT”) facility on April 1, 2012. The critical path was through the distributed control system (“DCS”) software factory acceptance test (“FAT”) followed by the path reported last month through construction dependent balance of plant (“BOP”) electrical work. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the Project milestones had been completed though limestone storage silos complete (external walls and roofs) by the Materials Handling Contractor scheduled for August 1, 2010, but completed July 17, 2010.

Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which

**Independent Engineer's Report for August 2010**  
**Merrimack Clean Air Project Photographs – September 15, 2010**  
**Attachment 1**  
Page 3

**REDACTED**

these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. Due to a continued upward trend in first aid and recordable incidents, PSNH and URS stepped up efforts to increase safety awareness at all levels of the staff, from craft, through supervision to management and this effort continues.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity- based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 4

REDACTED

has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or “islands.” Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic (“FRP”) lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the BOP and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement Construction Management (“EPCM”) contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc.), the FGD Island supplier; Dearborn Midwest (“DMW”), the Material Handling Island supplier; Hamon-Custodis (“HC”), the Reinforced Concrete Chimney supplier; Siemens-Water Technology (“SWT”) and Northern Peabody, LLC (joint venture) (“SWT/NP”), the supplier of the FGD WWT Facility; Francis Harvey & Sons (“FH”), the contractor for the major Project foundations; Merrill Iron and Steel Inc. (“MIS”), the steel ductwork subcontractor; AZCO Inc. (“AZCO”), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. (“ESB”), the BOP Electrical Erection Subcontractor. More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

There were nine first aid injuries, one Occupational Safety and Health (“OSHA”) recordable injury and no lost-time injuries during the Period. As reported last month, due to the upward trend in first aids and recordables, PSNH and URS stepped up efforts to increase safety awareness at all levels of the staff, from craft, through supervision to management and this effort continues. During the Period, the project worked on development and implementation of a recovery plan to improve safety awareness and reverse the upward trend in safety incidents. The recovery plan includes establishment of a management safety steering committee (including representatives from the major contractors), additional safety walkdowns by URS personnel, mentoring of contractor superintendents and foreman in safety walkdowns, and additional task-specific training.

## Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Support for the National Pollution Discharge Elimination System (“NPDES”) permit continued. The enhanced WWT system (additional mercury and arsenic removal) work was awarded to SWT/NP and SWT/NP was given a limited release to proceed with engineering and procurement while the final contract was being completed. At the MPM, URS reported that the contract was expected to be finalized by September 24, 2010.

A permit will be required prior to installation of the quench pump diesel drive and PSNH and URS were working to determine what permitting procedures would be necessary.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through August 2010.

The most critical path remained essentially the same this month as last and was DCS engineering dependent through the DCS FAT scheduled for September 7-24, 2010 and then once the DCS equipment and software is delivered to the site the path is construction dependent through ESB's BOP electrical erection construction schedule. This includes installation of the DCS hardware and the control cable pulling and terminations required at the cabinets. It then interfaces with the start-up and turnover of the switchgear and motor control centers (“MCC”) which ties to permanent power available on March 1, 2011 and DCS available on March 31, 2011. The logic then defaults through the installation and turnover of the SESS FGD systems in preparation for the Unit 2 outage. The SESS path terminates with the August 1, 2011 FGD mechanical completion date and is outage dependent until it defaults into the SWT WWT start-up, Substantial Completion of the WWT and Project Completion on April 1, 2012. The secondary critical path is SWT fabrication dependent through the delivery of the piping for the instrument air system. The path continues through the mechanical completion date for the instrument air system (“IAS”) on February 11, 2011 before tying into the most critical path at the SESS utility systems available milestone date of March 1, 2011.

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 6

REDACTED

Table 1  
Status of Project Milestones  
August 2010

	Planned (Target)	Forecast (Actual)
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A) <sup>(1)</sup>
Stack Complete	09/13/2010	05/28/2010(A) <sup>(2)</sup>
PSNH FGD Substation Complete	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Completion of the main silo exterior walls and roofs. DMW still has a 59-day activity to complete the silo internals.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

## Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. The Project's overall progress through the Period was 82 percent versus a plan of 82 percent. The earned percent complete for construction was 70 percent versus a plan of 72 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.00. This compares with 1.05 last month. This remains good performance and indicates that the administration and execution of the Project was being appropriately managed.

## Project Schedule

With engineering and procurement nearing completion, the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor; is also reporting installed quantities, in units of thousands of pounds of steel ductwork (Kips). Various other methods are being used by the smaller contractors including AZCO, the BOP Mechanical Erection Subcontractor; and ESB, the BOP Electrical Erection Subcontractor. The measured quantities are converted into a percent complete by the contractors. PSNH/URS checked the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

During the Period, all parties continued to update the status of their tasks. Future Independent Review Team ("IRT") reviews are planned to focus on critical construction/testing activities.

## Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the Major Project Contractors in this and future Reports, will be based on the progress of construction and testing activities, unless otherwise indicated. Therefore, care must be taken when comparing the earned versus planned percent complete in past Reports (prior to the July 2010 Report) to this and future Reports. It should be noted that the transition to quantity-based measurement has resulted in a period of adjustment to the total earned versus planned percent complete for some of the Major Project Contractors.

## URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 99 percent versus a plan of 98 percent and for construction management and start-up services the earned value was 47 percent versus a plan of 44 percent. No significant issues were reported.

URS issued the site finalization Phase 1 drawings and specifications for inquiry and held a site walkdown with a prospective contractor. URS also issued the arc flash calculation to PSNH for review and issued the truck wash building foundation and ramp heat tracing drawings for construction. A pre-bid meeting was held for the truck delivery of limestone bid package and completed the evaluation of the bids for the enhanced WWT system and awarded the work to SWT/NP. URS met with PSNH to review the control room arrangement as well as electrical tie-in interfaces with existing plant systems.

At the MPM, URS confirmed that the DCS software FAT started on September 7, 2010, that the scrubber software testing was completed with some action items and that the SWT software was being tested at the time of the meeting. Some of the scrubber software action items involved logic corrections, which SESS was addressing. URS and Emerson were also discussing the use of a dedicated truck for delivery of the DCS to the Project to recover some time in the schedule.

## Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 65 percent versus a plan of 71 percent. This compares with 56 percent and 63 percent last month. While the SESS work was reported to be progressing reasonably well, concerns were raised that piping (large bore pipe) and electrical (conduit, power cable and control cable) quantities were falling behind the planned curves. During the Period, SESS erected the absorber vessel through Ring 18 including the wash water spray headers and continued ground assembly of the absorber outlet hood and transition duct. They also set the toggle bridge duct support steel and the outlet duct to the chimney liner. At the time of our site visit, the outlet hood and transition duct were also set in place. FGD building steel erection was completed in the absorber and reagent prep areas, and the cable bus support steel was also completed. Fireproofing continued behind schedule, but SESS reported that it was working two shifts and had brought in additional spray equipment to speed this work up and complete it before the weather got too cold. Metal siding and roofing installation was completed in the dewatering area and continued in the absorber and reagent prep areas and for the elevator. The ball mill erection continued with installation of liners. SESS completed the limestone day silos and released the area (on August 2, 2010) to DMW for their work. Equipment continued to be set throughout the FGD building as the areas were available. Large bore pipe installation continued in the dewatering and absorber areas. Cable tray and conduit installation continued with emphasis on lighting the building, since it is quickly being enclosed. The elevator subcontractor mobilized and began installation of guide brackets.

## **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 70 percent versus a plan of 61 percent. This compares with 57 percent and 50 percent last month. Last Period DMW achieved the Limestone Silos Complete Milestone originally scheduled for August 1, 2010. However, DMS still has to complete the silo internals. During the Period erection of the conveyor head house continued on top of Limestone Silo No. 1 (the east silo), and at the time of our site visit, DMW had begun work on the silo internals. Conveyor tube L-5 and the last section of the L-2 conveyor were erected and work continued on conveyor GS-3 framing and conveyor hardware and on the conveyors inside the GSB. DMW also set the limestone transfer conveyor between the limestone day silos in the FGD building. Conveyor belt installation continued throughout the system. The electrical subcontractor continued to install tray and conduit in the conveyor tubes and transfer towers and lighting in the gypsum storage building, and the mechanical subcontractor continued piping installation throughout the system.

## **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (“the State”) and demobilized from site. Because the permanent power supply is not yet in place, the state elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

## **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 83 percent versus a plan of 71 percent. This compares with 83 percent and 67 percent last month. Note that the lack of change in the planned percent complete is a result of the limited detail and logic in the SWT/NP schedule. URS is tracking the quantities installed to make sure that the actual earned progress is on plan to meet the Project's requirements, especially for instrument air. Since all of the Project's instrument air is being supplied by equipment that is in the WWT Facility, progress in this area was being closely monitored. During the Period, SWT/NP released the MCC room to ESB, completed the laboratory, completed setting equipment skids, continued to install conduit and interconnecting piping, and started setting the variable frequency drives in place.

While SWT/NP has been continuously behind its plan, it should be noted that SWP/NP mobilized earlier than was required by the original URS project schedule. URS previously suggested that SWT should update and re-baseline its schedule based on its actual plan and staffing. Now that SWT has been awarded the work for the enhanced water treatment, URS said it would demand that SWT update its schedule and incorporate the expanded scope.

Although they are working with a small crew and there are delays in some activities in SWP/NP's schedule, completion of its work is ahead of what is required by the Project Schedule and SWT did add some craft this Period.

### **Francis Harvey and Sons Inc. (Major Foundations)**

FH is nearing the end of its contracted work. No update was provided for the Period.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had a construction/testing earned percent complete of 56 percent versus a plan of 58 percent. This compares with 52 percent and 50 percent last month. During the Period, MIS continued to ground assemble and insulate steel duct work sections and continued to erect Unit Nos. 1 and 2 duct support steel and duct work sections. MIS also erected the metal siding and roofing for the SWPH. MIS continued to install the booster fan (“BF”) outlet duct in place and to install the duct support steel in this same area. MIS also continued installation of expansion joints and dampers in the ducts.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had a construction/testing earned percent complete of 33 percent versus a plan of 49 percent. This compares with 17 percent and 34 percent last month. During the Period, AZCO completed rough set of the Unit 1 BF (including the rotor, which was received during the Period) and the Unit 2A (east) BF. They continued to weld the housings and align the Unit 2A and 2B BFs. AZCO also installed the underground piping to the limestone silo dust suppression skid, and was ground assembling the SWPH above grade pipe and BF lube oil pipe.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had a construction/testing earned percent complete of 22 percent versus a plan of 20 percent. This compares with 20 percent and 11 percent last month. During the Period, ESB completed installation of the lower cable bus tray to the FGD building, and continued to install cable tray in the FGD switchgear room and dewatering area. ESB also completed assembling the medium and low-voltage switchgear in the FGD electrical room and motor control centers in the FGD DCS room. ESB started installing DCS input/output (“I/O”) cabinets in the electrical rooms and installing conduit from the control room to the duct support steel. They also continued cable tray installation in the FGD switchgear room and dewatering area. ESB completed the cable tray in the WWT building, continued procurement of bulk electrical materials and continued to receive/maintain engineered equipment.

## **Start-Up**

URS received PSNH's comments on the Start Up Plan. Electrical training began for the PSNH 115 kilovolt (“kV”) Switchyard and URS electrical equipment. Electrical and P&ID drawings were reviewed for Start Up Packages. The overall training schedule was developed for the DCS, major islands and maintenance programs.

## **Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through August 2010. The estimated cost at completion remained unchanged at \$457,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the various cost accounts.

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs - September 15, 2010  
Attachment 1

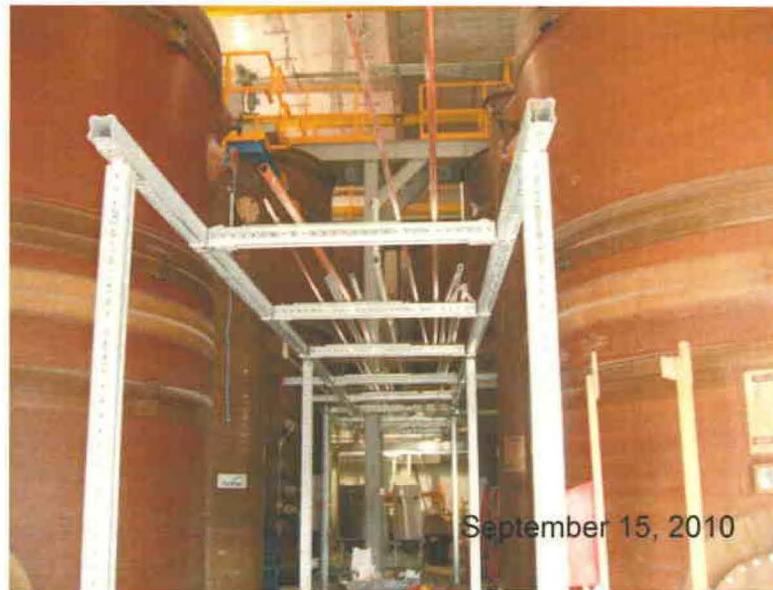


Figure 1 - Interconnecting Piping Installation in the WWR Electric Room



Figure 2 - Service Water Pump House

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 2



Figure 3 - South Side of FGD Building

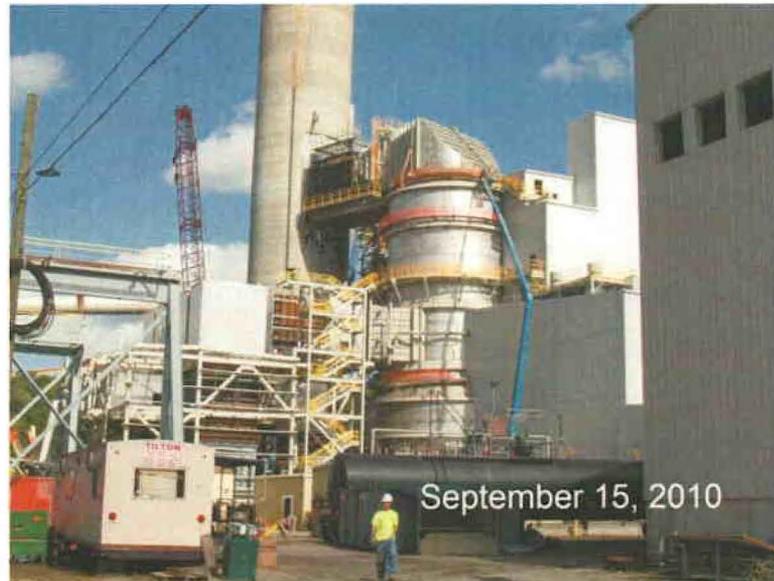


Figure 4 - North Side of FGD Building

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 3



Figure 5 - Unit 2 BF Casings (left) Unit 2A Duct Support Steel (right)



Figure 6 - Unit 2B BF Duct Support Steel and Ductwork

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 4



Figure 7 - Absorber Erection Progress – Installation of Outlet Hood and Transition Duct



Figure 8 - Flue Gas Ductwork Ground Assembly

Independent Engineer's Report for August 2010  
Merrimack Clean Air Project Photographs – September 15, 2010  
Attachment 1  
Page 5



Figure 9 - Limestone Conveyor Belt, Piping and Cable Tray Installation

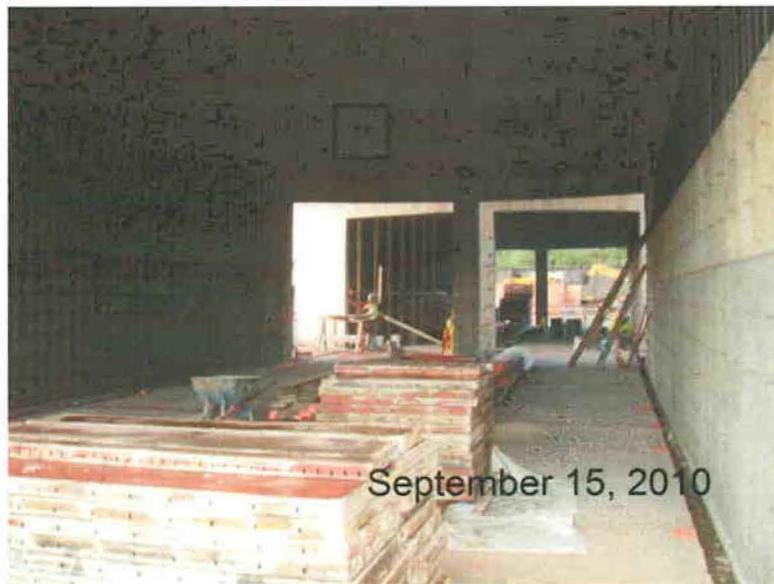


Figure 10 - Limestone Silos – Internal Concrete Work

March 10, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for September 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for September 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on October 20, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – October 20, 2010

c: Distribution

**Independent Engineer's Report for September 2010**  
**Merrimack Clean Air Project**  
Page 2

## Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on October 20, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path was through activities that support the availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed though direct current ("DC") and uninterruptable power supply ("UPS") systems construction turnover ("CTO") completed on September 28, 2010.

Through the Period, projected costs for the Project were reduced from \$457,000,000 to \$430,000,000. The \$27,000,000 decrease included reductions of \$16,000,000 in reserves and \$11,000,000 in contingency. These reductions were based on recognition of the accumulated cost savings (variance) up to that point in the Project and an assessment of the contingency that may be required to complete the Project.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report.

## Independent Engineer's Report for September 2010 Merrimack Clean Air Project

Page 3

On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. Safety performance during the Period was unchanged from the past several months despite the challenge by PSNH and URS to all Project Stakeholders to significantly increase efforts to improve safety awareness at all levels. It was agreed that greater oversight of safety and further enhancements in the safety program were needed immediately.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were reduced from \$457,000,000 to \$430,000,000. The reduction was based on recognition of the accumulated cost savings (variance) up to that point in the Project and an assessment of the contingency that may be required to complete the Project.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

## Independent Engineer's Report for September 2010 Merrimack Clean Air Project

Page 4

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI")), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. Progress on this work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

As reported the last several months, due to the upward trend in first aid and recordable injuries, PSNH and URS challenged all Project Stakeholders to significantly increase their efforts to increase safety awareness at all levels of the staff, from craft through supervision to management. Despite this increased focus and effort, during the Period, the safety performance on site was unchanged. There were nine first aid injuries and one Occupational Safety and Health ("OSHA") recordable injury. There were no lost-time accidents during the Period. In addition, at the time of the MPM on October 20th three more recordable injuries had occurred.

Safety was the dominant subject during both the regular MPM between PSNH and URS and the MPM with SESS. Senior management from PSNH, URS and SESS were present, along with their representatives responsible for safety. Safety performance the past several months was not acceptable. There was a need to understand why recent increased efforts to improve safety awareness and to enhance the "Culture of Safety" had not had the desired effect. Some contractors had not recognized and accepted that they had a safety problem. The initial responses by some contractors and other Project Stakeholders to recent safety initiatives, such as,

## Independent Engineer's Report for September 2010 Merrimack Clean Air Project

Page 5

the new Management Safety Steering Committee were not adequate. It was agreed that greater oversight of safety and further enhancements in the safety program were needed immediately.

During the Period, additional safety initiatives were established. A new Management Safety Steering Committee was created with URS, PSNH, SESS, AZCO, ESB and DMW site management participating. A Monthly All Hands Meeting was initiated with all craft to discuss safety issues, statistics and upcoming events. Safety training for superintendents and foremen was scheduled for October 30, 2010. URS added a second Site Safety Coordinator. Safety meetings were held with the executive management of SESS, DMW and AZCO. DMW submitted a recovery plan, initiated weekly safety conference calls and added a second safety professional; AZCO added a second safety professional; and SESS submitted a recovery plan and added a second safety professional.

### Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule. There is only one building permit remaining to be approved by the Building Inspector.

URS support for the National Pollution Discharge Elimination System ("NPDES") permit continued. The conformed technical specification for the Enhanced Wastewater Treatment System (Additional Mercury and Arsenic Removal) was issued to SWT/NP for review and comments and URS started review of SWT/NP equipment arrangement details, process flow diagrams ("PFDs"), mass balances, process and instrument diagrams ("P&IDs"), and load list. Work continued on the NPDES Permit modifications. PSNH was preparing a letter to the EPA Regional Administrator on "Best Available Technology." Discussions were being held with PSNH's legal counsel and outside legal counsel regarding the appropriate response.

An air permit from the New Hampshire Department of Environmental Services will be required prior to installation of the Emergency Quench Pump Diesel Engine ("EQPDE"). It was noted during the October 20th MPM, that the permit application was submitted on October 18th.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through September 2010. The most critical path was through activities that support the availability of the DCS and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The path was through the DCS supplier (Emerson), DCS software clean-up in October and delivery of the remaining DCS hardware to the site in early November 2010. The path was then construction dependent through the ESB DCS and power distribution work, including the installation of the DCS hardware in early November 2010, followed by the control cable pulling and terminations required at the cabinets. The critical path continued into the start-up and turnover schedule of the 4,160 volt ("V") switchgear and 480 V and 480 V Motor

  
**Independent Engineer's Report for September 2010  
Merrimack Clean Air Project****Page 6**

Control Centers ("MCC"). This logic tied to permanent power being available to the Island Contractors to support the beginning of the start-up phase of the Project. The logic then defaulted through the installation and turnover of the SESS systems in preparation for the tie-in outages. The SESS path terminated with the August 1, 2011 Mechanical Completion Date. The path was then outage dependent until it defaulted into the SWT start-up and Project completion April 1, 2012.

**Independent Engineer's Report for September 2010**  
**Merrimack Clean Air Project**  
 Page 7

**Table 1**  
**Status of Project Milestones**  
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Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A) <sup>(1)</sup>
Stack Complete	09/13/2010	05/28/2010(A) <sup>(2)</sup>
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Completion of the main silo exterior walls and roofs.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

## Independent Engineer's Report for September 2010 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. URS reported that the Project's overall progress through the Period was 85 percent versus a plan of 85 percent. The earned percent complete for construction was 73 percent versus a plan of 74 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.00. This compares with 1.00 last month. This remains good performance and indicates that the administration and execution of the Project was being appropriately managed.

### Project Schedule

With engineering and procurement nearing completion, the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity - based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor, is also reporting installed quantities, in units of thousands of pounds ("Kips") of steel ductwork. Various other methods are being used by the other contractors including AZCO, the BOP Mechanical Erection Subcontractor; and ESB, the BOP Electrical Erection Subcontractor. The measured quantities are converted into a percent complete by the contractors. PSNH/URS checks the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

During the Period, all parties continued to update the status of their tasks. Future Independent Review Team ("IRT") reviews are planned to focus on critical construction/testing activities.

### Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors in this Report is based on the progress of construction and testing activities, unless otherwise indicated. Therefore, care must be taken when comparing the earned versus planned percent complete in past Reports (prior to the July 2010 Report) to this Report. It should be noted that the transition to quantity-based measurement has resulted in a period of adjustment to the total earned versus planned percent complete for some of the Major Project Contractors.

## Independent Engineer's Report for September 2010 Merrimack Clean Air Project

Page 9

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 99 percent versus a plan of 99 percent and for construction management and start-up services the earned value was 50 percent versus a plan of 48 percent. No significant issues were reported.

URS engineering and representatives of PSNH participated in the DCS Software Factory Acceptance Test at Emerson's facilities for three weeks; issued the Site Finalization Phase 1 drawings and specifications for construction to support the start of paving prior to winter; started the evaluation of the Limestone Truck Delivery Package bids and held bid review meetings with each bidder; issued the conformed specification for the "Enhanced Wastewater Treatment System" (Additional Mercury and Arsenic Removal) to SWT/NP for review and comment and started the review of SWT/NP equipment arrangement details, PFDs and mass balances; and issued the Truck Wash Building electrical design for PSNH review. URS procurement evaluated proposals and held a bid review meeting for the Limestone Truck Delivery Facility; and finalized recommendations and awarded contracts for Start-up Electrical Testing and Site Finalization Phase 1.

During the MPM, it was reported that the DCS Software Factory Acceptance Test went well and that the balance of the DCS hardware was on schedule to ship from Emerson on a dedicated truck for delivery November 5, 2010. Additional technical support services will be required from Emerson, beyond those currently in the contract, to complete the installation, start-up and commissioning of the DCS.

### Siemens Environmental Systems and Services (FGD Island)

During the SESS MPM, there was an extensive discussion of SESS' safety performance, especially that of some SESS' subcontractors. SESS committed to enhance its safety program and that of its subcontractors.

Through the Period, SESS had a construction/testing earned percent complete of 72 percent versus a plan of 77 percent. This compares with 65 percent and 71 percent last month. The SESS work was reported to be progressing reasonably well, with the absorber nearing completion. However, there was growing concern that the quantity of installed piping (small bore and large bore pipe) and electrical bulk materials (conduit, power cable and control cable) were falling behind the early planned schedule curves. Installed small bore piping was behind the late planned schedule curves. There was particular concern that no power or control cable had been pulled, placing the start of these activities at least three months behind the early planned schedule. During the MPM, URS commented that the "cable is finally on site," while SESS noted later in the SESS MPM that they "started to pull cable today." URS was analyzing the impact of the delay in cable pulling. It was not impacting the critical path at that time.

SESS does not intend to provide heat to the FGD Building which may limit or delay some activities. They have ended the second shift of building steel fireproofing. This was a concern because it may delay completion of the fireproofing, extending the inefficiencies created to other

## Independent Engineer's Report for September 2010 Merrimack Clean Air Project

Page 10

trades. The onset of cold weather could also delay completion of the steel fireproofing without building heating.

During the Period, SESS met with PSNH/URS management to discuss safety performance. The setting, fitting and welding of the absorber outlet hood was completed and the heavy lift crane was demobilized. Erection of three field erected tanks was in progress. Alignment of the absorber outlet duct, to finalize expansion joint installation, continued and steel erection for the oxidation air blower enclosure was completed. Installation of piping systems, tray and conduit supports continued, as well as, fireproofing on the building steel and siding on the FGD Building in the absorber and reagent preparation areas. Installation of the ball mill auxiliary equipment was completed and the installation of the DCS room heating, ventilation, and air conditioning ("HVAC") duct and equipment continued.

### **Dearborn Midwest (Material Handling Systems)**

DMW met with PSNH/URS management to discuss safety performance.

Through the Period, DMW had a construction/testing earned percent complete of 77 percent versus a plan of 65 percent. This compares with 70 percent and 61 percent last month. During the Period, DMW continued to install conveyor belts, drives and chute work throughout the system. They installed the GS-3 conveyor framing and conveyors in the Gypsum Storage Building ("GSB") and completed the detailing of the head house on top of Limestone Storage Silo No. 1 ("LSS-1"). DMW started the erection of the interior walls in both limestone storage silos. DMW's electrical subcontractor continued to install tray and conduit and its mechanical subcontractor continued piping installation throughout the system.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (the "State") and demobilized from site. Because the permanent power supply was not yet in place, the State elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 84 percent versus a plan of 76 percent. This compares with 83 percent and 71 percent last month. The lack of significant change in the planned percent complete over a number of months was a result of the limited detail and logic in the SWT/NP schedule. URS was tracking the quantities installed to make sure that the actual earned progress was on plan to meet the Project's requirements, especially for instrument air, since all of the Project's instrument air is being supplied by equipment that is in the WWT Facility. Progress in this area was being closely monitored. During the Period, SWT/NP continued to install conduit, interconnecting piping, and platforms in and around the building.

**Independent Engineer's Report for September 2010****Merrimack Clean Air Project**

Page 11

**Francis Harvey and Sons Inc. (Major Foundations)**

FH is nearing the end of its contracted work. No update was provided for the Period.

**Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 67 percent versus a plan of 67 percent. This compares with 56 percent and 58 percent last month. During the Period, MIS continued to ground assemble and insulate steel duct work sections, continued to erect the Units 1 and 2 duct support steel at the Booster Fans ("BF") and continued the installation of expansion joints and dampers. They also started to erect the BF area platforms. The BF outlet duct to the absorber was completed and the Unit 1 BF discharge duct was set. MIS resumed erecting duct support steel and ducts in the area east of the Unit 2 fly ash silo and erected the stair tower at the Service Water Pump House ("SWPH").

**AZCO Inc. (BOP Mechanical Erection Subcontractor)**

AZCO met with PSNH/URS management to discuss safety performance.

Through the Period, AZCO had an overall earned percent complete of 52 percent versus a plan of 61 percent. This compares with 33 percent and 49 percent last month. During the Period, AZCO continued to weld and align the Units A and B BFs' housings and started to weld the Unit 1 BF. The installation of the SWPH above grade pipe was started and fabrication of the BF lube oil pipe continued.

**E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

ESB met with PSNH/URS management to discuss safety performance.

Through the Period, ESB had an overall earned percent complete of 33 percent versus a plan of 34 percent. This compares with 22 percent and 20 percent last month. During the Period, ESB completed installation of the lower cable bus and the cable tray to the FGD Building switchgear room and dewatering areas; completed pulling cable from the WWT switchgear to the MCCs and completed CTO for the DC and UPS systems. They continued the installation of conduit from the plant control room to the duct support steel; continued to terminate cables from the switchgear to MCCs in FGD Building and continued to install cable tray in the FGD Building and on the SWPH pipe bridge. ESB continued to procure electrical materials.

**G. C. Cairns (Site Finalization - Phase I)**

G. C. Cairns ("GCC") was awarded the Site Finalization Phase I contract.

**Start-Up**

URS updated the Start-Up Plan based on PSNH's comments and reviewed the Island Contractor's Start-Up Plans. The first two turnover packages were received. The 125 V DC

**Independent Engineer's Report for September 2010****Merrimack Clean Air Project**

Page 12

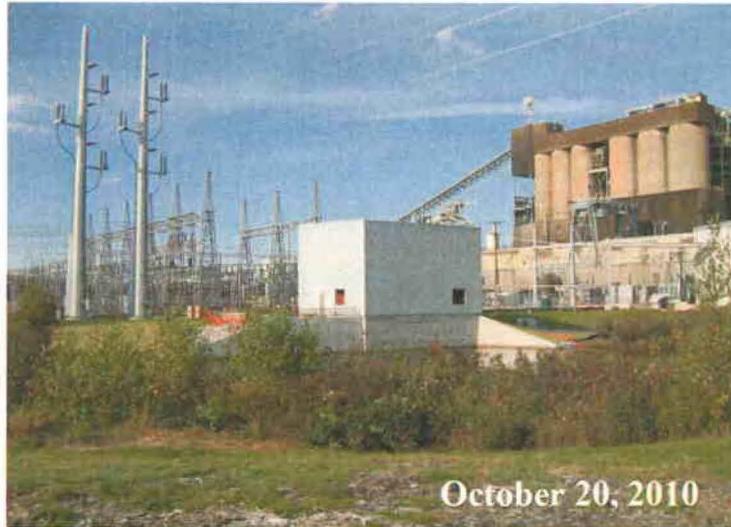
batteries were charged in place. A start-up kick-off meeting was held with DMW and meetings were scheduled for October with SESS and SWT.

**Merrimack Clean Air Project Cost Summary**

Senior Management from PSNH, NU, URS and others have completed a periodic review of the status of the Project. The Project was estimated to be 75 percent complete at that time. An analysis was made of the work and budget required to complete the Project. A risk assessment was also performed to identify any potential problems or events that could negatively impact the estimated completion date or cost of the Project. Based on this analysis, the projected cost for the Project was reduced from \$457,000,000 to \$430,000,000. The \$27,000,000 decrease included reductions of \$16,000,000 in reserves and \$11,000,000 in contingency. The reduction in reserves was based on recognition of the accumulated cost savings (variance) up to that point in the Project, due to lower material and contractor labor costs and also lower fees and payments. The reduction in contingency was due to that fact that at 75 percent complete many potential Project unknowns or other risks, for which contingency was included in the original Project budget, were avoided or the costs were incurred and are already included in the actual reported costs to date for the Project. The cost savings were attributed to a number of factors including: bids for a number of contracts were lower than budget estimates; favorable commodity cost adjustments under the escalation provisions of some contracts reduced final contract costs; high labor productivity; the quality of the work was good, requiring less rework; favorable weather conditions; early project completion; and others.

**Independent Engineer's Report for September 2010  
Merrimack Clean Air Project Photographs - October 20, 2010  
Attachment 1**

Page 1

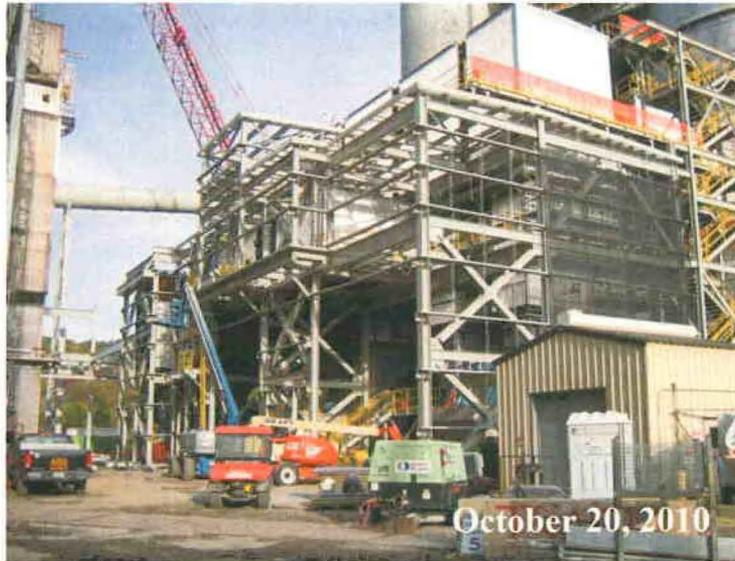


**Figure A-1 Service Water Pump House**

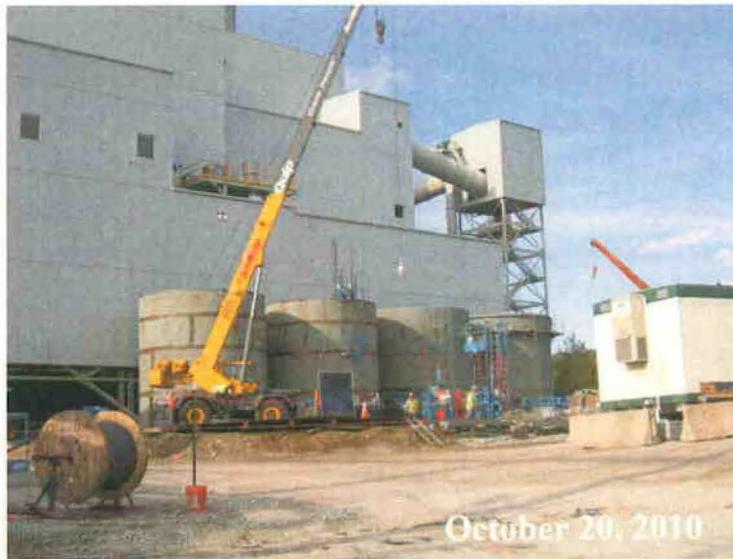


**Figure A-2 BF Enclosure and FGD Inlet Duct**

**Independent Engineer's Report for September 2010**  
**Merrimack Clean Air Project Photographs - October 20, 2010**  
**Attachment 1**  
Page 2



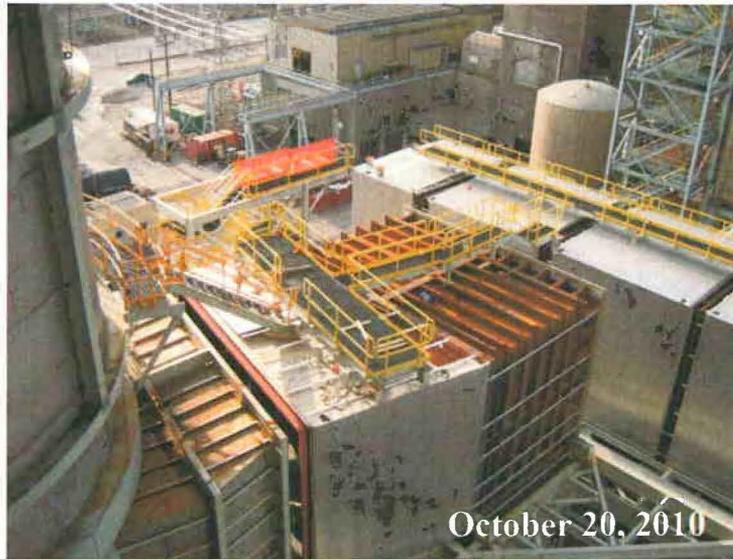
**Figure A-3 BF Enclosure**



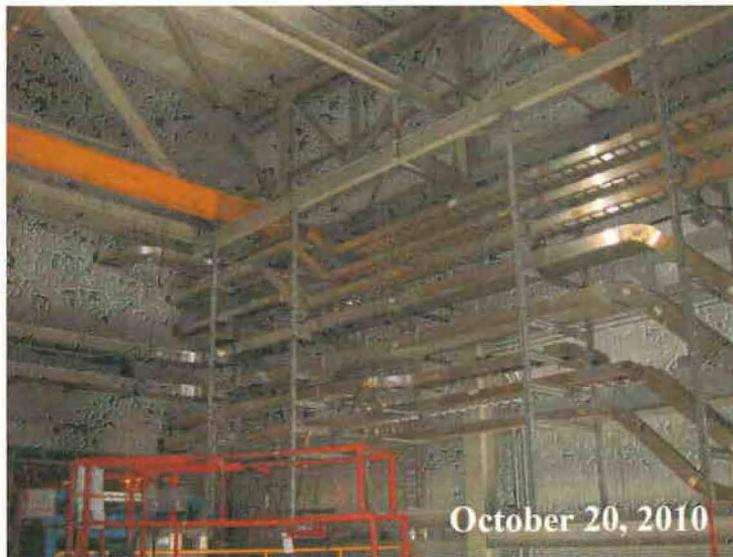
**Figure A-4 South Side of FGD Building - Field Erected Tanks**

**Independent Engineer's Report for September 2010  
Merrimack Clean Air Project Photographs - October 20, 2010  
Attachment 1**

Page 3



**Figure A-5 Combined Flue Gas FGD Absorber Inlet Duct**



**Figure A-6 FGD Building - Cable Tray**

Independent Engineer's Report for September 2010  
Merrimack Clean Air Project Photographs - October 20, 2010  
Attachment 1  
Page 4

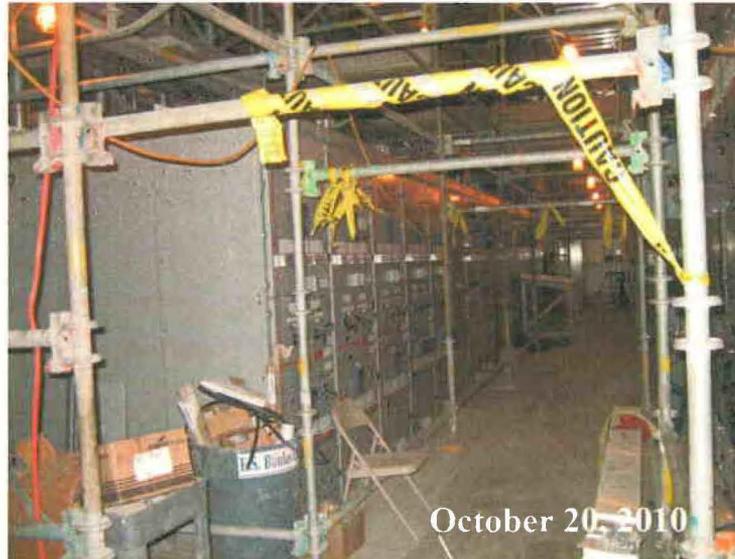


Figure A-7 FGD Building Electrical Room

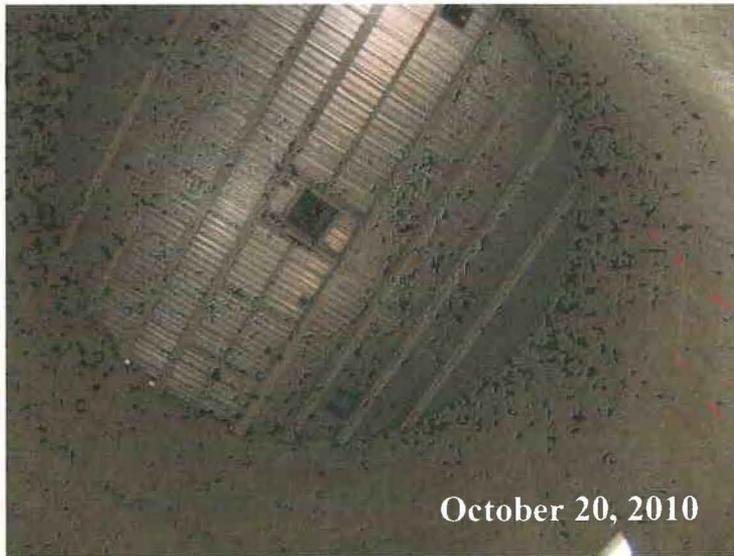


Figure A-8 Absorber Spray Nozzles and Headers

**Independent Engineer's Report for September 2010  
Merrimack Clean Air Project Photographs - October 20, 2010  
Attachment 1  
Page 5**



**Figure A-9 Hydroclones**



**FigureA-10 Limestone Silo Prior to Installation of Interior Walls**

March 10, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for October 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for October 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on November 17, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads 'Richard J. Gendreau'.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – November 17, 010  
c: Distribution

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on November 17, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the wastewater treatment ("WWT") facility on April 1, 2012. The critical path was though activities that support the availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project milestones had been completed though direct current ("DC") and uninterruptable power supply ("UPS") construction turnover ("CTO") complete on September 28, 2010.

Through the Period, projected costs for the Project were unchanged, since the \$27,000,000 reduction last month at \$430,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large, complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report.

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 3

On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. Safety performance during the Period was unchanged; however, safety initiatives were beginning to have the desired result. The overall safety culture on the Project was improved, along with the attitude of the workforce towards the efforts of management to enhance and enforce the safety program.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$430,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 4

has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") systems and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI")), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. Progress on this work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

PSNH/URS reported that the safety initiatives were beginning to have the desired result. There was a definite improvement in the overall safety culture on the Project and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program. There were four Occupational Safety and Health ("OSHA") recordable injuries during the Period, but only one of those occurred since the last MPM on October 20, 2010. There were no lost-time accidents.

During the Period, safety meetings were held with Executive Management of SESS, DMW and AZCO. URS added a second Site Safety Coordinator. SESS submitted its draft safety recovery plan and added a second safety professional. DMW submitted its recovery plan, initiated weekly safety conference calls and added a second safety professional. AZCO added a second safety professional. There was an all-hands meeting with craft to discuss safety issues, statistics

## **Independent Engineer's Report for October 2010 Merrimack Clean Air Project**

Page 5

and upcoming events. There were safety walk-downs with the URS Construction Manager and contractor site management and safety training for superintendents and foremen.

### **Environmental and Permitting**

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project schedule. During the Period, the Service Water Pump House ("SWPH") electrical design was approved and building permit applications were submitted for the electrical and mechanical design of the Truck Wash Building. The Emergency Quench Pump Diesel Engine ("EQPDE") air permit application was submitted by PSNH to the New Hampshire Department of Environmental Services for approval. The renewal process for the National Pollution Discharge Elimination System ("NPDES") permit continued. PSNH issued a letter to the EPA Regional Administrator ("EPA") on "Best Available Technology" ("BAT") on October 8, 2010 and a reply was received on October 29, 2010. The EPA requested additional information to support PSNH's determination of BAT for the enhanced (additional removal of mercury and other metals) WWT system. Pending resolution of this issue, PSNH has delayed giving SWT a full release to procure and install the additional equipment required for the enhanced WWT system. At this time, Project management does not believe that this delay will impact the Substantial Completion of the WWT facility on April 1, 2012.

PSNH has initiated the design and permitting for a gypsum surge pile. This is required because the buyers of the gypsum apparently do not maintain surge capacity.

### **Project Status**

#### **Overall Project**

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through October 2010. The most critical path was thought activities that support the availability of the DCS and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The path was through the delivery of the remaining DCS hardware to the site in early November 2010. It was then construction dependent through ESB, DCS and power distribution work, including the installation of the DCS hardware in early November, followed by the control cable pulling and termination work required at the cabinets to facilitate the CTO of the FGD DCS system.

The critical path continued into the schedule for the start-up and turnover of the 4,160 volt ("V") and 480 V switchgear and 480 V Motor Control Centers ("MCC") in the FGD Building. The path further continued through the start-up and commissioning of the 480 V switchgear and 480 V MCCs in the WWT Building that provide power to the compressed air system. The logic was then driven by the start-up and commissioning of the compressed air system in the WWT Building. Compressed air is required in the SWPH in order for service water to be available to the Island Contractors to begin the Start-up Phase. The logic then defaulted through the

**Independent Engineer's Report for October 2010  
Merrimack Clean Air Project**

Page 6

installation, turn over and commissioning of the SESS systems in preparation for the integrated testing and the tie-in outages. The SESS path terminated with the August 1, 2011 Mechanical Complete date. The path was then outage dependent until it defaults into the SWT Start-up and Project Completion April 1, 2012.

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**October 2010**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
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Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A) <sup>(1)</sup>
Stack Complete	09/13/2010	05/28/2010(A) <sup>(2)</sup>
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/12/2010
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	11/15/2010
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Completion of the main silo exterior walls and roofs.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

A measure of Project performance is the planned or scheduled percent complete versus the earned percent complete. This is an overall measure of the Project's progress and is used to identify significant trends. URS reported that the Project's overall progress through the Period was 89 percent versus a plan of 88 percent. The earned percent complete for construction and start-up phase was 74 percent versus a plan of 74 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 1.01. This compares with 1.00 last month. This remains good performance and indicates that the administration and execution of the Project was being appropriately managed.

### Project Schedule

With engineering and procurement nearing completion the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations and others. MIS, the steel ductwork subcontractor, is also reporting installed quantities, in units of thousands of pounds of steel ductwork ("Kips"). Various other methods are being used by the other contractors, including AZCO, the BOP Mechanical Erection Subcontractor, and ESB, the BOP Electrical Erection Subcontractor. The measured quantities are converted into a percent complete by the contractors. PSNH/URS checks the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

During the Period, all parties continued to update the status of their tasks. Future Independent Review Team ("IRT") reviews are planned to focus on critical construction/testing activities.

### Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the Major Project Contractors in this and future Reports, will be based on the progress of construction and testing activities, unless otherwise indicated. Therefore, care must be taken when comparing the earned versus planned percent complete in past Reports (prior to the July 2010 Report) to this and future Reports. It should be noted that the transition to quantity-based measurement has resulted in a period of adjustment to the total earned versus planned percent complete for some of the major Project contractors.

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 9

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 99 percent versus a plan of 100 percent and for construction management and start-up services the earned value was 53 percent versus a plan of 53 percent. No significant issues were reported.

URS Engineering issued the bid evaluation for the Limestone Truck Delivery Facility ("LTDF") contract and recommended DMW, the current Material Handling System contractor. They issued the piping arrangement drawings for the Units 1 and 2 Burner Management System ("BMS") furnace connections for PSNH review; finalized the conformed specifications for the enhanced WWT for full contract release; returned comments on the enhanced WWT equipment arrangement, process flow diagrams, mass balances, piping and instrument diagrams ("P&IDs") and electrical load list; issued fiber optic schematic design and termination drawings for construction; and continued to finalize the relay coordination and arc flash calculations to address PSNH comments.

### Siemens Environmental Systems and Services (FGD Island)

During the SESS MPM, SESS introduced its new Safety Supervisor. He described the joint SESS/SBMI Safety Recovery Plan that would be followed by SESS and its prime erection subcontractor SBMI and the steps that would be taken immediately to implement its provisions.

Through the Period, SESS reported a construction/testing earned percent complete of 80 percent versus a plan of 83 percent. This compares with 72 percent and 77 percent last month. During the Period, SESS continued to erect the Field Erected Tanks ("FETs"), with all six in progress; completed aligning the outlet duct to finalize the expansion joint installation; continued to install piping systems, tray and conduit supports; continued to install fireproofing on the building steel; started to pull power and instrumentation cables; and started to perform hydraulic testing of piping systems.

There was continued concern that the quantities of installed small bore pipe, power cables, and control cables were falling seriously behind the early planned schedule curves. During the Period, the installation of power and control cables began, four months behind the early planned schedule curve. Installed small bore piping was behind the late planned schedule curve by two months, while electrical termination work had not even begun and was at least two months behind the early planned schedule curve. At that time, these delays were not impacting the critical path. However, without a clear understanding of the reasons for the delays there was concern that the delays would continue and would ultimately impact the critical path.

During the SESS MPM there was a wide ranging discussion of the potential causes for these delays, along with the potential remedies and schedule impacts. SESS indicated that they would be meeting with SBMI and ESB to develop a recovery plan. The plan was expected to be completed by Monday, November 22, 2010. URS indicated that a planned follow-up IRT review was scheduled for November 17 and 18 and that a major objective of the IRT was to review the SESS electrical construction and start-up activities.

  
**Independent Engineer's Report for October 2010  
Merrimack Clean Air Project**

Page 10

SESS still did not intend to provide temporary heat in the FGD Building, which may limit or delay some activities, including completion of the building steel fireproofing and the application of the lining on the field erected tanks. Delays in completing the steel fireproofing had already created inefficiencies to the other trades.

**Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 80 percent versus a plan of 69 percent. This compares with 77 percent and 65 percent last month. During the Period, DMW continued to install conveyor belts on conveyors throughout the system; continued to install cable tray and conduit in the Gypsum Storage Building ("GSB"); completed installing the GS-3 conveyor framing and conveyors in the GSB; continued to install pipe in conveyor tubes; continued to install cable tray and conduit throughout the system; completed installing the interior side walls in both Limestone Storage Silos and started the sloped portions; and continued to detail the conveyors throughout, installing drives and chute work.

Premature deterioration of the paint finish on conveyor idlers and frames was a concern.

**Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (the "State") and demobilized from the site. Because the permanent power supply is not yet in place, the State elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

**Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 84 percent versus a plan of 80 percent. This compares with 84 percent and 76 percent last month. The lack of significant change in the planned percent complete over a number of months was a result of the limited detail and logic in the SWT/NP schedule. URS was tracking the quantities installed to make sure that the actual earned progress was on plan to meet the Project's requirements, especially for instrument air, since all of the Project's instrument air is being supplied by equipment that is installed in the WWT Facility. Continued erosion in the schedule float of the piping and electrical activities was being closely monitored.

During the Period, SWT/NP continued to install conduit, interconnecting piping, and platforms in and around the building. They started to pull cable. The delay in the final release of the enhanced WWT equipment and systems was a potential concern.

**Francis Harvey and Sons Inc. (Major Foundations)**

FH continued to install the Truck Wash Building foundation and was nearing the end of its contracted work.

## Independent Engineer's Report for October 2010 Merrimack Clean Air Project

Page 11

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 83 percent versus a plan of 75 percent. This compares with 67 percent and 67 percent last month. During the Period, MIS continued to ground assemble and insulate steel duct work sections; completed erection of the Unit 1 duct support steel and setting the Unit 1 duct, except for the tie in; continued the installation of expansion joints and dampers; continued coating the damper ductwork; continued to erect the booster fan ("BF") area platforms; continued detailing the BF enclosure girts and purlins; and completed the interior room in the SWPH.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 63 percent versus a plan of 73 percent. This compares with 52 percent and 61 percent last month. During the Period, AZCO completed welding and aligning the Units 2A and B BFs; continued to install the SWPH above grade pipe; and continued to install the BF lube oil piping. Installation of the EQPDE, which was not on the critical path, was delayed pending receipt of the air permit.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 45 percent versus a plan of 47 percent. This compares with 33 percent and 34 percent last month. During the Period, ESB completed installation of the cable tray to and in the SWPH area; completed installing the upper cable bus, continued to install the conduit from the existing plant control room to the duct support steel; completed terminating cables from the switchgear to MCC's in FGD Building and continued to install cable tray in the FGD Building and in the Reagent Preparation Area.

### **G. C. Cairns (Site Finalization - Phase I)**

Through the Period, G. C. Cairns ("GCC") had an overall earned percent complete of 19 percent versus a plan of 20 percent. This compares with 0 percent and 0 percent last month. During the Period, GCC completed grading of roadways 1 and 2 and the area west of plant warehouses; started to grade the area east of Merrimack Station Units 1 and 2; and completed replacement of catch basin and piping south of the GSB.

### **Start-Up**

During the Period, URS provided notification to all of the subcontractors that commissioning had begun. They met with PSNH and resolved all comments to the start-up lock-out-tag-out ("LOTO") procedure; issued all system descriptions and operating instructions; and held training/start-up kick-off meetings with SESS, SWT and the electrical testing contractor. URS plans to mobilize the DCS start-up engineer, the electrical start-up engineer and the LOTO coordinator in November or December 2010. The electrical testing contractor will mobilize in early December 2010.

  
**Independent Engineer's Report for October 2010**  
**Merrimack Clean Air Project**

Page 12

**Merrimack Clean Air Project Cost Summary**

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through October 2010. The estimated cost at completion, through the Period, was unchanged since the \$27,000,000 reduction last month at \$430,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

Independent Engineer's Report for October 2010  
Merrimack Clean Air Project Photographs - November 17, 2010  
Attachment 1  
Page 13



Figure A-1 FGD Building - West Side



Figure A-2 FGD Outlet Duct

Independent Engineer's Report for October 2010  
Merrimack Clean Air Project Photographs – November 17, 2010  
Attachment 1  
Page 14



Figure A-3 BF Enclosure

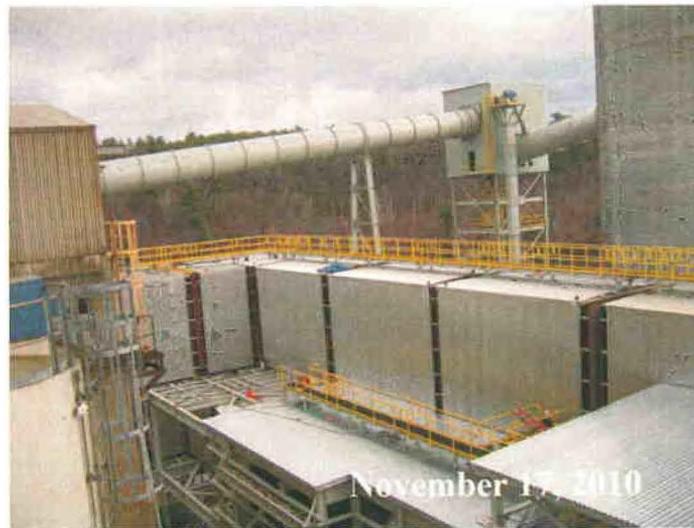
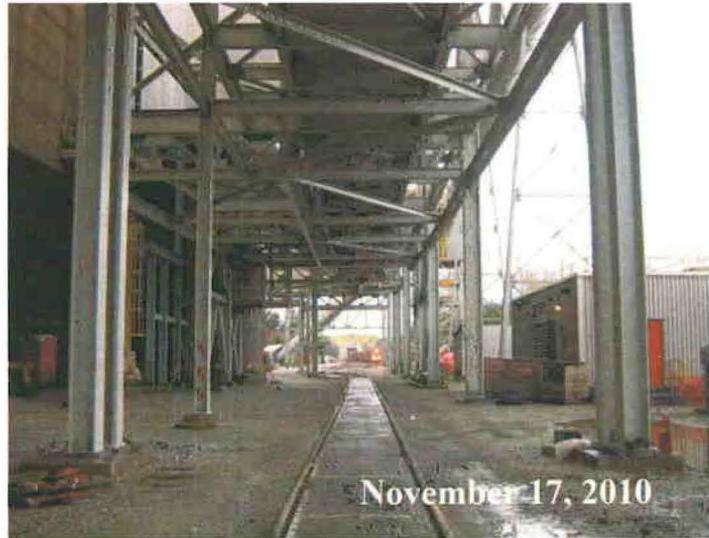


Figure A-4 Unit 2 Flue Gas Duct

Independent Engineer's Report for October 2010  
Merrimack Clean Air Project Photographs – November 17, 2010  
Attachment 1  
Page 15



**Figure A-5 Flue Gas Duct Support Steel and Unit 1 Duct Above**



**Figure A-6 BF Outlet Ducts**

Independent Engineer's Report for October 2010  
Merrimack Clean Air Project Photographs - November 17, 2010  
Attachment 1  
Page 16



Figure A-7 FGD Building - South Side- Field Erected Tanks

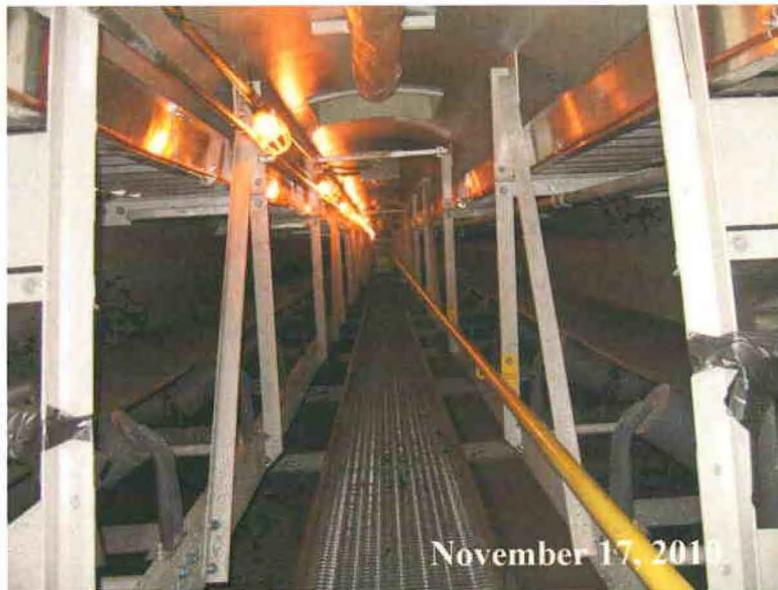
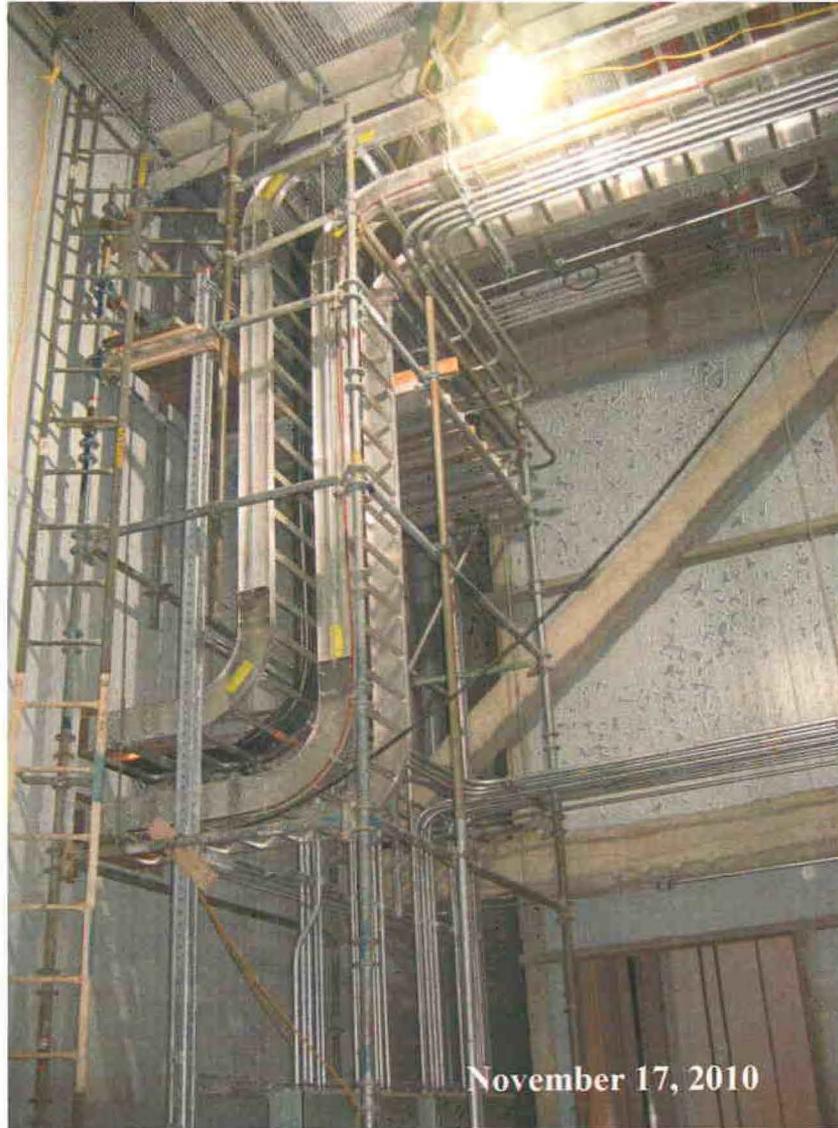


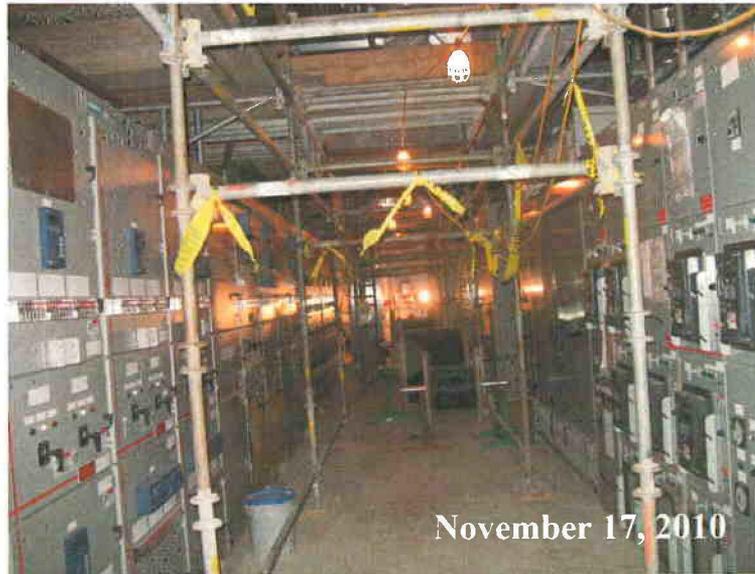
Figure A-8 Inside Gypsum Conveyor Gallery

**Independent Engineer's Report for October 2010**  
**Merrimack Clean Air Project Photographs - November 17, 2010**  
**Attachment 1**  
Page 17

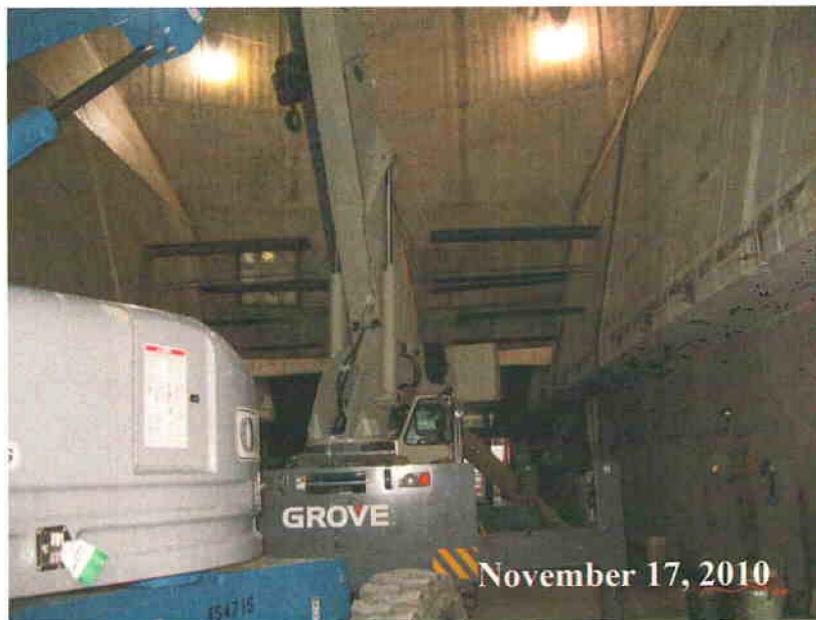


**Figure A-9 Cable Tray and Conduit - FGD Building**

**Independent Engineer's Report for October 2010  
Merrimack Clean Air Project Photographs – November 17, 2010  
Attachment 1  
Page 18**



**FigureA-10 FGD Electrical Room - Cable Pulling**



**FigureA-11 Limestone Silo Slopped Sides**

June 16, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for November 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for November 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on December 15, 2010.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – December 15, 2010  
c: Distribution



## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 2

## Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on December 15, 2010. During this site visit, we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the Wastewater Treatment ("WWT") facility on April 1, 2012. The critical path was through activities that support the availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed though PSNH FGD Substation energization on November 10, 2010.

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 reduction (\$11,000 in contingency and \$16,000,000 in reserves) in October 2010. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report.

## Independent Engineer's Report for November 2010 Merrimack Clean Air Project

Page 3

On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. Safety performance has improved over the past month or more. The aggressive response to the increase in safety-related incidents by Project management and labor at all levels has had the desired result. There has been a definite improvement in the overall safety culture on the Project and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$430,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960,

## Independent Engineer's Report for November 2010 Merrimack Clean Air Project

Page 4

and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI")), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. Progress on this work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

PSNH/URS reported that safety performance has improved over the past month or more. The aggressive response to the increase in safety-related incidents by Project management and labor at all levels has had the desired result. There has been a definite improvement in the overall safety culture on the Project and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program.

During the Period, the Safety Partnership with PSNH, SESS, SBMI and URS was initiated. URS held a luncheon for craft labor and site personnel to acknowledge 750,000 hours worked on the Project without a lost-time accident. Also, each craft member received an incentive award (MagLite flashlight and holster) as a result of the Project working the month of November without an OSHA recordable injury.

## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 5

## Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Work continued on the NPDES Permit modification. On December 3, 2010 PSNH submitted its response to the EPA's Informational Request Letter of October 29, 2010 on "Best Available Technology." During the Period, URS and SWT continued engineering of the Enhanced WWT system; however, pending confirmation of the requirements for the NPDES Permit modification, PSNH delayed giving SWT a full release to procure and install the additional equipment necessary for the enhanced system. Project management was evaluating various options to mitigate any potential impacts on the schedule due to these delays.

An air permit application for the quench pump diesel engine was submitted by PSNH on October 18, 2010. A response is expected by mid-January 2011.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through November 2010. The most critical path remained through activities that support the availability of the DCS and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The logic path began with the completion of the cable installation and termination of the FGD DCS system and continued through construction turnover ("CTO") to start-up.

The critical path then interfaced with the dismantling of the scaffold in the FGD Switchgear Room to facilitate the commencement of testing of the 4,160 ("V") and 480 V switchgear and 480 V Motor Control Centers ("MCC") in the FGD Building. The path further continued through the start-up and commissioning of the 480 V switchgear and MCCs in the WWT Building to provide power to the compressed air system. The logic was then driven by the start-up and commissioning of the compressed air system in the WWT Building. Compressed air is required in the Service Water Pump House ("SWPH") in order for service water to be available to the Island Contractors to begin the Start-up Phase. The logic then defaulted through the completion of cable pulls and terminations for various systems and commissioning of the SESS systems in preparation for the integrated testing and the tie-in outages. The SESS path terminated with the August 1, 2011 Mechanical Completion Date. The path is then outage dependent until it defaults into the SWT start-up and Project completion April 2012.

As part of the latest planning, start-up and commissioning will be performed on an extended work week schedule to ensure completion of the low-voltage and medium-voltage electrical system testing to support energizing the compressed air system in the WWT Building.

**Independent Engineer's Report for November 2010**  
**Merrimack Clean Air Project**  
 Page 6

**Table 1**  
**Status of Project Milestones**  
**November 2010**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
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(1) Completion of the main silo exterior walls and roofs. DMW still has a 59-day activity to complete the silo internals.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 7

## Project Percent Complete and Performance

The earned and planned percent complete for the Project was reported to be somewhat overstated in previous reporting; particularly the progress reported by SESS. The reasons for this included: commodity curves (control and power cable, terminations, small bore pipe, craft man-hours and others) were just being updated to include the higher actual design quantities and the associated installation man-hours versus the original bid quantities; the schedule logic was being revised to correct the start-up systems sequence; and the CTO to start-up activities were being better defined and reflected in the overall Project Schedule. See the discussion of the November 2010 URS Independent Review Team ("IRT") review below. Over the next month or two the reported progress will be adjusted to reflect these changes, which will result in a reduction in both reported earned and planned progress. These revisions are not expected to change the major Project Milestones or the Project completion dates.

Recognizing that these changes are not reflected in the current reported progress, the Project's overall progress through the Period was 89 percent versus a plan of 90 percent. The earned percent complete for construction was 85 percent versus a plan of 85 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.99. This compares with 1.01 last month. The reported SPI will also be adjusted in the coming months.

## Project Schedule

With engineering and procurement nearing completion the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor, is also reporting installed quantities, in units of thousands of pounds ("Kips") of steel ductwork. Various other methods are being used by the smaller contractors including AZCO, the BOP mechanical erection subcontractor; and ESB, the BOP electrical erection subcontractor (also the electrical subcontractor to SESS and DMW). The measured quantities are converted into a percent complete by the contractors. PSNH/URS checks the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 8

#### URS Independent Review Team

A URS IRT performed a follow-up schedule review on November 17 and 18, 2010. The detailed SESS electrical construction (by ESB), SESS start-up, BOP electrical, BOP mechanical and URS start-up schedule activities in the overall integrated Project Schedule were reviewed. These detailed activities and logic were not fully developed and available for the previous IRT schedule review conducted in May 2010. At this point in the Project, a comprehensive management review of the remaining electrical, mechanical and start-up activities is critical, since the successful and timely completion of these activities is a precondition for the start of integrated testing, unit tie-ins, and operation of the Project.

The IRT made a number of requests and recommendations, including the following:

#### *SESS Electrical Recovery Plan*

Develop an electrical recovery plan for cable pulling including:

- Revised schedule with logical ties to correct the start-up systems sequence.
- Verify that CTO activities are shown for each of the planned 37 start-up systems.
- Updated manpower chart for cable pulling.
- Updated cable pulling commodity curves (both power and control) showing new planned and actual cable pulled per week.
- Verify that bid quantities still accurately reflect the final design quantities.
- Develop a commodity curve for CTO to start-up which shows planned CTO packages per week versus actual accomplished.

#### *BOP Electrical and URS Start-up Schedule*

- ESB to develop electrical commodity curves and manpower curves showing planned per week versus actual accomplished.
- Include ESB's commodity and manpower curves in the monthly report.

#### *Overall Project Schedule to SESS Ties*

The IRT recommended that the overall Project Schedule identify the proper ties to the SESS activities to determine when the BOP electrical power feeders must be completed and turned over to URS start-up to support the SESS start-up activities.

## Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 9

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 91.2 percent versus a plan of 92.4 percent. This compares with 99 percent and 100 percent reported last month. URS was asked to explain the eight percentage point negative change in the reported engineering and procurement services earned and planned percent complete. They indicated that there was an error in the spreadsheet that they were using for these calculations. The denominator of the equations used to calculate earned and planned percent complete were not updated with the additional man-hours from the approved change orders, while the numerators of those equations included the earned and planned man-hours for all of the activities, including the approved change orders. URS confirmed that reports of progress in other areas of the Project were not impacted by this error.

For construction management and start-up services, the earned value was 50 percent versus a plan of 48 percent. No significant issues were reported.

URS engineering started work on the Site Finalization Phase 2 specification and drawings; issued the truck wash equipment and piping arrangement drawings for construction; awarded the Limestone Truck Delivery Facility contract and began conforming the technical documents. They issued the piping arrangement drawings for the Units 1 and 2 Burner Management System ("BMS") furnace connections for construction; issued the final relay coordination and arc flash calculations and addressed PSNH comments; and issued revised BMS conduit drawings for the relocated instrument locations.

#### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 82 percent versus a plan of 89 percent. This compares with 72 percent and 77 percent last month. As discussed above, the SESS earned and planned percent complete for the Project are somewhat overstated. Over the next month or two, the reported progress will be adjusted to reflect the latest commodity quantities, man-hours and schedule logic.

During the Period, SESS met with PSNH/URS to review and discuss the SESS/SBMI Safety Recovery Plan and initiate the Safety Partnership. They continued erecting the field erected tanks, with all six in progress; continued to install outlet duct expansion joints; continued to install and perform hydro testing of piping systems; and continued installing fireproofing on the building steel. SESS completed installing siding on the Reagent Preparation Area; continued installing the Ball Mill feeders and chute work; continued to install the FGD Building elevator; continued to install the fire detection system; and continued to pull power and instrumentation cables.

There was continued concern that the quantities of installed piping (small bore pipe) and electrical bulk materials (power cable and control cable) were behind the planned schedule curves; although some improvement was reported. New commodity curves, based on the final design quantities, rather than the bid quantities were being developed.

## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 10

SESS has started to make plans to provide heat in the FGD Building. Until the electric heaters are delivered and installed and the FGD Building is closed-up, hydraulic testing of piping and other heat sensitive activities were suspended. Enclosing the building was being impacted by delays in the completion of the field erected tanks, the relocation of ventilation openings and other ongoing activities.

### Dearborn Midwest (Material Handling Systems)

Through the Period, DMW had a construction/testing earned percent complete of 84 percent versus a plan of 75 percent. This compares with 80 percent and 69 percent last month.

During the Period, DMW completed installing cable tray and conduit in the Gypsum Storage Building ("GSB"); started to pull cable from the GSB to the FGD Electrical Room; completed siding the Head House on top of the Limestone System conveyor, LSS-1; and completed installing pipe in conveyor tubes. They continued to install cable tray and conduit at the Limestone Storage Silos; completed installing the interior sloped surfaces in both Limestone Storage Silos and started the interior walls; continued to detail the conveyors throughout, installing drives and chute work; and awarded the Limestone truck unloading scope as part of this contract.

Premature deterioration of the paint finish on conveyor idlers and frames remained a concern.

### Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (the "State") and demobilized from site. Because the permanent power supply is not yet in place, the State elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

### Siemens-Water Technology and Northern Peabody (WWT Facility)

Through the Period, SWT/NP had a construction/testing earned percent complete of 81 percent versus a plan of 84 percent. This compares with 80 percent and 84 percent last month. The lack of significant change in the planned percent complete over a number of months is a result of the limited detail and logic in the SWT/NP schedule. URS is tracking the quantities installed to make sure that the actual earned progress is on plan to meet the Project's requirements, especially for instrument air. Since all of the Project's instrument air is being supplied by equipment that is in the WWT Facility, progress in this area was being closely monitored. During the Period, SWT/NP continued to pull cable; continued to install platforms in and around building; and continued to install interconnecting pipe.

Continued erosion of the float in the piping and electrical activities remained a concern.

### Francis Harvey and Sons Inc. (Major Foundations)

FH is nearing the end of its contracted work. No update was provided for the Period.

**Independent Engineer's Report for November 2010****Merrimack Clean Air Project**

Page 11

**Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 88 percent versus a plan of 83 percent. This compares with 67 percent and 67 percent last month. During the Period, MIS continued ground assembly and insulation of duct sections for Units 1 and 2 ducts; completed erecting the Unit 2 duct support steel; completed setting the Unit 2 duct; and continued to install expansion joints in duct. They completed applying coating to the damper ductwork; completed erecting the Booster Fan ("BF") area platforms; continued detailing the BF enclosure girts and purlins; continued to insulate the duct, BFs and expansion joints; demobilized the heavy-lift crane used for setting duct and started to erect the Truck Wash Building framing.

**AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 69 percent versus a plan of 85 percent. This compares with 52 percent and 61 percent last month. During the Period, AZCO continued installing the SWPH above grade pipe and continued to install the BF lube oil pipe. Installation of emergency quench pump diesel is awaiting receipt of the air permit.

**E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 52 percent versus a plan of 62 percent. This compares with 33 percent and 34 percent last month. During the Period, ESB continued installing cable from the FGD Electrical Rooms to the SWPH area; completed terminating the cable bus; continued to install conduit from the existing Merrimack Station Control Room to the duct support steel; completed installing cable tray in the FGD Building Reagent Prep area; started to install cable tray in the BF enclosure and set the remaining DCS cabinets in the FGD, WWT and SWPH.

**G. C. Cairns (Site Finalization - Phase I)**

Through the Period, G. C. Cairns ("GCC") had an overall earned percent complete of 49 percent versus a plan of 60 percent. This compares with 19 percent and 20 percent last month. During the Period, GCC completed asphaltting of Roadways 1 and 2 and area west of the Merrimack Station warehouses; completed grading area east of Units 1 and 2; started to install the trench modification south of Unit 2 in Road 3 and started to grade the road south of the GSB.

**Construction Turnover**

CTO Packages: 7 issued versus an early plan of 11.

Electrical Cables CTO: 127 actual versus 127 planned.

## Independent Engineer's Report for November 2010

### Merrimack Clean Air Project

Page 12

## Start-Up

URS mobilized their Electrical Start-Up engineer; scheduled the uninterruptible power supply system ("UPS") vendor to commission the UPS system; scheduled the DCS vendor to verify the DCS cabinets for energization; scheduled Scott Testing to mobilize on January 3, 2011 to start electrical testing; and performed the IRT on start-up schedules.

## Corrosion Concerns with Alloy 2205

The absorber shell and outlet hood from the flue gas inlet to the flue gas outlet, as well as other components of the FGD system are constructed of Solid Alloy 2205 (also designated as UNS-S32205, based on the Unified Numbering System for Metals and Alloys or "UNS") duplex stainless steel. Corrosion of Alloy 2205 FGD absorber vessels has recently been reported by several power plant operators. It is estimated that there are about 60 absorber vessels in service fabricated from Alloy 2205, and that about 60 percent have experienced some degree of corrosion. This is an industry-wide issue. It is not limited to any one supplier, fuel or set of operating conditions. At the moment, there is no consensus in the industry as to what is causing the corrosion or what corrective actions or mitigating measures should be implemented to resolve the problem. Generally, this corrosion has been observed within 12 to 24 four months of initial operation, but sometimes within as little as 2 to 3 months. In some cases, the FGD system had to be removed from service until repairs could be made. While in other cases, no corrosion was observed.

In response to this development, PSNH has hired an engineering consultant (Sargent and Lundy), with broad, first-hand experience dealing with this issue, to evaluate possible options to deal with this potentially serious problem. PSNH indicated that they intend to identify and implement one or more mitigation measure, prior to placing the FGD system into service scrubbing flue gas for the first time. It was not known what impact, if any, this would have on the Project Schedule.

## Merrimack Clean Air Project Cost Summary

R. W. Beck reviewed the Project's projected costs compared with the original budget. The data was updated through November 2010. The estimated cost at completion, through the Period, was unchanged at \$430,000,000, since the \$27,000,000 reduction (\$11,000 in contingency and \$16,000,000 in reserves) in October 2010. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

**Independent Engineer's Report for November 2010  
Merrimack Clean Air Project Photographs – December 15, 2010  
Attachment 1**

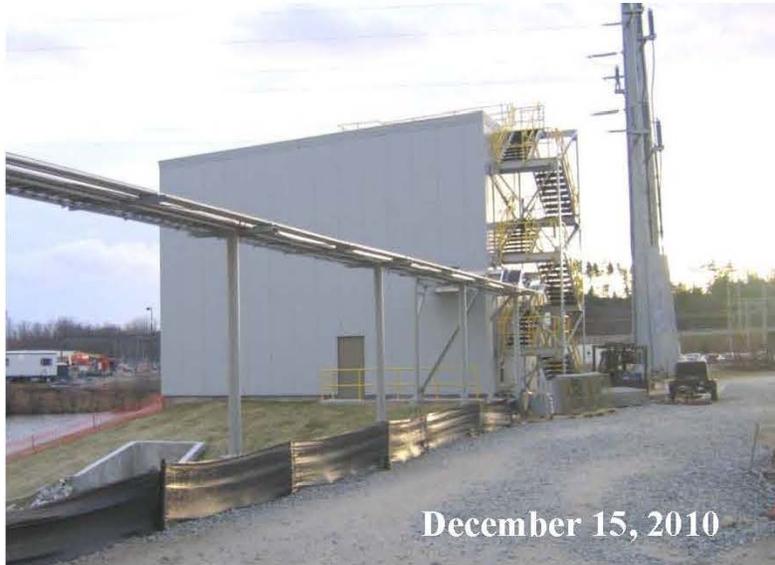


**Figure A-1 The "Meeting Place"**



**Figure A-2 WWT Building Compressed Air Storage Tank, Air Compressor and Air Dryers**

**Independent Engineer's Report for November 2010  
Merrimack Clean Air Project Photographs – December 15, 2010  
Attachment 1  
Page 2**



**Figure A-3 Service Water Pump House**



**Figure A-4 Service Water Pumps**

**Independent Engineer's Report for November 2010  
Merrimack Clean Air Project Photographs – December 15, 2010  
Attachment 1  
Page 3**

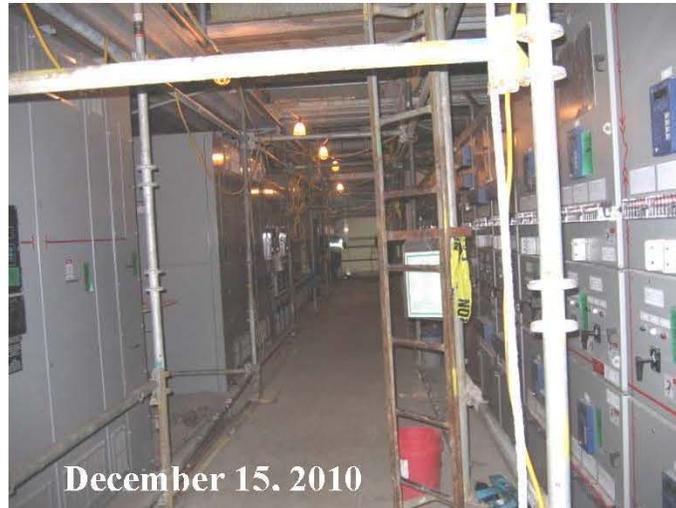


**Figure A-5 Future Location of the Diesel Driven Service Water Pump - Diesel Storage Tank**



**Figure A-6 Field Erected Storage Tanks - FGD Building South Side**

**Independent Engineer's Report for November 2010  
Merrimack Clean Air Project Photographs – December 15, 2010  
Attachment 1  
Page 4**



**Figure A-7 FGD Building Electrical Room**



**Figure A-8 FGD Booster Fan Enclosure Siding**

**Independent Engineer's Report for November 2010  
Merrimack Clean Air Project Photographs – December 15, 2010  
Attachment 1  
Page 5**



**Figure A-9 Limestone Silo Internals**



**Figure A-10 Truck Wash**

REDACTED

June 16, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for December 2010**

Attached is the Independent Engineer's Monthly Report (the "Report") for December 2010 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on January 19, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive, flowing style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – January 19, 2011

c: Distribution



## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on January 19, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the Wastewater Treatment ("WWT") facility on April 1, 2012. The critical path continued to be through activities that support the availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed though Enclose FGD Building on December 16, 2010.

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 reduction (\$11,000 in contingency and \$16,000,000 in reserves) in October 2010. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report.

## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 3

On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. The aggressive response to the increase in safety related incidents by Project management and labor at all levels continued to have the desired result. The Project worked a second month in a row without a Recordable Injury.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$430,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 4

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI")), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC (joint venture) ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

PSNH/URS reported that safety performance continued to improve. The Project worked a second month in a row without a Recordable Injury. The overall safety culture on the Project was reported to be good and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program was positive.

There was one serious near miss incident on December 9, 2010 when a swing stage malfunctioned with one end falling ten feet to the ground. There was no serious injury because the operator was properly tied-off with his Personal Fall Arrest System ("PFAS").

Each craft member received an incentive award (Thermos with Project logo and carry bag) as a result of the Project working the month of December 2010 without an OSHA Recordable Injury.

## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 5

### Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Work continued on the NPDES Permit modification. On December 3, 2010 PSNH submitted its response to the EPA's Informational request letter of October 29, 2010 on "Best Available Technology". A full release was issued to SWT for the Enhanced WWT system.

An air permit application for the Quench Pump Diesel Engine was submitted by PSNH. Approval was expected in April 2011.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through December 2010. The most critical path remained through activities that support the availability of the DCS and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011.

The logic path began with the testing of the 4,160 volt ("V") and 480 V switchgear and transformers and 480 V motor control centers ("MCC") in the FGD Building. The path continued through the start-up and commissioning of the 480V switchgear and 480V MCCs in the WWT Building for providing the power feed to the compressed air system. The logic was then driven by the start-up and commissioning of the compressed air system in the WWT Building. Compressed air is required in the Service Water Pump House ("SWPH") in order for service water to be available to the Island Contractors to begin the Start-up Phase. The logic then defaulted to a three day float path through the completion of the absorber hold tank and absorber area sump systems to facilitate filling up the absorber for pre-operational checkout of the recycle pumps and oxidation air blowers. The path further continued through completion of pre-operational checkout of the various systems to drain the absorber vessel for final cleaning followed by refilling the vessel in preparation for the integrated testing and the Tie-In Outages.

The SESS path terminated with the August 1, 2011 Mechanical Complete date. The path was then outage dependent until it defaulted into the SWT Start-up and Project Completion April 1, 2012. Start-up and commissioning was being performed on an extended work schedule to ensure timely completion of the low voltage ("LV") and medium voltage ("MV") electrical system testing to support power available to the air compressor system and ultimately air and service water available to the Island Contractors. Further, SESS electrical progress was being closely scrutinized to ensure weekly performance was in compliance with the recovery plan.

# Independent Engineer's Report for December 2010

## Merrimack Clean Air Project

Page 6

**Table 1**  
**Status of Project Milestones**  
**December 2010**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A) <sup>(1)</sup>
Stack Complete	09/13/2010	05/28/2010(A) <sup>(2)</sup>
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A) <sup>(3)</sup>
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	02/04/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Completion of the main silo exterior walls and roofs. DMW was still completing the silo internals.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

(3) Excluding temporary access openings.

## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 7

### Project Percent Complete and Performance

As reported in the November MPR, the earned and planned percent complete for the Project were somewhat overstated; particularly the progress reported by SESS. The reasons for this included: commodity curves (control and power cable, terminations, small bore pipe, craft man-hours and others) were just being updated to include the final design quantities and the associated installation man-hours versus the original bid quantities; the schedule logic was being revised to correct the start-up systems sequence; and the construction turnover ("CTO") to start-up activities were being better defined and reflected in the overall Project Schedule.

URS reported that the Project's overall progress through the Period was 89.9 percent versus a plan of 92.1 percent. The earned percent complete for construction was 81.8 percent versus a plan of 86.7 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The earned and planned percent complete for the Project were corrected to account for the revisions to the commodity curves and schedules discussed above. This resulted in the reported construction earned percent complete for November 2010 of 85 percent being reduced to 81.8 percent for December 2010.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.97. This compares with 0.99 last month. The reduction in the month-to-month SPI for the Project also reflects the changes to the basis used for calculating progress discussed above.

There was a 4.9 percentage point difference between the earned (81.8 percent) and planned (86.7 percent) percent complete for construction and start-up. URS reported that the major activities behind schedule were in the SESS scope-of-work including: FGD tanks; electrical cable pulls and terminations; architectural finishes; and fire protection and small bore piping. They indicated that, all of the activities that were behind schedule were being actively managed and that, at that time, none of the delays were expected to impact the contract completion dates.

### Project Schedule

With engineering and procurement nearing completion the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor, is also reporting installed quantities, in units of thousands of pounds (Kips) of steel ductwork. Various other methods are being used by the smaller contractors including AZCO, the BOP Mechanical Erection Subcontractor; and ESB, the BOP Electrical Erection Subcontractor (also the electrical

**Independent Engineer's Report for December 2010  
Merrimack Clean Air Project**

Page 8

subcontractor to SESS and DMW). The measured quantities are converted into a percent complete by the contractors. PSNH/URS checks the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

## **Major Project Contractors**

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

### **URS (Program Manager)**

URS reported that through the Period, the earned percent complete for engineering and procurement services was 92.5 percent versus a plan of 95.4 percent. This compares with 91.2 percent and 92.4 percent reported last month. For construction management and start-up services the earned value was 59.2 percent versus a plan of 60.2 percent. This compares with 50 percent and 48 percent, respectively, last month. No significant issues were reported.

### **Siemens Environmental Systems and Services (FGD Island)**

Through the Period, SESS had a construction/testing earned percent complete of 78 percent versus a plan of 93 percent. This compares with 82 percent and 89 percent last month. As discussed above, the SESS earned and planned percent complete for the Project had been overstated. This resulted in the reported SESS earned percent complete for November 2010 of 82 percent being reduced to 78 percent for December 2010. The major SESS activities that were behind schedule included FGD tanks; electrical cable pulls and terminations; architectural finishes; and fire protection and small bore piping. At that time, none of the delays were expected to impact the contract completion dates.

During the Period, SESS completed erecting the Field Erected Tanks; mobilized the tank coating subcontractor and completed installing the absorber outlet duct expansion joint. They continued to install and perform hydro testing of piping systems; continued to pull power and instrumentation cables and started electrical terminations. SESS completed enclosing the FGD Building (excluding temporary access openings) and suspended work on the installation of the FGD Building elevator until power is available.

Major areas of the SESS scope-of-work were behind schedule. These included the field erected tanks, electrical installation and piping installation. However, it was reported that these delays were not impacting the major contract milestone dates. Commodity curves (control and power cable, terminations, small bore pipe, craft man-hours and others) had been updated to include the final design quantities and the associated installation man-hours versus the original bid quantities. Revised schedules and installation curves were developed to recover the lost time in these areas. These new schedules and curves were being closely monitored by URS/PSNH

## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 9

project management. SESS had not included start-up activities in its schedule. The addition of these activities increased the remaining work and further reduced SESS' reported progress.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 86 percent versus a plan of 80 percent. This compares with 84 percent and 80 percent last month.

During the Period, DMW continued to pull cable from the Gypsum Storage Building ("GSB") to the FGD electrical room and started to pull cable from the L-5 conveyor area to the FGD electrical room. They continued to install cable tray and conduit at the Limestone Storage Silos ("LSS") completed installing the interior walls in both LSS' and started the interior beams; and continued to detail the conveyors throughout, installing drives and chute work.

Lack of progress on the work under the Limestone Storage Silos and premature deterioration of the paint finish on conveyor idlers and frames were concerns.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because the permanent power supply is not yet in place, the State elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 82 percent versus a plan of 84 percent. This compares with 81 percent and 84 percent last month. During the Period, SWT/NP continued to pull cable and to install platforms in and around the building. They also continued to install interconnecting pipe.

Continued erosion of the schedule float in the piping and electrical activities remained a concern.

### **Francis Harvey and Sons Inc. (Major Foundations)**

FH is nearing the end of its contracted work. No update was provided for the Period.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 91 percent versus a plan of 91 percent. This compares with 88 percent and 83 percent last month. During the Period, MIS continued to install expansion joints in the steel ductwork; completed detailing the Booster Fan Enclosure girts, except for the removable sections; and continued to insulate the steel ductwork, Booster Fans and expansion joints. They completed erecting the Truck Wash building framing and started siding and roofing installation. MIS also started to install siding on the Booster Fan Enclosure.

**Independent Engineer's Report for December 2010  
Merrimack Clean Air Project**

Page 10

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 75 percent versus a plan of 94 percent. This compares with 69 percent and 85 percent last month. During the Period, AZCO completed installing the SWPH above grade pipe; continued to install the Booster Fan lube oil pipe; started to install the Booster Fan area instrument air pipe; and continued to install Booster Fan and SWPH area instruments. They received the Truck Wash equipment.

Installation of Emergency Quench Pump Diesel is awaiting receipt of the air permit.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 62 percent versus a plan of 74 percent. This compares with 52 percent and 62 percent last month. During the Period, ESB completed installing cable from the FGD electrical rooms to the SWPH area; continued to install conduit from the Merrimack Station control room to the duct support steel and continued to install cable tray in the Booster Fan enclosure. They pulled, tested and terminated cable to the recycle pump, ball mill and vacuum filter motors and started to pull the electrical feed cables to Transfer Tower No. 1 MCC. ESB's work was being delayed by the lack of access to some areas caused by others.

### **G. C. Cairns (Site Finalization - Phase I)**

Through the Period, G. C. Cairns ("GCC") had an overall earned percent complete of 67 percent versus a plan of 100 percent. This compares with 49 percent and 60 percent last month. During the Period, GCC completed trench modification south of Merrimack Station Unit 2 in Road 3; completed grading and asphalt installation of the road south of the GSB and completed grading the area south of the LSSs and Truck Wash Building.

GCC demobilized from site until spring.

## **Construction Turnover**

CTO Packages: 13 issued versus an early plan of 22.

## **Start-Up**

URS' Start-Up group ("Start-Up") commissioned the uninterruptable power supply ("UPS") system and the 125 VDC Battery Chargers; accepted MCC Turnover Packages; and coordinated access to the Electrical Rooms to begin testing and commissioning. Scott Testing is expected to mobilize in early January 2011 to perform the electrical testing. The DCS Start-Up Engineer and the lockout-tagout ("LOTO")/permit-to-work ("PTW") coordinator mobilized to the site.

Emerson conducted DCS Operator training. Start-Up submitted the training program syllabus to PSNH for comment.

## Independent Engineer's Report for December 2010 Merrimack Clean Air Project

Page 11

### Corrosion Concerns with Alloy 2205

As discussed in last month's report, corrosion of Alloy 2205 FGD absorber vessels, similar to the Project's absorber vessel, has recently been reported by several power plant operators. In some cases, the corrosion of Alloy 2205 FGD absorber vessels has been rapid and very serious. In response to this development, PSNH hired Sargent and Lundy ("S&L") to evaluate possible options to deal with this potentially serious problem. As a result of this analysis, PSNH selected Potential Adjustment Protection ("PAP") technology, supplied by Corrosion Services of Markham, Ontario, Canada (outside of Toronto) to address this emerging problem.

PAP is a corrosion prevention technique developed for stainless steels in oxidizing acid-chloride environments. The original application was in bleach plant washer drums used in the pulping industry. This technology has since found other successful applications in vessels such as FGD system absorbers and rotating biological contactors in municipal processing plants. The PAP corrosion protection system prevents the formation of wormhole corrosion attack. Stainless steel in oxidizing acid-chloride environments, like that in the Project's absorber vessel, exhibits solution potentials in the pitting corrosion zone. An external source of direct current moves the solution potential from the pitting zone into the passive zone where corrosion rates are significantly lower. PAP limits the corrosion rate on fully or intermittently immersed stainless steel by the application of a controlled direct current that is automatically controlled to maintain the solution potential at the steel/solution interface in the passive, low corrosion rate zone.

This system has previously been installed primarily on absorber vessels constructed of metals other than Alloy 2205. The first system used on an Alloy 2205 absorber vessel was installed in 2010 at Duke Energy's power plant in Indiana. They will be adding more anodes shortly to provide the desired protection.

Corrosion Service Company Limited provides corrosion engineering services in North America, Asia, Central and South America, Europe, Africa, and the Middle East. It offers services in the areas of external corrosion direct assessment, close interval survey, tank bottom cathodic protection, and reinforced concrete cathodic protection. The company provides cathodic protection and rehabilitation services for reinforced concrete structures, such as bridges, buildings, parking garages, piers, and water facilities; and remote monitoring systems to the corrosion prevention industry, as well as manufactures rectifiers, current anodes, sacrificial anodes, backfill materials, and monitoring probes. Its services also include cathodic protection system design, anodic protection system design, potential adjustment protection, corrosion coupon monitoring, remote monitoring, installation, and corrosion consulting. The company was founded in 1950 and is based in Markham, Canada. It has locations in Dartmouth, Edmonton, and Vancouver, Canada; and City of Wilmington, Delaware.

### Merrimack Clean Air Project Cost Summary

We reviewed the Project's projected costs compared with the original budget. The data was updated through November 2010. The estimated cost at completion, through the Period, was unchanged at \$430,000,000, since the \$27,000,000 (\$11,000 in contingency and \$16,000,000 in

**Independent Engineer's Report for December 2010  
Merrimack Clean Air Project**

Page 12

reserves), reduction in October 2010. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

Independent Engineer's Report for December 2010  
Merrimack Clean Air Project Photographs –January 19, 2011  
Attachment 1



**Figure A-1 The "Meeting Place"**



**Figure A-2 South Side of FGD Building and Field Erected Tanks**

Independent Engineer's Report for December 2010  
Merrimack Clean Air Project Photographs –January 19, 2011  
Attachment 1  
Page 2



Figure A-3 Outlet of Booster Fans and Inlet of FGD Absorber



Figure A-4 North Side of the Booster Fan Enclosure

Independent Engineer's Report for December 2010  
Merrimack Clean Air Project Photographs –January 19, 2011  
Attachment 1  
Page 3



**Figure A-5 Truck Access Isle South Side of the FGD Building with Temporary Heating Duct**



**Figure A-6 Cable Pulling FGD Building**

Independent Engineer's Report for December 2010  
Merrimack Clean Air Project Photographs -January 19, 2011  
Attachment 1  
Page 4



Figure A-7 Switchgear Terminations FGD Building Electrical Room



Figure A-8 Truck Wash

Independent Engineer's Report for December 2010  
Merrimack Clean Air Project Photographs –January 19, 2011  
Attachment 1  
Page 5



**Figure A-9 Inside Truck Wash**



**Figure A-10 Installation of Limestone Silo Internals**

REDACTED

August 2, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for January 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for January 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on February 16, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive, flowing style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – February 16, 2011

c: Distribution



## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on February 16, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD on January 31, 2012 and Substantial Completion of the Wastewater Treatment ("WWT") facility on April 1, 2012. The critical path continued to be through activities that support the availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed through Enclose FGD Building on December 16, 2010.

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report.

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 3

On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. The aggressive response to the increase in safety related incidents by Project management and labor at all levels continued to have the desired result. The Project worked a third month in a row without a Recordable Injury.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors are reporting progress using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. Through the Period, projected costs for the Project were unchanged at \$430,000,000. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
5. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
6. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 4

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI")), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Safety

PSNH/URS reported that safety performance continued to improve. The Project worked a third month in a row without a Recordable Injury. The overall safety culture on the Project was reported to be good and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program was positive.

There was one serious near miss incident on January 13, 2011 when a section of fiberglass reinforced plastic quench water piping ruptured during pneumatic testing at the service water pumphouse building. No immediate injuries resulted from this incident. AZCO and URS personnel were subsequently evaluated for acute noise exposure from the incident and no further medical care was required.

Each craft member received an incentive award (multi-tool with the project logo) as a result of the Project working the month of January 2011 without an OSHA Recordable Injury.

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 5

### Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

PSNH received New Hampshire Department of Environmental Services ("NHDES") approval of the Alteration of Terrain Permit Amendment to include the limestone truck unloading area.

An air permit application for the Quench Pump Diesel Engine was submitted by PSNH. Final approval was expected in April 2011, but PSNH indicated that after the public hearing the first week of February 2011, a draft permit was issued, which allowed installation of the diesel pump.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through January 2011. The most critical path remained through activities that support the availability of the DCS and utility systems, including permanent power, air and water, to the Island Contractors by March 1, 2011.

The logic path began with the testing of the 4,160 volt ("V") and 480 V switchgear and transformers and 480 V motor control centers ("MCC") in the FGD Building. The path continued through the start-up and commissioning of the 480V switchgear and 480 V MCCs in the WWT Building for providing the power feed to the compressed air system. The logic was then driven by the start-up and commissioning of the compressed air system in the WWT Building. Compressed air is required in the Service Water Pump House ("SWPH") in order for service water to be available to the Island Contractors to begin the Start-up Phase. The logic then defaulted to a zero-day float path through the completion of the absorber hold tank and absorber area sump systems to facilitate filling up the absorber for pre-operational checkout of the recycle pumps and oxidation air blowers. The path further continued through completion of pre-operational checkout of the various systems to draining the absorber vessel for final cleaning followed by refilling the vessel in preparation for the integrated testing and the Tie-In Outages.

The SESS path terminated with the August 1, 2011 Mechanical Complete date. The path was then outage dependent until it defaulted into the SWT Start-up and Project Completion April 1, 2012. Start-up and commissioning was being performed on an extended work schedule to ensure timely completion of the low voltage ("LV") and medium voltage ("MV") electrical system testing to support power available to the air compressor system and ultimately air and service water available to the Island Contractors. Further, SESS electrical progress was being closely scrutinized to ensure weekly performance was in compliance with the recovery plan. The benefit of adding a second and third shift for internal tank coating was also being reviewed by SESS to maintain schedule.

# Independent Engineer's Report for January 2011

## Merrimack Clean Air Project

Page 6

**Table 1**  
**Status of Project Milestones**  
**January 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A) <sup>(1)</sup>
Stack Complete	09/13/2010	05/28/2010(A) <sup>(2)</sup>
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A) <sup>(3)</sup>
Power Available to Islands	03/01/2011	03/01/2011
Service Water Available	03/01/2011	03/01/2011
Absorber and Internals Complete	08/11/2010	02/04/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Completion of the main silo exterior walls and roofs. DMW was still completing the silo internals.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

(3) Excluding temporary access openings.

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 7

### Project Percent Complete and Performance

As reported in the November MPR, the earned and planned percent complete for the Project were somewhat overstated; particularly the progress reported by SESS. The reasons for this included: commodity curves (control and power cable, terminations, small bore pipe, craft man-hours and others) were just being updated to include the final design quantities and the associated installation man-hours versus the original bid quantities; the schedule logic was being revised to correct the start-up systems sequence; and the construction turnover ("CTO") to start-up activities were being better defined and reflected in the overall Project Schedule.

URS reported that the Project's overall progress through the Period was 92.1 percent versus a plan of 94.1 percent. The earned percent complete for construction was 85.7 percent versus a plan of 89.6 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.98. This compares with 0.97 last month.

There was a 3.9 percentage point difference between the earned (85.7 percent) and planned (89.6 percent) percent complete for construction and start-up. While this was an improvement from last month's 4.9 percent, URS reported that the major activities behind schedule were in the SESS FGD Island scope-of-work including: tank coating; electrical cable pulls and terminations; architectural finishes; and fire protection and small bore piping. They indicated that, all of the activities that were behind schedule were being actively managed and that, at that time, none of the delays were expected to impact the contract completion dates.

### Project Schedule

With engineering and procurement nearing completion the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) is in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor, is also reporting installed quantities, in units of thousands of pounds (Kips) of steel ductwork. Various other methods are being used by the smaller contractors including AZCO, the BOP Mechanical Erection Subcontractor; and ESB, the BOP Electrical Erection Subcontractor (also the electrical subcontractor to SESS and DMW). The measured quantities are converted into a percent complete by the contractors. PSNH/URS checks the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 8

In addition, URS began including in the monthly progress report a start-up progress curve, which reflects progress on loop checks, instrument calibrations and mechanical completion activities. URS also provided tracking of CTO packages completed by construction and turned over to commissioning.

URS stated that it was working on finalizing tie-in outage schedules for the Units 1 and 2 fall 2011 outages. PSNH requested more coordination with the plant personnel on outage schedules, particularly for activities that involve operations.

### Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 94.1 percent versus a plan of 95.6 percent. This compares with 92.5 percent and 95.4 percent reported last month. For construction management and start-up services the earned value was 64.0 percent versus a plan of 64.4 percent. This compares with 59.2 percent and 60.2 percent, respectively, last month. No significant issues were reported.

#### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 86 percent versus a plan of 95 percent. This compares with 78 percent and 93 percent last month. As discussed previously, the SESS earned and planned percent complete for the Project had been overstated in the past. This resulted in the reported SESS earned percent complete for November 2010 of 82 percent being reduced to 78 percent for January 2011. The major SESS activities that were behind schedule included FGD tanks; electrical cable pulls and terminations; architectural finishes; and fire protection and small bore piping. However, URS and SESS reported that none of the delays were expected to impact the contract completion dates.

During the Period, SESS completed hydro testing the field erected tanks and started to coat the field erected tanks utilizing second and third shifts to minimize the impact on other trades. They are providing heat and have installed temporary insulation to facilitate the coating of the tanks. SESS completed installing the ball mill miscellaneous equipment and continued to pull power and instrumentation cables and make electrical and control terminations. They also installed structural steel around the field erected tanks.

Major areas of the SESS scope-of-work were behind schedule. These included the field erected tanks (mainly coating work now), electrical cable pulls and terminations, architectural finishes, fire protection and small bore piping. However, it was reported that SESS was mitigating the electrical work delays by working extended hours and adding a second shift, and also adding a second and third shift to the field erected tank coating operation. It was also reported that the

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 9

identified delays were not impacting the major contract milestone dates. Commodity curves (control and power cable, terminations, small bore pipe, craft man-hours and others) had been updated to include the final design quantities and the associated installation man-hours versus the original bid quantities. Revised schedules and installation curves were developed to recover the lost time in these areas. These new schedules and curves were being closely monitored by URS/PSNH project management.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 87 percent versus a plan of 85 percent. This compares with 86 percent and 80 percent last month.

During the Period, DMW completed the Gypsum Storage Building ("GSB") continued to pull cable from the GSB and the L-5 conveyor area to the FGD electrical room. They also continued to install cable tray and conduit to the L-2 conveyor. At the Limestone Storage Silos ("LSS") DMW completed installing the interior beams in both LSS' and started to install the tepees (flow diverters over the rotary plows) and reclaim shelf steel for the rotary plows. At the time of our site visit, DMW had completed installing the tepees.

Premature deterioration of the paint finish on conveyor idlers and frames, and out of tolerance interior concrete rework requiring rework to beams and tepees were concerns. However, URS was working on a settlement with DMW regarding the conveyor idlers and frames and as noted above, installation of the beams was complete and installation of the tepees was nearing completion at the time of our site visit.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because the permanent power supply is not yet in place, the State elevator inspection has not yet been completed and is scheduled to be completed by March 1, 2011.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 84 percent versus a plan of 84 percent. This compares with 82 percent and 84 percent last month. During the Period, SWT/NP completed a walkdown of the instrument air system for release to commissioning. SWT/NP continued to pull and terminate cable, to install platforms in and around the building and also continued to install interconnecting pipe.

Finalizing the enhanced mercury removal system and final change order approval remained a concern.

To ensure timely completion of instrument air and service water system commissioning to support the Island Contractor milestone, URS noted that commissioning was working an extended work schedule and performing instrument air and service water system commissioning in parallel.

**Independent Engineer's Report for January 2011**  
**Merrimack Clean Air Project**

Page 10

### **Francis Harvey and Sons Inc. (Major Foundations)**

FH is nearing the end of its contracted work. No update was provided for the Period.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 93 percent versus a plan of 97 percent. This compares with 91 percent and 91 percent last month. During the Period, MIS continued to install siding on the booster fan enclosure; completed installing duct area platforms; continued to insulate the duct, booster fans and expansion joints; completed erecting the truck wash building siding, and started to erect the truck wash electrical room block wall.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 79 percent versus a plan of 97 percent. This compares with 75 percent and 94 percent last month. During the Period, AZCO continued to install the Booster Fan lube oil and instrument air piping; relocated the Unit 1 booster fan lube oil skid; procured the new quench water piping for the SWPH; and, started to erect the truck wash equipment.

Main areas behind schedule included the booster fans, quench system and truck wash system, but a recovery plan was in place and was making progress.

Installation of emergency diesel quench pump was awaiting receipt of the air permit. However, as noted earlier, the draft permit was issued and AZCO was released to install the diesel pump starting near the end of February 2011.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 72.6 percent versus a plan of 84 percent. This compares with 62 percent and 74 percent last month. During the Period, ESB continued to install conduit from the Merrimack Station control room to the duct support steel continued to install cable tray in the Booster Fan enclosure. They pulled, tested and terminated cable to the oxidation air blowers; pulled the electrical power cables to DMW's Transfer Tower No. 1 MCCs; and started to install cable tray and conduit on the utility bridge to the booster fans.

Main areas behind schedule were the booster fans (ESB was working a second shift and was recovering schedule), quench system, and truck wash system. However, no impacts to the overall milestone schedule were anticipated.

### **G. C. Cairns (Site Finalization - Phase I)**

Through the previous Period, G. C. Cairns ("GCC") had an overall earned percent complete of 67 percent versus a plan of 100 percent. This compared with 49 percent and 60 percent last month. During the Period, GCC was demobilized from the site until spring, when site work could be completed.

## Independent Engineer's Report for January 2011 Merrimack Clean Air Project

Page 11

### Construction Turnover

CTO Packages: 26 issued versus an early plan of 29.

### Start-Up

URS' Start-Up group ("Start-Up") began reporting its percent complete and reported an overall earned percent complete of 19.9 percent versus a plan of 21.5 percent. Start-Up energized the FGD and WWT DCS systems, performed de-energized checks on the 480 V MCCs, performed loop checks on the electrical switchgear and reported that Scott Testing mobilized in early January 2011 and completed the majority of the electrical testing during the Period. Start-Up mobilized an Emerson DCS field engineer to assist in the commissioning of the DCS and a URS mechanical startup engineer.

BOP mechanical operator training was also conducted during the Period.

### Absorber Potential Adjustment Protection

As discussed in our November 2011 report and in more detail in our December 2011 report, corrosion of Alloy 2205 FGD absorber vessels, similar to the Project's absorber vessel, has recently been reported by several power plant operators. PSNH decided to be proactive and retained Sargent and Lundy ("S&L") in November 2010 to evaluate possible options to deal with this potentially serious problem. As a result of this analysis, PSNH selected Potential Adjustment Protection ("PAP") technology, supplied by Corrosion Services of Markham, Ontario, Canada (outside of Toronto). It is expected that a purchase order with Corrosion Services will be executed in February 2011.

### Merrimack Clean Air Project Cost Summary

We reviewed the Project's projected costs compared with the original budget. The data was updated through November 2010. The estimated cost at completion, through the Period, was unchanged at \$430,000,000, since the \$27,000,000 (\$11,000 in contingency and \$16,000,000 in reserves), reduction in October 2010. This included appropriate funds in contingency and in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

**Independent Engineer's Report for January 2011  
Merrimack Clean Air Project Photographs -February 16, 2011  
Attachment 1**



**Figure A-1 South Side of FGD Building and Field Erected Tanks**



**Figure A-2 South Side of FGD Building and Field Erected Tanks**

Independent Engineer's Report for January 2011  
Merrimack Clean Air Project Photographs -February 16, 2011  
Attachment 1  
Page 2



Figure A-3 FGD Building East Side (looking west) at Completed Siding



Figure A-4 North Side of the Booster Fan Enclosure

**Independent Engineer's Report for January 2011  
Merrimack Clean Air Project Photographs -February 16, 2011  
Attachment 1  
Page 3**



**Figure A-5 FGD Electrical Room Partially Energized**



**Figure A-6 Instrument Installation - FGD Building**

**Independent Engineer's Report for January 2011  
Merrimack Clean Air Project Photographs -February 16, 2011  
Attachment 1  
Page 4**



**Figure A-7 Completed Gypsum Storage Building (GSB) Looking West**



**Figure A-8 Truck Wash Building Siding Complete**

Independent Engineer's Report for January 2011  
Merrimack Clean Air Project Photographs -February 16, 2011  
Attachment 1  
Page 5



Figure A-9 Inside Truck Wash – Installation of Mechanical Equipment and Block Walls



Figure A-10 Installation of Reclaim Shelf and Rotary Plow Track under Limestone Silos



An SAIC Company

July 20, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for February 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for February 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on March 16, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – March 16, 2011

Attachment 2: EMAR System and SWWT System

c: Distribution



## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on March 16, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system. The EMAR system is discussed in Attachment 2.

In late February 2011, the project completed the milestone for availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors, which was required by March 1, 2011. Therefore, the critical path shifted to completion of the FGD system field erected tank internal coatings and commissioning and pre-operational testing of various subsystems of the FGD system. The Project was on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed through Power Available to Islands and Service Water Available on February 28, 2011.

PSNH has decided to proceed with the installation of a Secondary Wastewater Treatment ("SWWT") system as part of the Project. This system will eliminate the need to discharge the treated FGD effluent into the Merrimack River; and therefore, it removes the risks to the scheduled completion of the Project from the lack of a new National Pollutant Discharge Elimination System ("NPDES") permit or the refusal of the Environmental Protection Agency ("EPA") to provide temporary authorization/consent for the discharge in a timely manner.

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. However, the additional costs for the Potential Adjustment Protection ("PAP") and the SWWT system have eliminated all of the reserves and contingency at the total project level of the Project's projected costs. PSNH was evaluating potential cost savings and confirming its estimated cost to complete in order to identify an appropriate level of funds in reserves to complete the Project. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 3

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. The aggressive response to the increase in safety-related incidents by Project management and labor at all levels continued to have the desired result. However, after working three months in a row without a Recordable Injury, the project did suffer two Recordable Injuries during the Period.
2. PSNH and URS continued to focus significant resources on the Project Schedule. As is normal practice at this point in a project, the major contractors continued to report progress using quantity-based measurements, such as, earned man-hours, feet of pipe, conduit and cable tray, electrical terminations, thousands of tons of steel and others. PSNH/URS are checking the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress. In addition, PSNH and URS stepped up monitoring of construction completion and turnover of completed systems to commissioning and other commissioning progress measures, such as, completion of power and control loop checks.
3. PSNH has decided to proceed with the installation of a SWWT system as part of the Project. This system will eliminate the need to discharge the treated FGD effluent into the Merrimack River; and therefore, it removes the risks to the scheduled completion of the Project from the lack of a new NPDES permit or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.
4. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 4

mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.

5. Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. However, the additional costs for the PAP and the SWWT system have eliminated all of the reserves and contingency at the total project level of the Project's projected costs. PSNH was evaluating potential cost savings and confirming its estimated cost to complete in order to identify an appropriate level of funds in reserves to complete the Project. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.
6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at Merrimack Station.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMSR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 5

Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI")), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP Electrical Erection Subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

PSNH/URS reported that safety performance continued to be reasonable. During the Period the Project achieved a major safety milestone of 1,000,000 hours worked without a lost-time injury. However, after working three months in a row without a Recordable Injury, the Project suffered two Recordable Injuries during the Period. The overall safety culture on the Project was reported to be good and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program was positive.

Following up on the most recent Recordable Injuries, PSNH/URS were informed that a foreman supervising in the area where one of the incidents occurred was suspended from work for three days. PSNH/URS asked for more information and were considering additional disciplinary action, because the same individual was involved in previous incidents and did not seem to be getting the message.

A luncheon was provided for all of the craft on March 17, 2011 to celebrate the 1,000,000 hours worked without a lost-time injury.

### Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

Approval for the Limestone Truck Unloading Facility was received from the Bow, New Hampshire Planning Board on February 17, 2011. Follow up submittals will be required for the lighting photometric design, but no architectural submittal was expected to be required. The Building Permit for the Truck Wash Building electrical installation was also received.

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 6

PSNH received the air permit for the Quench Pump Diesel Engine from the New Hampshire Department of Environmental Services ("NHDES") and the engine was installed.

PSNH has decided to proceed with the installation of a SWWT system as part of the Project. This is discussed in Attachment 2. This system eliminates the need to discharge the treated FGD effluent into the Merrimack River; and therefore, it removes the risks to the scheduled completion of the Project from the lack of a new NPDES permit, that includes the FGD effluent discharge or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.

## Project Status

### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through February 2011. With completion of the activities that support the availability of the DCS and utility systems, including permanent power, air and water, to the Island Contractors on February 28, 2011, the most critical path shifted to completion of the FGD field erected tank internal coatings followed by testing and commissioning of the FGD reagent preparation and dewatering systems. This SESS path terminated with the August 1, 2011 Mechanical Completion Date (FGD Ready for Gas).

The next most critical path (2 days of float) began with the completion of the contract milestone for having air, water and power available to the island contractors (achieved on February 28, 2011) and continued through successful testing and restoration of the service water system for start-up and commissioning. The logic was then driven by testing (with service water) of various FGD systems including the recycle pumps, oxidation air blowers, vacuum belt filters, and the filter feed system. The path further continued through completion of pre-operational checkout of the various systems to draining the absorber vessel for final cleaning, followed by refilling the vessel in preparation for the integrated testing and the Tie-In Outages. The SESS path terminated with the August 1, 2011 Mechanical Complete date. The path was then outage-dependent until it defaulted into the SWT Start-up and Project Completion on April 1, 2012.

SESS started a second and third shift for the field erected tank internal coatings to maintain schedule. Schedule slippage on SESS system turnovers from construction to start-up was also a concern and at the request of PSNH/URS, SESS was formalizing a recovery plan. URS also noted that the plan for installation of the PAP system components inside the absorber needed to be scheduled and coordinated with the onsite contractors. PSNH committed to providing a schedule for the PAP work to be integrated into the overall Project schedule.

# Independent Engineer's Report for February 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**February 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A) <sup>(1)</sup>
Stack Complete	09/13/2010	05/28/2010(A) <sup>(2)</sup>
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A) <sup>(3)</sup>
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber and Internals Complete	08/11/2010	02/04/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Ready for Gas	08/01/2011	08/01/2011
MK-1 Tie-in Outage End	10/05/2011	10/03/2011
MK-2 Tie-in Outage End	11/16/2011	11/09/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

(1) Completion of the main silo exterior walls and roofs. DMW was still completing the silo internals.

(2) Mechanical completion was achieved under the HC Contract. All work was complete, except for final state inspection of the chimney elevator as discussed herein.

(3) Excluding temporary access openings.

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 92.7 percent versus a plan of 94.9 percent. The earned percent complete for construction was 86.7 percent versus a plan of 91.0 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"). It is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.98. This compares with 0.98 last month.

There was a 4.3 percentage (3.9 percent last month) point difference between the earned (86.7 percent) and planned (91.0 percent) percent complete for construction and start-up. URS reported that the major activities behind schedule were in the SESS FGD Island scope-of-work including: tank coating; electrical cable pulls and terminations; architectural finishes; and fire protection and small bore piping. Some DMW material handling activities were also reported to be behind, including electrical and mechanical work associated with limestone conveyors L2 and L3 and the rotary plow reclaim system under the limestone silos. They indicated that all of the activities that were behind schedule were being actively managed and that, at the time, none of the delays were expected to impact the contract completion dates.

### Project Schedule

With engineering and procurement nearing completion the remaining work for the Island Contractors (SESS, DMW, HC and SWT/NP) was in construction and testing. As is normal practice at this point in a project, the Island Contractors are reporting progress for most activities using quantity-based measurements, such as, earned man-hours; feet of pipe, conduit and cable tray; electrical terminations and others. MIS, the steel ductwork subcontractor, is also reporting installed quantities, in units of thousands of pounds ("Kips") of steel ductwork. Various other methods are being used by the smaller contractors including AZCO, the BOP Mechanical Erection Subcontractor; and ESB, the BOP Electrical Erection Subcontractor (also the electrical subcontractor to SESS and DMW). The measured quantities are converted into a percent complete by the contractors. PSNH/URS checks the reported progress against the quantities installed or consumed. This is an objective and accurate measurement of progress for many activities at this point in the Project.

In addition, URS also began including a start-up progress curve in its monthly progress report, which reflected progress on loop checks, instrument calibrations and mechanical completion activities. URS also provided tracking of construction turnover ("CTO") packages completed by construction and turned over to commissioning.

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 9

### Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 94.7 percent versus a plan of 96.0 percent. This compares with 94.1 percent and 95.6 percent reported last month. For construction management and start-up services the earned value was 68.1 percent versus a plan of 68.1 percent. This compares with 64.0 percent and 64.4 percent, respectively, last month. No significant issues were reported.

#### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 88 percent versus a plan of 96 percent. This compares with 86 percent and 95 percent last month. The major SESS activities that were behind schedule included FGD field erected tanks; electrical cable pulls and terminations; architectural finishes; small bore piping and CTOs. However, based on actions taken to recover schedule, URS and SESS reported that none of the delays were expected to impact the contract completion dates.

During the Period, SESS completed installation of structural steel around the field erected tanks and installed roofing and siding in the available areas; completed coating the reagent preparation tank and continued to coat the other field erected tanks utilizing second and third shifts to recover schedule and to minimize impacts on other trades. They continued providing heat and have installed temporary insulation to facilitate the coating of the tanks. They also continued to pull power and instrumentation cables and make electrical and control terminations and were installing piping systems in all areas. SESS also continued to clean the absorber vessel internally.

Areas that were behind schedule included the field erected tanks (mainly coating work now), electrical cable pulls and terminations, architectural finishes, and small bore piping. URS noted that the Project met its milestone of having compressed air and service water available to SESS before March 1, 2011, but as of the review meeting SESS was still about a week away from being able to start the testing that required the air and water supply.

It was reported that SESS was mitigating the electrical work delays by working extended hours and adding a second shift, and also adding a second and third shift to the field erected tank coating operation. It was also reported that the identified delays were not impacting the major contract milestone dates. To address the delays in CTOs, URS start-up reported that it was working with SESS on workarounds to do partial turnovers to allow hydrostatic testing to proceed.

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 10

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 88 percent versus a plan of 92 percent. This compares with 87 percent and 85 percent last month.

During the Period, DMW completed installing the tepees (flow diverters over the rotary plows) and reclaim shelf steel for the rotary plows under the Limestone Storage Silos ("LSS") and began aligning the reclaim shelving. They also continued to terminate cable from the Gypsum Storage Building ("GSB") and the L-5 conveyor area to the FGD electrical room, started to install conduit in conveyor 3A and began pulling cable to the transfer tower No. 1 motor control centers ("MCCs").

Premature deterioration of the paint finish on conveyor idlers and frames, and completion of limestone truck unloading foundations to support the June 11, 2011 start date for DMW work were concerns. However, URS was working on a settlement with DMW regarding the conveyor idlers and frames and also on a temporary workaround to allow initial limestone deliveries for commissioning the material handling equipment using an existing reclaim system in the coal yard, until the construction on the limestone truck unloading system caught up.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because of delays in providing permanent power, the State elevator inspection was postponed to May 2011.

### **Siemens-Water Technology and Northern Peabody (FGD WWT Facility)**

Through the Period, for the PWWT system, SWT/NP had a construction/testing earned percent complete of 83 percent versus a plan of 84 percent. This compares with 83 percent and 84 percent last month, meaning that there has been no significant measurable change since last month. During the Period, SWT/NP completed the instrument air system start-up to support the March 1, 2011 milestone for compressed air to the Islands. SWT/NP also continued to pull and terminate cable, to install platforms in and around the building and also continued to install interconnecting pipe.

At the time of the MPM, the EMAR system specifications were finalized and the associated change order was approved by PSNH. PSNH indicated that they would provide more detailed information on the SWWT system as it was developed.

### **Francis Harvey and Sons Inc. (Major Foundations)**

FH is nearing the end of its contracted work. No update was provided for the Period.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 93 percent versus a plan of 97 percent. This compares with 93 percent and 97 percent last month, meaning that there has

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 11

been no significant measurable change since last month. During the Period, MIS continued to install siding on the Booster Fan enclosure; continued to insulate the duct, Booster Fans and expansion joints; continued to erect the truck wash electrical room block wall, dry wall and fireproofing; and anchored the Booster Fan utility bridge steel.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 82 percent versus a plan of 98 percent. This compares with 79 percent and 97 percent last month. During the Period, AZCO completed installing the Booster Fan lube oil piping; continued to install instrument air piping and tubing in the Booster Fan area; set the quench pump diesel engine; set the instrument air filters for the FGD building and Booster Fan area; began fabricating the new quench water piping for the service water pump house ("SWPH"); and set the truck wash equipment.

Main areas behind schedule included the Booster Fans, quench system and truck wash system. A recovery plan was in place (mainly for the Booster Fans) and making progress.

### **ESB (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 77 percent versus a plan of 94 percent. This compares with 73 percent and 84 percent last month. During the Period, ESB completed installing cable tray in the Booster Fan enclosure and on the utility bridge and continued to install conduit from the MK control room to the duct support steel and in the Booster Fan enclosure. They completed pulling the electrical power cables to DMW's Transfer Tower No. 1 MCCs; installed the Booster Fan area DCS cabinets and started to pull cable for the Booster Fan motors.

The most critical area behind schedule was the Booster Fan cable installation required for the scheduled April 2011 CTO, and ESB was working a second shift and was recovering schedule. No impacts to the overall milestone schedule were anticipated.

### **G. C. Cairns (Site Finalization – Phase I)**

Through December 2010, G. C. Cairns ("GCC") had an overall earned percent complete of 67 percent versus a plan of 100 percent and could not complete its work due to poor weather. In January 2011, GCC was demobilized from the site until spring, when site work could be completed.

## **Construction Turnover**

CTO Packages: 27 issued versus an early plan of 44.

## Independent Engineer's Report for February 2011 Merrimack Clean Air Project

Page 12

### Start-Up

URS' Start-Up group ("Start-Up") began reporting its percent complete and reported an overall earned percent complete of 45.5 percent versus a plan of 22.2 percent, compared to 19.9 percent earned versus a plan of 21.5 percent last month.

Start-Up energized and commissioned the 4,160 volt ("V") and 480 V switchgear, the 480 V MCCs, and air compressors and dryers. They commissioned the service water system, performed air blows of the underground air lines and flushes of the service water lines. Start-Up also completed the supply of air, water and power to the Islands prior to the March 1, 2011 milestone. They also reported that Scott Testing completed its electrical testing activities and demobilized from the Project site. Start-Up was also responsible for conducting the waste water treatment operations and maintenance training.

### Absorber Potential Adjustment Protection

As discussed in our November 2011 report and in more detail in our December 2011 report, corrosion of Alloy 2205 FGD absorber vessels, similar to the Project's absorber vessel, has recently been reported by several power plant operators and PSNH decided to be proactive and install PAP technology, supplied by Corrosion Services of Markham, Ontario, Canada (outside of Toronto) to address this emerging problem.

This effort is being managed directly by PSNH separate from the activities being managed by URS on behalf of PSNH. During the Period, PSNH reported that work continued on the design of the PAP system and procurement of the material that needed to be installed inside the absorber vessel.

### EMAR System and SWWT System

The EMAR and the SWWT systems are discussed in Attachment 2 to this Report.

### Merrimack Clean Air Project Cost Summary

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. However, subsequent to the reduction in the estimated completion cost for the Project, the addition of the PAP system, for corrosion protection of the FGD absorber, and the SWWT system, to eliminate the discharge of treated FGD effluent into the Merrimack River, were identified as being required to complete the Project on schedule, control Project costs and risks, and to operate the Project reliably. The additional cost for the PAP system was a few million dollars and the preliminary estimated cost for the SWWT system was \$20,000,000 to \$25,000,000, depending on whether PSNH decides to include the second crystallizer and filter press. While these additional costs were not expected to increase the total projected costs for the Project of \$430,000,000, they eliminated all of the reserves and contingency at the total Project level in PSNH's projected costs spreadsheet. PSNH was evaluating potential cost savings that



**Independent Engineer's Report for February 2011  
Merrimack Clean Air Project**

Page 13

could result from the projected early completion of the Project and in other areas of the Project. It was in the process of confirming its estimated cost to complete and adjusting its construction budget accordingly to include appropriate funds in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1



Figure A-1 Safety Banner over the entrance to the FGD Building work area



Figure A-2 South side of FGD Building and field erected tanks

**Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 2**



**Figure A-3 FGD Building north side (looking southeast) at completed siding**

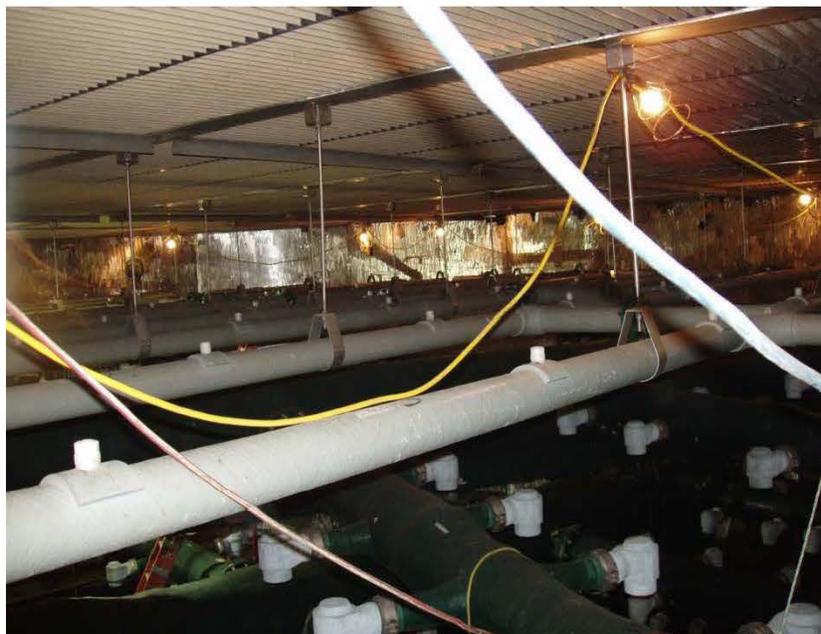


**Figure A-4 Absorber vessel demister material**

**Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 3**



**Figure A-5 Demister spray piping and valves**



**Figure A-6 View Inside the FGD absorber; slurry spray nozzles at bottom, demister spray piping in the center, and demister material installed at the top**

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 4



Figure A-7 Hydroclones inside FGD Building



Figure A-8 FGD Building elevator installation

**Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 5**



**Figure A-9 Limestone rotary plow reclaim equipment set on track inside maintenance area steel**



**Figure A-10 Adjustment of reclaim shelf (rotary plow on track at far end) under limestone silos**

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

## EMAR System and SWWT System

The PWWT system removes metals and other elements from the FDG system's liquid discharges, including gypsum dewatering and absorber blowdown. The original design of the PWWT system was developed in 2009 based on contractual effluent guarantees and currently demonstrated state-of-the-art FGD wastewater treatment technology. PSNH, with URS experts, worked with the NHDES beginning in the later part of 2009 to identify all wastewater design and discharge parameters required to support renewal of MK's NPDES permit. The NHDES required that there be zero net increase of the individual chemical species in the mass discharge from MK, compared to present day discharges. The results of the negotiations with the NHDES were rigorous new permit limits and conditions, requiring additional wastewater treatment to reduce the discharge of mercury and arsenic into the Merrimack River. To address these new discharge limits the EMAR was added to the Project design to further treat the effluent from the existing (under construction) physical-chemical PWWT system.

The scope of EMAR system contract included the engineering, design, fabrication, testing, delivery, installation, start-up, and commissioning of a nominal 50 gallons per minute ("gpm") EMAR system. The system was specified to receive treated effluent from the PWWT system based on the original SWT/NP effluent guarantees and to discharge effluent with concentrations of mercury and arsenic that meet the requirements of the anticipated NPDES permit.

The request for proposal was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- SWT/NP

Complete proposals were submitted by [REDACTED] and SWT/NP, the current PWWT system contractor. SWT/NP was selected to provide the EMAR system. The additional work was incorporated via a Work Change Request (WCR-023, Rev 1), dated November 4, 2010, in the amount of [REDACTED] to the original PWWT system contract with SWT/NP.

## Secondary Wastewater Treatment System

### Background

According to the latest Project Schedule, the FGD system will be ready to accept flue gas on August 1, 2011 and that following completion of the MK-1 Tie-in Outage on October 3, 2011 flue gas from MK-1 will be available for treatment. With completion of the MK-2 Tie-in Outage on November 9, 2011 the FGD system will be capable of treating flue gas from both units. Completion of integrated system tuning and the Performance Tests is expected to occur by November 16, 2011. At some point during this period, October through November 2011, treated

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 2

FGD process effluent will have to be discharged along with MK's current permitted effluent discharge to the Merrimack River. To accommodate the new discharge stream, the Project must either revise its NPDES permit to include the new stream or it must obtain some form of interim consent from the EPA that authorizes the discharge until such time as MK receives a renewed NPDES permit. Failing to obtain authorization to discharge the treated FGD effluent has the potential to seriously increase the cost of the Project and to delay the environmental benefits that the Project is intended to provide.

Beginning in mid-2010, PSNH and the NHDES had discussions with the EPA to ensure that they were aware of the Project's schedule and that treated effluent from the FGD system would need to be included with MK's permitted effluent discharge. In November 2010, a meeting was held between the EPA, NHDES, and PSNH to advise the EPA of the new discharge limits for mercury and arsenic that had been negotiated between PSNH and the NHDES, and to provide details on the new EMAR system that was being added to the Project to achieve the low discharge levels. The goal of the discussions was to provide the EPA with the basis on which to authorize the new FGD treated wastewater discharge (35-70 gpm estimated) outside of the NPDES process. The EPA asked many technical questions in December 2010 regarding the possibility of eliminating most or all discharge from the new FGD WWT system.

In the end, the EPA was unwilling to provide authorization for the new discharge outside of the renewal process for MK's NPDES permit. The EPA insisted that the treated FGD effluent could only be permitted as part of the MK NPDES permit renewal process for the whole station, which the EPA had been working on for a number of years. They were unwilling to issue a special Operational Permit or Administrative Consent Order that would allow the discharge of treated FGD effluent. The EPA indicated that they expected the Draft Permit to be issued in December 2010. It has yet to be issued.

The EPA's apparent refusal to provide temporary authorization to discharge treated FGD effluent until the new NPDES permit process is complete, and the uncertainty of the time that it will take to complete the permitting process, due to periods built into the process for comment, public hearings, appeals and challenges, exposes the Project to potentially serious delays and increased costs. PSNH estimates that a new NPDES permit for MK may not be issued until sometime in 2012 to 2014, due to potential challenges. During all of this time, the Project will be unable to operate and to achieve its intended purpose. PSNH may also be in violation of the NH Clean Power Act ("NHCPA") which requires that the MK FGD system be operational no later than July 1, 2013.

### Risk Mitigation Alternatives

#### *Eliminate the Discharge of Treated FGD Effluent*

PSNH had anticipated that the EPA may not be willing to expedite the NSPS permitting process or to agree to provide temporary consent/authorization to discharge treated FGD effluent. They

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 3

had previously evaluated the use of additional treatment options to reduce the volume of the treated FGD effluent, by a factor of 10 or more; to the point where the concentrated stream could be used on-site for dust control or other uses, or sent off-site for disposal. Or with an additional stage of treatment a stable solid waste could be produced with high quality water that could be reused in the power plant, as the only other byproduct.

These volume reduction systems typically consist of a falling-film evaporator or brine concentrator followed by a crystallizer (evaporator). An additional crystallizer and final dewatering/filtration equipment (filter press, etc.) are needed to produce a solid waste and pure water. These systems and components have been used in other industries to eliminate discharges of cooling tower blowdown and demineralizer wastes, etc., and to reclaim the water in areas with limited water resources. These systems are now being considered to eliminate the blowdown from wet FGD systems. PSNH had discussions with potential suppliers of these systems and obtained budgetary quotations in 2010.

Implementation of this technology, known on the Project as the Secondary Wastewater Treatment ("SWWT") system, to eliminate the discharge of FGD effluent into the Merrimack River would not require EPA or NHDES approvals; and therefore, it would eliminate the risks to the scheduled completion of the Project.

### Other Alternatives

Without a revised NPDES permit or other authorization from the EPA that would allow the temporary discharge of treated FGD effluent into the Merrimack River, PSNH has limited options.

1. It could complete the Project to the maximum extent possible and then disband all contractors until a new NPDES permit was issued or the EPA issued a temporary authorization/consent. Under this alternative, the Project could incur significant additional costs to demobilize and remobilize PSNH and contractor's staff and facilities; to maintain systems and equipment during the lay-up period; to complete systems once the Project is reactivated; and to start-up, test and recommission the Project. During this suspension, critical PSNH and contractor management and staff may be lost. AFUDC and other Owner's Costs would continue until the Project was placed into service. System and equipment warranties may expire or PSNH may have to pay to extend the warranties.

From our experience, suspending the operation of large complex systems for an extended period of time, once they have been commissioned or partially commissioned, can have unintended and expensive consequences and should be avoided if possible.

2. It could collect the FGD effluent in a receiver tank and truck it to disposal locations without secondary treatment. The only high volume disposal locations in the area are Publically Owned Treatment Works ("POTWs"). These are public facilities and even if

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 4

community approvals are obtained, changes could occur at the contracted facility that are not under PSNH's control and could negatively impact the ability of PSNH to operate the Project and to meet NH law. The uncertainty of the length of time that this disposal method would be necessary greatly increases its risk. This alternative should also be avoided if possible

3. It could add a SWWT system to eliminate the need for any discharge of FGD effluent into the Merrimack River; and therefore, the need for the new NPDES permit or EPA consent as a condition precedent to placing the Project into service. As discussed above, this technology is relatively low risk, because of its historical use in the power industry to eliminate other similar liquid discharges.

The completion of the SWWT system by the end of 2011 is the greatest challenge to this alternative. However, PSNH has identified a number of reasonable options that could be used if the completion of the SWWT system is delayed by a month or two. The trucking option discussed in item (2) above could be used. The difference in this case is that the period would be short and well known, unlike waiting for the NPDES permit or EPA consent. The use of lower chloride coals would reduce the amount of blowdown from the FGD system, since the rate of blowdown is controlled to limit the chloride concentration in the FGD absorber. Fewer chlorides entering the absorber, less blowdown. These and other options, alone or in combination, provide PSNH with reasonable control over the risk of a short delay in the completion of the SWWT system.

### **Mitigation Decision and Plan**

PSNH/NU decided that the lowest risk for the Project was to install the SWWT system. This provides PSNH with control over the remaining management and execution of the Project, including cost and schedule.

### ***Cost Analysis***

The cost of the SWWT system is estimated at \$20,000,000 to \$26,000,000. PSNH's analysis indicates that this would be less than the cost of a lengthy delay in the completion of the Project.

### ***Schedule Analysis***

The completion of the SWWT system in combination with the mitigating strategies discussed above to deal with any short delays is currently not expected to affect the critical path of the Project or in-service date.

### **SWWT System Status**

PSNH hired Burns and McDonnell ("B&McD") on November 17, 2010 to provide technical assistance based on their knowledge and expertise with this technology. B&McD concluded that

**Independent Engineer's Report for February 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2**

Page 5

the application of a brine concentrator and crystallizer would reduce the FGD effluent steam down to less than 5 gpm and that an additional crystallizer and dewatering device could be employed to further reduce effluent volume. Figure B-1 is a graphic diagram of the SWWT system. Note that B-1 does not include the second effect, which incorporates a second crystallizer and filter process to recover solids.

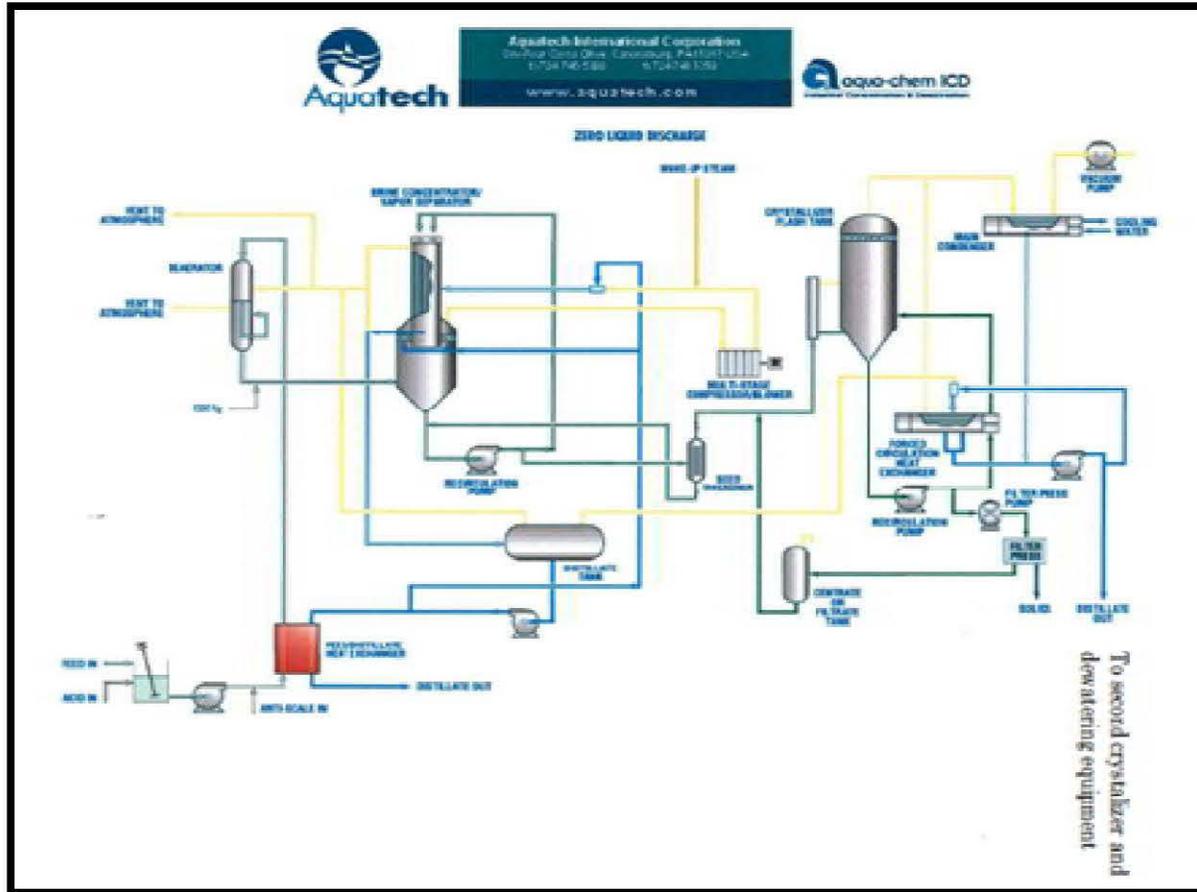
A multidiscipline team that included representatives from PSNH, NU and B&McD was formed to implement the B&McD recommendations in a timely manner. A release for early engineering and procurement of long lead time materials was issued in early January 2011, once vendor selection and firm pricing were available. In parallel, contract terms were finalized.

An aggressive goal was set to have some elements of the SWWT system in service by late 2011 to support start-up and commercial operation of the Project and the remaining elements in service in early 2012.

The construction of the SWWT system is being managed by PSNH. We will report more details on the design, cost, schedule and progress of the SWWT system in future monthly progress reports as they become available.

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Figure B-1  
SWWT System



ATTACHMENT WHS-2  
REDACTED

REDACTED

August 11, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for March 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for March 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on April 20, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in cursive script that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – April 20, 2011

Attachment 2: EMAR System and SWWT System

c: Distribution



## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on April 20, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system. The EMAR system is discussed in Attachment 2.

In late February 2011, the project completed the milestone for availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors, which was required by March 1, 2011. With the completion of this major milestone, URS reported that there were now three different critical paths with zero days of float. Two of the three critical paths went through FGD Island activities and the third through the EMAR system. The Project remained on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed through Power Available to Islands and Service Water Available on February 28, 2011.

PSNH has decided to proceed with the installation of a Secondary Wastewater Treatment ("SWWT") system as part of the Project, see Attachment 2. This system will eliminate the need to discharge the treated FGD effluent into the Merrimack River; and therefore, it removes the risks to the scheduled completion of the Project from the lack of a new National Pollutant Discharge Elimination System (NPDES) permit or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. However, the additional costs for the Potential Adjustment Protection ("PAP") and the SWWT system have eliminated all of the reserves and contingency at the total project level of the Project's projected costs. PSNH was evaluating potential cost savings and confirming its estimated cost to complete in order to identify an appropriate level of funds in reserves to complete the Project. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 3

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project is transitioning from the construction phase to the start-up and commissioning phases. PSNH and URS are monitoring and reporting construction completion and turnover of completed systems to commissioning and other commissioning progress measures, such as, completion of power and control loop checks.
3. PSNH has decided to proceed with the installation of a SWWT system as part of the Project. This system will eliminate the need to discharge the treated FGD effluent into the Merrimack River; and therefore, it removes the risks to the scheduled completion of the Project from the lack of a new NPDES permit or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.
4. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
5. Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. However, the additional costs for the PAP and the SWWT system have eliminated all of the reserves and contingency at the total project level of the

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 4

Project's projected costs. PSNH was evaluating potential cost savings and confirming its estimated cost to complete in order to identify an appropriate level of funds in reserves to complete the Project. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. Merrimack Station consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 5

Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

PSNH/URS reported that safety performance continued to be reasonable. There were two Recordable Injuries and one First Aid Injury during the Period. It was noted that the two Recordable Injuries would not have been classified, as such, if a new Physician's Assistant at the local clinic had not recommended the use of prescription medication, rather than a suitable equivalent over-the-counter medication. The overall safety culture on the Project was reported to be good and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program was positive.

An evacuation drill was conducted with Project personnel participating. PSNH reported that "it went very well." URS conducted a Safety Perception Survey. A luncheon was provided for all of the craft on March 17, 2011 to celebrate the 1,000,000 hours worked without a lost-time injury.

### Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

URS submitted the Limestone Truck Delivery Facility ("LTDF") lighting photometric design for the April 2011 meeting of the Bow Planning Board. No architectural submittal was required. Also, the LTDF foundation building permit application and the proposed fire water booster pump electrical power supply configuration were submitted for approval.

PSNH has decided to proceed with the installation of a SWWT system as part of the Project. This is discussed in Attachment 2. This system eliminates the need to discharge the treated FGD effluent into the Merrimack River; and therefore, it removes the risks to the scheduled completion of the Project from the lack of a new NPDES permit, that includes the FGD effluent discharge or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 6

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through March 2011. In late February 2011, the project completed the milestone for availability of the distributed control system ("DCS") and utility systems, including permanent power, air and water, to the Island Contractors, which was required by March 1, 2011. With the completion of this major milestone, URS reported that there were three different critical paths with zero days of float. Two of the three critical paths went through FGD Island activities and the third went through the EMAR system.

The first FGD Island critical path included the completion of testing and restoration of the instrumentation air system for start-up and commissioning in the FGD Island; commissioning of the absorber recycle system and various other systems to support absorber first fill; and preoperational checkouts of various FGD systems followed by draining of the absorber vessel for final cleaning and subsequent refilling of the vessel in preparation for the integrated testing and the tie-in outages. The second FGD Island critical path included the completion of the tank coatings followed by testing and commissioning of the reagent preparation/dewatering systems. Both FGD Island paths terminate with the August 1, 2011 Mechanical Completion date (FGD Ready for Gas). The third critical path is the completion of the mechanical and electrical installation for the EMAR system.

The Project remained on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed through Power Available to Islands and Service Water Available on February 28, 2011. The Absorber and Internals Complete milestone was further delayed until April 14, 2011, due to the ongoing PAP system installation work.

There was considerable concern with SESS' performance and schedule erosion. SESS was failing to complete activities on schedule, resulting in increased float density. The wave of uncompleted activities continued to build downstream. SESS was working five, 10-hour shifts in some areas to pick up the pace. They had started a second and third shift for the field erected tank internal coatings to maintain schedule. PSNH reported that the installation of the PAP system components inside the absorber vessel was proceeding as planned.

# Independent Engineer's Report for March 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**February 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber and Internals Complete	08/11/2010	04/14/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Mechanical Completion	08/01/2011	08/01/2011
FGD Ready for Gas	09/01/2011	09/01/2011
MK-1 Tie-in Outage End	09/26/2011	09/20/2011
MK-2 Tie-in Outage End	11/10/2011	11/10/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 93.8 percent versus a plan of 95.8 percent. The earned percent complete for construction and start-up phase was 88.6 percent versus a plan of 92.5 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"), which is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.98. This compares with 0.98 last month.

There was a 3.9 percentage (4.3 percent last month) point difference between the earned (88.6 percent) and planned (92.5 percent) percent complete for construction and start-up. URS reported that progress on the Island contracts was mainly impacted by the work in the FGD and Material Handling Islands. The key areas lagging behind schedule in the FGD Island included tank coating, cable pulls and terminations, small bore piping and construction turnovers. The electrical and mechanical work associated with limestone conveyors was lagging behind schedule in the Material Handling Island. The earned percent complete on the BOP contracts was lagging by 3.5 percent due primarily to schedule slippages in the booster fan area, chimney, truck wash system and quench system. The issue with schedule slippage was being addressed in weekly meetings.

### Project Schedule

Contractors continued to report construction progress using quantity-based measurements; however, the Project is transitioning from the construction phase to the startup and commissioning phases. PSNH and URS were monitoring and reporting construction completion and turnover of completed systems to commissioning and other commissioning progress. URS included a start-up progress curve in its monthly progress report, which reflected progress on loop checks, instrument calibrations and mechanical completion activities. URS also provided tracking of construction turnover ("CTO") packages completed by construction and turned over to commissioning.

### Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 95.5 percent versus a plan of 97.4 percent. This compares with

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 9

94.7 percent and 96.0 percent reported last month. For construction management and start-up services the earned value was 71.6 percent versus a plan of 72.6 percent. This compares with 68.1 percent and 68.1 percent, respectively, last month. No significant issues were reported.

### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 91 percent versus a plan of 98 percent. This compares with 88 percent and 96 percent last month. The major SESS activities that were behind schedule included FGD tanks, electrical pulls and terminations, architectural finishes, small bore piping and construction system turnovers. SESS continued second shifts to complete tank coating and linings and discontinued the electrical second shift at mid month. There were concerns that SESS was having difficulties transitioning from construction to start-up and commissioning. There were questions about the adequacy of SESS planning to complete the Project.

During the Period, SESS completed installing the roofing and siding around the field erected tanks and the absorber awning. They continued to coat the field erected tanks, completing the filter feed tanks and starting the reclaim water tank; continued to pull and terminate power and instrumentation cables; continued to install piping systems in all areas; resumed testing of the piping systems; and continued cleaning the absorber. They started to install the nozzles for the PAP system and continued to perform system walk downs.

### Dearborn Midwest (Material Handling Systems)

Through the Period, DMW had a construction/testing earned percent complete of 90 percent versus a plan of 94 percent. This compares with 88 percent and 92 percent last month.

During the Period, DMW completed installing the rotary plows for both conveyors and aligning them to the shelving; completed installing conduit for Conveyors 3A and 3B; completed terminating cable from the Gypsum Storage Building ("GSB") and L-5 conveyor to the FGD electrical room; and completed pulling cable to the Transfer Tower No. 1 MCC. They erected and installed siding on the maintenance building at the limestone storage silos and ran in all gypsum conveyors, bucket elevator and emergency feed conveyor unloader.

Premature deterioration of the paint finish on conveyor idlers and frames, resolution of milestone dates for completion of commissioning with material on belts, and delays in the installation of the limestone truck unloading foundations and the DMW Substantial Completion date were concerns. However, URS was working on a settlement with DMW regarding the conveyor idlers and frames and also on a temporary workaround to allow initial limestone deliveries for commissioning the material handling equipment using an existing reclaim system in the coal yard, until the construction on the limestone truck unloading system caught up.

**Independent Engineer's Report for March 2011**  
**Merrimack Clean Air Project**

Page 10

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because of delays in providing permanent power, the State elevator inspection was postponed to May 2011.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 84 percent versus a plan of 84 percent. This compares with 83 percent and 84 percent last month. During the Period, SWT/NP completed installing platforms in and around the FGD Building; continued to pull and terminate cable; continued to install interconnecting piping; and continued to walk down systems for turnover to start-up. The performance of SWT/NP continued to be problematic. It was reported that system turnovers and start-up activities were moving slowly. System design interface issues associated with the new SWWT system and the schedule for completion and start-up of the EMAR system were concerns.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 94 percent versus a plan of 97 percent. This compares with 93 percent and 97 percent last month. During the Period, MIS completed the booster fan utility bridge steel and continued to insulate the ductwork, the booster fan enclosure and the expansion joints. They started to install fans and louvers on the remaining buildings.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 92 percent versus a plan of 100 percent. This compares with 82 percent and 98 percent last month. During the Period, AZCO completed flushing the booster fan lube oil piping and released the CTO package; completed installing the air filter for the FGD Building system; and completed installing the acid and caustic unloading station, including the safety shower in the existing MK station. They continued to install piping in the Truck Wash Building, continued to install the quench water pipe and continued to install instrument air in the booster fan area.

Main areas behind schedule included the booster fans, quench system and truck wash system. A recovery plan was in place and making progress, mainly for the booster fans. The installation of the quench water piping was ongoing and was scheduled to be completed and tested by April 8, 2011. It was noted that close coordination between contractors in the booster fan area would be required to facilitate completion of mechanical work by April 1, 2011.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 85 percent versus a plan of 96 percent. This compares with 77 percent and 94 percent last month. During the Period, ESB continued to install conduit from the MK control room to the duct support steel and in the

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 11

booster fan enclosure; pulled the feed to all three booster fan motors and terminated the Unit 2 fans; continued to pull and terminate cable to the booster fan equipment; and started to pull cable to the existing control room.

Main areas behind schedule included the booster fans, quench water system and truck wash system. Installation of cable to support the booster fan April CTO remained a concern. ESB continued to work a second shift to recover schedule. No impacts to the overall milestone schedule were anticipated.

### G. C. Cairns (Site Finalization - Phase I)

Through December 2010, G. C. Cairns ("GCC") had an overall earned percent complete of 67 percent versus a plan of 100 percent and could not complete its work due to poor weather. In January 2011, GCC was demobilized from the site until spring, when site work could be completed.

### Construction Turnover

URS reported that 42 CTO Packages were issued versus an early plan of 45. This compares with 27 packages issued versus a plan of 36 last month.

### Start-Up

URS' Start-Up group ("Start-Up") reported an overall earned percent complete of 43.8 percent versus a plan of 39 percent. Start-Up performed gypsum conveyor motor bumps; ran the gypsum conveyors; established a data link with the gypsum conveyor programmable logic controller ("PLC"); and energized the vent fans and garage doors in the GSB. They energized the available lights in the FGD Building; energized the FGD Building heaters; energized the B1, B2, and B3 DCS cabinets in the FGD Building. The DCS availability date for SESS was achieved on March 25, 2011.

### Absorber Potential Adjustment Protection

A Work Change Request ("WCR") was issued to SESS for the installation of the PAP system. It was reported that there is no change to the SESS schedule or warranty as a result of the installation of the PAP system. During the Period, the PAP system nozzles/penetrations in the absorber vessel and the PAP system absorber internals were being installed, see Figure A-6 in Attachment 1.

### EMAR System and SWWT System

The background for the decisions to proceed with the EMAR and the SWWT systems is discussed in Attachment 2 to this Report.

## Independent Engineer's Report for March 2011 Merrimack Clean Air Project

Page 12

### EMAR System

The status of the EMAR system is discussed as part of SWT/NP scope-of-work and the FGD WWT system above.

### SWWT System

Burns and McDonnell ("B&McD") received a PO for the overall engineering, design and integration of the SWWT system on February 1, 2011. Aquatech was selected by PSNH/B&McD to supply the integrated, automated process systems and equipment for the SWWT, including two mechanical vapor compression brine concentrators, a forced circulation crystallizer, and solids dewatering equipment. PSNH issued a limited notice-to-proceed to Aquatech for the procurement of long lead time items on January 25, 2011 and a PO was issued to Aquatech on March 7, 2011.

### Merrimack Clean Air Project Cost Summary

Through the Period, projected costs for the Project were unchanged at \$430,000,000, since the \$27,000,000 (\$11,000,000 in contingency and \$16,000,000 in reserves) reduction in October 2010. However, subsequent to the reduction in the estimated completion cost for the Project, the addition of the PAP system, for corrosion protection of the FGD absorber, and the SWWT System, to eliminate the discharge of treated FGD effluent into the Merrimack River, were identified as being required to complete the Project on schedule, control Project costs and risks, and to operate the Project reliably. The additional cost for the PAP system was a few million dollars and the preliminary estimated cost for the SWWT system was \$20,000,000 to \$25,000,000, depending on whether PSNH decides to include the second crystallizer and filter press. While these additional costs were not expected to increase the total projected costs for the Project of \$430,000,000, they eliminated all of the reserves and contingency at the total Project level in PSNH's projected costs spreadsheet. PSNH was evaluating potential cost savings that could result from the projected early completion of the Project and in other areas of the Project. It was in the process of confirming its estimated cost to complete and adjusting its construction budget accordingly to include appropriate funds in reserves. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1



Figure A-1 The "Meeting Place"



Figure A-2 Service Water Pumps and Red Emergency Diesel Quench Pump

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 2



Figure A-3 Booster Fan Enclosure (looking southeast) at Completed Siding



Figure A-4 L-to-R, Booster Fan Enclosure, Absorber and FGD Building Looking Southeast

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 3



**Figure A-5 FGD Electrical Room**



**Figure A-6 Installation of the PAP System in the Absorber**



**Figure A-7 Absorber Inlet Duct, Expansion Joint and Emergency Spray Piping**



**Figure A-8 Flue Gas Duct Penetrations and Instrumentation**

Independent Engineer's Report for February 2011  
Merrimack Clean Air Project Photographs – March 16, 2011  
Attachment 1  
Page 5



Figure A-9 Steel Reclaim Shelves Above and Rotary Plow Track under Limestone Storage Silos



Figure A-10 Truck Wash

Independent Engineer's Report for March 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

## EMAR System and SWWT System

The PWWT system removes metals and other elements from the FGD system's liquid discharges, including gypsum dewatering and absorber blowdown. The original design of the PWWT system was developed in 2009 based on contractual effluent guarantees and currently demonstrated state-of-the-art FGD wastewater treatment technology. PSNH, with URS experts, worked with the NHDES beginning in the later part of 2009 to identify all wastewater design and discharge parameters required to support renewal of MK's NPDES permit. The NHDES required that there be zero net increase of the individual chemical species in the mass discharge from MK, compared to present day discharges. The results of the negotiations with the NHDES were rigorous new permit limits and conditions, requiring additional wastewater treatment to reduce the discharge of mercury and arsenic into the Merrimack River. To address these new discharge limits the EMAR was added to the Project design to further treat the effluent from the existing (under construction) physical-chemical PWWT system.

The scope of EMAR system contract included the engineering, design, fabrication, testing, delivery, installation, start-up, and commissioning of a nominal 50 gallons per minute ("gpm") EMAR system. The system was specified to receive treated effluent from the PWWT system based on the original SWT/NP effluent guarantees and to discharge effluent with concentrations of mercury and arsenic that meet the requirements of the anticipated NPDES permit.

The request for proposal was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- SWT/NP

Complete proposals were submitted by [REDACTED] and SWT/NP, the current PWWT system contractor. SWT/NP was selected to provide the EMAR system. The additional work was incorporated via a Work Change Request (WCR-023, Rev 1), dated November 4, 2010, in the amount of [REDACTED] to the original PWWT system contract with SWT/NP.

## Secondary Wastewater Treatment System

### Background

According to the latest Project Schedule, the FGD system will be ready to accept flue gas on August 1, 2011 and that following completion of the MK-1 Tie-in Outage on September 20, 2011 flue gas from MK-1 will be available for treatment. With completion of the MK-2 Tie-in Outage on November 10, 2011 the FGD system will be capable of treating flue gas from both units. At some point during this period, October through November 2011, treated FGD process effluent will have to be discharged along with MK's current permitted effluent discharge to the

Independent Engineer's Report for March 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 2

Merrimack River. To accommodate the new discharge stream, the Project must either revise its NPDES permit to include the new stream or it must obtain some form of interim consent from the EPA that authorizes the discharge until such time as MK receives a renewed NPDES permit. Failing to obtain authorization to discharge the treated FGD effluent has the potential to seriously increase the cost of the Project and to delay the environmental benefits that the Project is intended to provide.

Beginning in mid-2010, PSNH and the NHDES had discussions with the EPA to ensure that they were aware of the Project's schedule and that treated effluent from the FGD system would need to be included with MK's permitted effluent discharge. In November 2010, a meeting was held between the EPA, NHDES, and PSNH to advise the EPA of the new discharge limits for mercury and arsenic that had been negotiated between PSNH and the NHDES, and to provide details on the new EMAR system that was being added to the Project to achieve the low discharge levels. The goal of the discussions was to provide the EPA with the basis on which to authorize the new FGD treated wastewater discharge (35 to 70 gpm estimated) outside of the NPDES process. The EPA asked many technical questions in December 2010 regarding the possibility of eliminating most or all discharge from the new FGD WWT system.

In the end, the EPA was unwilling to provide authorization for the new discharge outside of the renewal process for MK's NPDES permit. The EPA insisted that the treated FGD effluent could only be permitted as part of the MK NPDES permit renewal process for the whole station, which the EPA had been working on for a number of years. They were unwilling to issue a special Operational Permit or Administrative Consent Order that would allow the discharge of treated FGD effluent. The EPA indicated that they expected the Draft Permit to be issued in December 2010. It has yet to be issued.

The EPA's apparent refusal to provide temporary authorization to discharge treated FGD effluent until the new NPDES permit process is complete, and the uncertainty of the time that it will take to complete the permitting process, due to periods built into the process for comment, public hearings, appeals and challenges, exposes the Project to potentially serious delays and increased costs. PSNH estimates that a new NPDES permit for MK may not be issued until sometime in 2012 to 2014, due to potential challenges. During all of this time, the Project would be unable to operate and to achieve its intended purpose. PSNH might also be in violation of the New Hampshire Clean Power Act ("NHCPA") which requires that the MK FGD system be operational no later than July 1, 2013.

### Risk Mitigation Alternatives

#### *Eliminate the Discharge of Treated FGD Effluent*

PSNH had anticipated that the EPA might not be willing to expedite the NPDES permitting process or to agree to provide temporary consent/authorization to discharge treated FGD effluent. They had previously evaluated the use of additional treatment options to reduce the

Independent Engineer's Report for March 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 3

volume of the treated FGD effluent, by a factor of 10 or more; to the point where the concentrated stream could be used on site for wetting flyash prior to off-site shipment or sent off site for disposal. Or with an additional stage of treatment a stable solid waste could be produced with high quality water that could be reused in the power plant, as the only other byproduct.

These volume reduction systems typically consist of a falling-film evaporator or brine concentrator followed by a crystallizer (evaporator). An additional crystallizer and final dewatering/filtration equipment (filter press, etc.) are needed to produce a solid waste and pure water. These systems and components have been used in other industries to eliminate discharges of cooling tower blowdown and demineralizer wastes, etc., and to reclaim the water in areas with limited water resources. These systems are now being considered to eliminate the blowdown from wet FGD systems. PSNH had discussions with potential suppliers of these systems and obtained budgetary quotations in 2010.

Implementation of this technology, known on the Project as the SWWT system, to eliminate the discharge of FGD effluent into the Merrimack River would not require EPA or NHDES approvals; and therefore, it would eliminate the risks to the scheduled completion of the Project.

### Alternatives Considered

Without a revised NPDES permit or other authorization from the EPA that would allow the temporary discharge of treated FGD effluent into the Merrimack River, PSNH has limited options.

1. It could complete the Project to the maximum extent possible and then disband all contractors until a new NPDES permit was issued or the EPA issued a temporary authorization/consent. Under this alternative, the Project could incur significant additional costs to demobilize and remobilize PSNH and contractor's staff and facilities; to maintain systems and equipment during the lay-up period; to complete systems once the Project is reactivated; and to start-up, test and recommission the Project. During this suspension, critical PSNH and contractor management and staff may be lost. The allowance for funds used during construction ("AFUDC") and other Owner's Costs would continue until the Project was placed into service. System and equipment warranties may expire or PSNH might have to pay to extend the warranties.

From our experience, suspending the operation of large complex systems for an extended period of time, once they have been commissioned or partially commissioned, can have unintended and expensive consequences and should be avoided if possible.

2. It could collect the FGD effluent in a receiver tank and truck it to disposal locations without secondary treatment. The primary high volume disposal locations in the area are Publically Owned Treatment Works ("POTWs"). These are public facilities and even if community approvals are obtained, changes could occur at the contracted facility that are not under PSNH's control and could negatively impact the ability of PSNH to operate the

Independent Engineer's Report for March 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 4

Project and to meet New Hampshire law. The uncertainty of the length of time that this disposal method would be necessary greatly increases its risk. This alternative should also be avoided if possible. It should be noted, that this is not the only wastewater disposal option available to reduce the risk of delay in the operation of the Project. Alternate disposal locations are under consideration.

3. It could add a SWWT system to eliminate the need for any discharge of FGD effluent into the Merrimack River; and therefore, the need for the new NPDES permit or EPA consent as a condition precedent to placing the Project into service. As discussed above, this technology is relatively low risk, because of its historical use in the power and other industries to eliminate similar liquid discharges.

The completion of the SWWT system by the end of 2011 is the greatest challenge to this alternative. However, PSNH has identified a number of reasonable options that could be used if the completion of the SWWT system is delayed by a month or two. The trucking option discussed in item (2) above could be used. The difference in this case is that the period to establish such a program would be relatively short and well known, unlike waiting for the NPDES permit or EPA consent. The use of lower chloride coals would reduce the amount of blowdown from the FGD system, since the rate of blowdown is controlled to limit the chloride concentration in the FGD absorber. With fewer chlorides entering the absorber, there would be less blowdown. These and other options, alone or in combination, provide PSNH with reasonable control over the risk of a short delay in the completion of the SWWT system.

### **Mitigation Decision and Plan**

PSNH/NU decided that the lowest risk for the Project was to install the SWWT system. This provides PSNH with control over the remaining management and execution of the Project, including cost and schedule.

### ***Cost Analysis***

The cost of the SWWT system is currently estimated at \$20,000,000 to \$26,000,000, with some bids not due until August 2011. PSNH's analysis indicates that this would be less than the cost of a lengthy delay in the completion of the Project.

### ***Schedule Analysis***

The completion of the SWWT system in combination with the mitigating strategies discussed above to deal with any short delays is currently not expected to affect the critical path of the Project or in-service date.

**Independent Engineer's Report for March 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2**

Page 5

### **SWWT System Status**

PSNH hired Burns and McDonnell ("B&McD") on November 17, 2010 to provide technical assistance based on their knowledge and expertise with this technology. B&McD concluded that the application of a brine concentrator and crystallizer would reduce the FGD effluent steam down to less than 5 gpm and that an additional crystallizer and dewatering device could be employed to further reduce effluent volume. Figure B-1 is a graphic diagram of the SWWT system. Note that Figure B-1 does not include the second effect, which incorporates a second crystallizer and filter process to recover solids.

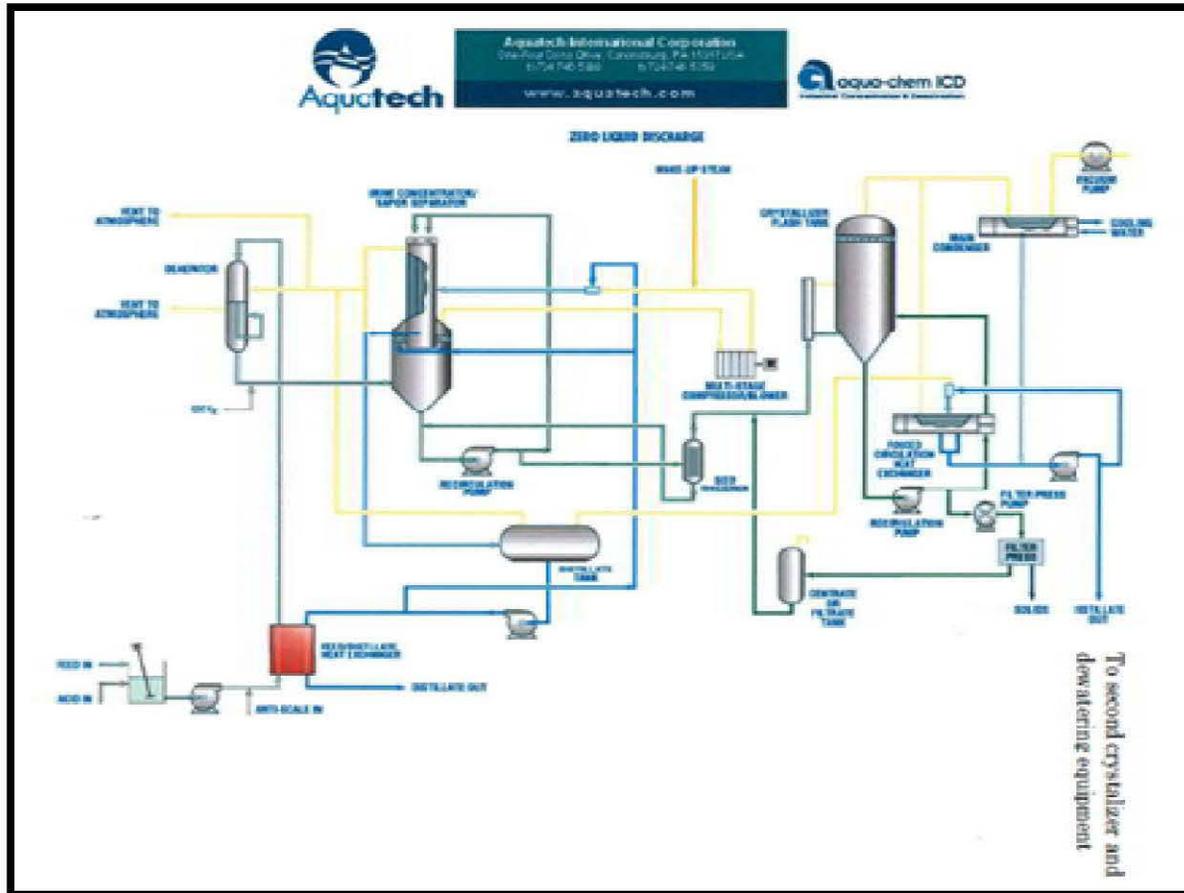
A multidiscipline team that included representatives from PSNH, NU and B&McD was formed to implement the B&McD recommendations in a timely manner. A release for early engineering and procurement of long lead time materials was issued in early January 2011, once vendor selection and firm pricing were available. In parallel, contract terms were finalized.

An aggressive goal was set to have some elements of the SWWT system in service by late 2011 to support start-up and commercial operation of the Project and the remaining elements in service in early 2012.

The construction of the SWWT system is being managed by PSNH. We will report more details on the design, cost, schedule and progress of the SWWT system in future monthly progress reports as they become available.

Independent Engineer's Report for March 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Figure B-1  
SWWT System



ATTACHMENT WHS-2  
REDACTED

REDACTED

August 11, 2011

Via E-mail



An SAIC Company

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for April 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for April 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on April 20, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive, flowing style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – May 18, 2011

Attachment 2: EMAR System and SWWT System

c: Distribution



## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on May 18, 2010. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system. The EMAR system is described in Attachment 2.

On April 6, 2011 a fire pump/hydrant pressure and flow test was performed on the existing Merrimack Station's ("MK") fire pumping system. Based on the results of this test, it was determined that a FGD building fire water booster pump would have to be installed to achieve the water pressure, required by the Fire Chief for the Town of Bow, at the highest elevations of the building. The supply and installation of the fire booster pump was reported to be the first critical path, with a negative eighteen days of float. With some delays to completion of the SESS construction turnover and start-up activities, URS reported that there were five different critical paths with zero or less days of float, including the path for the FGD building fire booster pump. Four of the five critical paths went through the FGD island activities and the fifth went through the EMAR system. However, URS reported that the Project remained on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed through Power Available to Islands and Service Water Available on February 28, 2011. Absorber vessel completion/closeout originally forecast for completion in April 2011 was reforecast for May 9, 2011.

PSNH was proceeding with the installation of a Secondary Wastewater Treatment ("SWWT") system as part of the Project. This system will eliminate the need to discharge the treated FGD effluent into the Merrimack River; removing the risk to the Project from the lack of a new National Pollutant Discharge Elimination System ("NPDES") permit or the refusal of the Environmental Protection Agency ("EPA") to provide temporary authorization/consent for the discharge in a timely manner.

Through the Period, projected costs for the Project were unchanged at \$430,000,000. In April 2011 PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all AFUDC (Allowance for Funds Used During Construction) in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 3

by and useful to PSNH for purposes of inclusion in the rate base, would occur in late 2011, rather than mid-2012. Note that the in-service date is not the same as the contractual Substantial Completion dates. R W Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicates that the reserves should be sufficient. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as, changes in the scope of work, force majeure, change in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project is transitioning from the construction phase to the start-up and commissioning phases. PSNH and URS are monitoring and reporting construction completion and turnover of completed systems to commissioning and other commissioning progress measures, such as, completion of power and control loop checks.
3. PSNH was proceeding with the installation of a SWWT system as part of the Project. This system will eliminate the need to discharge the treated FGD effluent into the Merrimack River; removing the risk to the Project from the lack of a new NPDES permit or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 4

4. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
5. Through the Period, projected costs for the Project were unchanged at \$430,000,000. In April 2011 PSNH reported \$9,000,000 in reserves. Whether these reserves are sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicates that the reserves should be sufficient.
6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's MK. PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 5

Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP Mechanical Erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the Material Handling Systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

### Safety

PSNH/URS reported that safety performance continued to be reasonable. There were two Recordable Injuries and two First Aid Injuries during the Period. The overall safety culture on the Project was reported to be good and the attitude of the workforce towards the efforts of management to enhance and enforce the safety program was positive.

Old Republic, PSNH's insurer for the Project, presented PSNH and URS with plaques recognizing the achievement of 1,000,000 Safe Work Hours without a lost time injury. URS provided 2009 OSHA Recordable Incident Rate Data (OSHA data across all construction for the most recent year available), and noted that while incident rates on the Project were higher than the URS target, they were still below the industry averages.

### Environmental and Permitting

PSNH and URS continued to effectively manage the process of obtaining local permits so that there were no impacts on the Project Schedule.

URS received the Bow Planning Board's approval for the Limestone Truck Delivery Facility ("LTDF") architectural and aesthetic standards and also received the building permit for the LTDF foundations. URS also received code review approval for the proposed FGD building fire water booster pump electrical power supply configuration.

URS also issued the final continuous emissions monitoring system ("CEMS") plan, Relative Accuracy Test Audit ("RATA") Protocol and disposition of prior New Hampshire Department of Environmental Services ("NHDES") comments to PSNH for formal submittal to NHDES.

As noted above, PSNH has decided to proceed with the installation of a SWWT system as part of the Project, eliminating the need to discharge the treated FGD effluent into the Merrimack

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 6

River. This removes the potential risks to the scheduled completion of the Project, due to the lack of a new NPDES permit that includes the FGD effluent discharge or the refusal of the EPA to provide temporary authorization/consent for the discharge in a timely manner.

## Project Status

### Overall Project

URS reported that, while there were some issues being addressed with schedule recovery plans, overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through April 2011. On April 6, 2011 a fire pump/hydrant pressure and flow test was performed on the existing MK fire pumping system. Based on the results of this test, it was determined that a FGD building fire water booster pump would have to be installed to achieve the water pressure, required by the Fire Chief for the Town of Bow, at the highest elevations of the building. The supply and installation of the FGD building fire booster pump was reported to be on the first critical path, with a negative eighteen days of float.

With delays to the completion of some of the SESS construction turnover and start-up activities, URS reported that there were now five different critical paths with zero or less days of float. The most critical FGD Island path, with 18 days of negative float, began with SESS' approval of the design submittal for the FGD building fire booster pump installation followed by procurement and delivery of the pump. The path then continued through completion of the pump foundation and physical installation of the pump followed by construction turnover and preoperational checkouts of the fire protection system. The second FGD Island critical path was a negative two-day float logic path, which addressed completion of work associated with the emergency quench system to support the test run and preliminary adjustment of the Absorber area. The third FGD Island critical path was a zero-day float path that addressed the completion of the limestone reagent preparation systems followed by testing and commissioning of ball mills (Train B) with limestone. The fourth FGD Island critical path was a zero-day float path that addressed completion of the Absorber hold tank internal coating and installation of tank internals followed by testing and commissioning of the Absorber hold system to support the test run and preliminary adjustment of the FGD system. All four FGD Island paths terminate with the August 1, 2011 Mechanical Completion Date (FGD Ready for Gas). The fifth critical path was a zero-day float path that addressed completion of the mechanical and electrical installation for the EMAR system.

All of the major Project Milestones had been completed through Power Available to Islands and Service Water Available on February 28, 2011. The Absorber vessel completion/closeout milestone was further delayed until May 9, 2011.

While the Project remained on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities, there was considerable concern with SESS' performance and schedule erosion. SESS was failing to complete activities on schedule, resulting in increased float density. The wave of incomplete

  
**Independent Engineer's Report for April 2011  
Merrimack Clean Air Project**

Page 7

activities continued to build downstream. As part of a mitigation plan, SESS was adding additional manpower to address schedule issues with loop checks and pre-operational checkouts and continued working five, 10-hour shifts in some areas. They previously started a second and third shift for the Absorber area field erected tank internal coatings to maintain schedule and coating work for the last tank, the hold tank, was expected to be completed in May 2011. PSNH reported that the installation of the Potential Adjustment Protection ("PAP") system components inside the Absorber vessel was completed by SESS.

# Independent Engineer's Report for April 2011

## Merrimack Clean Air Project

Page 8

**Table 1**  
**Status of Project Milestones**  
**February 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion/Closeout	02/04/2011	05/09/2011
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Mechanical Completion	08/01/2011	08/01/2011
FGD Ready for Gas	09/01/2011	09/01/2011
MK-1 Tie-in Outage End	09/26/2011	09/20/2011
MK-2 Tie-in Outage End	11/10/2011	11/10/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 9

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 95.0 percent versus a plan of 96.4 percent. The earned percent complete for the construction and start-up phase was 90.8 percent versus a plan of 93.4 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

The Project also measured progress and performance using the Schedule Performance Index ("SPI"), which is the ratio of earned versus planned progress, based on dollars expended. This is a widely used project management tool. An SPI score near one is the optimum goal. For complex projects, like the Project, with thousands of activities, there will be some activities that are above one and some that are below. The SPI for the Project through the Period, as calculated from the overall earned percent complete, was 0.98. This compares with 0.98 last month.

There was a 2.6 percentage (3.9 last month) point difference between the earned (90.8 percent) and planned (93.4 percent) percent complete for construction and start-up. URS reported that progress on the Island contracts was mainly impacted by the work in the FGD and Wastewater Treatment Islands. The key areas lagging behind schedule in the FGD Island included tank coating, cable pulls and terminations, construction turnovers and start-up pre-operational checkouts. URS reported that delays in system turnovers in the Wastewater Treatment Island, could potentially delay Mechanical Completion of the PWWT system beyond the planned date of June 1, 2011. The earned percent complete on the BOP contracts was lagging by 2.1 percent due primarily to schedule slippages in the booster fan area, truck wash system and quench system. The schedule slippage issue was being addressed in weekly meetings.

### Project Schedule

Contractors continued to report construction progress using quantity-based measurements for remaining construction work; however, the Project continued transitioning from the construction phase to the startup and commissioning phases. PSNH and URS were monitoring and reporting construction completion and turnover of completed systems to commissioning and other commissioning progress. URS included a start-up progress curve in its monthly progress report, which reflected progress on loop checks, instrument calibrations and mechanical completion activities. URS also provided tracking of construction turnover ("CTO") packages completed by construction and turned over to commissioning.

### Major Project Contractors

To more clearly focus on the execution of the remaining activities, the reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 10

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 96.1 percent versus a plan of 98.2 percent. This compares with 95.5 percent and 97.4 percent reported last month.

URS reported that it would issue the Phase II site finalization package for bids in early May 2011 and that bids would be due late in May 2011.

For construction management and start-up services the earned value was 73.8 percent versus a plan of 73.9 percent. This compares with 71.6 percent and 72.6 percent, respectively, last month. No significant issues were reported.

### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 94 percent versus a plan of 99 percent. This compares with 91 percent and 98 percent last month. The major SESS activities that were behind schedule included FGD tank coating, cable pulls and terminations, construction turnovers and start-up pre-operational checkouts (loop checks and other work). SESS continued second shifts to complete tank coating and linings and planned to add additional personnel for loop checks. URS was also assisting SESS with loop checks. There were concerns that SESS was having difficulties transitioning from construction to start-up and commissioning. There were questions about the adequacy of SESS planning to complete the Project. Regular management discussions continued between URS and SESS management.

During the Period, SESS completed testing and blow downs of the instrument air system and completed the installation of the PAP system components inside the Absorber vessel. They continued to coat the field erected tanks, completing the reclaim water tank; continued to pull and terminate power and instrumentation cables; continued to install and test piping systems in all areas; and continued cleaning the absorber. They also continued to perform system walkdowns; and performed the fire pump/hydrant pressure and flow test.

### Dearborn Midwest (Material Handling Systems)

Through the Period, DMW had a construction/testing earned percent complete of 94 percent versus a plan of 96 percent. This compares with 90 percent and 94 percent last month.

During the Period, DMW completed installing conduit for Conveyors 3A and 3B; completed terminating cable to the Transfer Tower No. 1 motor control center ("MCC") and ran in (operated without conveying material) Limestone Conveyors L-2, L-2A, L-3A and C, L-4, and L-5.

Premature deterioration of the paint finish on conveyor idlers and frames, resolution of milestone dates for completion of commissioning with material on belts, and finalization of the DMW Substantial Completion Date pending finalization of the LTDF schedule were concerns. URS was working on a settlement with DMW regarding the conveyor idlers and frames and also

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 11

on a temporary workaround to allow initial limestone deliveries for commissioning the material handling equipment using an existing reclaim system in the coal yard, until the construction on the LTDF caught up. Installation of the temporary limestone delivery system was nearly completed at the time of our site visit, and excavation for the LTDF foundations was started. Installation of the LTDF foundations is scheduled for completion and release to DMW by June 24, 2011.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire ("the State") and demobilized from site. Because of delays in providing permanent power, the State elevator inspection was postponed to May 2011. At the time of our site visit, PSNH reported that the state elevator inspection was completed on May 6, 2011 and that PSNH was awaiting the elevator permit certificate.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 84 percent versus a plan of 86 percent. This compares with 84 percent and 84 percent last month. During the Period, SWT/NP continued to pull and terminate cable; continued to install interconnecting piping; and continued to walk down systems for turnover to start-up. The performance of SWT/NP continued to be problematic. It was reported that SWT/NP system turnovers and start-up activities were moving slowly and could impact the planned Milestone Mechanical Completion Date for the PWWT system of June 1, 2011; this was to be discussed at a face-to-face schedule review meeting the week of May 23 to 27, 2011. System design interface issues associated with the new SWWT system and the schedule for completion and start-up of the EMAR system were also concerns. SWT/NP was indicating a November 2011 completion for the EMAR system, but PSNH wants it completed in September 2011.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 95 percent versus a plan of 97 percent. This compares with 94 percent and 97 percent last month. During the Period, MIS completed installing siding and roofing on the booster fan enclosure, and also completed installing fans and louvers on remaining buildings. They also continued to insulate the ductwork, the booster fans and expansion joints. Essentially MIS' work was nearing completion, except for the work required during the unit outages. URS reported that they were planning a detailed outage readiness review with MIS covering both unit outages.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 99.5 percent versus a plan of 100 percent. This compares with 92 percent and 100 percent last month. During the Period, AZCO completed truck wash equipment piping installation, quench water piping installation and

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 12

testing, and booster fan area instrument air piping installation. AZCO also set the safety shower in the SWPH, and the quench pump diesel engine.

Main areas of concern were completion of the construction turnover of the booster fans and craft support for commissioning, testing, CTOs and punchlist completion. URS was negotiating a change order for performance testing support.

### E. S. Boulos Co. (BOP Electrical Erection Subcontractor)

Through the Period, ESB had an overall earned percent complete of 88 percent versus a plan of 98 percent. This compares with 85 percent and 96 percent last month. During the Period, ESB completed cable tray and conduit from the MK control room to the duct support steel and in the booster fan enclosure; completed cable pulls and terminations to all three booster fans; continued to pull and terminate cable to the booster fan equipment; continued to pull cable to the existing control room; and started to install electrical equipment and conduit in the truck wash building.

Main areas behind schedule included the booster fans, quench water system and truck wash system. Installation of cable to support the booster fan CTO remained a concern. ESB continued to work a second shift to recover schedule. During the review meeting we attended, URS reported that ESB would be ending its second shift on May 20, 2011. No impacts to the overall milestone schedule were anticipated.

### G. C. Cairns (Site Finalization - Phase I)

Through December 2010, G. C. Cairns ("GCC") had an overall earned percent complete of 67 percent versus a plan of 100 percent and could not complete its work due to poor weather. In January 2011, GCC was demobilized from the site until spring, when site work could be completed. At the time of our site visit, GCC was back on site installing bollards and road base for paving in the booster fan area.

## Construction Turnover

URS reported that 67 CTO packages were issued versus an early plan of 125 and forecast of 101. This compares with 41 packages issued versus a forecast of 45 last month. URS reported that it concluded that it was not possible to recover to the early plan or its revised CTO completion forecast. The revised forecast shows 112 CTOs by the end of May 2011.

## Start-Up

URS' Start-Up group ("Start-Up") reported an overall earned percent complete of 52.9 percent versus a plan of 43.0 percent. This compares with 43.8 percent and 39 percent last month.

Start-Up conducted lock out tag out ("LOTO") and permit to work ("PTW") training; energized the 4B3 MCCs in Transfer Tower No. 1; performed limestone conveyor motor bumps; ran the limestone conveyors; created the programmable logic controller ("PLC") data link with the

## Independent Engineer's Report for April 2011 Merrimack Clean Air Project

Page 13

DMW PLC for the limestone conveyors; energized the auxiliary equipment for DMW; bumped and ran the Absorber recycle pumps and assisted SESS with loop checks; and performed walkdowns and reviews of turnover packages.

### Absorber Potential Adjustment Protection

During the Period, PSNH reported that SESS completed the installation of the PAP system components that were located inside the Absorber vessel. The remaining activities required for the completion of the PAP system included wiring of the many Absorber penetrations that connect to the internal elements of the system, to a central control box and then interconnecting the PAP system controls box to the plant control system. This is expected to be completed in the third quarter of 2011.

### EMAR System and SWWT System

The background for the decisions to proceed with the EMAR and the SWWT systems is discussed in Attachment 2 to this Report.

#### EMAR System

The status of the EMAR system is discussed as part of SWT/NP scope-of-work and the FGD WWT system above.

#### SWWT System

During the Period, Burns and McDonnell ("B&McD") continued BOP engineering activities. PSNH awarded the electrical switchgear, DCS and building steel contracts and conducted kick-off meetings for each of these contracts. They received and reviewed bids for foundations and underground utilities and continued to negotiate the change order for the second effect of the SWWT system with Aquatech.

### Merrimack Clean Air Project Cost Summary

Through the Period, projected costs for the Project were unchanged at \$430,000,000. The additional costs for the PAP and the SWWT system eliminated all of the reserves and contingency through the March 2011 reporting period. However, in April 2011 PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all AFUDC (Allowance for Funds Used During Construction) in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH, would occur in late 2011, rather than mid-2012. Note that the in-service date is not the same as the contractual completion dates, e.g., Substantial Completion. R W Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicates that the reserves

**Independent Engineer's Report for April 2011  
Merrimack Clean Air Project**

Page 14

should be sufficient. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

Independent Engineer's Report for April 2011  
Merrimack Clean Air Project Photographs – May 18, 2011  
Attachment 1



Figure A-1 FGD Building Looking North at Tanks being Coated



Figure A-2 Limestone Ball Mill

Independent Engineer's Report for April 2011  
Merrimack Clean Air Project Photographs – May 18, 2011  
Attachment 1  
Page 2



**Figure A-3 Cable Pulling Near the Booster Fan Enclosure (looking northwest)**



**Figure A-4 GCC Installing Road Base for Paving between  
Booster Fan Enclosure and Existing Plant**

**Independent Engineer's Report for April 2011  
Merrimack Clean Air Project Photographs – May 18, 2011  
Attachment 1  
Page 3**



**Figure A-5 Rotary Plow Limestone Reclaim**



**Figure A-6 Temporary Limestone Truck Unloading Ramp and Hopper in the Coal Yard**

**Independent Engineer's Report for April 2011  
Merrimack Clean Air Project Photographs – May 18, 2011  
Attachment 1  
Page 4**



**Figure A-7 LTDF Foundation Excavation**



**Figure A-8 SWWT Site**

Independent Engineer's Report for April 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

## EMAR System and SWWT System

The PWWT system removes metals and other elements from the FGD system's liquid discharges, including gypsum dewatering and absorber blowdown. The original design of the PWWT system was developed in 2009 based on contractual effluent guarantees and currently demonstrated state-of-the-art FGD wastewater treatment technology. PSNH, with URS experts, worked with the NHDES beginning in the later part of 2009 to identify all wastewater design and discharge parameters required to support renewal of MK's NPDES permit. The NHDES required that there be zero net increase of the individual chemical species in the mass discharge from MK, compared to present day discharges. The results of the negotiations with the NHDES were rigorous new permit limits and conditions, requiring additional wastewater treatment to reduce the discharge of mercury and arsenic into the Merrimack River. To address these new discharge limits the EMAR was added to the Project design to further treat the effluent from the existing (under construction) physical-chemical PWWT system.

The scope of EMAR system contract included the engineering, design, fabrication, testing, delivery, installation, start-up, and commissioning of a nominal 50 gallons per minute ("gpm") EMAR system. The system was specified to receive treated effluent from the PWWT system based on the original SWT/NP effluent guarantees and to discharge effluent with concentrations of mercury and arsenic that meet the requirements of the anticipated NPDES permit.

The request for proposal was issued to the following potential bidders:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- SWT/NP

Complete proposals were submitted by [REDACTED] and SWT/NP, the current PWWT system contractor. SWT/NP was selected to provide the EMAR system. The additional work was incorporated via a Work Change Request (WCR-023, Rev 1), dated November 4, 2010, in the amount of [REDACTED] to the original PWWT system contract with SWT/NP.

## Secondary Wastewater Treatment System

### Background

According to the latest Project Schedule, the FGD system will be ready to accept flue gas on August 1, 2011 and that following completion of the MK-1 Tie-in Outage on September 20, 2011 flue gas from MK-1 will be available for treatment. With completion of the MK-2 Tie-in Outage on November 10, 2011 the FGD system will be capable of treating flue gas from both units. At some point during this period, October through November 2011, treated FGD process effluent will have to be discharged along with MK's current permitted effluent discharge to the

Independent Engineer's Report for April 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 2

Merrimack River. To accommodate the new discharge stream, the Project must either revise its NPDES permit to include the new stream or it must obtain some form of interim consent from the EPA that authorizes the discharge until such time as MK receives a renewed NPDES permit. Failing to obtain authorization to discharge the treated FGD effluent has the potential to seriously increase the cost of the Project and to delay the environmental benefits that the Project is intended to provide.

Beginning in mid-2010, PSNH and the NHDES had discussions with the EPA to ensure that they were aware of the Project's schedule and that treated effluent from the FGD system would need to be included with MK's permitted effluent discharge. In November 2010, a meeting was held between the EPA, NHDES, and PSNH to advise the EPA of the new discharge limits for mercury and arsenic that had been negotiated between PSNH and the NHDES, and to provide details on the new EMAR system that was being added to the Project to achieve the low discharge levels. The goal of the discussions was to provide the EPA with the basis on which to authorize the new FGD treated wastewater discharge (35 to 70 gpm estimated) outside of the NPDES process. The EPA asked many technical questions in December 2010 regarding the possibility of eliminating most or all discharge from the new FGD WWT system.

In the end, the EPA was unwilling to provide authorization for the new discharge outside of the renewal process for MK's NPDES permit. The EPA insisted that the treated FGD effluent could only be permitted as part of the MK NPDES permit renewal process for the whole station, which the EPA had been working on for a number of years. They were unwilling to issue a special Operational Permit or Administrative Consent Order that would allow the discharge of treated FGD effluent. The EPA indicated that they expected the Draft Permit to be issued in December 2010. It has yet to be issued.

The EPA's apparent refusal to provide temporary authorization to discharge treated FGD effluent until the new NPDES permit process is complete, and the uncertainty of the time that it will take to complete the permitting process, due to periods built into the process for comment, public hearings, appeals and challenges, exposes the Project to potentially serious delays and increased costs. PSNH estimates that a new NPDES permit for MK may not be issued until sometime in 2012 to 2014, due to potential challenges. During all of this time, the Project would be unable to operate and to achieve its intended purpose. PSNH might also be in violation of the New Hampshire Clean Power Act ("NHCPA") which requires that the MK FGD system be operational no later than July 1, 2013.

### Risk Mitigation Alternatives

#### *Eliminate the Discharge of Treated FGD Effluent*

PSNH had anticipated that the EPA might not be willing to expedite the NPDES permitting process or to agree to provide temporary consent/authorization to discharge treated FGD effluent. They had previously evaluated the use of additional treatment options to reduce the

**Independent Engineer's Report for April 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2**

Page 3

volume of the treated FGD effluent, by a factor of 10 or more; to the point where the concentrated stream could be used on site for wetting flyash prior to off-site shipment or sent off site for disposal. Or with an additional stage of treatment a stable solid waste could be produced with high quality water that could be reused in the power plant, as the only other byproduct.

These volume reduction systems typically consist of a falling-film evaporator or brine concentrator followed by a crystallizer (evaporator). An additional crystallizer and final dewatering/filtration equipment (filter press, etc.) are needed to produce a solid waste and pure water. These systems and components have been used in other industries to eliminate discharges of cooling tower blowdown and demineralizer wastes, etc., and to reclaim the water in areas with limited water resources. These systems are now being considered to eliminate the blowdown from wet FGD systems. PSNH had discussions with potential suppliers of these systems and obtained budgetary quotations in 2010.

Implementation of this technology, known on the Project as the SWWT system, to eliminate the discharge of FGD effluent into the Merrimack River would not require EPA or NHDES approvals and; therefore, it would eliminate the risks to the scheduled completion of the Project.

### **Alternatives Considered**

Without a revised NPDES permit or other authorization from the EPA that would allow the temporary discharge of treated FGD effluent into the Merrimack River, PSNH has limited options.

1. It could complete the Project to the maximum extent possible and then disband all contractors until a new NPDES permit was issued or the EPA issued a temporary authorization/consent. Under this alternative, the Project could incur significant additional costs to demobilize and remobilize PSNH and contractor's staff and facilities; to maintain systems and equipment during the lay-up period; to complete systems once the Project is reactivated; and to start-up, test and recommission the Project. During this suspension, critical PSNH and contractor management and staff may be lost. The allowance for funds used during construction ("AFUDC") and other Owner's Costs would continue until the Project was placed into service. System and equipment warranties may expire or PSNH might have to pay to extend the warranties.

From our experience, suspending the operation of large complex systems for an extended period of time, once they have been commissioned or partially commissioned, can have unintended and expensive consequences and should be avoided if possible.

2. It could collect the FGD effluent in a receiver tank and truck it to disposal locations without secondary treatment. The primary high volume disposal locations in the area are Publically Owned Treatment Works ("POTWs"). These are public facilities and even if community approvals are obtained, changes could occur at the contracted facility that are not under PSNH's control and could negatively impact the ability of PSNH to operate the

Independent Engineer's Report for April 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Page 4

Project and to meet New Hampshire law. The uncertainty of the length of time that this disposal method would be necessary greatly increases its risk. This alternative should also be avoided if possible. It should be noted, that this is not the only wastewater disposal option available to reduce the risk of delay in the operation of the Project. Alternate disposal locations are under consideration.

3. It could add a SWWT system to eliminate the need for any discharge of FGD effluent into the Merrimack River; and therefore, the need for the new NPDES permit or EPA consent as a condition precedent to placing the Project into service. As discussed above, this technology is relatively low risk, because of its historical use in the power and other industries to eliminate similar liquid discharges.

The completion of the SWWT system by the end of 2011 is the greatest challenge to this alternative. However, PSNH has identified a number of reasonable options that could be used if the completion of the SWWT system is delayed by a month or two. The trucking option discussed in item (2) above could be used. The difference in this case is that the period to establish such a program would be relatively short and well known, unlike waiting for the NPDES permit or EPA consent. The use of lower chloride coals would reduce the amount of blowdown from the FGD system, since the rate of blowdown is controlled to limit the chloride concentration in the FGD absorber. With fewer chlorides entering the absorber, there would be less blowdown. These and other options, alone or in combination, provide PSNH with reasonable control over the risk of a short delay in the completion of the SWWT system.

### **Mitigation Decision and Plan**

PSNH/NU decided that the lowest risk for the Project was to install the SWWT system. This provides PSNH with control over the remaining management and execution of the Project, including cost and schedule.

### ***Cost Analysis***

The cost of the SWWT system is currently estimated at \$20,000,000 to \$26,000,000, with some bids not due until August 2011. PSNH's analysis indicates that this would be less than the cost of a lengthy delay in the completion of the Project.

### ***Schedule Analysis***

The completion of the SWWT system in combination with the mitigating strategies discussed above to deal with any short delays is currently not expected to affect the critical path of the Project or in-service date.

**Independent Engineer's Report for April 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2**

Page 5

### **SWWT System Status**

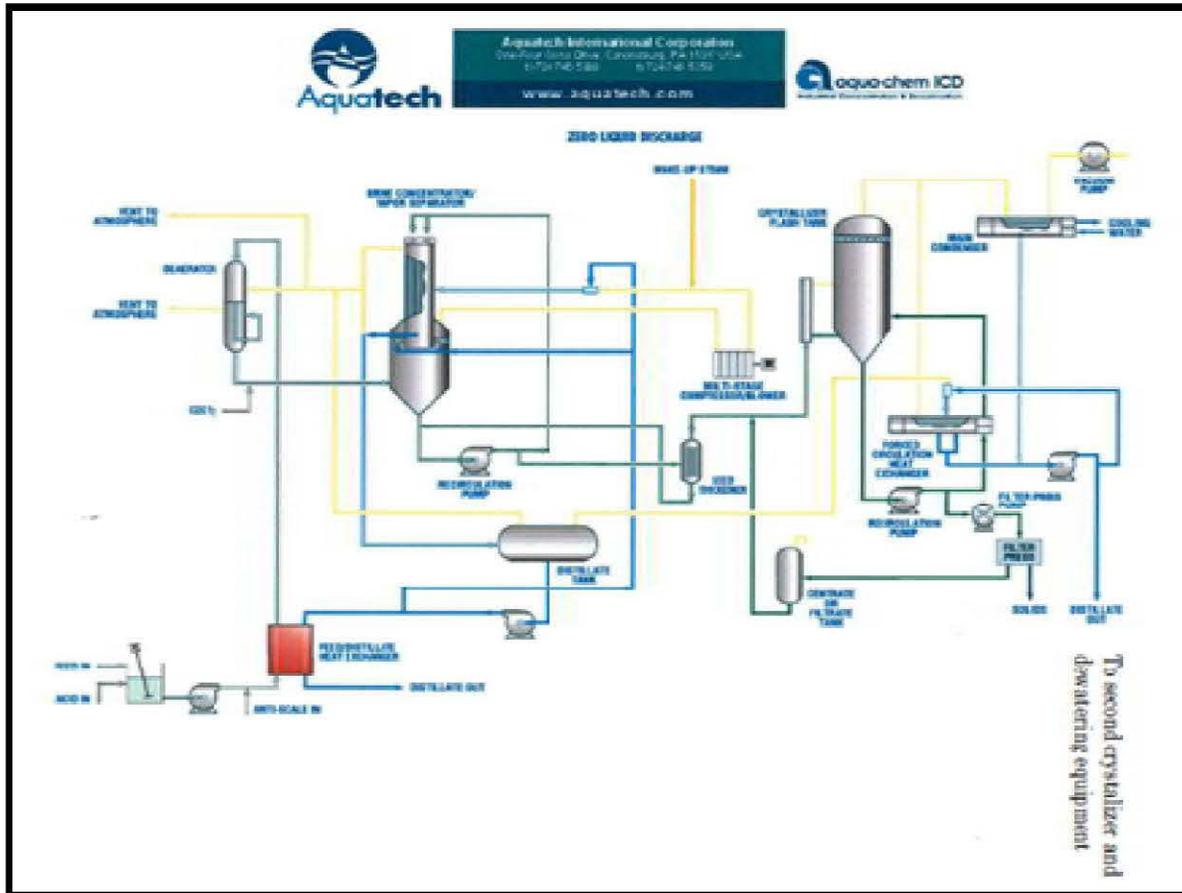
PSNH hired B&McD on November 17, 2010 to provide technical assistance based on their knowledge and expertise with this technology. B&McD concluded that the application of a brine concentrator and crystallizer would reduce the FGD effluent steam down to less than 5 gpm and that an additional crystallizer and dewatering device could be employed to further reduce effluent volume. Figure B-1 is a graphic diagram of the SWWT system. Note that Figure B-1 does not include the second effect, which incorporates a second crystallizer and filter process to recover solids.

A multidiscipline team that included representatives from PSNH, NU and B&McD was formed to implement the B&McD recommendations in a timely manner. A release for early engineering and procurement of long lead time materials was issued in early January 2011, once vendor selection and firm pricing were available. In parallel, contract terms were finalized.

An aggressive goal was set to have some elements of the SWWT system in service by late 2011 to support start-up and commercial operation of the Project and the remaining elements in service in early 2012. The construction of the SWWT system is being managed by PSNH.

Independent Engineer's Report for April 2011  
Merrimack Clean Air Project  
EMAR System and SWWT System  
Attachment 2

Figure B-1  
SWWT System



REDACTED



An SAIC Company

August 11, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for May 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for May 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on June 15, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads 'Richard J. Gendreau'.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – June 15, 2011  
c: Distribution



## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on June 15, 2011. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system.

The supply and installation of the FGD building fire booster pump was reported to be the first critical path, with a negative 31 days of float, a further slip from a negative 18 days in April. The second, third and fourth critical paths had negative floats ranging from two to ten days. However, URS reported that the Project remained on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones had been completed through Absorber Vessel Completion/Closeout on April 16, 2011.

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all Allowance for Funds Used During Construction ("AFUDC") in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH for purposes of inclusion in the rate base, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual Substantial Completion Dates. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the Secondary Wastewater Treatment ("SWWT") system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicates that the reserves should be sufficient.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as: changes in the scope of work, force majeure, changes in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 3

changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

### Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project is rapidly transitioning from the construction phase to the start-up and commissioning phases. PSNH and URS are monitoring and reporting construction completion and turnover of completed systems to commissioning and other commissioning progress measures, such as, completion of power and control loop checks.
3. PSNH was proceeding with the installation of a SWWT system as part of the Project, removing the risk to the scheduled completion of the Project from the lack of a new National Pollutant Discharge Elimination System ("NPDES") permit or the refusal of the Environmental Protection Agency ("EPA") to provide temporary authorization/consent for the discharge in a timely manner.
4. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
5. Through the Period, projected costs for the Project were unchanged at \$430,000,000. During the Period, PSNH reported \$9,000,000 in reserves. Whether these reserves are sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicates that the reserves should be sufficient.
6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 4

undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

### Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection Subcontractor; and E. S. Boulou Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report.

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 5

### Safety

PSNH/URS reported that there were no Recordable Injuries and three First Aid Injuries during the Period. The Project had gone eight weeks without a recordable injury.

### Environmental and Permitting

The final Statement of Special Inspections Reports for all of the foundations was issued by URS to the Town of Bow in support of final occupancy permit requirements.

### Project Status

#### Overall Project

URS reported that, while there were some issues being addressed with schedule recovery plans, overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through March 2011. On May 16, 2011 the Project completed the milestone, Absorber Vessel Completion and Closeout. A number of other significant milestones, not shown in Table 1, were completed during May, including ball mills ready for checkout, reagent preparation area piping complete, dewatering area piping complete, first fill of the Absorber, Absorber area piping complete, testing and checkout of the FGD piping systems complete and limestone system Mechanical Completion.

On April 6, 2011, a fire pump/hydrant pressure and flow test was performed on the existing MK fire pumping system. Based on the results of this test, it was determined that a FGD building fire water booster pump would have to be installed to achieve the water pressure, required by the Fire Chief for the Town of Bow, at the highest elevations of the building. The supply and installation of the FGD building fire booster pump was reported to be on the first critical path, with a negative 31 days of float, a further slip from a negative 18 days last month.

With delays in the completion of the SESS construction turnover ("CTO") packages and start-up activities, URS reported that there were now four critical paths with zero or less days of float. The first critical path, with a negative 31 days of float, began with delivery of the FGD building fire booster pump and continued through completion of the pump foundation and physical installation of the pump, followed by CTO and preoperational checkouts of the fire protection system. The second critical path had a negative two days of float. It included the completion of work associated with the emergency quench system to support the test run and completion of the FGD system checkout and commissioning by the August 1, 2011, the FGD Mechanical Completion Date. The third critical path had five days of negative float. It included the completion of the limestone reagent preparation systems followed by testing and commissioning of the ball mills with limestone. The fourth critical path had ten days of negative float. It included the completion of the hold tank coating and installation of tank internals followed by commissioning of the Absorber hold system. A fifth critical path had four days of positive float. It included the completion of the mechanical and electrical installation for the EMAR system.

  
**Independent Engineer's Report for May 2011**  
**Merrimack Clean Air Project**

Page 6

A delay in completion of various critical path systems will potentially impact the Mechanical Completion Date of the Island contractors. The Mechanical Completion of the EMAR system is critical to demonstrate system operation with clean water and subsequent performance testing with FGD wastewater. SESS has added additional manpower and was working extended hours and weekends to address schedule issues with loop checks and preoperational checkouts. Schedule slippage on system turnover to start-up was an issue, leaving a significant number of preoperational checkouts to be accomplished in a short period of time. Coordinating efforts continued with SESS on a daily basis.

# Independent Engineer's Report for May 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**February 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion / Closeout	02/04/2011	05/16/2011(A)
Milestone: WWT Mechanical Complete	06/01/2011	06/01/2011
FGD Mechanical Completion	08/01/2011	08/01/2011
FGD Ready for Gas	09/01/2011	09/01/2011
MK-1 Tie-in Outage End	09/26/2011	09/20/2011
MK-2 Tie-in Outage End	11/10/2011	11/10/2011
MK-1 and MK-2 Tune and Performance Test	11/16/2011	11/16/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 95.8 percent versus a plan of 96.7 percent. The earned percent complete for construction and start-up phase was 95.0 percent versus a plan of 96.4 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base. The Schedule Performance Index ("SPI") for the Project through the Period, as calculated from the overall earned percent complete, was 0.99. This compares with 0.98 last month.

There was a 1.7 percentage (2.6 percent last month) point difference between the earned (92.2 percent) and planned (93.9 percent) percent complete for construction and start-up. URS reported that progress on the Island contracts was mainly impacted by the work in the FGD Island. The key areas lagging behind schedule in the FGD Island included tank coating, CTOs and start-up preoperational checkouts. In the WWT Island, SWT/NP's failure to complete system turnovers in a timely manner delayed Mechanical Completion of the PWWT system until the first week of August 2011.

The earned percent complete on the BOP contracts was lagging by 1.1 percent (2.1 percent last month) due primarily to schedule slippages in the booster fan area, chimney, truck wash system and quench system. The issue with schedule slippage was being addressed in weekly meetings.

### Project Schedule

The Project is rapidly transitioning from the construction phase to the start-up and commissioning phases. PSNH and URS are monitoring and reporting construction completion and CTO of completed systems to commissioning and other commissioning progress. URS included a start-up progress curve in its monthly progress report, which reflected progress on loop checks, instrument calibrations and Mechanical Completion activities. URS also provided tracking of CTO packages completed by construction and turned over to commissioning.

### Major Project Contractors

The reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and testing activities, unless otherwise indicated.

### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 96.7 percent versus a plan of 99.0 percent. This compares with 96.1 percent and 98.2 percent reported last month. For construction management and start-up services, the earned value was 77.5 percent versus a plan of 77.0 percent. This compares with 73.8 percent and 73.9 percent, respectively, last month. No significant issues were reported.

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 9

### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 95 percent versus a plan of 99 percent. This compares with 94 percent and 99 percent last month. SESS completed 740 out of 1965 loop checks. This was well behind the late plan of 1,322 loop checks. SESS had a start-up status (including walk downs, de-energized tests, energized tests, loop checks, mechanical checks, and operational tests) of 34.9 percent earned versus 43.5 percent planned.

During the Period, SESS completed installing the Potential Adjustment Protection ("PAP") system and the electrical work for the electrical room heating, ventilation, and air conditioning ("HVAC") system. They continued to coat the hold tank and paint the remaining tank exteriors. They awarded the contract to line the two shop fabricated tanks and turned ten systems over to start-up. SESS start-up flushed and commissioned the HPU skid and Absorber recycle pump inlet valves, filled the Absorber vessel and commissioned the sump agitators.

PSNH/URS identified a number of concerns with the performance of SESS, including the lack of an adequate start plan; the Start-Up Manager was working from SESS' offices in Pittsburg and not the site; insufficient staff on site to both complete the outstanding loop checks and to support the commissioning schedule; and concern that SESS management in the Pittsburg office was not fully aware of the problems.

During the MPM, URS reported that it had sent a letter, on June 2, 2011, to SESS project management putting them on notice that they had failed to complete the June 1, 2011, Pre-commissioning Complete and Ready for Commissioning and Testing Critical Milestone and that URS/PSNH would be assessing daily liquidated damages per Article 12.1 Liquidated Delay Damages of the Engineering Procurement and Construction ("EPC") Agreement.

### Dearborn Midwest (Material Handling Systems)

Through the Period, DMW had a construction/testing earned percent complete of 95 percent versus a plan of 97 percent. This compares with 94 percent and 96 percent last month. They completed 17 CTOs compared to 17 in the forecast.

During the Period, DMW achieved Mechanical Completion of the limestone system on May 28, 2011. They completed pipe installation for the dust suppression systems, flushed the service water and air lines and performed integrated tests on the limestone system. The electrical subcontractor continued to work on lighting and communications in the silo and conveyor tubes.

DMW made a proposal to PSNH to replace several conveyor idlers. It is being reviewed by PSNH.

### Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (the "State") and demobilized from site. PSNH reported that the state elevator

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 10

inspection was completed on May 6, 2011 and that PSNH was awaiting the elevator permit certificate.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 84 percent versus a plan of 84 percent. This compares with 84 percent and 84 percent last month. They completed 192 out of 734 loop checks and completed no CTO packages compared to 4 in the forecast.

During the Period, SWT/NP completed installing pipe systems; continued to terminate cables and installed the concrete in the clarifiers. CTO walk downs continued, but they were not supporting the June 1 Mechanical Completion date. SWT/NP is forecasting August 04, 2011 for Mechanical Completion of the PWWT.

The mezzanine floor for the EMAR system was delivered and erection began. Meetings were held with SWT/NP management to review the EMAR system schedule to try to improve the completion of testing. URS indicated during the MPM that Mechanical Completion for the EMAR system was scheduled for November 9, 2011.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 96 percent versus a plan of 97 percent. This compares with 95 percent and 97 percent last month. During the Period, MIS completed insulating the dampers and expansion joints and painted the block wall in the truck wash and door frames in other areas. The contractor submitted their tie in outage schedules with an option to reduce the Unit 1 tie in schedule. This option is being reviewed.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 100 percent versus a plan of 100 percent. They completed 21 CTO packages compared to 23 in the forecast. During the Period, AZCO completed installing the quench engine fuel and exhaust pipe. They completed the CTOs for the truck wash, continuous emissions monitoring system ("CEMS") and Burner Management System ("BMS") systems. They performed the initial alignment of the diesel engine; booster fan lube oil flushes; blowdown of the instrument air piping in the booster fan area and they walked down the ductwork for the booster fan runs.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 93 percent versus a plan of 98 percent. This compares with 88 percent and 98 percent last month. They completed 31 CTO packages compared to 35 in the forecast. During the period, ESB continued to pull and terminate cable to the booster fan hoists and area lighting; continued installing equipment and conduit in the truck wash; and completed pulling cable to the existing control room. They

## Independent Engineer's Report for May 2011 Merrimack Clean Air Project

Page 11

removed the scaffolding from the 232 electrical room and discontinued the second shift. They commissioned the booster fan electrical feeders.

### G. C. Cairns (Site Finalization - Phase I)

During the Period, George Cairns continued installing bollards at the ammonia tank farm; modified the trench walls near the Unit 2 Selective Catalytic Reduction ("SCR") system and prepared several areas for base course asphalt installation. They started the limestone truck unloading foundation installation.

### Construction Turnover

URS reported that 95 CTO packages were issued versus a forecast of 112.

### Start-Up

URS' Start-Up group ("Start-Up") reported an overall earned percent complete of 65.3 percent versus a plan of 47.0 percent. Start-Up commissioned and turned over the acid and caustic piping, performed air line blows in the booster fan area and checks on the Bentley Nevada booster fan vibration equipment. They assisted SESS with a number of activities, including flushing and checkout of the HPU skid and Absorber recycle pump inlet valves; loop checks and commissioning; Absorber vessel fill; and sump agitators commissioning. They assisted DMW with the limestone system.

### Absorber Potential Adjustment Protection

The installation of the electrical components on the PAP system, including the transformer, control panel, and wiring was scheduled for August 2011.

### SWWT System

During the Period, Burns and McDonnell ("B&McD") continued BOP engineering activities. PSNH awarded the foundation contract and conducted the kick-off meeting. They completed the mechanical bid package specification and issued it for bids.

The Mechanical Completion Date for the first effect (first stage) of the SWWT system is currently estimated to be November 2011 with start-up, commissioning and testing to be completed by January 2012. The Mechanical Completion Date for the second effect is currently estimated for the second quarter of 2012 with start-up, commissioning and testing to be completed by the second quarter of 2012.

### Merrimack Clean Air Project Cost Summary

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all

  
**Independent Engineer's Report for May 2011  
Merrimack Clean Air Project**

Page 12

AFUDC in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual completion dates, e.g., Substantial Completion. R W Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicates that the reserves should be sufficient. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

**Independent Engineer's Report for May 2011  
Merrimack Clean Air Project Photographs - June 15, 2011  
Attachment 1  
Page 1**



**Figure A-1 SWWT System Foundations**



**Figure A-2 Enhanced Mercury/Arsenic Removal System Elevated Platform**



**Independent Engineer's Report for May 2011  
Merrimack Clean Air Project Photographs - June 15, 2011  
Attachment 1  
Page 2**



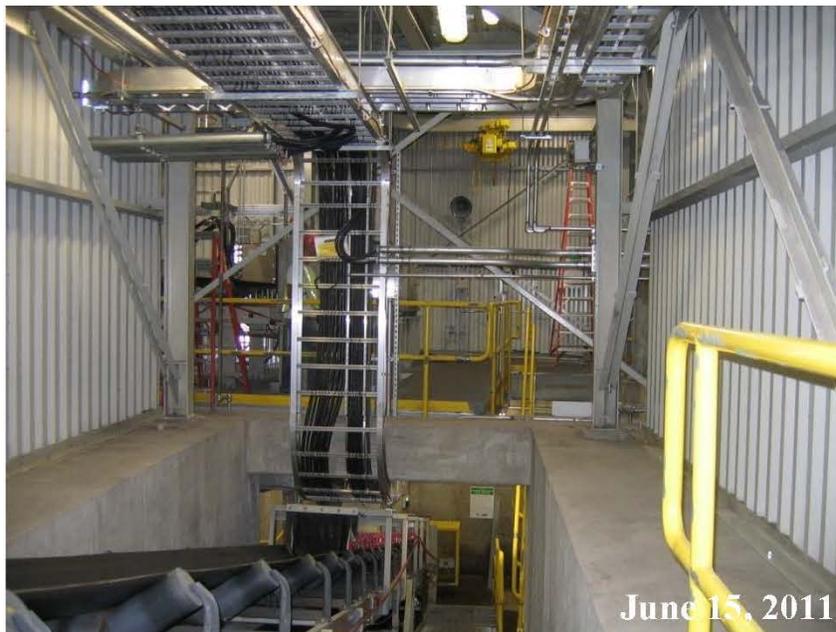
**Figure A-3 South Side of FGD Building**



**Figure A-4 Field Erected Tanks**



**Figure A-5 Absorber Limestone Slurry Agitator**



**Figure A-6 Limestone Conveyor L-3C**

Independent Engineer's Report for May 2011  
Merrimack Clean Air Project Photographs - June 15, 2011  
Attachment 1  
Page 4



**Figure A-7 Limestone Storage Silos Conveyor L-3A**



**Figure A-8 Limestone Storage Silo Traveling Rotary Plow Feeder**

**Independent Engineer's Report for May 2011  
Merrimack Clean Air Project Photographs – June 15, 2011  
Attachment 1  
Page 5**



**Figure A-9 Limestone Truck Unloading Foundations**



**Figure A-10 Existing Radial Stacker and Limestone Receiving Hopper and Transfer Tower**

Independent Engineer's Report for May 2011  
Merrimack Clean Air Project Photographs - June 15, 2011  
Attachment 1  
Page 6



Figure A-11 Truck Wash



Figure A-12 L to R: Emergency Service Water Pump Diesel Drive, Diesel Storage Tank and Eye Wash

REDACTED



An SAIC Company

September 26, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for June 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for June 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on July 20, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – July 20, 2011

c: Distribution

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## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck visited the Project site on July 20, 2011. During this site visit we attended the Monthly Project Meeting (“MPM”) between PSNH and URS, (the “Program Manager”), followed by the MPM with Siemens Environmental Systems and Services (“SESS”), the Flue Gas Desulfurization (“FGD”) System Island Contractor. We also met with PSNH separately to review the status of the Secondary Wastewater Treatment (“SWWT”) system. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment (“PWWT”) facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original base FGD WWT Facility) and the additional Enhanced Mercury/Arsenic Removal (“EMAR”) system.

There was a general sense that SESS’ performance had improved significantly, since they were put on notice, by letter on June 2, 2011, that they had failed to complete the milestone, FGD Pre-Commissioning Complete and Ready for Testing scheduled for June 1, 2011 and that URS/PSNH would assess daily liquidated damages (“LD”) until completed. URS reported that since that letter was issued there was an improvement in communications and cooperation with SESS’ management on site and with senior management in Pittsburgh. The SESS Start-Up Manager relocated to the site with a commensurate improvement in the completion of loop checks, construction turnover (“CTO”) packages and punchlist items.

The supply and installation of the FGD building fire booster pump was reported to be the first critical path, with zero days of float. This was a significant improvement over the -31 days of float reported last month. The second, third and fourth critical paths had -2, -3 and zero days of float, respectively. URS reported that the Project remained on schedule to meet the tie-in outage milestone dates in late 2011 and the related initial equipment and system testing, start-up and commissioning activities. All of the major Project Milestones were completed through Absorber Vessel Completion/Closeout on May 16, 2011.

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves through the Period. The source of these reserves was the elimination of almost all Allowance for Funds Used During Construction (“AFUDC”) in 2012, based on PSNH’s analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH for purposes of inclusion in the rate base, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual Substantial Completion dates. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH’s budget analysis indicated that the reserves should be sufficient.

## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 3

It should be noted that for large projects with complex fixed-price, target-price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as: changes in the scope of work, force majeure, changes in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project is rapidly transitioning from the construction phase to the start-up and commissioning phases. PSNH and URS are monitoring and reporting construction completion and turnover of completed systems to commissioning and other commissioning progress measures, such as, completion of power and control loop checks.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. PSNH was proceeding with the installation of the SWWT system. Start-up, commissioning and testing of the first effect (first stage) of the system was scheduled to be completed by January 2012 and start-up, commissioning and testing of the second effect was scheduled to be completed by the second quarter of 2012.
5. Through the Period, projected costs for the Project were unchanged at \$430,000,000. During the Period, PSNH reported \$9,000,000 in reserves. Whether these reserves are sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all

## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 4

outstanding contractor claims and others. PSNH's budget analysis indicated that the reserves should be sufficient.

6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or to correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection subcontractor; and E. S. Boulou Co.

## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 5

("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report. Background on the EMAR system and the SWWT system is contained in the February, March and April 2011 MPRs.

### Safety

PSNH/URS reported that there were no Recordable Injuries or First Aid Injuries during the Period.

### Environmental and Permitting

There was no activity with the Bow Planning Board.

The Temporary Air Permit extension through September 30, 2012 and the structural and architectural building permit for the limestone truck unloading facility ("LTU Facility") conveyors were received.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through June 2011. On May 16, 2011 the Project completed the milestone, Absorber Vessel Completion and Closeout. A number of other significant milestones, not shown in Table 1, were completed during June, including, SWT/NP final set lime slurry storage tanks, SESS complete preoperational checkout of the Absorber, SESS initial Absorber operations testing and SESS limestone feed available to the day silos.

The SESS Milestone, FGD Pre-Commissioning Complete and Ready for Testing scheduled for June 1, 2011 was not completed in June 2011. URS sent a letter, on June 2, 2011, to SESS project management putting them on notice that they had failed to complete this milestone and that URS/PSNH would be assessing daily LDs per Article 12.1 Liquidated Delay Damages of the Engineering Procurement and Construction ("EPC") Agreement.

URS reported that there were now four critical paths with zero or less days of float, all involving SESS activities. The first path with zero days of float began with delivery of the FGD building fire booster pump. The path then continued through completion of the pump foundation and physical installation of the pump followed by CTO and preoperational checkouts of the fire protection system. This is a significant improvement compared to the 31 days of negative float in this path last month. The second path had a negative two days of float. It included the

**Independent Engineer's Report for June 2011  
Merrimack Clean Air Project**

Page 6

completion of work associated with the Absorber hold tank system to support completion of FGD system checkout and commissioning by August 1, 2011. The third critical path with a negative three days of float included completion of the limestone reagent preparation systems followed by testing and commissioning of the ball mills with limestone. The SESS path terminates with FGD Mechanical Completion on August 1, 2011. The fourth critical path with zero days of float included the completion of preoperational checkouts and commissioning of the vacuum filter system. This path terminated with FGD Mechanical Completion on August 1, 2011.

SESS added additional manpower and was working extended hours and weekends to address schedule issues, including loop checks and preoperational checkouts.

# Independent Engineer's Report for June 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**June 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
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## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 96.8 percent versus a plan of 97.3 percent. The earned percent complete for construction and start-up phase was 95.8 percent versus a plan of 96.7 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base. The Schedule Performance Index ("SPI") for the Project through the Period, as calculated from the overall earned percent complete, was 0.99. This compares with 0.99 last month.

There was an 0.8 percentage (1.7 percent last month) point difference between the earned (94.0 percent) and planned (94.8 percent) percent complete for construction and start-up. URS reported that progress on the island contracts was mainly impacted by the work in the WWT Island. The failure in timely completion of WWT system turnovers has delayed Mechanical Completion of the PWWT (base portion of the system) until the middle of August 2011.

### Project Schedule

The Project is rapidly transitioning from the construction phase to the start-up and commissioning phases. PSNH and URS are monitoring and reporting construction completion and CTO of completed systems to commissioning and other commissioning progress. URS included a start-up progress curve in its monthly progress report, which reflected progress on loop checks, instrument calibrations and Mechanical Completion activities. URS also provided tracking of CTO packages completed by construction and turned over to start-up.

### Major Project Contractors

The reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and start-up activities, unless otherwise indicated.

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 97.1 percent versus a plan of 99.6 percent. This compares with 96.7 percent and 99.0 percent reported last month. For construction management and start-up services, the earned value was 80.4 percent versus a plan of 79.5 percent. This compares with 77.5 percent and 77.0 percent, respectively, last month. No significant issues were reported.

#### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 98 percent versus a plan of 100 percent. This compares with 95 percent and 99 percent last month. SESS completed 1,655 out of a total of 1,965 loop checks. This was somewhat behind the late plan of 1,894 loop checks, but a significant improvement compared to the previous Period. They had completed 32 CTO packages versus a forecast of 35.

Independent Engineer's Report for June 2011  
Merrimack Clean Air Project

Page 9

PSNH/URS acknowledged that SESS had made significant progress over the past month. SESS' level of effort, cooperation, coordination and communications had all improved. The SESS Start-Up Manger was assigned to the site full time. While URS still did not expect that SESS would achieve the FGD Mechanical Completion Milestone by August 1, 2011, they appeared to be much more confident, than last month, that the delay would not be more than a week or two. URS sent a letter to SESS identifying what was required to achieve the Mechanical Completion Milestone. URS reported that SESS generally agreed with these requirements.

The improvements in SESS' performance and cooperation were thought, in part, to be the result of the LD letter sent by URS to SESS on June 2, 2011. In this letter to SESS' project management, URS/PSNH put them on notice that they had failed to complete the June 1, 2011, Pre-Commissioning Complete and Ready for Commissioning and Testing Critical Milestone, and that URS/PSNH would be assessing daily LDs per Article 12.1 Liquidated Delay Damages of the EPC Agreement until the milestone was achieved.

During the Period, SESS completed coating the inside of the hold tank and painting the remaining tank exteriors; completed installing the valves on the fire protection risers in the stairways and started to install sound attenuation panels in the oxidation air blower enclosure. They completed six CTO packages. SESS start-up commissioned the oxidation air compressors; the sump pumps and agitators; and the recycle pumps. They filled the Absorber vessel; performed ball mill motor runs; and ran the ball mills empty on the main motors.

There remained some concerns with SESS' performance. CTOs and the start-up schedule were running behind, reducing the remaining float. SESS continued to work extended work hours, brought on extra people and was working weekends to recover. At the time of the MPM, the Project had experienced an interruption in service water due to the blinding (plugging) of the backwash filter by very fine silt. SESS indicated during its MPM that the lack of service water was impacting its start-up and commissioning activities. At the time of our site visit, a temporary replacement for the backwash filter was delivered to the site to facilitate a work around while the issue with the permanent filter was studied (see Photograph A-12).

Some system and equipment problems were identified. The HVAC units were not pressurizing the electrical rooms. SESS indicated that they would be replacing the fans to provide the required positive pressure and would be providing temporary cooling of the spaces until the new fans were installed. There were long discussions in both the main MPM and the separate SESS MPM about problems with the rotary plow feeders under the limestone day silos. The rotary plow feeders were specified by PSNH in the FGD specification. The feeders were operated with the silos empty and with up to 20 tons of limestone in a silo (the capacity of each silo is 360 tons) without any problem. Much above this point, the rotary plow feeder could not be restarted against the weight of the limestone in the silo. It was noted that SESS did not run the rotary plow feeders as the silos were being filled with limestone, as required by the vendor. This apparently establishes the flow path to and through the rotary plow feeder, preventing the limestone from packing around the feeder. SESS contacted Tampa Electric who has a similar installation and has worked through similar problems. Running the rotary plow feeder during

## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 10

filling is one of their established procedures. Various causes and possible solutions were discussed during the meeting. Limestone samples were sent out for analysis by both PSNH and SESS to make sure that the limestone was in accordance with the specification. Resolving this problem may have to wait until the FGD system is operational and various fixes can be tested with a continuous flow of limestone into and out of the silos.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 97 percent versus a plan of 98 percent. This compares with 95 percent and 97 percent last month. During the Period, DMW began to receive material for the LTU Facility; completed the limestone storage silo exterior concrete repair; loaded limestone in the storage silos from rail cars; performed final integrated tests on the limestone unloading system and flushed the service water and air lines.

DMW's proposal to replace several conveyor idlers had been accepted by PSNH. In addition, PSNH will receive a \$7,500 credit to be used to purchase future idlers or other equipment.

DMW experienced limestone bridging and packing problems in the storage silos affecting the rotary plow reclaim system as noted above.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (the "State") and demobilized from the site. PSNH reported that the State elevator inspection was completed on May 6, 2011 and that they have received the elevator permit certificate.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 86 percent versus a plan of 92 percent. This compares with 84 percent and 84 percent last month. They completed 290 out of 734 loop checks and completed 8 CTO packages compared to 15 in the forecast.

During the Period, SWT/NP completed the steel for the EMAR system platform and placed the concrete floor slab; completed system hydrostatic tests; started to anchor the fiberglass tanks; started to install and coat the agitator blades; filled the hydrated lime tanks; and commissioned the hydrated lime system and the clarifier rakes.

SWT/NP failed to achieve Mechanical Completion on the June 1, 2011 Milestone Date. SWT/NP was forecasting August 4, 2011 for Mechanical Completion of the PWWT. This delay was not expected to impact the processing of the FGD wastewater stream. SWT/NP was working extended hours to maintain the August 2011 Mechanical Completion Date for the PWWT system (base scope). Meetings continued to be held with SWT/NP management to review the EMARS and PWWT schedules to try to improve the completion of testing. Mechanical Completion for the EMAR system was scheduled for November 30, 2011.

Independent Engineer's Report for June 2011  
Merrimack Clean Air Project

Page 11

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

Through the Period, MIS had an overall earned percent complete of 97 percent versus a plan of 97 percent. This compares with 96 percent and 97 percent last month. The contractor submitted their tie in outage schedules with an option to reduce the Unit 1 tie in schedule. This option was not accepted by PSNH. The contractor demobilized until mid August 2011.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO had an overall earned percent complete of 100 percent versus a plan of 100 percent. They completed 23 CTO packages compared to 24 in the forecast. During the Period, AZCO completed installation of the emergency quench water pump diesel engine diesel storage tank overflow alarm; completed start-up support for the booster fans with final alignment and coupling installation; performed booster fan motor runs; coupled booster fans; commissioned dampers and seal air fans; performed initial alignment of the emergency quench water pump diesel engine; and performed instrument air blow down in the booster fan area.

The Unit 1 booster fan experienced high vibration, 8 mills, during start-up, but operated at a normal 1.5 mills when at full speed. The fan supplier, Flaktwoods, indicated that this was normal for this specific type of fan and recommended that a three-second delay be added to the vibration trip logic to allow the fan to pass through the critical speed during start-up without tripping. PSNH/URS indicated some concern with this recommendation. It was noted that there is a two-year warranty on the fan.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 97 percent versus a plan of 98 percent. This compares with 93 percent and 98 percent last month. They completed 35 CTO packages compared to 38 in the forecast. During the period, ESB continued to pull and terminate cable to the booster fan hoists and area lighting; continued to install conduit in the truck wash, released the distributed control system ("DCS") and uninterruptible power supply ("UPS") in the plant control room; released the continuous emissions monitoring system ("CEMS") equipment to start-up; and commissioned the damper electrical feeders.

### **G. C. Cairns (Site Finalization - Phase I)**

During the Period, George Cairns continued to pave the areas east of Unit 2, north of the booster fan enclosure and the remaining warehouse area. They continued to make concrete placements for the LTU Facility foundations.

Completion of the LTU Facility foundation was one month behind schedule.

The Phase 2 Site Finalization bids were received on June 24, 2011 and are being evaluated.

## Independent Engineer's Report for June 2011 Merrimack Clean Air Project

Page 12

### Start-Up

URS' Start-Up Group ("Start-Up") reported an overall earned percent complete of 82.4 percent versus a plan of 59.4 percent. Start-Up assisted SESS with the commissioning of the oxidation air blowers, ball mills and sump agitators; filled the hydrated lime tanks and commissioned the system; performed checks on the Bentley Nevada vibration equipment for the booster fans; assisted DMW with the performance testing of the limestone train unloading system; ran booster fan motors and coupled the fans; and began development of standard operating procedures ("SOPs").

### Absorber Potential Adjustment Protection

The installation of the electrical components in the Potential Adjustment Protection ("PAP") system, including the transformer, control panel, and wiring was scheduled for August 2011.

### SWWT System

During the Period, PSNH issued the mechanical construction/installation package for bids; conducted the pre-bid meeting and received the bids. They reviewed the electrical construction bid package and issued it for bids. They received bids for the soda ash silo and continued to develop the softening design parameters.

The foundation contractor placed the concrete for the sump floor, sump walls and foundation pedestals. They continued foundation installation. PSNH reported that the foundation work was going well.

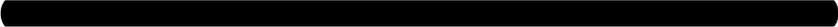
The bids for the mechanical construction/installation work were substantially higher than the value in the estimate. Some of this increase was attributed to the accelerated schedule. PSNH was evaluating ways to improve the pricing. The electrical construction/installation bids came in somewhat less than estimated.

PSNH reported that the structural steel supplier was in bankruptcy, but that steps were being taken to mitigate any impact. They also noted that the delivery of the first crystallizer was delayed. PSNH also reported that three to four disposal sites had been identified to take the treated FGD wastewater until the SWWT system was placed into service.

The Mechanical Completion Date for the first effect (first stage) of the SWWT system was estimated to be November 2011 with start-up, commissioning and testing to be completed by January 2012. The Mechanical Completion Date for the second effect was estimated for the second quarter of 2012 with start-up, commissioning and testing to be completed by the second quarter of 2012.

### Merrimack Clean Air Project Cost Summary

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all

  
**Independent Engineer's Report for June 2011**  
**Merrimack Clean Air Project**

Page 13

AFUDC in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual completion dates, e.g., Substantial Completion. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicated that the reserves should be sufficient. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

**Independent Engineer's Report for June 2011  
Merrimack Clean Air Project Photographs – July 20, 2011  
Attachment 1  
Page 1**



**Figure A-1 EMAR System Elevated Platform**



**Figure A-2 WWT System Filter Press**



**Independent Engineer's Report for June 2011  
Merrimack Clean Air Project Photographs – July 20, 2011  
Attachment 1  
Page 2**



**Figure A-3 WWT System Tank Being Filled with Water**



**Figure A-4 South Side of FGD Building and Field Erected Tanks**

**Independent Engineer's Report for June 2011**  
**Merrimack Clean Air Project Photographs – July 20, 2011**  
**Attachment 1**  
Page 3



**Figure A-5 PAP System Electrical Connection (near) – Analyzer Hot Tap Penetration (beyond)**



**Figure A-6 Absorber Outlet Duct and Emergency Spray Piping**

**Independent Engineer's Report for June 2011**  
**Merrimack Clean Air Project Photographs – July 20, 2011**  
**Attachment 1**  
Page 4



**Figure A-7 Absorber Outlet Duct, Expansion Joints and Drain Piping**



**Figure A-8 East Side of FGD Building and Flue Gas Ducts from Units 1 and 2**

**Independent Engineer's Report for June 2011**  
**Merrimack Clean Air Project Photographs – July 20, 2011**  
**Attachment 1**  
Page 5



**Figure A-9 Limestone Storage Silo Outlet and Rotary Plow**



**Figure A-10 Limestone Truck Unloading System Foundations**

**Independent Engineer's Report for June 2011  
Merrimack Clean Air Project Photographs – July 20, 2011  
Attachment 1  
Page 6**



**Figure A-11 Problematic (blinded) Service Water System Backwash Filter**



**Figure A-12 Temporary Replacement for the Backwash Filter**

REDACTED



An SAIC Company

September 29, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for July 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for July 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on August 17, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau". The signature is written in a cursive style.

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – August 17, 2011

c: Distribution



## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on August 17, 2011. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. We also met with PSNH separately to review the status of the Secondary Wastewater Treatment ("SWWT") system. Following these meetings, we toured the construction site to make firsthand observations of the work being performed and to confirm the progress reported by the various parties during the MPMs. We also reviewed data made available by PSNH, URS (eRoom and Documentum document filing sites) and others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original base FGD WWT Facility) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system.

The Project was focused on completing the final construction, start-up and commissioning activities and preparing for the tie-in outages. The critical path for the Project included the MK-1 and MK-2 tie-in outages, the restart and tuning of MK-2, the FGD performance test and the PWWT performance test.

On July 18<sup>th</sup> SESS received notice from URS that they had achieved the critical milestone, FGD Pre-Commissioning Complete and Ready for Testing, as of July 14, 2011. This milestone was originally scheduled to occur on June 1, 2011; making SESS' achievement of this milestone potentially 43 days late. The URS letter also indicated that, as a result of this delay, Liquidated Damages ("LD") in the amount of \$950,000 would be assessed per Article 12.2 Liquidated Delay Damages of the Engineering, Procurement and Construction ("EPC") Agreement. SESS disputed the URS' finding that they did not meet this milestone date.

It was reported during the MPM, that SESS had achieved the major milestone, FGD Mechanical Completion, on August 4, 2011. PSNH acknowledged that the three days of delay beyond the original date of August 1, 2011, were not SESS' responsibility. They were the result of the service water system being out of service, due to blinding of the backwash filter, preventing SESS from completing this milestone on time.

SESS' achievement of Mechanical Completion on schedule was significant for both SESS and for the PSNH/URS project management. Only a few months before, SESS was expected to miss this milestone by several weeks to up to a month or more. The schedule recovery was the result of PSNH/URS' continued emphasis on the schedule and the enforcement of EPC Agreement milestones and LDs. In this case, SESS' level of effort, cooperation, coordination and communications improved significantly once they failed to achieve the June 1, 2011 critical milestone, FGD Pre-Commissioning Complete and Ready for Testing and PSNH/URS put them

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 3

on notice that they would be subject to LDs until they achieved the milestone. LDs of \$950,000 were ultimately assessed as discussed above.

It was also reported that SWT/NP had achieved the major milestone, WWT Mechanical Complete (Primary WWT) on August 1, 2011.

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves through the Period. The source of these reserves was the elimination of almost all Allowance for Funds Used During Construction ("AFUDC") in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH for purposes of inclusion in the rate base, would occur in late 2011, rather than mid-2012. Note that the in-service date is not the same as the contractual Substantial Completion dates. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicated that the reserves should be sufficient.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as: changes in the scope of work, force majeure, changes in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project was focused on completing the final construction, start-up and commissioning activities and preparing for the tie-in outages. The Project was using a range of schedules, lists and reports to track the progress in these areas.

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 4

3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. PSNH was proceeding with the installation of the SWWT system. Start-up, commissioning and testing of the first effect (first stage) of the system was scheduled to be completed by January 2012 and start-up, commissioning and testing of the second effect was scheduled to be completed by the second quarter of 2012.
5. Through the Period, projected costs for the Project were unchanged at \$430,000,000. During the Period, PSNH reported \$9,000,000 in reserves. Whether these reserves are sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicated that the reserves should be sufficient.
6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 5

and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report. Background on the EMAR system and the SWWT system is contained in the February, March and April 2011 MPRs.

### Safety

The Project had gone three months without a Recordable Injury or a First Aid Injury. However, during the Period, PSNH/URS reported that there were two OSHA Recordable Injuries and three First Aid Injuries. URS added another full-time safety professional to its on-site staff in response to these events.

URS presented the Project with the President's Award for going over one million craft man-hours without a Lost-Time Accident.

### Environmental and Permitting

SESS and SWT initiated discussions with the Bow Building Inspector to obtain Occupancy Permits for their respective buildings.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through July 2011. It was reported during the MPM that SESS achieved the major milestone, FGD Mechanical

**Independent Engineer's Report for July 2011  
Merrimack Clean Air Project**

Page 6

Completion, on August 4, 2011. PSNH acknowledged that the three days of delay beyond the original date of August 1, 2011, were not SESS' responsibility. They were the result of the service water system being out of service, due to blinding of the backwash filter, preventing SESS from completing this milestone on time. It was also reported that SWT/NP achieved the major milestone, WWT Mechanical Complete (Primary WWT) on August 1, 2011; this was several months after the original scheduled date of June 1, 2011. A number of other significant milestones, not shown in Table 1, were completed during July, including, SESS A & B limestone feed to the ball mills, A & B ball mill test run (with 30 percent charge) and A & B test/run of the dewatering system; and SWT/NP mechanical completion of the lime slurry feed.

The next major milestones for the Project are FGD Ready for Gas, on September 1, 2011, and the completion of the MK-1 and MK-2 Tie-in Outages in late September and mid-November, respectively.

The critical path for the Project included the MK-1 and MK-2 tie-in outages, the restart and tuning of MK-2, the FGD performance test and the PWWT performance test.

# Independent Engineer's Report for July 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**July 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion / Closeout	02/04/2011	05/16/2011(A)
Milestone: WWT Mechanical Complete (Primary WWT)	06/01/2011	08/01/2011 (A)
FGD Mechanical Completion	08/01/2011	08/04/2011 (A)
FGD Ready for Gas	09/01/2011	09/01/2011
MK-1 Tie-in Outage End	09/28/2011	09/28/2011
MK-2 Tie-in Outage End	11/21/2011	11/21/2011
MK-1 and MK-2 Tune and Performance Test	11/27/2011	11/27/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 8

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 97.4 percent versus a plan of 97.6 percent. The earned percent complete for construction and start-up phase was 95.2 percent versus a plan of 95.3 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

There was only 0.1 percentage (0.8 percent last month) point difference between the earned (95.2 percent) and planned (95.3 percent) percent complete for construction and start-up. This difference has been rapidly reduced over the past few months.

### Project Schedule

The Project was focused on completing the final construction, start-up and commissioning activities and preparing for the tie-in outages. The Project was using a range of schedules, lists and reports to track the progress in these areas.

### Major Project Contractors

The reporting of earned versus planned percent complete for the major Project contractors is based on the progress of construction and start-up activities, unless otherwise indicated.

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 98.4 percent versus a plan of 99.8 percent. This compares with 97.1 percent and 99.6 percent reported last month. For construction management and start-up services, the earned value was 83.3 percent versus a plan of 82.0 percent. This compares with 80.4 percent and 79.5 percent, respectively, last month. No significant issues were reported.

#### Siemens Environmental Systems and Services (FGD Island)

Through the Period, SESS had a construction/testing earned percent complete of 99 percent versus a plan of 100 percent. This compares with 98 percent and 100 percent last month.

On July 18th SESS received notice from URS that they had achieved the critical milestone, FGD Pre-Commissioning Complete and Ready for Testing, as of July 14, 2011. This milestone was originally scheduled to occur on June 1, 2011, making SESS' achievement of this milestone potentially 43 days late. The URS letter also indicated that, as a result of this delay, LDs in the amount of \$950,000 would be assessed per Article 12.2 Liquidated Delay Damages of the Agreement. SESS disputed the URS finding that they did not meet this milestone date.

It was reported during the MPM, that SESS had achieved the major milestone, FGD Mechanical Completion, on August 4, 2011. PSNH acknowledged that the three days of delay beyond the original date of August 1, 2011, were not SESS' responsibility. They were the result of the

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 9

service water system being out of service, due to blinding of the backwash filter, preventing SESS from completing this milestone on time.

SESS' achievement of Mechanical Completion on schedule was a significant for both SESS and for the PSNH/URS project management. Only a few months before, SESS was expected to miss this milestone by several weeks to up to a month or more. The schedule recovery was the result of PNSH/URS' continued emphasis on the schedule and the enforcement of EPC Agreement milestones and LDs. In this case, SESS' level of effort, cooperation, coordination and communications improved significantly once they failed to achieve the June 1, 2011 critical milestone, FGD Pre-Commissioning Complete and Ready for Testing, and PSNH/URS put them on notice that they would be subject to LDs until they achieved the milestone. LDs of \$950,000 were ultimately assessed as discussed above.

During the Period, SESS completed installing the sound attenuation panels in the oxidation air blower enclosure and the hold tank agitators. They coated the interior of two shop fabricated tanks. Start-up commissioned the ball mills, reagent preparation system and the vacuum pumps and belt filters.

The original SESS design for the HVAC systems in the FGD building electrical rooms was not adequate to maintain a positive air pressure in these rooms to keep out dust. It was reported that contacts in some of the switchgear had to be cleaned, because of dust that was getting into these rooms and equipment. SESS redesigned the HVAC systems. It was reported during the MPM that installation of the new equipment had already begun.

SESS replaced the motors and trimmed the rotary plows on the limestone day silos to correct the plow stalling problems that were experienced during commissioning. Whether this is sufficient to correct the problem will not be known until after the tie-in outage, when operation of the FGD system will provide a continuous demand for limestone.

It was reported during the MPM, that multiple sump pump failures in the FGD building were delaying the FGD system integration testing required to support the FGD Ready for Gas Milestone. SESS thought that they had an adequate recovery plan and that the repaired pumps would be returned in time to support the remaining integration testing.

When the Absorber was drained, following its initial fill during commissioning, staining was found on the floor. The Absorber floor is made of Alloy 2205, similar to the walls and other parts of the Absorber. With so much concern over corrosion of Alloy 2205, leading to the installation of the Potential Adjustment Protection ("PAP") technology in the Project's Absorber, this was a potential problem. It should be noted that the PAP system had not been completed at this time and, therefore, was not operating. At the time of the MPM, a metallurgist from Sargent & Lundy was scheduled to arrive to inspect the stain and decide what actions, if any, were required.

### **Dearborn Midwest (Material Handling Systems)**

Through the Period, DMW had a construction/testing earned percent complete of 99 percent versus a plan of 99 percent. This compares with 97 percent and 98 percent last month. During

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 10

the Period, DMW continued to erect the limestone truck unloading facility ("LTU Facility"). They received the -1 conveyor tube sections and bolted them together; set the dust suppression system, electrical buildings and the L-1 conveyor bents. DMW started to install cable tray and pipe in the tube.

Limestone bridging and packing in the storage silos remained a problem/concern.

### **Hamon-Custodis (Reinforced Concrete Chimney and FRP Liner)**

HC completed their work in late May 2010, except for the elevator inspection by the State of New Hampshire (the "State") and demobilized from site. PSNH reported that the State elevator inspection was completed on May 6, 2011 and that they had received the elevator permit certificate.

### **Siemens-Water Technology and Northern Peabody (WWT Facility)**

Through the Period, SWT/NP had a construction/testing earned percent complete of 93 percent versus a plan of 92 percent. This compares with 86 percent and 92 percent last month. During the Period, SWT/NP completed terminating system cables and testing pipe, including in-service testing and completed anchoring the FRP tanks and coating the agitator blade joints. SWT/NP completed construction turnover walk downs for the base scope of the FGD WWT Facility (PWWT) and turned the systems over to start-up. Start-up commissioned the sump pumps and agitators, the hydrated lime system, reaction tanks, sludge system, filters, treated wastewater and chemical feed systems.

It was also reported during the MPM, that SWT/NP had achieved the major milestone, WWT Mechanical Complete (Primary WWT) on August 1, 2011.

### **EMAR System**

The EMAR mezzanine floor monorail steel was erected and the fiberglass tank for the EMAR system was delivered, but other deliveries were behind schedule. Meetings continued to be held with SWT/NP management to review the EMAR system and softening schedules to try to improve the mechanical completion date.

Mechanical Completion of the EMAR system was scheduled for November 30, 2011.

### **Merrill Iron and Steel Inc. (Ductwork and Structural Steel Erection)**

The contractor demobilized until mid-August 2011 when they will be preparing for the tie-in outages.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

AZCO's construction activities were complete. They were preparing for the tie-in outages.

**Independent Engineer's Report for July 2011**  
**Merrimack Clean Air Project**

Page 11

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

Through the Period, ESB had an overall earned percent complete of 98 percent versus a plan of 98 percent. This compares with 97 percent and 98 percent last month. During the period, ESB continued to install cable in the truck wash building and lighting and receptacles in the booster fan enclosure. They started to install conduit to the existing selective catalytic reduction ("SCR") and forced draft ("FD") fan dampers and began to install the duct bank to the LTU Facility's electrical building.

### **G. C. Cairns (Site Finalization - Phase I)**

During the Period, George Cairns completed placing concrete for the LTU Facility foundation, started backfilling the foundations and installed hand rails and platforms.

The Phase 2 Site Finalization bids were being evaluated.

### **Start-Up**

URS start-up assisted SESS and SWT/NP with mechanical completion activities. During the period, FGD Island commissioning activities were complete, except for the rotary plows in the limestone day silos. Commissioning activities in the base FGD WWT Facility (PWWT) were also completed.

### **Tie-In Outage Planning**

Major work activities in support of the upcoming tie-in outages included, integrating the tie-in outage schedule with the plant outage activities, completing the assembly of the electrical and mechanical outage work packages, finalizing the outage ductwork rigging plan and issuing the Outage Readiness Review ("ORR") report and action items list.

### **Outage Readiness Review**

An ORR was performed on June 28, 2011 to ensure that the Project team was prepared for the upcoming tie-in outages and that all required materials were available and outage schedules and execution plans were in place. The review team included representatives from PSNH, URS, AZCO and ESB. Table B-1 in Attachment 2 is a list of the participants. An action items list with 33 items and the responsible organization was developed during the ORR. The review concluded that the tie-in outage work for both units was well planned and as much work as possible had or was being done pre-outage by the contractors.

### **Absorber Potential Adjustment Protection**

The installation of the electrical components in the PAP system, including the transformer, control panel, and wiring was scheduled for August 2011.

## Independent Engineer's Report for July 2011 Merrimack Clean Air Project

Page 12

### SWWT System

During the Period, PSNH issued the electrical construction package for bid, received bids for the mechanical package, received a second round of bids for the electrical and mechanical packages and continued negotiations on the electrical and mechanical packages. Bids were received for the soda ash silo. Work continued on the installation of foundations and grade beams. Three loads of steel were received.

PSNH had decided to proceed with the mechanical work on a time and material ("T&M") basis to better control costs and eliminate change orders. They had good experience installing the PAP system on a T&M basis. The completion costs for the PAP system were substantially less than the original fixed price proposal. While the PAP system is much smaller and less complicated than the SWWT system, it also had to be designed, procured and installed in a very short period of time and in a congested area. The potential for numerous change orders was significant, given these circumstances, justifying the change in contracting strategy to T&M.

We were informed during our August 17, 2011 site visit that AZCO, the current BOP Mechanical Contractor, was selected to perform the SWWT system mechanical installation.

PSNH had also retained the URS Construction Manager, Jim Lavallee, to assist in managing the construction of the SWWT.

The mechanical completion date for the first effect (first stage) of the SWWT system was estimated to be November 2011 with start-up, commissioning and testing to be completed by January 2012. The mechanical completion date for the second effect was estimated for the second quarter of 2012 with start-up, commissioning and testing to be completed by the second quarter of 2012.

### Merrimack Clean Air Project Cost Summary

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all AFUDC in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual completion dates, e.g., Substantial Completion. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of all outstanding contractor claims and others. PSNH's budget analysis indicated that the reserves should be sufficient. Reserves are the accumulated costs savings (variance) that are currently projected in the different cost accounts.

**Independent Engineer's Report for July 2011  
Outage Readiness Review Meeting Participants  
Attachment 2**

Page 1



**Figure A-1 SWWT Building Foundations**

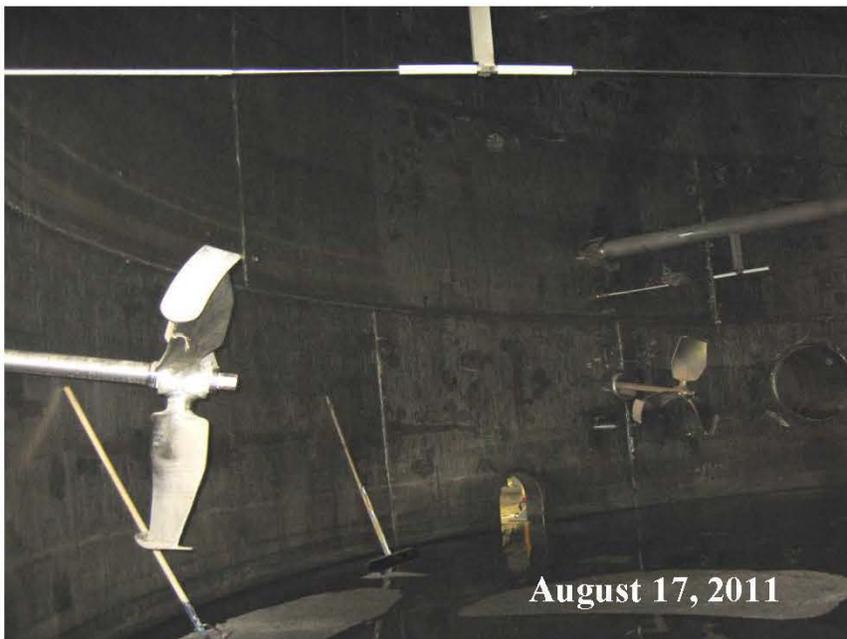


**Figure A-2 EMAR System Elevated Platform**

**Independent Engineer's Report for July 2011**  
**Merrimack Clean Air Project Photographs – August 17, 2011**  
**Attachment 1**  
Page 2



**Figure A-3 EMAR System Tank**



**Figure A-4 Inside the Absorber**

**Independent Engineer's Report for July 2011**  
**Merrimack Clean Air Project Photographs – August 17, 2011**  
**Attachment 1**  
Page 3



**Figure A-5 PAP System Inside the Absorber**



**Figure A-6 Limestone Storage Silo Outlet Shelf**

**Independent Engineer's Report for July 2011  
Merrimack Clean Air Project Photographs – August 17, 2011  
Attachment 1  
Page 4**



**Figure A-7 Limestone Truck Unloading System**



**Figure A-8 Limestone Truck Unloading System**

Independent Engineer's Report for July 2011  
 Outage Readiness Review Meeting Participants  
 Attachment 2  
 Page 1

<b>Table B-1 Outage Readiness Review Meeting Participants</b>	
<b>URS ORR Members</b>	
Al Mock	VP AQCS Projects
Bob Villa	Director of Project Controls
• Roger Kvasager	VP Construction
• Peter Grosso	Project Engineer
Cam Farley	Director of Startup
Merrimack CAP URS Team Members	
Dennis Pennline	Project Manager
Jim Lavallee	Construction Manager
Harish Saligramma	Project Controls Manager
Terry Tollefson	Startup Manager
Jim Blackford	Mechanical Coordinator
Jim Walters	Electrical Coordinator
Roger Ward	Safety Manager
<b>Merrimack CAP PSNH Team Members</b>	
Mike Hitchko	Project Manager
Brent Sowle	Project Engineer
Lee Hess	Project Controls
Jim Peterson	Maintenance Supervisor
John Smith	Operations and Maintenance Advisor
<b>Merrimack CAP Contractors</b>	
• John Trottier	AZCO VP
• Tony Densmore	AZCO Project Manager
• Clint VanBoxtel	AZCO Superintendent
• Scott Marquis	ES Boulos Project Manager
• Scott Morris	ES Boulos Superintendent
• Tim Henry	ES Boulos General Foreman



An SAIC Company

November 14, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for August 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for August 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on September 21, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, *"Initial Project Review Report"* (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – September 21, 2011  
c: Distribution



## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on September 21, 2011. During this site visit we met with Public Service of New Hampshire ("PSNH") to review the status of the Project, including the Secondary Wastewater Treatment ("SWWT") system. Following the meeting, we toured the construction site to make firsthand observations of the work being performed. We also reviewed data made available by PSNH, by URS (the "Program Manager") through its web based document filing sites (eRoom and Documentum) and by others as applicable in preparing this Report.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the FGD system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original base FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system.

The Project was focused on completing the final construction, start-up and commissioning activities and preparing for the tie-in outages. The MK-1 tie-in outage began on September 6, 2011 and was ongoing during this site visit. It was expected to be completed on September 28, 2011. The critical path for the Project included the MK-1 and MK-2 tie-in outages and the PWWT performance test.

During the Period, a number of major milestones were achieved. SESS completed the FGD Mechanical Completion milestone on August 4, 2011 and SWT/NP completed the WWT Mechanical Complete milestone (Primary WWT) on August 1, 2011. It was also reported that SESS had completed the milestone, FGD Ready for Gas, on September 1, 2011.

The achievement of the Mechanical Completion and FGD Ready for Gas Milestones, on schedule, was a major accomplishment for both SESS and PSNH/URS project management. Only a few months before, SESS was expected to miss this milestone by several weeks to up to a month or more. The schedule recovery was the result of PSNH/URS' continued emphasis on the schedule and the enforcement of EPC Agreement milestones and LDs.

The Site Finalization Phase 2 and the Performance Testing contracts were awarded. These are the last two contracts to be awarded by URS on the Project.

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves through the Period. The source of these reserves was the elimination of almost all Allowance for Funds Used During Construction ("AFUDC") in 2012, based on PSNH's analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH for purposes of inclusion in the rate base, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual Substantial Completion dates. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, the actual in-service date, resolution of potential contractor claims and others. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient, even though the

## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 3

estimated cost for the SWWT system was approximately \$7.0 million higher than the earliest cost estimates.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as: changes in the scope of work, force majeure, changes in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project was focused on completing the final construction, start-up and commissioning activities and preparing for the tie-in outages. The Project was using a range of schedules, lists and reports to track the progress in these areas.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. PSNH was proceeding with the installation of the SWWT system. Start-up, commissioning and testing of the first effect (first stage) of the system was scheduled to be completed by January 2012 and start-up, commissioning and testing of the second effect was scheduled to be completed by the second quarter of 2012.
5. Through the Period, projected costs for the Project were unchanged at \$430,000,000. During the Period, PSNH reported \$9,000,000 in reserves. Whether these reserves are sufficient will depend on a number of factors including the final cost for the SWWT system, the actual in-service date, resolution of potential contractor claims and others. PSNH's budget analysis indicated that the reserves should be sufficient.

## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 4

6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

### Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling

## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 5

systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report. Background on the EMAR system and the SWWT system is contained in the February, March and April 2011 MPRs.

### Safety

The Project experienced no OSHA Recordable Injuries during the Period. There were two First Aid Injuries.

### Environmental and Permitting

SESS and SWT received occupancy permits for their respective buildings. The permit for the FGD building is a 30-day temporary permit pending completion of final grading at doorway thresholds. DMW was working to address third-party comments on the electrical building permit application for the limestone truck unloading facility ("LTU Facility") conveyors.

### Project Status

#### Overall Project

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through August 2011. SESS achieved the major milestone, FGD Mechanical Completion, on August 4, 2011. PSNH acknowledged that the three days of delay beyond the original date of August 1, 2011, were not SESS' responsibility. They were the result of the service water system being out of service, due to blinding of the backwash filter, preventing SESS from completing this milestone on time.

SWT/NP achieved the major milestone, WWT Mechanical Complete (Primary WWT) on August 1, 2011. It was also reported that SESS had completed the milestone, FGD Ready for Gas, on September 1, 2011.

Other significant milestones, not shown in Table 1, were completed during the Period. The Absorber vessel was drained and the integrated testing was completed. The factory acceptance test ("FAT") was held at Emerson for the EMAR's DCS system control logic.

The critical path for the Project included the MK-1 and MK-2 tie-in outages, and the PWWT performance test.

# Independent Engineer's Report for August 2011

## Merrimack Clean Air Project

Page 6

**Table 1**  
**Status of Project Milestones**  
**August 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion / Closeout	02/04/2011	05/16/2011(A)
Milestone: WWT Mechanical Complete (Primary WWT)	06/01/2011	08/01/2011 (A)
FGD Mechanical Completion	08/01/2011	08/04/2011 (A)
FGD Ready for Gas	09/01/2011	09/01/2011 (A)
MK-1 Tie-in Outage End	09/28/2011	09/28/2011
MK-2 Tie-in Outage End	11/21/2011	11/21/2011
MK-1 and MK-2 Tune and Performance Test	11/27/2011	11/27/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012

## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 7

### Project Percent Complete and Performance

URS reported that the Project's overall progress through the Period was 98.0 percent versus a plan of 98.2 percent. The earned percent complete for the construction and start-up phase was 96.2 percent versus a plan of 96.5 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

### Project Schedule

The Project was focused on completing the final construction, start-up and commissioning activities and preparing for the tie-in outages. The Project was using a range of schedules, lists and reports to track the progress in these areas.

### Major Project Contractors

#### URS (Program Manager)

URS reported that through the Period, the earned percent complete for engineering and procurement services was 98.7 percent versus a plan of 99.9 percent. This compares with 98.4 percent and 99.8 percent reported last month. For construction management and start-up services, the earned value was 86.6 percent versus a plan of 84.6 percent. This compares with 83.3 percent and 82.0 percent, respectively, last month. No significant issues were reported.

#### Siemens Environmental Systems and Services (FGD Island)

During the Period, SESS completed fireproofing of the structural steel in the FGD building; completed the installation of the oxidation air blower sound attenuation blankets; completed the installation of the fire water booster pump, the fire booster pump building and the fire booster pump piping; and completed testing of the fire booster pump. They completed installing the west building wall louvers and the electrical room HVAC fans and louvers.

SESS received an occupancy permit for the FGD building. The permit is a 30-day temporary permit pending completion of final grading at the doorway thresholds.

SESS completed the FGD Mechanical Completion Milestone and the integrated testing. On September 1, 2011 SESS completed the FGD Ready for Gas Milestone.

#### Dearborn Midwest (Material Handling Systems)

During the Period, DMW worked on the LTU Facility. They set the L-1 conveyor tube, erected the tail and completed installing cable tray and pipe in the tube. DMW set the feeder conveyor and started to pull cable to the LTU Facility electrical building.

Independent Engineer's Report for August 2011  
Merrimack Clean Air Project

Page 8

## **Siemens-Water Technology and Northern Peabody (WWT Facility)**

During the Period, SWT/NP achieved Mechanical Completion of the base PWWT system. They received an occupancy permit for the WWT building.

### **EMAR System**

During the Period, the EMAR system equipment skids were delivered and the mezzanine floor coating was installed. The installation of piping and conduit and the integration of the EMAR system control logic into the distributed control system ("DCS") were begun. Meetings continued to be held with SWT/NP management to review the EMAR system and softening schedules to try to improve the Mechanical Completion Date.

SWT/NP was forecasting that it would achieve Mechanical Completion of the EMAR system on November 23, 2011 a week prior to the contract date of November 30, 2011. URS was working closely with SWT/NP to expedite material deliveries and minimize installation and testing time to achieve Mechanical Completion sooner.

## **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO re-mobilized to the site and installed the booster fan motor removal monorails.

## **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

During the Period, ESB continued to install cable in the truck wash building. They continued to install conduit to the existing selective catalytic reduction ("SCR") and forced draft ("FD") fan dampers and began to pull cable. ESB completed the lighting and receptacles in the booster fan enclosure and completed installing the duct bank to the LTU Facility electrical building. They installed the electrical portion of the Absorber PAP system.

## **G. C. Cairns (Site Finalization - Phase I)**

During the Period, George Cairns ("Cairns") completed back filling the LTU Facility foundations and installed the hand rails and platforms. They started to modify the concrete trench south of the gypsum storage building.

Cairns was awarded the Site Finalization Phase 2 work. A change order to the Site Finalization Phase 1 contract will be executed to accommodate this additional phase of the work.

## **Start-Up**

During the Period, the URS start-up team ("Start-Up") assisted SESS and SWT/NP to achieve Mechanical Completion of their respective islands; migrated the DCS into the main plant and placed the equipment into its final locations; assisted SESS and DMW with the integrated testing of the FGD and the material handling islands, respectively, and worked with SESS towards achieving substantial completion of the FGD Island. They continued working on

## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 9

standard operating procedures (“SOP”) and on completion of the final turnover packages. They commissioned the seal air fan guillotine dampers and performed the booster fan runs with the modified current transformer (“CT”) wiring.

### Tie-In Outage Planning

During the Period, major work activities in support of the upcoming tie-in outages included the following:

- Attended plant outage meetings
- Held discussions with AZCO on the ductwork execution plan
- Reviewed action items for the tie-in outages
- Integrated the fall tie-in outage schedule with the plant outage activities
- Completed assembling electrical and mechanical outage work packages
- Finalized the site outage plot plan to identify equipment layout and work areas for the MK-1 outage
- Finalized the lockout/tagout plan for the outage
- Finalized the plan for sealing the MK stack
- Finalized and communicated the integrated testing plan to contractors on site
- Developed and coordinated the outage air monitoring plan requirements with AZCO
- Developed a detailed testing plan to support commissioning during the outage and post outage

### SWWT System

During the Period, work continued on the installation of foundations and the placement of concrete for equipment pads. Deliveries of building steel continued. PSNH awarded two major installation contracts. AZCO was awarded the Mechanical Installation Contract and Electric Corporation of America (“ECA”) was awarded the Electrical Installation Contract.

The estimated Mechanical Completion Date for the first effect (first stage) of the SWWT system continued to be November 2011, with start-up, commissioning and testing to be completed by January 2012. The Mechanical Completion Date for the second effect was estimated for the second quarter of 2012 with start-up, commissioning and testing to be completed by the second quarter of 2012.

### Absorber Potential Adjustment Protection

During the Period, ESB installed the electrical components of the PAP system, including the transformer, control panel, and wiring.

## Independent Engineer's Report for August 2011 Merrimack Clean Air Project

Page 10

### **Absorber Staining**

When the Absorber was drained, following its initial fill during commissioning, staining was found on the floor. The Absorber floor is made of Alloy 2205, similar to the walls and other parts of the Absorber. With so much concern over corrosion of Alloy 2205, leading to the installation of the Potential Adjustment Protection (“PAP”) technology in the Project’s Absorber, this was a potential problem. It should be noted that the PAP system had not be completed at that time and, therefore, was not operating.

PSNH retained Sargent & Lundy (“S&L”) to evaluate the staining. S&L was originally retained by PSNH to assist it with understanding industry experience with the Alloy 2205 corrosion issues and to provide recommendations to address the issues. This consultation resulted in the decision to install the PAP system in the Absorber. S&L inspected the Absorber and the staining on the floor. S&L concluded that the Absorber was in good condition and recommended that the stain be removed and that the area be treated again to passivate the surface. This work was done.

### **Merrimack Clean Air Project Cost Summary**

Through the Period, projected costs for the Project were unchanged at \$430,000,000. PSNH reported \$9,000,000 in reserves. The source of these reserves was the elimination of almost all AFUDC in 2012, based on PSNH’s analysis that the in-service date, the date on which the Project is determined to be used by and useful to PSNH, would occur in late 2011 rather than mid-2012. Note that the in-service date is not the same as the contractual completion dates, e.g., Substantial Completion. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. Whether the \$9,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, which is still being developed, the actual in-service date, resolution of potential contractor claims and others. PSNH’s budget analysis through the Period indicated that the reserves should be sufficient, even though the estimated cost for the SWWT system was approximately \$7.0 million higher than the earliest cost estimates.

**Independent Engineer's Report for August 2011**  
**Merrimack Clean Air Project Photographs – September 21, 2011**  
**Attachment 1**  
Page 1



**Figure A-1 SWWT Building**



**Figure A-2 SWWT Underground Electrical Conduit Installation**

Independent Engineer's Report for August 2011  
Merrimack Clean Air Project Photographs – September 21, 2011  
Attachment 1  
Page 2



Figure A-3 EMAR System



Figure A-4 Electrical Connections to PAP System Absorber Penetration

**Independent Engineer's Report for August 2011**  
**Merrimack Clean Air Project Photographs – September 21, 2011**  
**Attachment 1**  
Page 3



**Figure A-5 Fire Booster Pump House**



**Figure A-6 CEMS Trailer at the Base of the Concrete Chimney**

**Independent Engineer's Report for August 2011**  
**Merrimack Clean Air Project Photographs – September 21, 2011**  
**Attachment 1**  
Page 4



**Figure A-7 Grading and Paving Looking North Toward the Coal Yard**



**Figure A-8 LTU Facility**

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December 16, 2011

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for September 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for September 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). A site visit to the Merrimack Clean Air Project (the "Project") was not made for this report. Our last site visit to the Project was on September 21, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Project Manager

RJG/dm  
c: Distribution

## Summary

This report was prepared by R. W. Beck, Inc. ("R. W. Beck") based on communications with representatives of Public Service of New Hampshire ("PSNH") and through the review of data and documents made available by PSNH, by URS (the "Program Manager") through its web based document filing sites (eRoom and Documentum) and by others as applicable.

Through the Period, URS reported that overall, the Project remained on schedule to achieve Substantial Completion of the Flue Gas Desulfurization ("FGD") system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original base FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system.

The Project was focused on completing the final construction, start-up, commissioning and punch list activities; completing the Merrimack Station Unit 1 ("MK-1") tie-in outage; the start of operational testing of the FGD system; and preparations for the Merrimack Station Unit 2 ("MK-2") tie-in outage. The MK-1 tie-in outage began on September 6, 2011 and was successfully completed on September 25, 2011, ahead of the September 28, 2011 forecast date.

PSNH reported that the MK-1 tie-in outage work was completed successfully on Saturday (September 24th) and was turned over to plant operations to commence start-up activities. A handful of issues were managed by the Project with support from Merrimack Station ("MK") plant operations and maintenance, URS, SESS, and several contractors. MK-1 was reconnected to the grid at 3:15 PM on Sunday, September 25, 2011 and reached full load at 9:30 PM. A few equipment problems were experienced but were reported to be manageable. PSNH reported that MK-1 and the FGD system operated well for the rest of the Period. Booster fan control was sensitive. Because of this the fan was operated in manual. URS was studying the problem to develop a permanent fix for the problem.

The critical path for the Project was through the MK-2 tie-in outage.

During the Period, in addition to the successful completion of MK-1 Tie-In Outage milestone on September 25, 2011, SESS completed the milestone FGD Ready for Gas, on September 1, 2011.

Through the Period, projected costs for the Project were reduced by \$8,000,000, from \$430,000,000 to \$422,000,000. This was primarily the result of a significant reduction in the expected cost for funds used during construction (Allowance for Funds Used During Construction, "AFUDC") and a reduction in reserves from \$9,000,000 to \$5,000,000. The reductions in projected costs and reserves are based on PSNH's assessment of the outstanding costs to complete the Project and an estimate of the Project's remaining uncertainties and risks. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. However, it is reasonable and normal industry practice to reduce the amount in reserves as major contracts are completed or nearing completion and the financial risks associated with the budgets for the remaining work are reduced. Whether the \$5,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the Secondary Waste Water Treatment ("SWWT") system; the actual in-service date (the date on

which AFUDC is no longer a cost to the Project); resolution of potential contractor claims and other factors. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as: changes in the scope of work, force majeure, changes in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## **Conclusions and Recommendations**

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. The Project was focused on completing the final construction, start-up, commissioning and punch list activities; completing the MK-1 tie-in outage; the start of operational testing of the FGD system; and preparation for the MK-2 tie-in outage. The Project was using a range of schedules, lists and reports to track the progress in these areas.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute.
4. PSNH was proceeding with the installation of the SWWT system. Start-up, commissioning and testing of the first effect (first stage) of the system was scheduled to be completed by January 2012 and start-up, commissioning and testing of the second effect was scheduled to be completed by the second quarter of 2012.
5. Through the Period, projected costs for the Project were reduced by \$8,000,000, from \$430,000,000 to \$422,000,000. This was primarily the result of a significant reduction in the forecast for AFUDC and a reduction in reserves from \$9,000,000 to \$5,000,000. The reductions in projected costs and reserves are based on PSNH's assessment of the outstanding costs to complete the Project and an estimate of the Project's remaining

uncertainties and risks. Whether the \$5,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system, the actual in-service date, resolution of potential contractor claims and other factors. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.

6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## **Background**

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are SESS (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor;

AZCO Inc. ("AZCO"), the BOP mechanical erection Subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report. Background on the EMAR system and the SWWT system is contained in the February, March and April 2011 MPRs.

## **Safety**

The Project experienced one OSHA Recordable Injury during the Period and one First Aid Injury. The OSHA Recordable Injury occurred when an Insulator Superintendent tore his right bicep muscle when setting a heavy insulation panel into an aerial lift basket.

## **Environmental and Permitting**

No significant activities to report.

## **Project Status**

### **Overall Project**

URS reported that overall the Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through August 2011. During the Period, several major milestones were achieved. SESS completed the milestone FGD Ready for Gas, on September 1, 2011 and the MK-1 Tie-In Outage was completed on September 25, 2011.

The critical path for the Project was through the MK-2 tie-in outage.

Independent Engineer's Report for September 2011  
Merrimack Clean Air Project

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Page 6

**Table 1**  
**Status of Project Milestones**  
**September 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion / Closeout	02/04/2011	05/16/2011(A)
Milestone: WWT Mechanical Complete (Primary WWT)	06/01/2011	08/01/2011 (A)
FGD Mechanical Completion	08/01/2011	08/04/2011 (A)
FGD Ready for Gas	09/01/2011	09/01/2011 (A)
MK-1 Tie-in Outage End	09/28/2011	09/25/2011 (A)
MK-2 Tie-in Outage End	11/21/2011	11/21/2011
MK-1 and MK-2 Tune and Performance Test	11/27/2011	11/27/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012
SWWT System In Service	2012 Q2	2012 Q2



## **Project Percent Complete and Performance**

URS reported that the Project's overall progress through the Period was 98.3 percent versus a plan of 98.5 percent. The earned percent complete for the construction and start-up phase was 97.2 percent versus a plan of 97.1 percent. The percent complete included the impact of the approved Change Notices ("CN") added into the earned value base.

## **Project Schedule**

The Project was focused on completing the final construction, start-up, commissioning and punch list activities; completing the MK-1 tie-in outage; the start of operational testing of the FGD system; and preparation for the MK-2 tie-in outage. The Project was using a range of schedules, lists and reports to track the progress in these areas.

## **Major Project Contractors**

### **URS (Program Manager)**

URS reported that through the Period, the earned percent complete for engineering and procurement services was 98.8 percent versus a plan of 99.9 percent. This compares with 98.7 percent and 99.9 percent reported last month. For construction management and start-up services, the earned value was 90.9 percent versus a plan of 89.6 percent. This compares with 86.6 percent and 84.6 percent, respectively, last month. No significant issues were reported.

### **Siemens Environmental Systems and Services (FGD Island)**

During the Period, SESS continued to work on punch list items and supported start-up activities. They commissioned the booster fire pump and completed installation of the FGD building louvers. The MK-1 tie-in outage was completed and the unit was returned to service on September 25, 2011 with flue gas passing through the FGD system for the first time. Operational testing of the FGD system was started.

### **Dearborn Midwest (Material Handling Systems)**

During the Period, DMW continued to work on punch list items and supported start-up activities. They continued installation of the limestone truck unloading facility ("LTUF"). DMW continued to work to remove bridging in limestone storage silos.

### **Siemens-Water Technology and Northern Peabody (PWWT Facility)**

#### **EMAR System**

During the Period, SWT/NP set the equipment skids and completed the piping and cable installation. Coatings in the chemical and electrical areas were completed. Meetings continued to be held with SWT/NP management to review the softening schedules to try to improve the Mechanical Completion Date. SWT/NP was forecasting that it would achieve Mechanical

Completion of the EMAR system on November 23, 2011 a week prior to the contract date of November 30, 2011.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO continued to work on punch list items and supported start-up activities. They completed installation of the booster fan motor monorails and continued the installation of the service water basket strainer. They installed the service water recirculation line control valve and by-pass.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

During the Period, ESB started to work on punch list items and continued support of start-up activities. They completed the electrical work in the LTUF and the tie-in of the MK-1 forced draft fans and the selective catalytic reduction system dampers. ESB continued to prepare for the MK-2 tie-in outage.

### **G. C. Cairns (Site Finalization - Phase I)**

During the Period, George Cairns ("Cairns") completed paving for the main entrance road, the road west of the gypsum storage building, south and east of the FGD building and north of the booster fan building. They completed modifying the concrete trench south of the gypsum storage building, started to modify the concrete trench near the ammonia tank farm and to install the foundation for the truck scale. Cairns prepared the road north of the plant for paving and continued work on punch list items.

## **Start-Up**

During the Period, the URS start-up team ("Start-Up") performed the final checkout of MK-1 and common systems. They performed the final checkout of the burner management system ("BMS") and the integrated fan testing on MK-1. Start-Up assisted with the start-up of MK-1 and the FGD system following the tie-in outage. They programmed and tested the new service water recirculation valve and began the checkout of the truck wash system. Start-Up began sending turnover packages to PSNH for review.

## **Tie-In Outages**

During the Period, activities in support of the tie-in outages included the following:

- Completed MK-1 outage work and restarted the unit with flue gas going to the FGD system for the first time;
- Continued to refine the MK-2 outage plan;
- Finalized the site outage plot plan to identify equipment layout and work areas for the MK-2 outage;

- Finalized the lockout/tagout plan for the MK-2 outage;
- Finalized the MK-2 outage air monitoring plan requirements;
- Developed a detailed testing plan to support commissioning during the outage and post outage and;
- Continued to finalize the short term and long term recommendations to PSNH for booster fan control on MK-1 and MK-2.

## **SWWT System**

During the Period, PSNH conducted a Kick-Off Meeting with Electric Corporation of America (“ECA”), the electrical installation contractor. Work continued on the placement of concrete for equipment pads; steel erection; receipt of miscellaneous equipment; siding installation and trench work. The falling film evaporator was set.

The estimated Mechanical Completion Date for the first effect (first stage) of the SWWT system continued to be November 2011, with start-up, commissioning and testing to be completed by January 2012. The Mechanical Completion Date for the second effect was estimated for the second quarter of 2012 with start-up, commissioning and testing to be completed by the second quarter of 2012.

## **Absorber Staining**

As reported last month, when the Absorber was drained, following its initial fill during commissioning, staining was found on the floor. The Absorber floor is made of Alloy 2205, duplex stainless steel (“Alloy 2205”) similar to the walls and other parts of the Absorber. With so much concern over corrosion of Alloy 2205 this staining was a potential problem. PSNH retained Sargent & Lundy (“S&L”) to evaluate the staining.

R. W. Beck reviewed the S&L Vendor Surveillance Report, dated September 21, 2011 and discussed the results with PSNH’s Project Engineer. S&L inspected the FGD reaction tank. Various conditions, such as, weld spatter, weld slag, narrow grooves, welding heat tint, staining and others were identified and corrected during the inspection. S&L concluded that the Absorber was in good condition.

## **Merrimack Clean Air Project Cost Summary**

Through the Period, projected costs for the Project were reduced by \$8,000,000, from \$430,000,000 to \$422,000,000. This was primarily the result of a significant reduction in the expected cost for funds used during construction (AFUDC) and a reduction in reserves from \$9,000,000 to \$5,000,000. The reductions in projected costs and reserves were based on PSNH’s assessment of the outstanding costs to complete the Project and an estimate of the Project’s remaining uncertainties and risks. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. However, it is reasonable and normal industry practice to reduce the amount in reserves as major contracts are completed or nearing

completion and the financial risks associated with the budgets for the remaining work are reduced. Whether the \$5,000,000 in reserves is sufficient will depend on a number of factors including the final cost for the SWWT system; the actual in-service date (the date on which AFUDC is no longer a cost to the Project); resolution of potential contractor claims and other factors. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.



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January 30, 2012

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for October and November 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for the months of October and November 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on December 28, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – December 28, 2011  
c: Distribution



## Independent Engineer's Report for October and November 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on December 28, 2011. During this site visit we met with Public Service of New Hampshire ("PSNH") to review the status of the Project, including the Secondary Wastewater Treatment ("SWWT") system. Following the meeting, we toured the construction site to make firsthand observations of the work being performed. We also reviewed data made available by PSNH, by URS (the "Program Manager") through its web-based document filing sites (eRoom and Documentum) and by others as applicable in preparing this Report.

Through the months of October and November 2011 (the "Period"), the Project was reported to be on schedule to achieve Substantial Completion of the flue gas desulfurization ("FGD") system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original base FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system.

As reported in the September 2011 Report, the Merrimack Station Unit 1 ("MK-1") tie-in outage work was completed successfully and the unit was back in service, with its flue gases being scrubbed by the FGD system for the first time on September 25, 2011, ahead of the September 28, 2011 milestone date. During October 2011, various operational tests were performed on MK-1 and the integrated FGD and auxiliary systems. The Merrimack Station Unit 2 ("MK-2") tie-in outage was started on October 12, 2011 and was successfully completed on November 14, 2011, ahead of the November 21, 2011 milestone date. For the remainder of October and November 2011, operational tests were performed with both MK-1 and MK-2 and the integrated FGD and auxiliary systems in service. MK-1 and MK-2 were out of service during some of the Period to make adjustments and modifications and to clean and inspect the Absorber Vessel.

The critical path for the Project was through the MK-1 and MK-2 Tune and Performance Test Milestone which is currently scheduled to continue through the week of January 9, 2012.

The primary problem experienced during the initial operation of MK-1 was the instability of the booster fan control system while in automatic. A number of potential fixes were identified to correct the problem. It was ultimately decided to add a flue gas recirculation duct from the discharge back to the inlet for each set of booster fans. This modification has been made to both the MK-1 and MK-2 booster fans. It was reported that the addition of the recirculation systems has corrected the problem and that the booster fan controls are now stable throughout the load range.

The FGD system wastewater discharge was being processed by the PWWT system and the effluent from the PWWT system was being trucked to several licensed treatment facilities out of state for disposal.

Through the Period, projected costs for the Project were unchanged at \$422,000,000, including reserves of \$5,000,000. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. PSNH has reported that the majority of the Project was

## Independent Engineer's Report for October and November 2011 Merrimack Clean Air Project

Page 3

officially placed into service on September 27, 2011, with the portion of the work associated with the MK-2 ducts and booster fans placed into service on November 11, 2011. The remaining portions of the Project are expected to be placed into service as follows: truck scales on December 21, 2011; SWWT in 2012; and site finalization in the second quarter of 2012. With the majority of the Project now classified as being in service, the cost associated with Allowance for Funds Used During Construction ("AFUDC") is no longer a significant cost factor or risk to the Project. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.

It should be noted that for large projects with complex fixed price, target price and other contract types, such as those employed on the Project, it is common practice to make changes to the contract, sometimes a number of changes, over the period of the contract. These contracts include provisions that provide for adjustments in the established price, increases and decreases, based on identified criteria, such as: changes in the scope of work, force majeure, changes in law, economic indices, cost of labor and materials, schedule, working conditions, performance incentives (bonuses/penalties) and others. Project cost estimates, budgets and forecasts of costs-to-complete include contingencies and reserves to account for these normal and expected changes. These contingencies and reserves are reviewed and updated on a regular basis. Good contract management requires a detailed understanding of the contract and a focus on contract change control requirements. PSNH and URS are providing appropriate management and control over contract changes and overall Project budget control.

## Conclusions and Recommendations

Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. With the exception of the SWWT system, the primary focus of the Project was on completing operational and performance testing and on the completion of punch list items. The Project was using a range of schedules, lists and reports to track the progress in these areas.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. PSNH was proceeding with the installation of the SWWT system. Start-up, commissioning and testing of the first effect (first stage) of the system was scheduled to

## Independent Engineer's Report for October and November 2011 Merrimack Clean Air Project

Page 4

be completed by January 2012 and start-up, commissioning and testing of the second effect was also scheduled to be completed by the second quarter of 2012.

5. Through the Period, projected costs for the Project were unchanged at \$422,000,000, including reserves of \$5,000,000. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. PSNH has reported that the majority of the Project has been officially placed into service; therefore, the cost associated with AFUDC is no longer a significant cost factor or risk to the Project. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.
6. PSNH and URS were identifying critical issues in a timely manner and providing clear direction to avoid problems or correct the situation.
7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

## Background

The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement,

## Independent Engineer's Report for October and November 2011 Merrimack Clean Air Project

Page 5

and construction management of the Project. Other major contractors on the Project are Siemens Environmental Systems and Services ("SESS") (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report. Background on the EMAR system and the SWWT system is contained in the February, March and April 2011 Reports.

### Safety

The Project experienced no OSHA Recordable Injuries and one First Aid Injury in October 2011. URS stopped issuing Monthly Progress Reports starting in November 2011, so no further data was available.

### Environmental and Permitting

There was nothing significant to report for the Period.

### Project Status

#### Overall Project

The Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through November 2011. The MK-2 tie-in outage was started on October 12, 2011 and was successfully completed on November 14, 2011, ahead of the November 21, 2011 milestone date. For the remainder of October and November 2011, operational tests were performed with both MK-1 and MK-2 and the integrated FGD and auxiliary systems in service. MK-1 and MK-2 were out of service during some of the Period to make corrections and modifications, to clean the Absorber Vessel and for economic reasons.

The critical path for the Project was through the MK-1 and MK-2 Tune and Performance Test Milestone which is currently scheduled to continue through the week of January 9, 2012.

The primary problem experienced during the initial operation of MK-1 was the instability of the booster fan control system while in automatic. This was caused by a number of factors that included a reduction in the pressure loss in the gas path from the MK-1 boiler through the FGD

Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project

Page 6

Absorber with only one boiler operating, compared to the design value. Other contributors to the problem included the fact that the MK-1 boiler back pass had been cleaned as part of the outage and the conservative sizing of the booster fan. Control of the MK-2 booster fans also proved to be difficult for many of the same reasons. A number of potential fixes were identified to correct the problem. It was ultimately decided to add a flue gas recirculation duct from the discharge back to the inlet for each set of booster fans. Gas recirculation allows the fans to operate at higher speeds where the process requirements and the performance of the fans are more stable. This modification has been made to both the MK-1 and MK-2 booster fans. It was reported that the addition of the recirculation systems has corrected the problem and that the booster fan controls are now stable throughout the load range.

# Independent Engineer's Report for October and November 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**October and November 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion / Closeout	02/04/2011	05/16/2011(A)
Milestone: WWT Mechanical Complete (Primary WWT)	06/01/2011	08/01/2011 (A)
FGD Mechanical Completion	08/01/2011	08/04/2011 (A)
FGD Ready for Gas	09/01/2011	09/01/2011 (A)
MK-1 Tie-in Outage End	09/28/2011	09/25/2011 (A)
MK-2 Tie-in Outage End	11/21/2011	11/14/2011(A)
MK-1 and MK-2 Tune and Performance Test	11/27/2011	11/27/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012
SWWT System In Service	2012 Q2	2012 Q2

Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project

Page 8

## Project Percent Complete and Performance

URS reported that the Project's overall progress through October was 98.9 percent versus a plan of 99.1 percent. URS stopped issuing Monthly Progress Reports starting in November 2011.

## Project Schedule

With the exception of the SWWT system, the primary focus of the Project during the Period was on completing operational and performance testing and on the completion of punch list items. The Project was using a range of schedules, lists and reports to track the progress in these areas.

## Major Project Contractors

### URS (Program Manager)

URS achieved Mechanical Completion of Unit 1 and the Common Facilities on September 24, 2011 and Mechanical Completion of Unit 2 on November 14, 2011.

URS continued to work with the Island Contractors to verify completion of their punch list items. They continued to manage the completion of their other remaining activities and services.

### Siemens Environmental Systems and Services (FGD Island)

During the Period, SESS continued operational testing with MK-1 and MK-2 in service. They worked punch list and other miscellaneous items. During one of the outages, the Absorber Vessel was cleaned.

### Dearborn Midwest (Material Handling Systems)

During the Period, DMW completed construction and started operational testing of the limestone truck unloading ("LTU") Facility. They continued operational testing of all of their systems. DMW continued to complete punch list items and to address bridging in the limestone storage silos.

### Siemens-Water Technology and Northern Peabody (PWWT Facility)

During the Period, SWT/NP continued operational testing of the PWWT system. They continued to complete punch list items.

The FGD system wastewater discharge was being processed by the PWWT system and the effluent from the PWWT system was being trucked to several licensed treatment facilities out of state for disposal.

Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project

Page 9

### **EMAR System**

During the Period, SWT/NPI completed construction and commissioning of the EMAR system. They achieved Mechanical Completion on November 21, 2011. SWT/NPI started and continued operational testing. They continued to complete punch list items.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO continued to support commissioning and testing activities and to complete punch list items.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

During the Period, ESB continued to work on punch list items and to finalize other activities.

### **G. C. Cairns (Site Finalization - Phase I)**

During the Period, George C. Cairns ("Cairns") installed the truck scale foundation and truck scale house. They completed the base paving for Roads 1 to 5 and continued to complete punch list items.

### **Start-Up**

During the Period, the URS start-up team ("Start-Up") continued to finalize its activities.

### **SWWT System**

During the Period, significant progress was made on the SWWT system. Concrete placement work was completed. All of the major equipment was received and set. Work continued on the installation of miscellaneous mechanical and electrical equipment, siding, and trench work.

The estimated Mechanical Completion Date for the first effect (first stage) of the SWWT system was revised to January 6, 2012. Start-up, commissioning and testing of the first effect is still scheduled to be completed by January 2012. The Mechanical Completion Date for the second effect was estimated for the second quarter of 2012 with start-up, commissioning and testing to also be completed by the second quarter of 2012.

### **Merrimack Clean Air Project Cost Summary**

Through the Period, projected costs for the Project were unchanged at \$422,000,000, including reserves of \$5,000,000. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. PSNH has reported that the majority of the Project was officially placed into service on September 27, 2011, with the portion of the work associated with the MK-2 ducts and booster fans placed into service on November 11, 2011. The remaining portions of the Project are expected to be placed into service as follows: truck scales on December 21, 2011; SWWT in 2012; and site finalization in the second quarter of 2012.

**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project**

Page 10

With the majority of the Project now classified as being in service the cost associated with AFUDC is no longer a significant cost factor or risk to the Project. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.

**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project Photographs – December 28, 2011  
Attachment 1**

Page 1



**Figure A-1 FGD in Service with MK-1 and MK-2**

**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project Photographs – December 28, 2011  
Attachment 1**

Page 2



**Figure A-2 SWWT System Falling Film Evaporator**

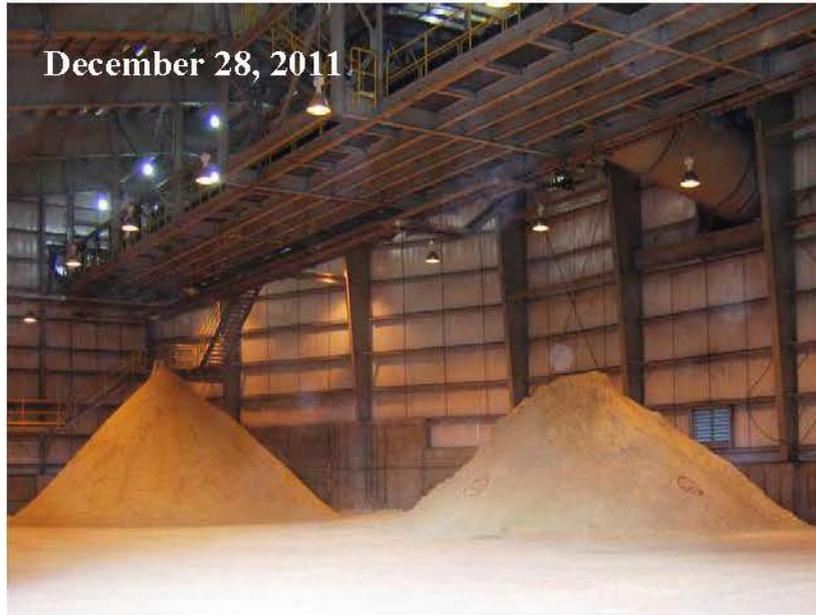
**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project Photographs – December 28, 2011  
Attachment 1  
Page 3**



**Figure A-3 SWWT System Crystallizer**



**Figure A-4 EMAR System**



**Figure A-5 Gypsum Storage Piles**



**Figure A-6 Oxidation Air Compressor**

**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project Photographs – December 28, 2011  
Attachment 1**

Page 5



**Figure A-7 Base Asphalt Paving**



**Figure A-8 Base Asphalt Paving**

**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project Photographs – December 28, 2011  
Attachment 1**

Page 6



**Figure A-9 LTU Facility**



**Figure A-10 LTU Facility**

**Independent Engineer's Report for October and November 2011  
Merrimack Clean Air Project Photographs – December 28, 2011  
Attachment 1**

Page 7



**Figure A-11 Truck Wash**



**Figure A-12 SWWT Soda Ash Storage Tank**

REDACTED



An SAIC Company

April 13, 2012

Via E-mail

Public Service of New Hampshire  
780 North Commercial Street  
Manchester, NH 03101  
Attention: John M. MacDonald, Vice President - Generation

**Subject: Merrimack Clean Air Project  
Monthly Report for December 2011**

Attached is the Independent Engineer's Monthly Report (the "Report") for the month of December 2011 (the "Period"). This Report was prepared by R. W. Beck, Inc. ("R. W. Beck") under our assignment as the Independent Engineer (the "IE") for Public Service of New Hampshire ("PSNH"). It is based on a visit to the Merrimack Clean Air Project (the "Project") on January 26, 2011.

The IE is responsible to provide objective, third-party, independent oversight for the engineering, procurement, construction, start-up, commissioning and performance testing phases of the Project. The IE has also reviewed the history of the Project. The historical review addressed the key decisions made by PSNH and others leading up to the start of our assignment in October 2009; the reports and studies that were relied on to make these decisions; the major contracts that were negotiated and that form the structure of the Project; and the role of the IE in monitoring the overall execution of the Project. The IE's findings from the historical review were documented in a separate report entitled, "*Initial Project Review Report*" (the "Initial Report"). The Initial Report should be reviewed and considered as part of this Report.

This assignment was performed in accordance with generally accepted engineering practices and included such investigation, observation and review as we, in our professional capacity, deemed necessary according to the circumstances.

If you have any questions please call me at (508) 935-1810.

Sincerely,

**R. W. BECK, INC.**

A handwritten signature in blue ink that reads "Richard J. Gendreau".

Richard J. Gendreau  
Senior Consultant

RJG/dm

Attachment 1: Project Photographs – January 26, 2012

c: Distribution

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## Independent Engineer's Report for December 2011 Merrimack Clean Air Project

Page 2

### Summary

Representatives of R. W. Beck, Inc. ("R. W. Beck") visited the Merrimack Clean Air Project (the "Project") site on January 26, 2011. During this site visit we attended the Monthly Project Meeting ("MPM") between Public Service of New Hampshire ("PSNH") and URS, (the "Program Manager"), followed by the MPM with Siemens Environmental Systems and Services ("SESS"), the Flue Gas Desulfurization ("FGD") System Island Contractor. Following the meetings, we toured the construction site to make firsthand observations of the work being performed. We also reviewed data made available by PSNH, by URS (the "Program Manager") through its web-based document filing sites (eRoom and Documentum) and by others as applicable in preparing this Report.

Through the Period, the Project was reported to be on schedule to achieve Substantial Completion of the flue gas desulfurization ("FGD") system on January 31, 2012 and Substantial Completion of the Primary Wastewater Treatment ("PWWT") facility on April 1, 2012. Note that the original FGD WWT system now includes the PWWT system (the original base FGD WWT) and the additional Enhanced Mercury/Arsenic Removal ("EMAR") system.

Operational testing continued on the PWWT and EMAR systems and the Material Handling systems. Work continued on the MK-1 and MK-2 booster fan recirculation ducts and on various other changes and modification deemed necessary or beneficial after the initial period of operation. The contractors continued to complete punch list items.

Mechanical and electrical installation work continued on the Secondary Waste Water Treatment ("SWWT") system. Commissioning of the SWWT started. The installation of the truck scales and the scale house were completed and other site finalization activities continued.

The critical path for the Project was through the MK-1 and MK-2 Tune and Performance Test Milestone scheduled for the week of January 9, 2012.

The FGD system wastewater discharge was being processed by the PWWT system and the effluent from the PWWT system was being trucked to several licensed treatment facilities out of state for disposal.

Through the Period, projected costs for the Project were unchanged at \$422,000,000, including reserves of \$5,000,000. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. PSNH has reported that the majority of the Project was officially placed into service on September 27, 2011, with the portion of the work associated with the MK-2 ducts and booster fans placed into service on November 11, 2011. The truck scales were placed into service in December 2011. The remaining portions of the Project are expected to be placed into service as follows: SWWT and site finalization in the second quarter of 2012. With the majority of the Project now classified as being in service the cost associated with Allowance for Funds Used During Construction ("AFUDC") is no longer a significant cost factor or risk to the Project. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.

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Page 3

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Set forth below are the principal opinions we reached following our review of the Project as of the Period. For a complete understanding of the review, analysis and assumptions upon which these opinions are based, this Report should be read in its entirety, along with the Initial Report. On the basis of our review and analyses of the Project and the assumptions set forth in this Report, we are of the opinion that:

1. Safety remained the highest priority on the Project. PSNH and URS continued to emphasize safety at all levels of management, staff and craft labor.
2. With the exception of the SWWT system, the primary focus of the Project was on completing operational and performance testing and on the completion of punch list items. The Project was using a range of schedules, lists and reports to track the progress in these areas.
3. The Project was on schedule to achieve the planned Substantial Completion Date of April 1, 2012. PSNH generally reports the expected completion date of the Project as July 1, 2012, which is one year before the completion date required by statute. This mid-2012 date is reasonable and consistent with PSNH's planning and the execution of the Project to date.
4. PSNH was proceeding with the installation of the SWWT system. Start-up, commissioning and testing of the first effect (first stage) of the system had begun and start-up, commissioning and testing of the second effect was scheduled to be completed by the second quarter of 2012.
5. Through the Period, projected costs for the Project were unchanged at \$422,000,000, including reserves of \$5,000,000. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. PSNH has reported that the majority of the Project has been officially placed into service; therefore, the cost associated with AFUDC is no longer a significant cost factor or risk to the Project.

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Page 4

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7. In general, the work appeared to be proceeding in compliance with the requirements of the Project plans, contracts, schedules and budgets. Defects and deficiencies, if any, were of an extent and nature as reasonably expected on similar projects that are undertaken by qualified and experienced project teams, and any such defects and deficiencies, if any, or other unforeseen conditions were being administered in accordance with the requirements of the Project contracts and agreements and normal industry practice.

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The Project involves the installation of a single wet FGD system at PSNH's Merrimack Station ("MK"). PSNH is a wholly-owned electric operating subsidiary of Northeast Utilities ("NU"). PSNH is New Hampshire's largest electric utility and serves 490,000 customers in 211 communities, representing approximately 70 percent of New Hampshire's population. MK consists of two, coal-fired units that normally operate as base load. Unit 1 was installed in 1960, and has a gross generation of 122 megawatts ("MW") and Unit 2 was constructed in 1968, and has a gross generation of 336 MW. The FGD system will treat the flue gas from both units at MK.

The Project primarily consists of four major work areas or "islands." Each of the islands has its own contract terms and is essentially independently designed, supplied and constructed except for the required interconnections. These islands consist of the FGD Island, the Material Handling Island (limestone and gypsum), a 445-foot high Reinforced Concrete Chimney with a fiberglass reinforced plastic ("FRP") lining, and a FGD WWT facility, now consisting of the PWWT and EMAR systems. The Project also includes all related site work, support systems and equipment, existing station integration and modifications to the balance of plant ("BOP") and all island interconnections necessary to make a complete and functioning FGD system. A more detailed description of the Project is contained in the Initial Report.

The Project is being built using an Engineering, Procurement and Construction Management ("EPCM") contracting approach in which the EPCM contractor, also called the Program Manager, acts as agent for the owner, and is responsible for engineering design, procurement, and construction management of the Project. Other major contractors on the Project are Siemens Environmental Systems and Services ("SESS") (including its erection subcontractor, Sterling Boiler and Mechanical, Inc. ("SBMI"), the FGD Island supplier; Dearborn Midwest ("DMW"), the Material Handling Island supplier; Hamon-Custodis ("HC"), the Reinforced Concrete Chimney supplier; Siemens-Water Technology ("SWT") and Northern Peabody, LLC ("NP") joint venture ("SWT/NP"), the supplier of the FGD WWT Facility; Francis Harvey & Sons ("FH"), the contractor for the major Project foundations; Merrill Iron and Steel Inc. ("MIS"), the steel ductwork subcontractor; AZCO Inc. ("AZCO"), the BOP mechanical erection

## Independent Engineer's Report for December 2011 Merrimack Clean Air Project

Page 5

subcontractor; and E. S. Boulos Co. ("ESB"), the BOP electrical erection subcontractor. It should be noted that ESB is also the electrical subcontractor for SESS for the FGD Island and for DMW on the material handling systems. ESB's progress on the latter work is reported as part of SESS' contract and DMW's contract, respectively.

More detail on the Project organization and a discussion of the major Project agreements and contracts are contained in the Initial Report. Background on the EMAR system and the SWWT system is contained in the February, March, and April 2011 Reports.

### Safety

The Project experienced no OSHA Recordable Injuries or First Aid Injuries in December 2011.

### Environmental and Permitting

There was nothing significant to report for the Period.

### Project Status

#### Overall Project

The Project remained on schedule to achieve Substantial Completion on April 1, 2012. Table 1 shows the status of the critical Project Milestones through December 2011. During Period, operational testing of Merrimack Station Unit 1 ("MK-1") and Unit 2 ("MK-2") continued. At various times during the Period, MK-2 was off-line and MK-1 operated on the bypass stack or through the FGD Absorber. At other times both MK-1 and MK-2 operated together through the FGD Absorber.

Operational testing continued on the PWWT and EMAR systems and the Material Handling systems.

Work also continued on the following:

- MK-1 Booster Fan Recirculation Duct. Actuator and electrical work was ongoing. Access platforms and associated steel was in fabrication.
- MK-2 Booster Fan Recirculation Duct. Actuator and electrical work was ongoing. Access platforms and associated steel was in fabrication.
- MK-2 Recirculation Damper Seal Air Skid. Work continued on the relocation of the existing seal air skid.
- MK-1 Bypass Damper Seal Air Skid. Work continued on replacing the seal air skid.
- Booster Fan Variable Inlet Vane ("VIV") Damper Drives. Work continued on replacing the VIV damper drives. Several options were being considered.
- Service Water Pumps
  - Variable Frequency Drives ("VFD"): work continued on the installation of VFDs.

Independent Engineer's Report for December 2011  
Merrimack Clean Air Project

Page 6

- Filter/Strainer: planning continued to replace the simplex strainer with a duplex design and make other improvements.
- Caustic skid: work was being done to upgrade the skid with stainless steel pumps and piping and to replace the static mixer with an upgraded model.
- Man Safe Damper Leaks: work continued on design modifications to minimize leakage and to provide venting.

Limestone silo bridging remained an ongoing issue with DMW. Several meetings were held with DMW to resolve the issue. URS and PSNH were waiting for responses to the numerous letters that they have sent to DMW on this issue. They acknowledged that resolution of this issue has been impacted by the radial stacker outage and the inability to unload railcars.

Mechanical and electrical installation work continued on the SWWT system. Commissioning of the SWWT started. The installation of the truck scales and the scale house were completed and other site finalization activities continued.

The critical path for the Project was through the MK-1 and MK-2 Tune and Performance Test Milestone scheduled for the week of January 9, 2012.

# Independent Engineer's Report for December 2011

## Merrimack Clean Air Project

Page 7

**Table 1**  
**Status of Project Milestones**  
**December 2011**

	<b>Planned (Target)</b>	<b>Forecast (Actual)</b>
Program Manager Contract Award		09/24/2007(A)
Award FGD Contract	07/03/2008	07/11/2008(A)
Award Stack Contract		07/18/2008(A)
Award Material Handling Contract	09/30/2008	11/14/2008(A)
Award Wastewater Treatment Contract	09/15/2008	09/30/2008(A)
Mobilize Construction (Site Work)	11/17/2008	12/01/2008(A)
Award Foundations Contract	02/16/2009	02/04/2009(A)
Start Foundation Work	02/27/2009	03/11/2009(A)
Stack Foundation Complete	06/12/2009	04/29/2009(A)
Stack Shell Complete	09/29/2009	06/27/2008(A)
Award Miscellaneous Steel Fabrication Contract	07/21/2009	08/05/2009(A)
Award Ductwork Fabrication Contract	08/05/2009	08/05/2009(A)
Install Transfer House and Conveyor Caissons	10/12/2009	10/07/2009(A)
Mobilize Material Handling	11/23/2009	10/28/2009(A)
Install Limestone Silo Foundation	11/24/2009	01/15/2010(A)
Award Steel and Duct Erection Subcontract	12/21/2009	12/31/2009(A)
Award BOP Mechanical Contract	01/05/2010	03/25/2010(A)
Award BOP Elect Subcontract (includes power and control)	02/05/2010	04/19/2010(A)
Electrical Rooms Released to BOP Electrical Subcontractor	06/01/2010	06/01/2010(A)
Limestone Silo Complete	08/01/2010	07/17/2010(A)
Stack Complete	09/13/2010	05/28/2010(A)
DC and UPS Construction Turnover Complete	09/28/2010	09/28/2010 (A)
PSNH FGD Substation Energized	02/11/2011	11/10/2010 (A)
Enclose FGD Building	12/30/2010	12/16/2010 (A)
Power Available to Islands	03/01/2011	02/28/2011 (A)
Service Water Available	03/01/2011	02/28/2011 (A)
Absorber Vessel Completion / Closeout	02/04/2011	05/16/2011(A)
Milestone: WWT Mechanical Complete (Primary WWT)	06/01/2011	08/01/2011 (A)
FGD Mechanical Completion	08/01/2011	08/04/2011 (A)
FGD Ready for Gas	09/01/2011	09/01/2011 (A)
MK-1 Tie-in Outage End	09/28/2011	09/25/2011 (A)
MK-2 Tie-in Outage End	11/21/2011	11/14/2011(A)
MK-1 and MK-2 Tune and Performance Test	11/27/2011	11/27/2011
Declare Substantial Completion (FGD)	01/31/2012	01/31/2012
Declare Substantial Completion (WWT)	04/01/2012	04/01/2012
SWWT System In Service	2012 Q2	2012 Q2

## Independent Engineer's Report for December 2011 Merrimack Clean Air Project

Page 8

### Project Schedule

With the exception of the SWWT system, the primary focus of the Project during the Period was on operational and performance testing; work on various changes and modification deemed necessary or beneficial after the initial period of operation; and punch list items. The Project was using a range of schedules, lists and reports to track the progress in these areas.

### Major Project Contractors

#### URS (Program Manager)

URS continued to work with the Island Contractors to verify completion of their punch list items. They continued to manage the completion of their other remaining activities and services. The URS as-built drawing effort was nearly complete. They were working to assemble final vendor documentation as they submitted final drawing packages.

URS home office staff was reduced to one full time person. The project manager and project controls staff were providing support only as required.

The URS construction manager was scheduled to be on the Project through February 2012. Other site support staff were scheduled for release over the first quarter of 2012 as the remaining tasks are completed.

#### Siemens Environmental Systems and Services (FGD Island)

During the Period, SESS continued operational testing; however, this was limited by the availability of MK-1 and MK-2. They continued to work on punch list and other miscellaneous items. The FGD system performance test was scheduled for the week of January 9, 2012. URS reported that the SESS punch list was in reasonably good shape for Substantial Completion. Open issues included disputed items, responsibility for the replacement of the ball mill gear box and the SWWT system interface design.

#### Dearborn Midwest (Material Handling Systems)

During the Period, DMW continued operational testing of all of their systems and completion of punch list items. Limestone silo bridging remained an ongoing issue with DMW. DMW maintained that the flow of limestone through the silo could not be interrupted for prolonged periods, defined as more than three days, without the potential for bridging in the silos. This limitation is inconsistent with the normal operation and maintenance requirements of most coal fired power plants. URS and PSNH expressed concerns that DMW had made changes in the design of the silos that deviated from the Solids Handling Technologies Inc. flow study, from the design specification and from the approved general arrangement drawings. They maintained that these design changes increased the likelihood of bridging of material in the limestone silos. Several meetings were held with DMW to resolve this issue. URS and PSNH were waiting for

Independent Engineer's Report for December 2011  
Merrimack Clean Air Project

Page 9

responses to the numerous letters that they have sent to DMW on this issue. They acknowledged that resolution of this issue had been impacted by the radial stacker outage and the inability to unload railcars.

### **Siemens-Water Technology and Northern Peabody (PWWT and EMAR Systems)**

URS reported that the performance test was held during the week of January 3, 2012 and that they were awaiting the test results. They reported that the punch list was in reasonably good shape for Substantial Completion. Open issues included disputed items, the lock-out-tag-out ("LOTO") requirements, and the very high hydrochloric acid ("HCL") dosage rate.

Work continued on the installation of the soda ash silo. DCS input/output cards may not be available until June or July 2012, which could delay the in service date for the soda ash system. A proposal has been received from Emerson for DCS programming.

The FGD system wastewater discharge was being processed by the PWWT system and the effluent from the PWWT system was being trucked to several licensed treatment facilities out of state for disposal.

### **AZCO Inc. (BOP Mechanical Erection Subcontractor)**

Through the Period, AZCO continued to support ongoing work activities and to complete punch list items.

### **E. S. Boulos Co. (BOP Electrical Erection Subcontractor)**

During the Period, ESB continued to support ongoing work activities and to complete punch list items.

### **G. C. Cairns (Site Finalization - Phase I)**

During the Period, George C. Cairns ("Cairns") installed the truck scales and the scale house; completed the base paving for Roads 3 and 4, installed trench covers and bollards and demobilized for the winter.

## **Start-Up**

During the Period, the URS start-up team ("Start-Up") continued to finalize its activities.

## **SWWT System**

During the Period, work continued on the installation of miscellaneous mechanical and electrical equipment and trench work. Commissioning of the SWWT system started.

The estimated Mechanical Completion Date for the first effect (first stage) of the SWWT system was revised to January 6, 2012. Start-up, commissioning and testing of the first effect was still

**Independent Engineer's Report for December 2011**  
**Merrimack Clean Air Project**

Page 10

scheduled to be completed by January 2012. The Mechanical Completion Date for the second effect was estimated for the second quarter of 2012 along with start-up, commissioning and testing.

## **Merrimack Clean Air Project Cost Summary**

Through the Period, projected costs for the Project were unchanged at \$422,000,000, including reserves of \$5,000,000. R. W. Beck has not performed a detailed budget analysis to determine the adequacy of the remaining reserves. PSNH has reported that the majority of the Project was officially placed into service on September 27, 2011, with the portion of the work associated with the MK-2 ducts and booster fans placed into service on November 11, 2011. The Truck Scales were placed into service in December 2011. The remaining portions of the Project are expected to be placed into service as follows: SWWT in 2012 and site finalization in the second quarter of 2012. With the majority of the Project now classified as being in service the cost associated with Allowance for Funds Used During Construction ("AFUDC") is no longer a significant cost factor or risk to the Project. PSNH's budget analysis, through the Period, indicated that the reserves should be sufficient.

**Independent Engineer's Report for December 2011  
Merrimack Clean Air Project Photographs – January 26, 2012  
Attachment 1  
Page 1**



**Figure A-1 FGD Site**



**Figure A-2 SWWT Building Falling Film Evaporator**

**Independent Engineer's Report for December 2011  
Merrimack Clean Air Project Photographs – January 26, 2012  
Attachment 1  
Page 2**



**Figure A-3 SWWT System Commissioning**



**Figure A-4 EMAR System**

**Independent Engineer's Report for December 2011  
Merrimack Clean Air Project Photographs – January 26, 2012  
Attachment 1  
Page 3**



**Figure A-5 Limestone Ball Mill Bull Gear Repair**



**Figure A-6 South Side of FGD Building**

**Independent Engineer's Report for December 2011  
Merrimack Clean Air Project Photographs – January 26, 2012  
Attachment 1  
Page 4**



**Figure A-7 North Side of FGD and Gypsum Buildings**