Public Service Company of New Hampshire
Docket No. DE 11-250

Data Request TC-01
Dated: 06/04/2012
Q-TC-006

Witness: William H. Smagula
Request from: TransCanada

Question:
(Originally numbered TC-01, Q-TC-006 in the Temporary Rates portion of this docket) Please provide a copy of any document provided to any elected or appointed government official in New Hampshire related to its position on achieving legislative approval for "An ACT relative to the reduction of mercury emissions" that took effect on June 8, 2006.

Response:

PSNH was a member of a collaborative group that supported the passage of HB 1673. *See* the legislative record for HB 1673 which contains the testimony of Terrance Large and Donna Gamache of PSNH as well as that of former DES Air Resources Director Robert Scott in support of the bill. See also the attached information responsive to query.

Merrimack Station Mercury Collaborative Plan

A New Hampshire Clean Air Leadership Initiative To Reduce Mercury at Merrimack Station in Bow, NH

November 2005

10/05 IAW

The Plan: Collaborative Effort to Reduce NH Mercury Emissions

- Focuses on installing technology at PSNH's Merrimack Station to reduce a minimum of 80% of the mercury in coal no later than 2013
- Provides incentives for PSNH to pursue mercury emissions reduction before 2013
- The emissions control technology will also reduce on-site SO_2 emissions by $90^{+}\%$
- The $250 million cost of the emissions technology would largely be off-set by PSNH not having to purchase SO_2 credits annually
- No trading allowed to meet the minimum 80% removal standard
- Maximizes the environmental benefit for NH residents, while effectively minimizing the financial impact on PSNH customers
- The plan is a result of a collaborative process of NH organizations. It is supported by a diverse coalition

Support for the Plan is Growing

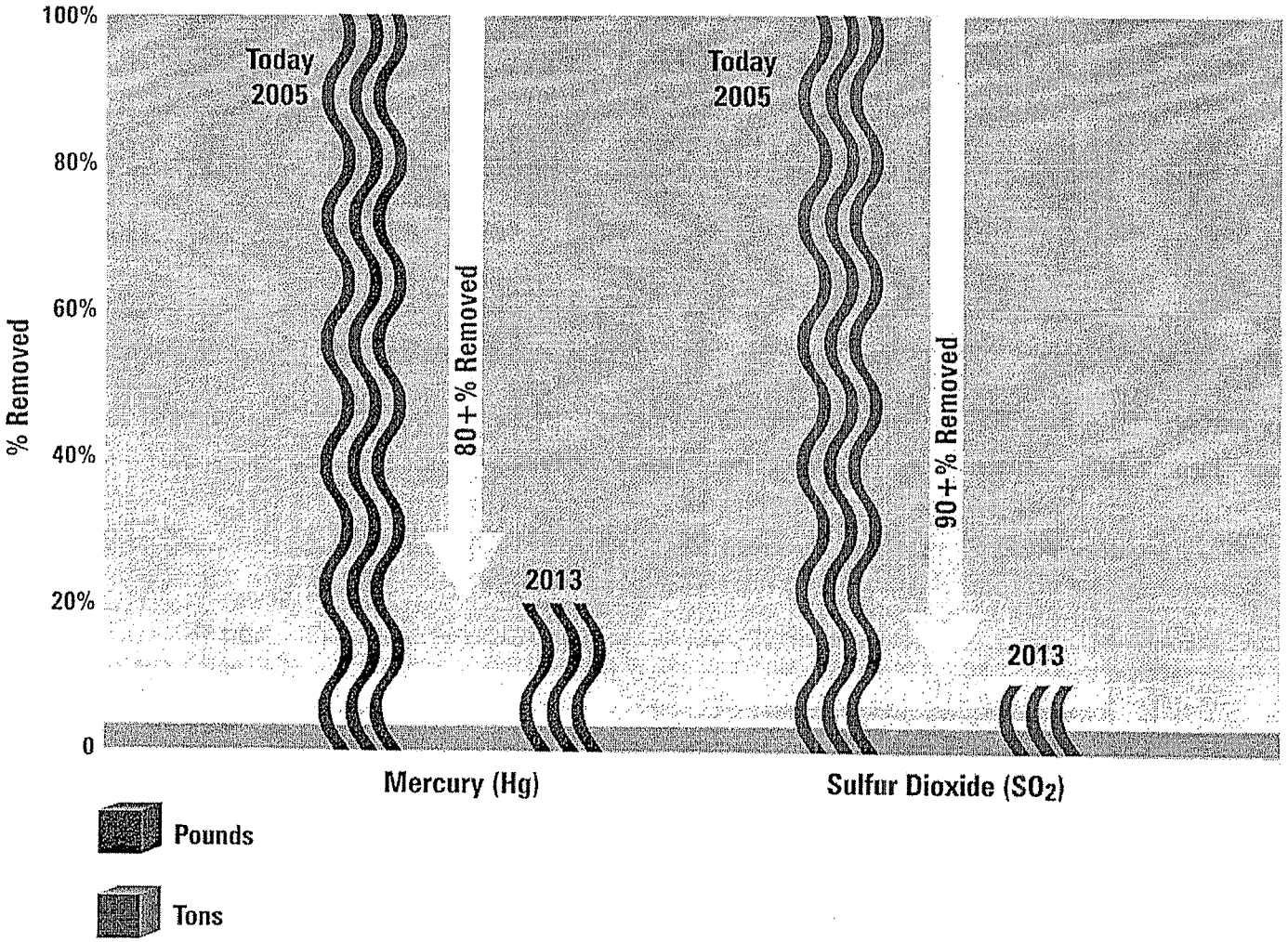
In August 2005, a small group of interested organizations began to discuss creative approaches to reducing mercury emissions. Organizations and NH Legislators that developed the plan include:

- NH Department of Environmental Services
- NH Office of Energy & State Planning
- NH Lakes Association
- NH Audubon Society
- PSNH
- Representative Larry Ross (R-Peterboro)
- Representative Naida Kaen (D-Lee)

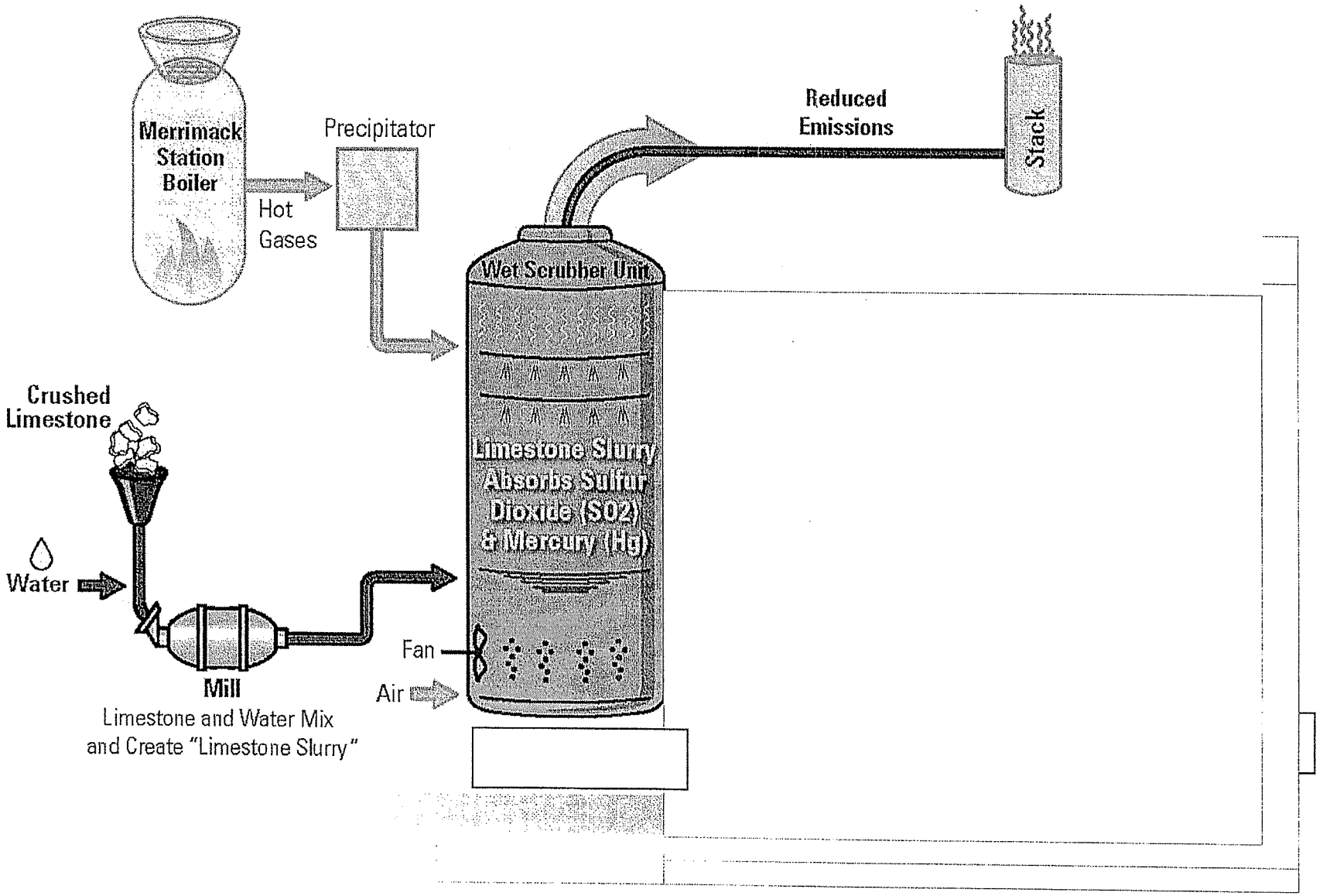
Technology Investment is at the Core of the Plan

- PSNH will install "wet scrubber" technology at Merrimack Station to reduce mercury emissions
- Scrubber technology is commercially available and has a proven track record for reducing SO_2 emissions
- Installation of this technology could cost as much as $250 million
- The cost of this investment would be substantially off-set by reducing the amount of SO_2 credits purchased annually to meet federal and state clean air requirements
- Scrubber technology would be installed and operating no-later-than July 2013

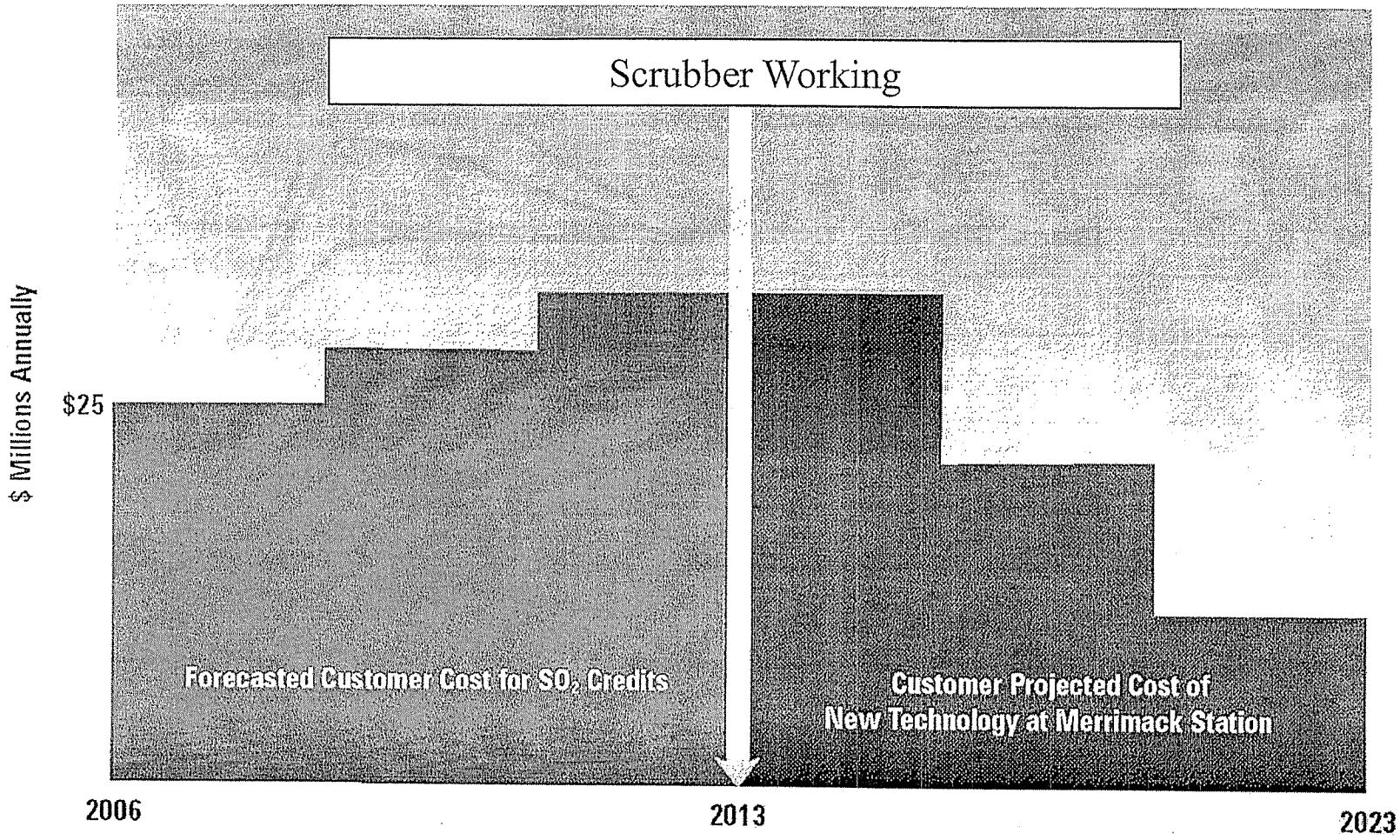
New Technology at Merrimack Station Reduces Emissions



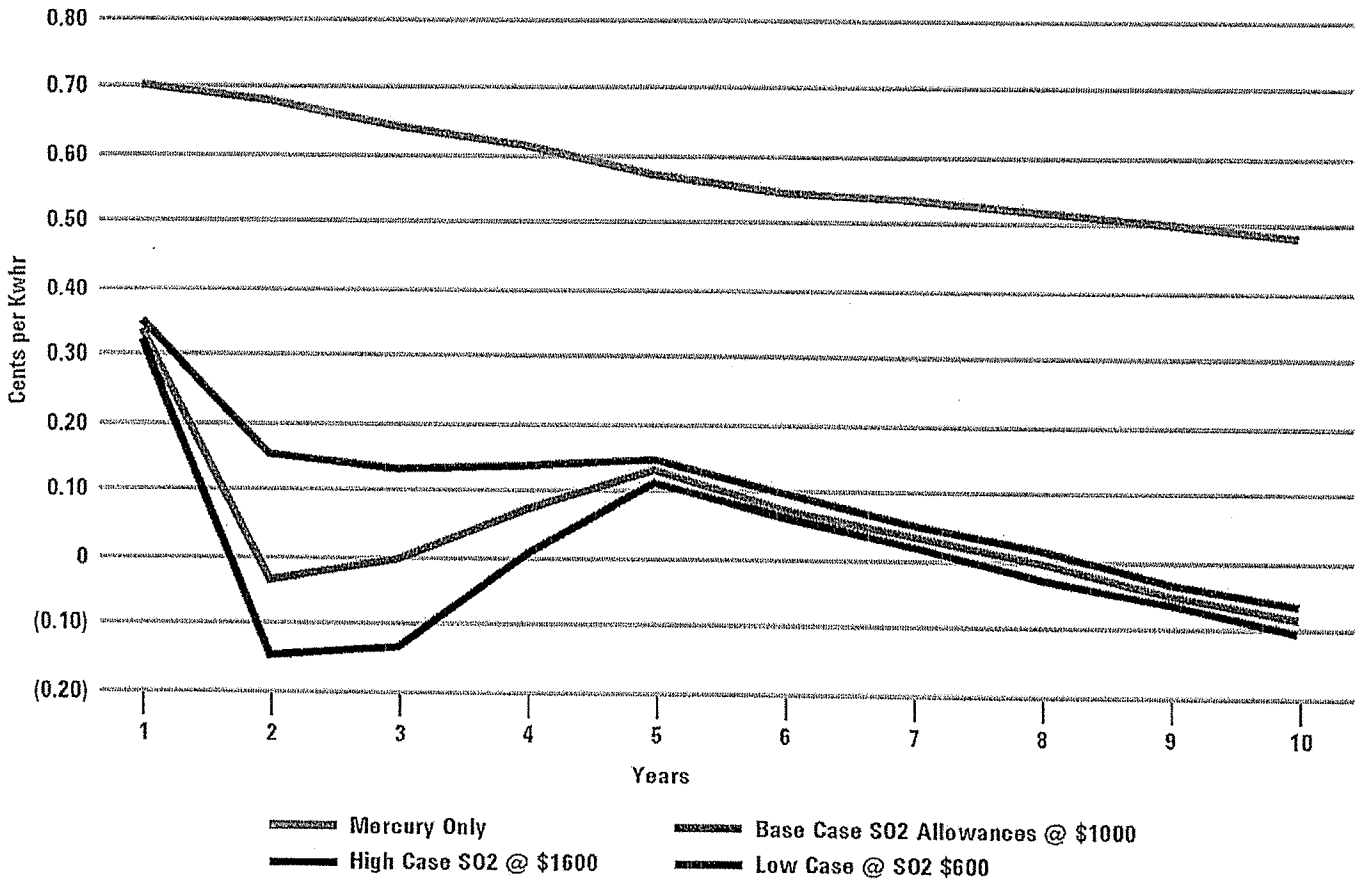
Wet Scrubber Technology for Merrimack Station



The Costs Of The Scrubber Technology Would Be Largely Offset By Reduced Purchase of SO_2 Credits



Credit for SO_2 Reductions Will Significantly Reduce Customer Cost



The Plan Includes Incentives for Maximizing Mercury Reductions After Scrubber Installation

- The plan includes incentives for PSNH to maximize the mercury reduction capabilities of the technology after 2013
- The plan establishes over-compliance credits for mercury removal achievements above 80%
- The plan proposes that these credits be banked for future use or converted to SO_2 credits to offset the cost to customers

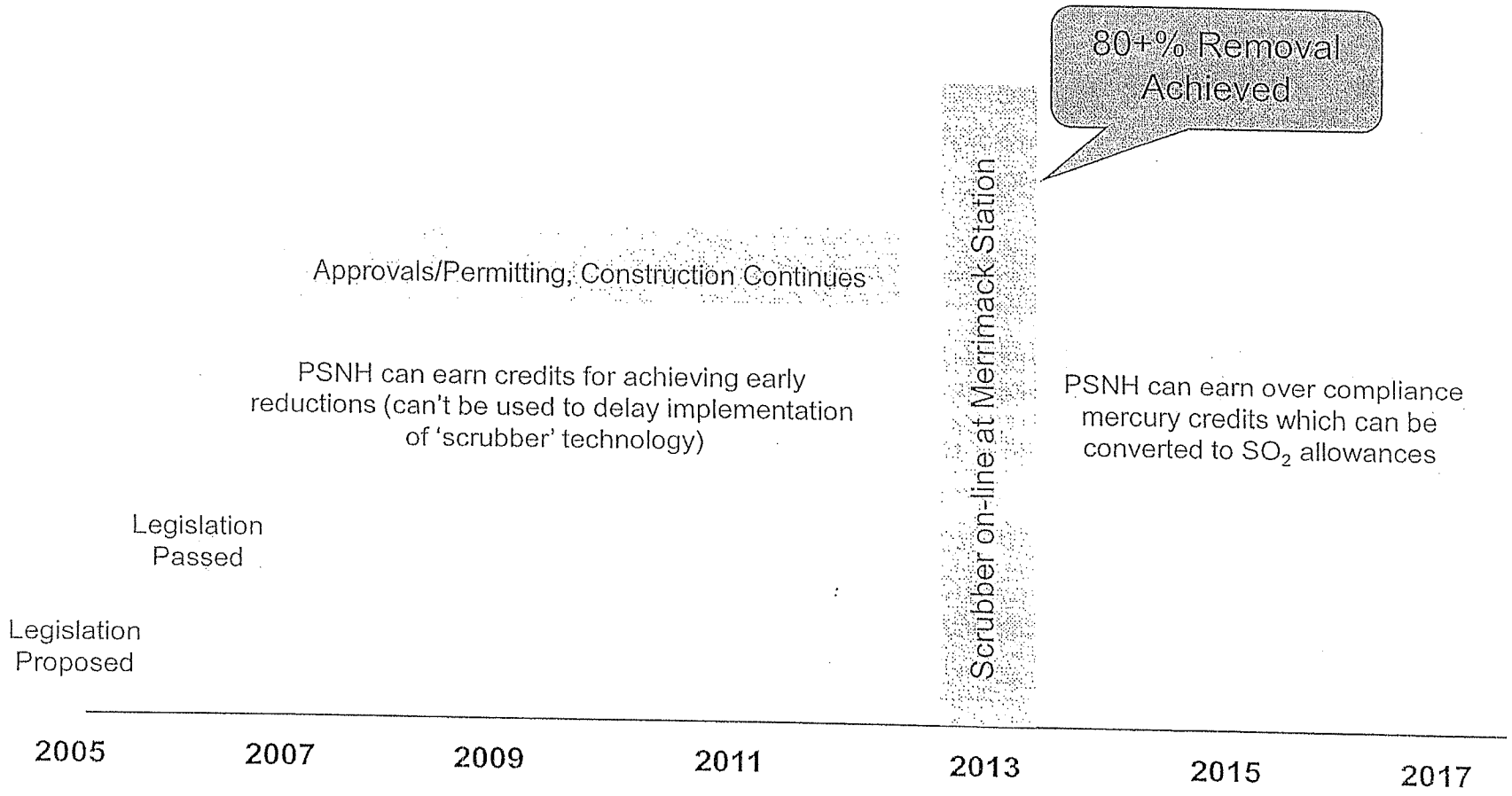
The Plan Offers Incentives for Early Mercury Reductions

- A "credit system" will be established for mercury reductions achieved from when the bill becomes law to July 1, 2013
- Importantly, early emission reduction credits may not be used to delay the scrubber installation
- The earlier mercury reductions are made, the higher the value of the credits
- Prior to scrubber installation, other mercury reduction strategies will be tested and/or implemented to achieve mercury removal while scrubber technology is being designed, permitted and constructed
- Once the scrubber is installed, the early reduction credits can be converted to over-compliance credits where they can be banked or converted to SO_2 allowances

Key Comparisons

Senate Bill 128	❖ Reductions to a total of 24 pounds emitted, achieved by July 2013 with opportunities for off-site reductions
US EPA Guidelines	❖ Target removal of 70%; no incentives for early reductions ❖ Federal compliance date of 2018 ❖ Cap & trade system in place, with potential for purchase of credits for compliance
Collaborative Plan	❖ 80% removal of Mercury by 2013 with incentives for earlier reductions ❖ Incentives for PSNH to maximize reduction capabilities of the technology beyond 2013 ❖ Over-compliance credits established for mercury removal above 80% ❖ All reductions achieved on-site; no purchase of credits permitted for compliance

The Plan Framework:
Proposed Mercury Emissions Reduction Timeline



A New Hampshire Clean Air Leadership Initiative at Merrimack Station

1. Merrimack Station Fact Sheet

2. What is Mercury & Sulfur Dioxide?

3. Mercury Initiatives at Merrimack Station

4. Merrimack Station Mercury Collaborative Plan

    a. The Plan
    b. Early Mercury Reductions Incentives
    c. Maximizing Mercury Reductions
    d. Developers & Supporters of the Plan
    e. Wet Scrubber Technology is at the Core of the Plan
    f. New Technology Reduces Emissions
    g. Key Comparisons

5. News Releases
    a. Gary Long – Reducing Mercury Emissions; Let's Do It Right

6. FAQs

Public Service
of New Hampshire

Merrimack Station
Bow, New Hampshire

Fact Sheet

PSNH's Merrimack Station is an important base load plant, operating 24/7 to meet customers' electrical demand in New Hampshire.
Creative environmental initiatives at Merrimack Station have earned the company numerous awards-including the Governor's Award for Pollution Prevention in 1996, and the U.S. environmental Protection Agency's Environmental Merit Award in 1996 and again in 1999.

Facts at a Glance:

- Electric Output: 478 Megawatts of power
- Supplies power to about 190,000 residential, commercial and industrial customers
- Began commercial operation in 1968
- Operates on two primary coal-fired steam turbines(Unit One – 113 MW; Unit Two – 320 MW); also home to two combustion turbines, utilized only during periods of great power demand
- Environmental improvement initiatives – Investment of almost $50 million since 1989

Environmental Initiatives and Improvements:

Although they also have significant operating costs, these improvements have enabled the station to significantly lower its emission of certain pollutants. For example, Merrimack Station now has the lowest NOx (nitrogen oxide) emission rate of any utility coal-fired power plant in all of New England.

1989 Installed an additional electro static precipitator (ESP) on Unit One, resulting in no visible emissions.

1995 Began Unit Two Selective Catalytic Reduction (SCR) system operation, resulting in a 65 percent reduction in NOx emissions. Merrimack Station became the first utility coal-fired plant in the US to install an SCR system.

1995 Installed a Selective Non-Catalytic Reduction (SNCR) system on Merrimack Station Unit One - resulting in a significant reduction in NOx emission.

1998 The early installation of additional catalyst material in the existing Unit Two SCR system, resulted in an 85 percent reduction of NOx emissions. The reduction was of critical importance in a decision by the US EPA not to require automobile tailpipe emission testing in New Hampshire.

1999 Installed an SCR system on the Unit One boiler, resulting in an 85 percent reduction of nitrogen oxides (NOx) emissions - equivalent to the removal of 700,000 automobiles from New Hampshire roads. As a result of this installation, NOx emissions from Merrimack

Station are in compliance with the EPA's NOx standards for new power plants, including gas plants.

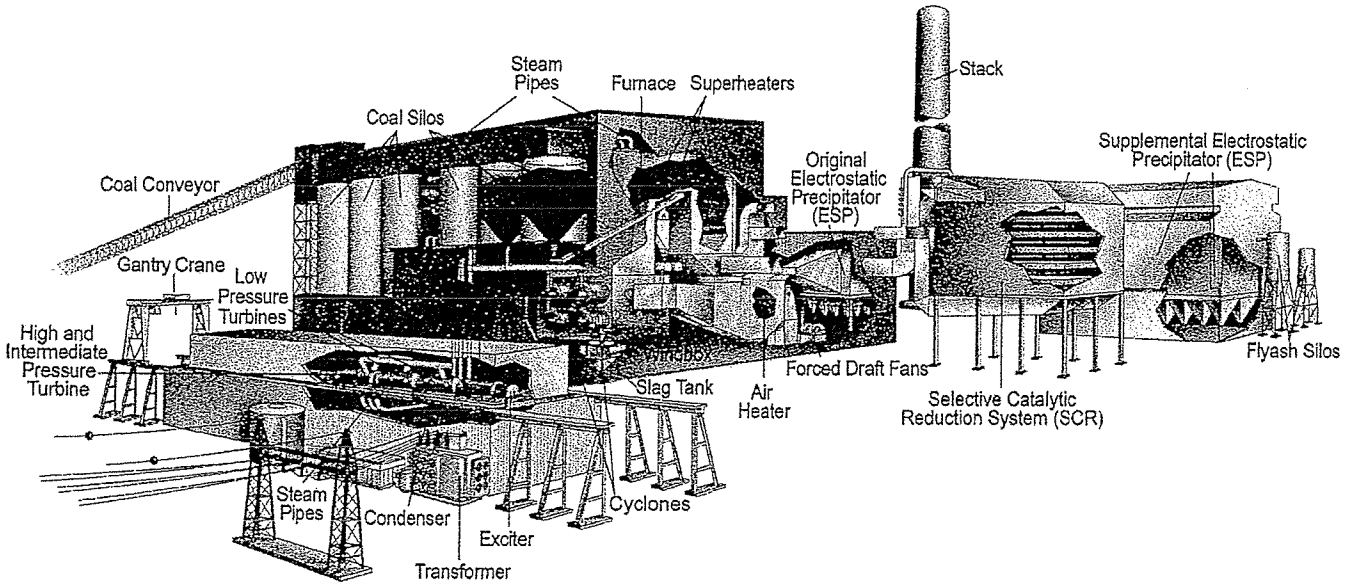
1999 An additional ESP on Unit Two became operational, resulting in reduction of particulate emissions to 0.02 lbs/mmBTU. This is better than the U.S. EPA's particulate and opacity (smoke density) standards for new plants, including gas plants.

2003 Installed upgraded turning vanes for the Unit Two Selective Catalytic Reduction (SCR) system, further reducing NOx emissions.

2002 Upgraded the original ESP on Unit One, resulting in a greater reduction of particulate emissions.

2002 Upgraded the original ESP on Unit Two, resulting in a greater reduction of particulate emissions.

The Inner Workings Of A Power Plant
Making energy at Merrimack Station – Unit Two



Station Environmental Awards

2004 Northeast Utilities 2003 Environmental Leadership Award for significantly reducing the emission of Sulfur Dioxide (SO2).

1999 US EPA Environmental Merit Award for Unit One NOx emission-reduction that resulted from the installation of a second Selective Catalytic Reduction system at Merrimack Station.

1996 Edison Electric Institute (EEI) Special Distinction Award for collaboration with government agencies and environmental groups to develop an ozone-reduction strategy to meet the Clean Air Act.

1996 US EPA Environmental Merit Award for installation of Unit Two SCR, and for corrosion-reduction system.

1996 New Hampshire Governor's Award for Pollution Prevention for installation of Unit Two SCR.

Public Service of New Hampshire

What Is Mercury?

Mercury (Hg) is a naturally occurring element that humans can neither create nor destroy. It enters the environment by normal breakdown of minerals in rocks and soil through exposure to wind and water.

Natural sources of mercury come from volcanoes, oceans, forest fires and other naturally occurring events. Manmade sources include combustion, energy production and incineration.

Mercury is used in medical instruments, electrical equipment and consumer products.

Trace amounts of mercury are found in coal. It accumulates in fish and aquatic species. The greatest exposure to humans is through eating fish, not through inhalation.

What is Sulfur Dioxide?

Sulfur dioxide (SO_2) is produced from the burning of fossil fuels. It is a colorless gas or liquid with a strong odor. It is a common air pollutant that is emitted by coal burning power plants. When the coal is burned, the sulfur dioxide is released into the air. If there is moisture in the air, the sulfur dioxide dissolves into the moisture creating acid rain.

PSNH Mercury Control Initiatives

- Mercury-in-coal analyses (1999, 2002-2003)
- Mercury stack testing at Merrimack and Schiller Stations (2003)
- Technical and economic feasibility study at Merrimack Station (2004)
- Additional Mercury stack testing at Merrimack Station (2004)
- Carbon injection pilot project at Merrimack Station (Summer 2005)
- Application submitted for US Department of Energy Project (Fall 2005)
- Proposed for legislation, 'Wet Scrubber' technology that will reduce Sulfur Dioxide (SO_2) emissions by more than 90 percent and Mercury (Hg) emissions by more than 80 percent (Fall 2005)

Merrimack Station Mercury Collaborative Plan

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November 2005

Summary Overview

The Plan: Collaborative Effort to Reduce NH Mercury Emissions

- Focuses on installing technology at PSNH's Merrimack Station to reduce a minimum of 80% of the mercury in coal no later than 2013
- Provides incentives for PSNH to pursue mercury emissions reductions before 2013
- The emissions controlled technology would also reduce on-site sulfur dioxide (SO2) emissions by at least 90+%
- The $250 million cost of the emissions technology would largely be off-set by PSNH not having to purchase SO_2 credits annually
- No trading allowed to meet the minimum 80% removal standard
- Maximizes the environmental benefit for NH, while effectively minimizing the financial impact on PSNH customers
- The plan is a result of a collaborative process of NH organizations. It was developed by a diverse coalition, including:
    - NH Department of Environmental Services
    - NH Office of Energy & State Planning
    - NH Lakes Association
    - NH Audubon Society
    - PSNH
    - Representative Larry Ross (R-Peterboro)
    - representative Naida Kaen (D-Lee)

The Plan Offers Incentives for Early Mercury Reductions

- Prior to scrubber installation, other mercury reduction strategies will be pursued to achieve mercury removal while scrubber technology is being designed, permitted and constructed
- A "credit system" will be established for early mercury reductions achieved from when the bill becomes law to July 1, 2013

- Importantly, early emission reduction credits may not be used to delay the scrubber installation
- The earlier mercury reductions are made, the higher the value of the credits
- Once the scrubber is installed, the early reduction credits can be converted to over-compliance credits where they can be "banked" or converted to SO2 allowances

The Plan Includes Incentives for Maximizing Mercury Reductions

- The plan includes incentives for PSNH to maximize the mercury reduction capabilities of the technology after 2013
- The plan establishes over-compliance credits for mercury removal achievements above 80%
- The plan proposes that these credits be banked for future use or converted to SO2 credits to offset the cost to customers

Support for the Plan is Growing

The plan is the result of a collaborative process of NH organizations starting early summer 2005. Organizations and NH Legislators supporting the plan include:

- NH Department of Environmental Services
- NH Lakes Association
- NH Audubon Society
- PSNH
- Society for the Protection of NH Forests
- Representative Larry Ross (R-Peterboro)
- Representative Naida Kaen (D-Dover)

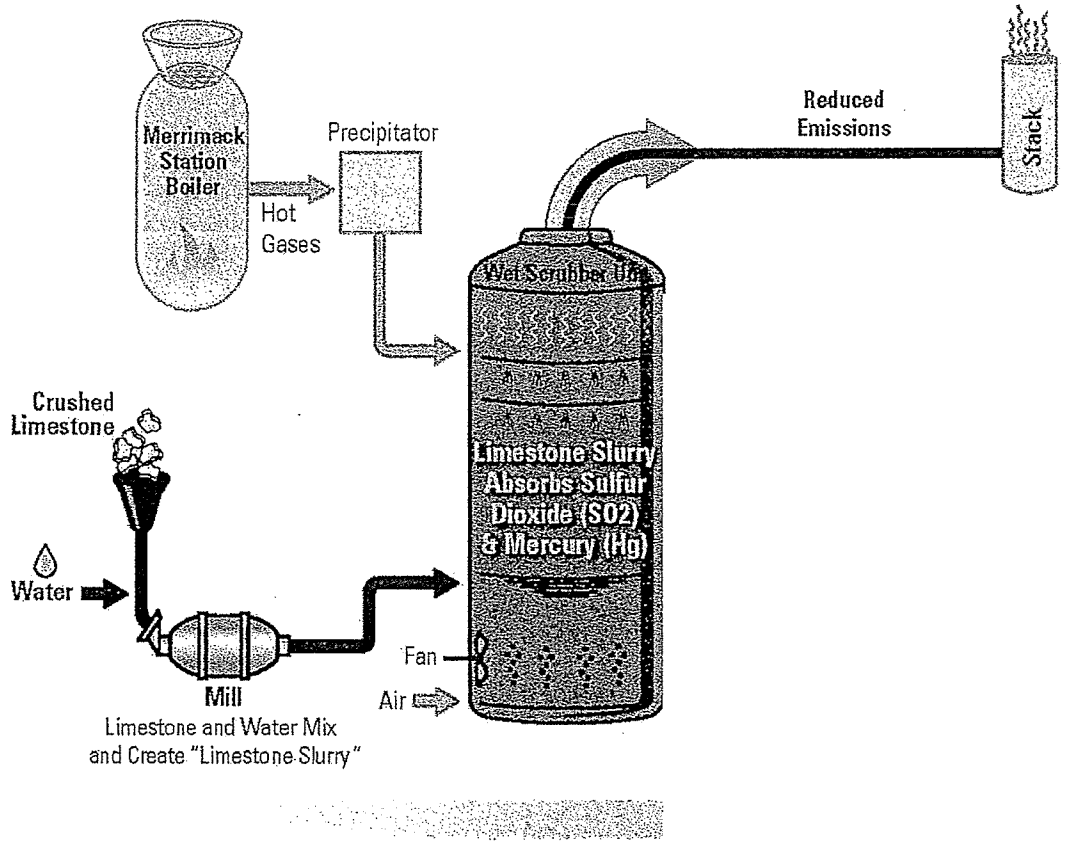
Technology Investment is at the Core of the Plan

- PSNH will install "wet scrubber" technology at Merrimack Station to reduce mercury emissions
- Scrubber technology is commercially available and has a proven track record for reducing SO2 emissions
- Installation of this technology could cost as much as $250 million
- The cost of this investment would be substantially off-set by reducing the amount of SO_2 credits purchased annually by PSNH to meet federal and state clean air requirements
- Scrubber technology would be installed and operating no-later-than July 2013

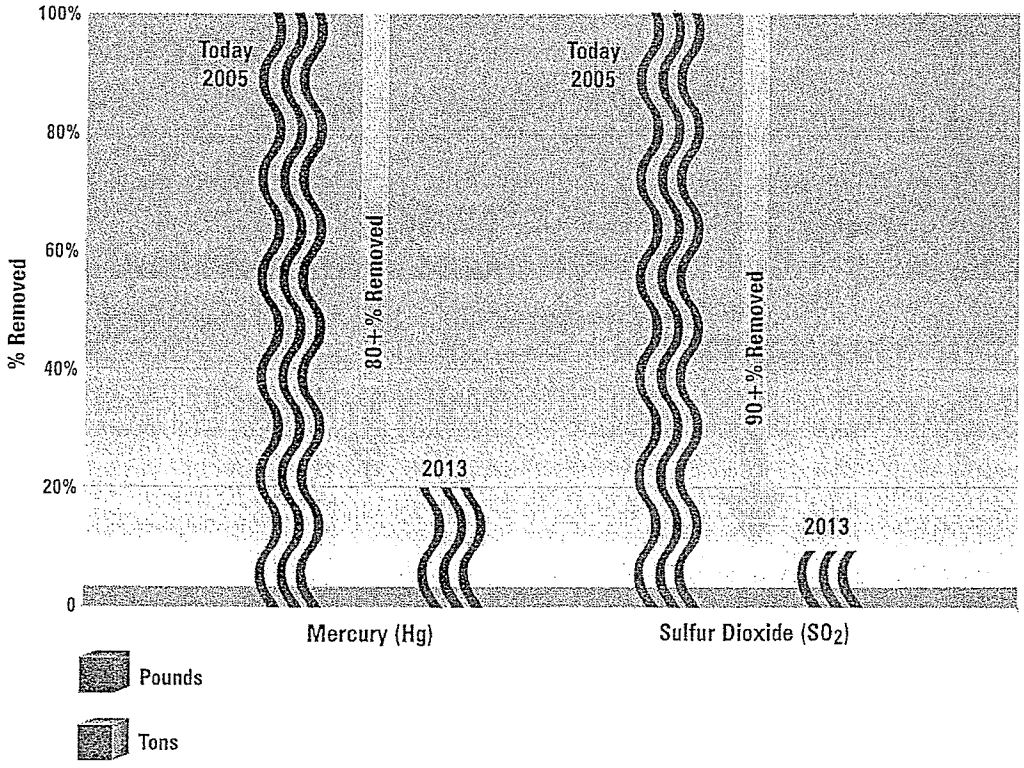
Wet Scrubber Facts

- Wet Scrubber technology is commercially available with a proven track record for reducing sulfur dioxide (SO_2) emissions
- Hot gases from the Merrimack Station boiler will travel through the Precipitator into the Wet Scrubber Unit
- Crushed limestone and water are milled to create a 'slurry' that absorbs SO_2 & Mercury (Hg) within the Wet Scrubber unit reducing emissions going to the stack
- Wet Scrubber technology removes over 90 percent of the SO_2 and over 80 percent of the Hg

Wet Scrubber Technology for Merrimack Station



New Technology For Merrimack Station Dramatically Reduces Emissions



Key Comparisons

Senate Bill 128 (Introduced in January 2005)	• Sets compliance date of 2013 • Reductions to a total of 24 pounds emitted, achieved by July 2013 with opportunities for off-site reductions
US EPA Mercury Guidelines (Introduced in March 2005)	• Sets compliance date of 2018 • Target removal of 70%; no incentives for further reductions • Proposes national cap & trade system for mercury by 2013, with potential for purchase of credits for compliance
Mercury Collaborative Plan (Introduced in November 2005)	• Sets compliance date of 2013 • Requires PSNH to an 80% reduction of Mercury emissions with incentives for earlier reductions • Incentives for PSNH to maximize reduction capabilities of the SO_2 reduction technology beyond 2013 • Over-compliance credits established for Mercury reduction above 80% • All reductions achieved on-site; no purchase of credits permitted for compliance

Reducing Mercury Emissions – Let's Do It Right

By Gary A. Long

The New Hampshire Legislature is considering a mercury reduction initiative that could increase electric rates substantially for PSNH customers. As written, NH Senate Bill-128 could add hundreds of millions of dollars to our energy production costs, and greatly diminish the fuel diversity and economical energy provided by our Merrimack Station in Bow.

The good news is that we believe that there *are* ways to achieve significant reductions in mercury emissions at our coal plants while minimizing rate impacts on our customers, maintaining a diversified fuel mix, and positioning New Hampshire to have future energy costs lower than other New England states.

We would do this by using the same collaborative approach we used to develop broad support for the passage in 2002 of the celebrated New Hampshire Clean Power Act, and previous successful efforts to achieve significant emissions reductions.

Unfortunately, SB-128 is not the result of collaboration, but instead embraces a deeply flawed approach to reducing mercury, and would set in law targets and timelines that are unachievable.

Mercury is a naturally occurring compound that is released globally by volcanic eruptions and by everyday activity that involves combustion of fuels. It is estimated that 60 percent of the mercury deposition in the U.S. comes from overseas – carried by wind patterns from industrial complexes as far away as China. Like many other emissions, mercury is also

deposited in New Hampshire from industrial sources in the Ohio River Valley and other areas.

The State of New Hampshire estimates that about 650 pounds of mercury are emitted annually in the state from multiple sources. PSNH's two coal-fired plants emit about 130 pounds annually, about 19 percent of the state's total annual emissions. SB-128 focuses on PSNH power plants for reductions; other sources, which collectively emit more than 80 percent of the state's annual mercury emissions, are not addressed.

In 2002, PSNH, the State of New Hampshire, environmental groups and others made a commitment to reduce mercury emissions as part of the New Hampshire Clean Power Act. All parties agreed to let the U.S. Environmental Protection Agency (EPA) take the lead in setting reduction targets, given that there were *no* federal standards yet regulating mercury emissions at power plants. The Clean Power Act also states that trading programs should be an integral part of any NH initiative to reduce mercury emissions.

Trading involves setting up a marketplace for buying and selling mercury credits – recognizing that mercury deposition in NH also comes from out-of-state sources. Trading programs have been successfully used to significantly and *economically* reduce other emissions, including those causing smog.

In March, the EPA issued new mercury regulations for US coal plants. The rule would require PSNH to reduce its annual mercury emissions by more than 60 percent by 2018 -- from 130 pounds to 50 pounds. The EPA also proposes to establish a national "cap and trade" system on mercury emissions to help achieve the reduction targets cost-effectively.

As written, SB-128 is much more aggressive. It requires PSNH to reduce its annual mercury emissions to 50 pounds by 2009, and then to 24 pounds by 2013. Also, SB-128 does *not* allow participation in any trading programs, nor does it encourage the company's participation in alternative mercury mitigation initiatives such as recycling household items containing mercury.

Without alternative mitigation and trading, the only option left to the company to meet the bill's reduction targets is experimental technology.

The fact is that there is *no* commercially available technology for coal-fired power plants which has been proven to achieve the mercury reductions required by SB-128. There are technologies available to reduce mercury emissions from coal-fired power plants', however; real questions exist as to whether any of these technologies alone can achieve the reductions called for in SB-128.

PSNH will implement a pilot program this summer at Merrimack Station to test the effectiveness of one mercury reduction technique, using carbon injection.

PSNH is willing to do its part to reduce mercury, provided it is a realistic plan and considers the impact on our customers' rates. I am hopeful that the Legislature will have the wisdom to reach for policies that balance the needs of its citizens, while positioning the state for a prosperous future.

Gary A. Long is president and chief operating officer of Public Service of New Hampshire.

FAQs

Who was involved in developing the plan?

The proposal to use a wet scrubber system was developed during the summer of 2005 by a small group of interested parties which worked collaboratively to find a mercury reduction method which would achieve the desired goal while minimizing the economic impact on customers. The group included: the NH Office of Energy and Planning; the NH Department of Environmental Services; members of the Legislature; the New Hampshire Audubon Society; the New Hampshire Lakes Association; and PSNH.

How does a wet-scrubber system work?

A wet scrubber system utilizes crushed limestone and water to create a "slurry" which interacts with and absorbs sulfur dioxide and mercury within the flue gas system, prior to the emission stage.

How do you know a wet-scrubber system will work at Merrimack Station?

Wet scrubber technology has been utilized for years as a primary method to reduce the emission of sulfur dioxide (SO2) emissions. In addition, the technology has more recently proven to successfully reduce mercury (Hg) emissions. The history of this technology indicates that it will successfully reduce sulfur and mercury emissions at Merrimack Station?

Why hasn't a wet scrubber system been installed earlier at Merrimack Station?

Merrimack Station has successfully complied with all state and federal environmental regulations to date through a variety of investments and projects. Emission reduction regulations are becoming more stringent and challenging, in turn impacting the evolution of emission reduction technologies and the costs associated with utilizing those technologies or, if available, the purchase of compliance credits. It makes sense from both environmental and business perspectives to now develop a wet scrubber system at Merrimack Station

Why was an 80 percent reduction of mercury selected as a target – can more mercury reduction be achieved?

Yes, more mercury reduction can be achieved. The proposal suggests and anticipates incentives for both interim reduction of mercury emissions, prior to the 2013 startup of a wet scrubber system – and additional mercury emission reduction following the startup. The mercury removal target of 80 percent is in line with the overall goal which was developed by the Legislature as part of its initial proposal, Senate Bill 128.

Why was 2013 selected as the 'start up' of the new technology? Can anything be done in the meantime to reduce mercury emissions?

The original legislative proposal, SB128, set July, 2013 as a target date to achieve a significant reduction of mercury at Merrimack Station. The date makes sense for the wet scrubber proposal, given that it will require significant time for design, permitting, site work and construction. In the meantime, the proposal outlines incentives to encourage interim reductions of mercury through other means, including carbon injection technology.

What will be the cost of the project be?

It is estimated that the project will require a capital investment of up to $250 million and annual operating expenses of about $10 million. As a regulated utility, PSNH must receive authorization from the NH Public Utilities Commission before making any such investment.

How will the project costs be paid?

If the New Hampshire Public Utilities Commission (NHPUC) approves the project, the costs will be recovered from customers through PSNH rates. Importantly, many of these costs will be offset by a reduction in the number of related emission reduction credits which must now be purchased by PSNH. Currently, PSNH spends about $20 million per year on sulfur dioxide credits, and the price of those credits is expected to increase. The proposal anticipates a significant reduction in the required purchase of SO2 credits, thereby offsetting project costs.

Will there be additional employees hired as a result of the project?

Yes. The new system will require some additional fulltime employees to be added to Merrimack Station's current workforce of 100 employees.