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Verso Paper – Bucksport Mill

Bucksport Environmental Innovative Partnership Project

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Executive Summary - BEIP

Maine's heavy economic reliance on its vast natural resources, as well as its independent heritage, has played a significant role in environmental regulatory development. The state has a tradition of imposing strict environmental requirements on industrial facilities based on an individual project or unit rather than a broad assessment as to how those requirements relate to the environmental impact of the entire facility. Increasingly, facilities have had to overcome increased energy costs, labor costs, and raw material costs, at a time when access to capital to remain competitive and survive is becoming more limited. As environmental regulations impose more stringent requirements across all media for those remaining facilities in the state, it has become increasingly important to prioritize environmental objectives with shrinking available capital. Utilizing a cooperative effort between industry and government to assess a facility's environmental impact in contrast to the imposition of a prescriptive regulatory requirement is unique. The Bucksport Environmental Innovative Partnership (BEIP) Project undertaken at the Verso Paper Bucksport mill is an example of a cooperative alternative regulatory strategy focusing on the entire mill complex with source reduction measures rather than the traditional New Source Review process of focusing on a single piece of equipment. This project has shown how working together with regulators and other stakeholders, a facility can maximize improvement in its environmental footprint in a more cost effective manner than a strict prescriptive command and control strategy allows.

In 1998, the Maine DEP issued a permit for the Bucksport mill that allowed the installation of a natural gas-fired combined cycle combustion turbine. In order to undertake this project without triggering federal Prevention of Significant Deterioration (PSD) permitting, the mill accepted an emission limit in order to keep increases below significance levels. The resulting license required that the mill limit NO_x emissions to six parts per million (ppm) within the first 21 months of operation. The facility was not able to meet this limit without the installation of Selective Catalytic Reduction (SCR) technology. However, installation of SCR would have resulted in an increase of particulate matter emissions and would introduce the use of ammonia, a hazardous substance, at the facility. The mill's proximity to Acadia National Park and the Penobscot Bay increased the potential negative effects of SCR installation.

Since the license was issued as a state permit, there was greater flexibility in how the terms of the license could be met. Therefore, Maine DEP and the mill representatives agreed to embark on an alternative compliance process. This process involved the development of a team that would determine projects that the mill would undertake to achieve at a minimum, the same emission reductions as those that could have been achieved by installation of SCR.

After five years of work, the results from the BEIP process have been outstanding. The Bucksport mill has reduced the facility's emissions significantly beyond what SCR would have achieved. Specifically, environmental reductions include:

- 54% reduction in SO_x emissions
- 30% reduction in NO_x emissions
- 19% reduction in sewer losses

- 8+% reduction in water use

In addition to the environmental achievements, these projects have also reduced the mill's operating costs by more than \$1,230,000 annually. This project has shown that environmental results can be obtained without sacrificing the bottom line.

Several critical elements led to the success of this innovative permitting effort, including:

- Regulatory flexibility within the state permit to meet BACT emission levels
- Involvement of outside entities/advocates to maintain focus on environmental targets
- Buy-in from top management at the mill and corporate headquarters
- Bottom-up participation by mill employees on individual potential projects
- Willingness by the mill to commit financial and technical resources to the project
- Commitment to continuing participation to keep the project moving forward

This project report highlights both the financial and environmental benefits that can be obtained when regulatory agencies and industry work together to maximize environmental results with limited available capital. In addition, recognizing how finite resources can be used to achieve greater environmental results should start to play a larger role in environmental solutions. Finally, this report should be a road map to employing these concepts in all areas of environmental regulatory development.

1. INTRODUCTION

In 2002, Verso Paper's Bucksport, Maine mill entered into a partnership with the Maine Department of Environmental Protection to move forward in an innovative way to address issues related to meeting the conditions of an air emission license. The following report details the history, process and progress of the project to date.

1.1. Background on the Pulp and Paper Industry

Papermaking in Maine began in the 1730s, with textile mill rags being the primary fiber source. In 1868, the papermakers began to use wood pulp, marking the beginning of the rapid growth of Maine's paper industry. By the early 1900's, the state had over twenty-five pulp mills and existing mills expanded, adding new machines and rebuilding existing machines.

By 1930, Maine surpassed Massachusetts in paper production, becoming the second leading paper producing state behind New York. From 1930 to the early 1960's no mills were built in Maine, however, changes at existing mills propelled Maine as the nation's leading paper producing state. Maine lost this claim in the 1960s to Wisconsin, as new mills migrated to the Midwest. Today, with increasing domestic and foreign competition combined with mill buy-outs and shutdowns, developing and maintaining a competitive edge is critical to keep a mill open. However, even with the many mill closures in Maine, the pulp and paper industry continues to be a critical part of the state's economy, representing 4.1% of Maine's state product and continues to represent the largest manufacturing sector in the state.

1.2. Facility Description

Verso Paper's Bucksport facility is an integrated pulp and paper mill located on 126 acres adjacent to the Penobscot River in Bucksport, Maine. The mill is located about 31 miles from Acadia National Park, a Federal Class I area to the Southeast of the facility. Air quality standards are more rigorous around Class I areas, especially for a major source of air emissions, such as the Bucksport facility.

The mill began operation in the 1930s as an affiliate of Central Maine Power. At the time the corporation needed an outlet for excess power production. Today, the mill produces 1,425 tons per day of lightweight-coated paper on four paper machines. Ground wood pulp and thermo-mechanical pulp manufactured on site, combined with purchased fibers, provide the feedstock for the paper. The facility receives spruce and fir pulpwood in four-foot lengths for the stone ground wood pulping operation and wood chips to supply the thermomechanical pulping operation. Ancillary mill operations include steam and power generation, wastewater treatment, intake water treatment, solid waste disposal and fuel unloading.

Before 1998, the mill operated four industrial boilers, consisting of three oil-fired boilers and one multi-fuel boiler which fired a variety of fuels including biomass, coal, oil, tire chips and paper mill sludge. These boilers produced steam for the facility's two steam generators and four paper machines. At the time, the air emissions from the boilers were typical of an industrial facility of comparable size.

1.3. Installation of Gas Turbine and BACT Analysis

In the late 1990s, natural gas became available as a fuel source in the Bucksport area. As a result, the Bucksport mill recognized an opportunity to utilize natural gas to increase the mill's energy flexibility, reduce the mill's energy costs, increase the electrical generation of the power plant, and reduce the facility's environmental footprint.

In May of 1998, the facility applied for an air emission license, requesting permission to construct and operate a 175 megawatt (MW) gas turbine generator. The generator included a heat recovery steam generator. The Bucksport mill applied to permit the gas turbine as a minor modification. This project was deemed minor due to netting calculations¹ allowed under the Federal Prevention of Significant Deterioration (PSD) program. The original gas turbine license amendment was issued in September of 1998. Although the process did not require a major PSD permit, the source underwent a rigorous minor modification permitting process pursuant to State rules. This process required the completion of a Best Available Control Technology (BACT) analysis along with an ambient air quality dispersion modeling analysis. A major concern with the project related to the determination of Best Available Control Technology (BACT) for nitrogen oxide (NO_x) controls. The facility evaluated three control options:

- Use of dry, low NO_x combustors with Selective Catalytic Reduction (SCR) to meet a 3.5 parts per million (ppm) NO_x level
- Use of dry, low NO_x combustors without SCR to meet 9 ppm NO_x
- Use of dry low NO_x combustors without SCR and/or with alternative control technologies to meet 6 ppm NO_x

The company proposed to install a state-of-the-art GE Frame 7E turbine generator with a guaranteed emission limit of 9 ppm on a 24-hour average. The State issued the air emission license amendment with an initial limit of 9 ppm with the requirement that the facility must achieve an emission limit of 6 ppm within 21 months after start-up of the turbine. If the mill did not achieve the 6 ppm level, the facility would be required to install SCR to achieve a 3.5 ppm NO_x emission level.

1.4. Impacts of Gas Turbine

Installation of the gas-fired turbine occurred in 2000 with the initial firing taking place in October 2000. The gas turbine replaced the use of all coal and reduced the facility use of No.6 fuel oil by fifty percent. The gas turbine, along with other changes at the mill, resulted in significant environmental benefits, including the reduction of combined air emissions by 74% by 2002 (Figure 1). Figure 2 shows the dramatic drop in NO_x and sulfur dioxide (SO₂) emissions from the Bucksport facility after the start-up of the gas turbine system and a fifty percent reduction in SARA 313 emissions² (Figure 3). In addition, the project also reduced steam and electrical costs for the facility.

¹ PSD netting is the procedure at major stationary sources for determining whether a proposed emissions increase of an air pollutant from a modification, along with other creditable emissions increases and decreases over a contemporaneous period, is significant and therefore subject to the major NSR provisions.

² SARA 313 requires facilities to report what hazardous chemicals are used, how much is used, and potential impacts on public health.

Figure 1 – Bucksport Mill Total Criteria Pollutant Emissions 1994-2004

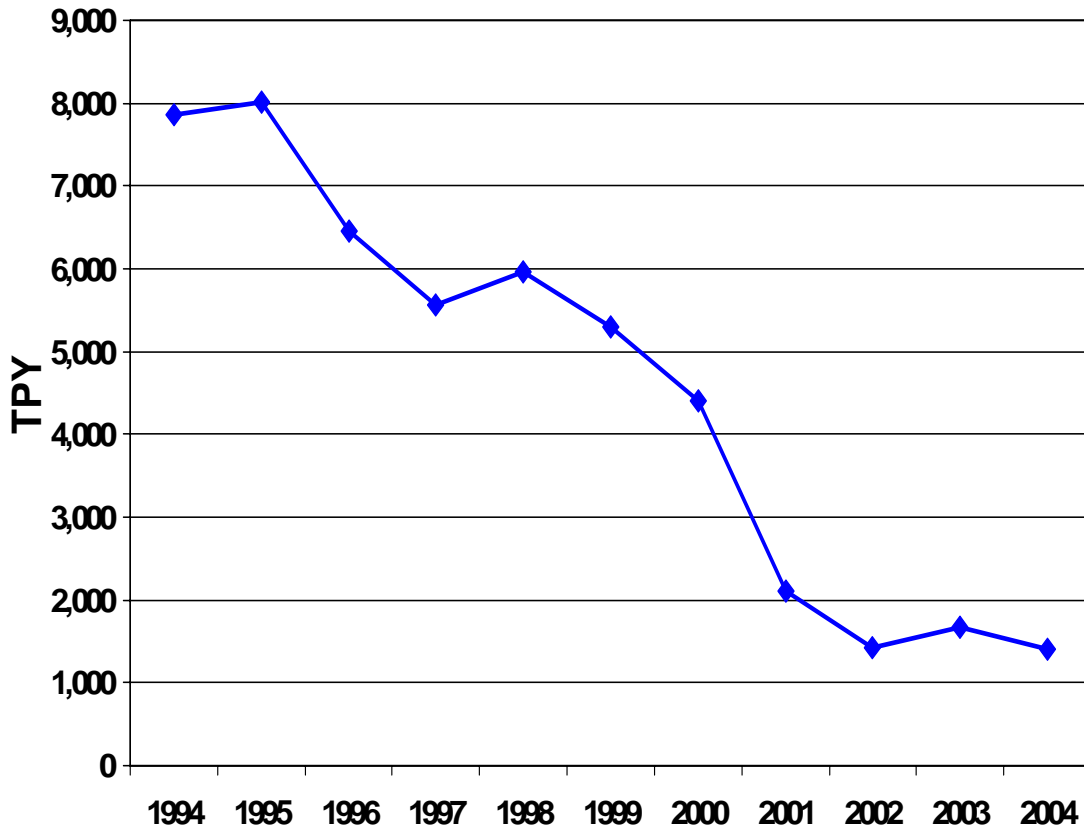


Figure 2 – Bucksport Mill NO_x and SO₂ Emissions Before and After Gas Turbine Installation

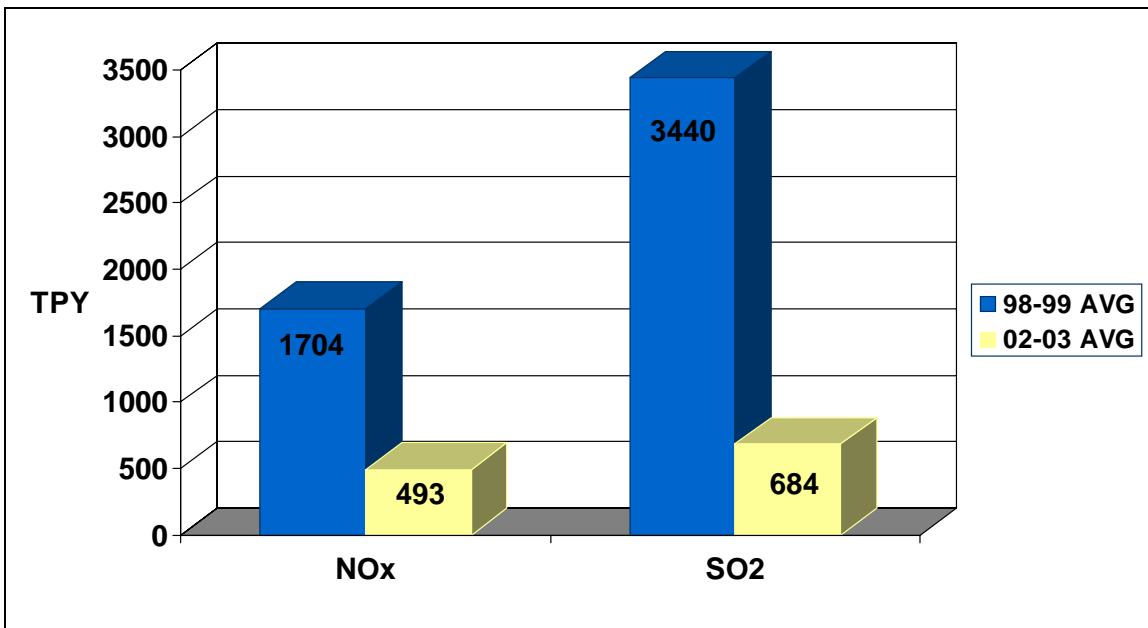
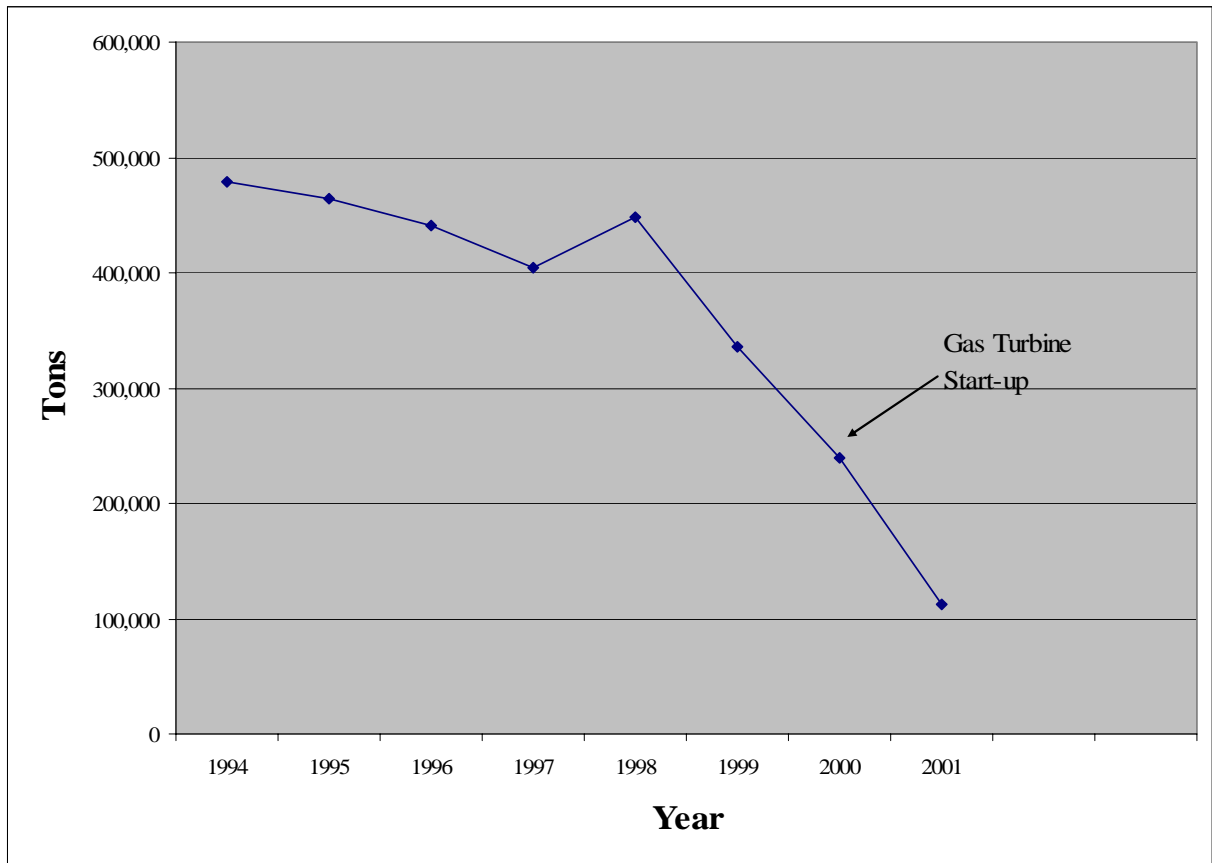


Figure 3 – Bucksport Mill SARA 313 Air Emissions 1994-2001



1.5. Emission Limit Compliance

Despite the mill's valiant efforts, the mill could not achieve the required 6 ppm NO_x emission level within the first 21 months of operation as required by the permit. Installation of dry, low NO_x burners have allowed the turbine to operate consistently at an average NO_x concentration of 7.3 ppm, however, repeated attempts to achieve 6 ppm were unsuccessful due to the threat of "lean burnout," resulting in turbine trips.

2. STRATEGIES FOR COMPLIANCE

The natural gas-fired combined cycle combustion turbine, licensed in September 1998, was processed as a minor modification to the facility. In order to be licensed as a minor modification, the source took emission limitations, which required the facility to keep emission increases below significance levels. Under this action, the BACT determination became a state decision. Typically, state licensing decisions can provide greater flexibility and are less prescriptive than a Federal PSD permit decision. Since the turbine permit netted out of Federal PSD, and emissions at the facility had not increased above significance levels, the state had greater discretion in determining what alternative BACT compliance mechanisms could be undertaken to meet the permit requirement. The following sections outline alternatives for compliance with the emission limit

2.1. Installation of Selective Catalytic Reduction (SCR)

The initial permit required installation of SCR if the 6 ppm requirement was not met. SCR control technologies are commonly used to reduce NO_x emissions at power generation facilities. This technology employs the use of ammonia which is added to the flue gas and absorbed into a catalyst. SCR control technology achieves high removal efficiencies at specific temperature ranges. The mill estimated it would cost \$4,500,000 to install and maintain SCR equipment at the Bucksport facility.

SCR reduces NO_x emissions by breaking it down to its basic elements: nitrogen and water. In this process, ammonia, serving as the reducing agent, is injected into the SCR system where the reduction reaction takes place in the presence of a catalyst. Ammonia may be injected directly or dry urea can be fed to the system and dissolved to form an aqueous ammonia solution upstream of the catalyst bed. The reduction is considered “selective” because the catalyst selectively targets NO_x reduction when ammonia is present. The catalyst material is generally a precious metal, such as tungsten, vanadium or titanium. Although the ammonia-to-NO_x ratio can be varied to achieve the desired level of NO_x control, not all of the ammonia is reacted. In the absence of an additional control device, the unreacted ammonia, or ammonia slip, passes through the catalyst and is emitted to the atmosphere. Currently, state air emission licenses typically limit the ammonia slip to 5-20 ppmv at 15 percent O₂.

While SCR does reduce NO_x emissions, its use presents additional risks and emissions. The use of ammonia, a hazardous chemical, would result in the generation of additional hazardous waste (the catalyst), and would create ancillary air impacts including increased ammonia and particulate emissions³. Given the close proximity of the facility to Acadia National Park, a Class I area, and the potential for increased particulate formation, the Department determined that the addition of SCR to the turbine could have a negative environmental impact on air quality related values, including visibility, at Acadia National Park.

³ Increased particulate emissions result from the secondary formation of fine particulates reacting with ammonia.

This predicament put the Maine DEP and the Bucksport mill in a unique, but difficult, position. The technology available to reduce NO_x emissions from the turbine could result in degradation of other site specific environmental factors, therefore both parties looked for alternative strategies to address NO_x reductions. Both the Maine DEP and Bucksport mill staff believed that greater environmental gains could be attained through the implementation of various mill improvement projects.

2.2. Challenge Permit Limit

Another potential compliance strategy was for the mill to challenge the permit limit. This option was available, but it was highly unlikely that the DEP would change the permit limit as a stand alone solution.

2.3. Alternative Compliance Strategy

The licensing section of the Maine DEP, Bureau of Air Quality, proposed the development of a multi-disciplinary team that would be commissioned to develop alternatives to SCR control on the turbine. The facility accepted the alternative compliance strategy proposal and began the process of identifying and engaging stakeholders. This became known as the BEIP process.

3. BEIP PROCESS

As an alternative method of achieving the necessary reductions in NO_x to meet their license requirements, the Bucksport mill entered into a collaborative effort with the Maine DEP and other stakeholders to find an alternative project or projects in lieu of installing SCR. The Bucksport mill proposed that the goals of the process target greater pollution reductions at the facility, reduce environmental impacts over installation of SCR, and provide a positive return on investment for the mill. In addition, the project team agreed that projects undertaken under the BEIP process would not necessarily be limited to the gas turbine or NO_x.

3.1. BEIP Stakeholders, Amendment, and Financial Commitment

The initial meeting of the Bucksport Environmental Innovation Partnership (BEIP) was held on September 12, 2002. In attendance were representatives from the Bucksport mill, International Paper - corporate level, Maine DEP, NESCAUM, Bucksport Energy, and US EPA Region 1 – New England. The mill's representatives gave an overview of the performance of the turbine and an overview of the mill's environmental footprint. The convening group all shared one common goal: reducing the mill's environmental impact while also improving the cost structure, competitiveness and long term viability of the facility. The group developed a list of tasks that would be undertaken to meet their goals. These included:

- **Legal requirements** – The group determined that the project could not move forward without a modification to the facility's permit that would allow for flexibility in meeting the mill's emission requirements. The existing air emission license required installation of SCR equipment within a given timeframe if the 6 ppm limit was not met. An amendment application was drafted which included preliminary language developed by the initial group. The group agreed that the draft amendment to the license would require review and agreement by the stakeholders before issuance. Since this amendment avoided PSD and only involved State requirements, the EPA was not required to approve the permit modification.
- **Project process** – The group discussed how the project might move forward and identified critical elements to meet the project goals. The group agreed that a project charter should be developed to guide this effort. NESCAUM took the lead in drafting the charter.
- **Project tasks** – The group developed a preliminary list of projects to investigate. In addition, the group determined that project specifics as well as an exhaustive list of potential projects must be developed. The mill took the lead on this effort.
- **Interaction with other efforts** – The group outlined how this effort would mesh with other mill activities, specifically focusing on the synergy between this effort and the mill's participation in EPA's National Environmental Performance Track Program (NEPT).

- **Identification of critical players** – Since this process was new and innovative, it was recognized that diverse viewpoints and critical input would be important to ensuring that all needs were met. Therefore, the group agreed that additional stakeholders should be invited to participate in the process. Mill staff and Maine DEP took the lead in identifying additional project participants.

In the 4th quarter of 2002, the BEIP team agreed through a collaborative process, that in lieu of installing add-on control technology, the mill would commit \$3.0 million⁴ dollars to fund various projects that would reduce the mill's environmental footprint over and above what SCR technology would have achieved. Additionally, the group agreed that once the group approved projects that would reduce NO_x levels below those of SCR, all additional projects would have a positive financial return for the mill. In January 2003, International Paper Corporate headquarters approved the \$3.0 million commitment. However, the capital remained within the framework of the facility's existing capital allocation for the facility which required all potential capital projects to be re-prioritized based on environmental commitments and financial returns.

The process moved forward with the mill formally applying to amend the air emission license and publishing a public notice informing the public of the amendment submittal. The permit amendment included the facility's commitment to spend \$3 million dollars on pollution reduction projects and the environmental targets for the spending. Several comments from the public were received. A written comment was received from the National Environmental Law Center (NELC) based in Boston represented by David Nicholas. The major point of this group was that the public would have no ability to judge or appeal the projects that the mill would be implementing nor have a say in the environmental results. The Department also received an e-mail expressing concern about the process from a local citizen. To alleviate the concerns of these two contributors, both were invited to participate in the BEIP process. The local citizen did join the process but the NELC declined the invitation and did not appeal ME DEP's eventual amendment to the mill's license. This amendment, Amendment #19 (included in the Appendix as Attachment B) was issued by ME DEP on April 29, 2003. This, along with other amendments for the facility was incorporated into the mill's Title V license, issued in December 2004.

As part of the preparations for the project kick-off, local officials from Acadia National Park agreed to participate and the University of Maine was retained as a technical resource.

Although an amendment had been issued to spend \$3 million with an objective of reducing environmental impacts through a stakeholder process, specifics of the stakeholder process were not set forth. With the participating group having been established, the next important task was to develop a BEIP team charter.

⁴ The amount of funding was determined by estimating the cost to install SCR at the facility.

3.2. BEIP Team Charter

The charter outlined three major concepts: (1) project goal, (2) project partners, and (3) project task outline (see charter in Appendix A). The goal of the Bucksport Environmental Innovation Partnership was to develop an alternative approach to meeting state permit requirements, which required the use of SCR control technology to reduce NO_x emissions. Utilization of SCR technology would have led to an annual reduction of approximately 90-95 tons of actual NO_x emissions, but would also have had negative consequences.

The negative impacts of installing SCR would have included the introduction and continued use of a hazardous material (anhydrous ammonia), an increase in particulate matter (PM) emissions, an increase in hazardous waste generation, and a decrease in turbine efficiency. The goal of the BEIP project, using flexible permitting, was expected to achieve greater emission and discharge reductions than would have been realized by the installation of SCR, and at the same time increase the economic viability and long-term competitiveness of the Bucksport mill.

The charter was written to meet the requirements set forth in the air emission license and takes into account the voluntary EPA program that the Mill was actively participating in: the National Environmental Performance Track (NEPT) Program. The NEPT goals for the Bucksport Mill included:

- Reduction of actual NO_x emissions by 25 percent from 625 tons per year to 470 tons per year
- Reduction of actual SO₂ emissions by 33 percent from 975 tons per year to 650 tons per year
- Reduction of fresh water use by 10 percent from 4.4 billion gallons per year to 4.0 billion gallons per year
- Reduction of generated landfill sludge by 38 percent from 27,634 wet tons per year to 20,000 wet tons per year

In addition, the mill committed to provide additional technical resources, such as engineering support from internal and external sources, to assure achievement of these goals.

3.3. BEIP Project Partners

The BEIP project used a collaborative, multi-participant stakeholder process to implement this project. Stakeholders worked together to draft project guidelines, identify issues and determine project activities. Representatives from the Bucksport mill, Maine DEP, Environmental Protection Agency (EPA), and the Northeast States for Coordinated Air Use Management (NESCAUM) were involved in the initial project development. Representatives from the Town of Bucksport, University of Maine (UMaine), Federal Land Management (FLM) program, Bucksport Energy and the general public (Richard

Soper, Pam Person) were invited and agreed to participate. Appendix A, Table A-1 contains a list of all participants.

Input and comment from the group participants was encouraged and considered throughout the process. Each participant maintained a responsibility to participate in all project meetings and provide input to the process. Beyond general project responsibilities, project partners were responsible for the following specific information:

- Bucksport mill - Determine the technical, environmental and economic feasibility of proposed BEIP projects.
- Maine DEP – Ensure regulatory requirements are met and environmental benefits for the State of Maine are secured through this effort.
- EPA – Ensure alignment of NEPT and BEIP efforts and act as liaison for EPA Headquarters innovation efforts.
- NESCAUM – Technical resource to assess air quality impacts and advocate for regional environmental protection.
- Town of Bucksport – Advocate for Town to ensure public health and safety and protect the town’s tax base.
- University of Maine – Technical resource to assess project activities.
- FLM – Advocate for the ambient air quality values in Acadia National Park.
- Public – Pam Person, Richard Soper - Provide comment on project activities for consideration during the decision-making process.

3.4. BEIP Process Challenges

Investing in this process put both the mill and Maine DEP in a position of risk. There was no guarantee that this alternative process would achieve the necessary reductions in NO_x in order for the Bucksport mill to approach the NO_x reductions that would have been attained through the installation of SCR. Nevertheless, the potential benefits to both outweighed the potential benefits of equal or greater environmental gain while using a more cost effective approach. Not only did this new approach require regulatory flexibility on the part of Maine DEP, it also challenged DEP staff and other stakeholders to evaluate the cost effectiveness of the proposed projects against various environmental measures, and other competing projects.

Maine DEP was able to provide flexibility and investigate the potential benefits of this approach because the state minor permitting program has wider latitude and flexibility than the federal PSD program offers. Unlike traditional regulatory efforts, this project allowed participants to explore holistic solutions that encompassed the larger environmental footprint of the facility. This provided another opportunity for Maine DEP staff, facility personnel, and the other stakeholders to understand the interconnectivity of the environmental issues with the operation of the Bucksport facility. As such, this allowed for the generation, development, and implementation of creative

projects that resulted in a reduction in the environmental footprint of the facility greater than what would have been achieved by installing SCR technology alone.

4. BEIP PROJECT DECISION MAKING

This section provides information on the specific project details.

4.1. BEIP Timeline Development

The BEIP team outlined a timeline for decision-making and implementation. Table 1 shows the timeline developed by the BEIP team to guide decision-making and to ensure progress on BEIP goals.

Table 1 -- BEIP Task Outline

Task	Participant	Timeline
Develop project overview	All project partners	September 2002 through March 2003
Identify alternative regulatory language for permit	All project partners	November 2002 through March 2003
Identify project activities	Bucksport mill, ME DEP, UMaine	November 2002 through August 2003
Analyze proposed projects	Bucksport mill and UMaine	March 2003 through August 2003
Determine projects to undertake	All project partners	May 2003 through December 2003
Implement Projects	Bucksport mill	Jan 2004 through June 2006
Measure/evaluate results of initial effort	All project partners	June 2005
Determine what, if any, additional Projects should be undertaken	All project partners	June 2005
Evaluate overall project	All project partners	June 2007

4.2. BEIP Project Selection Process

A technical group, headed by mill personnel, developed an initial list of potential projects that would help achieve the increased environmental performance goals of the BEIP. The initial set of projects is included in Table 2 below. During the course of the partnership, additional projects were identified and evaluated by the BEIP Project Team. A multi-vote process was used to select and recommend the most promising projects to mill management for a more complete technical and economic analysis. The BEIP Team considered a number of projects that could have had significant environmental impacts across all media

Table 2 – Initial BEIP Potential Projects*

Proj. No.	Project	Cost	ROI (%)	NOx (tons reduced, TPY)	SO2 (tons reduced, TPY)	Water Use (MGD reduced)	Landfilled Sludge (dry tons reduced)	BE-IP Team Recommendation
2	Natural Gas in #8 Boiler	1.69MM	13%	85-113 (actual)	306-409 (actual)			BE-IP Approved for Implementation
4B	Broke Chest Control Scheme (#1PM Broke Mgmt.)	16K	165%	0.08 (grid)	0.24 (grid)	0.006	0.8 TPD	BE-IP Approved for Implementation
5B	#1, #2, #4 PM Cleaner Improvements	47K	100+%				1.6 TPD	BE-IP Approved for Implementation
12	Split Flame Burner Tips- #8 Boiler	27K	26%	5-18 (actual)				BE-IP Approved for Implementation
14	Coating Filter Upgrade - PM4	633K	27%				1.5 TPD	BE-IP Approved for Implementation
4D	Equalizing Chest - Additional Broke Storage	500K	66%				2.5 TPD	BE-IP Approved for Implementation
7C	No. 5 PM Whitewater Strainer	600K	95%			0.3 - 1.5	0.2 TPD	BE-IP Approved for Implementation
7D	Vacuum seal water reuse on papermachines	300K	50%			0.8	0.3 TPD	BE-IP Approved for Implementation
4C	#1 PM Raw Broke Overflow Reduction	29K	73%			0.007	0.2	waiting for BE-IP endorsement
13	Raw Broke Overflow Reduction	28K	59%			0.007	0.2	waiting for BE-IP endorsement
1	Screw Press	3.1MM	27%	9 (actual)	32 (actual)	0.3	20 TPD	On Hold
3	VFD Drives - #3 Condenser Cooling Water Pumps	137K	19%	<1 (grid)	2 (grid)	n/a	n/a	Independently Approved
4A	Broke Chest Control Scheme (Cons. Control)	150-250 K	?%	0.08 (grid)	0.24 (grid)	0.006	1 TPD	On hold until CCB storage issue resolved
5A	GWD/TMP Cleaner Improvements	50K	>100%	0.5 (grid)	1.7 (grid)	0.017	1-2 TPD	On hold until GWD quality issues are resolved
6	#1 PM Rereeler Trim Blower Improvements	50K	12%	<1 (grid)	<1 (grid)	n/a	n/a	On Hold
7A	Whitewater Reuse (GWD Seal Pit)	440K	25%	0.02 (grid)	0.07 (grid)	1.2	0.3 TPD	On hold until GWD quality issues are resolved
7B	Whitewater Reuse (Vacuum Seal Water)	20K	110%	0.01 (grid)	0.02 (grid)	0.3	0.09 TPD	On hold until GWD quality issues are resolved
8	Regenerative Drive - #1PM Rereelers	800 K	9%	1 (grid)	3 (grid)	0	0	On Hold
9	Natural Gas in Air Cap - #4 PM	750K	35%	14.8 (grid)	50.8 (grid)	0	0	On Hold
10	Dryer Efficiency Improvements - #4 PM	2.73MM	20%	18 (grid)	63 (grid)	0.5	0	On Hold
	BE-IP endorsed for implementation			Complete but not yet endorsed by BE-IP				
	BE-IP approved for further study (in progress)			On hold or out				

*Note: reductions indicated were estimates.

The charter placed the burden of gathering environmental and economic impacts of each project on the Mill. At a minimum, the analysis for each proposed project provided information on the following primary selection criteria:

- Impact on environmental goals
- Pollution Prevention
- Return on Investment (ROI)
- Potential for success (level of certainty)

When possible, the analysis also included data on secondary evaluation criteria. These criteria included:

- Emission or discharge reductions beyond those identified in goals
- Overall impact on environmental footprint
- Technical feasibility of activity
- Process Risks/Benefits of activity
- Potential for reduced environmental incidents
- Internal resources needed to conduct activity
- Effect on safety
- Effect on product quality
- Effect on energy use
- Impact on sewer losses

Once the analyses of the recommended projects were completed, the BEIP Team endorsed or rejected projects for implementation by a consensus method. This part of the process required trust among team members. Each member needed to be satisfied that budgeted resources would be effectively allocated to maximize the impact toward the BEIP goals. This level of trust took some time to develop, but as information from the analysis developed, the choices became clearer. The final charter contained a method for dispute resolution, but this process was not used during the project.

Once the project team decided which projects should be recommended for implementation, then baseline and evaluation criteria, including defining measurement parameters, were developed. Setting these parameters was a critical step in determining how to measure project performance.

4.3. Tracking BEIP Project Impacts

Once a BEIP endorsed project was implemented, the mill tracked measurement parameters demonstrating the environmental and economic impact. Optimally, a baseline measure was taken prior to implementing a project. On a regular basis, Bucksport mill staff provided a status report on BEIP endorsed projects, including information on implementation progress/issues and environmental impact information.

In total, the project team reviewed twenty-one projects and approved eight projects for endorsement by the BEIP Team. The BEIP Team approved projects that supported the goals of the BEIP project and the mill's Performance Track (NEPT) commitments. In addition to the environmental benefits of these projects, many of these projects reduced the costs to run the mill.

The BEIP team endorsed, and the mill approved, eight projects which are highlighted in Table 3. These eight projects, discussed below along with a concurrent project, made up the portfolio of BEIP Team endorsed projects, which delivered improved environmental and economic performance when compared to the SCR alternative.

Table 3 - Project Portfolio

BE-IP Proj. No.	Project	Cost	Spent to Date (through 2007)	Projected Savings/yr	BE-IP Remaining Funds	Approval Status		NOx Emissions/Reductions (TPY)	SO2 Emissions/Reductions (TPY)	Water Use (MGD)	Landfilled Sludge (TPD)
					\$3,000,000						
2	Natural Gas in #8 Boiler	\$1,599,000	\$1,688,000	\$343,000	\$1,312,000	Project Complete	Estimated Reductions From 2001 baseline	131	452		
4B	Broke Chest Control Scheme (#1PM Broke Mgmt.)	\$18,900	\$18,900	\$30,000	\$1,293,100	Project Complete	Estimated Reductions From 2001 baseline				0.8
5B	#1, #2, #4 PM Cleaner Improvements	\$47,000	\$47,000	\$152,000	\$1,246,100	Project Complete	Estimated Reductions From 2001 baseline				2.3
12	Split Flame Burner Tips-#8 Boiler	\$27,000	\$33,000	\$50,000	\$1,213,100	Project Complete	Estimated Reductions From 2001 baseline	5-18			
14	Coating Filter Upgrade - PM4	\$672,000	\$668,000	\$267,000	\$545,100	Project Complete	Estimated Reductions From 2001 baseline			0.045	1.5
4D	Equalizing Chest - Additional Broke Storage	\$672,000	\$280,000	\$0	\$265,100	Project canceled due to improved management practices	Estimated Reductions From 2001 baseline				2.0
7C	No. 5 PM Whitewater Strainer	\$440,000	\$0	\$100,000	\$265,100	On hold pending measurement systems	Estimated Reductions From 2001 baseline			1.7	0.2
7D	Vacuum seal water reuse on papermachines	\$832,810	\$832,810	\$286,000	-\$567,710	Project Complete	Estimated Reductions From 2001 baseline			1.5	0.3
	BEIP Endorsed	\$4,208,710						90-131	306-409	2.5	7.1
	Expended to date		\$3,567,710								
	Savings			\$1,228,000							
	BE-IP endorsed for implementation										

4.3.1. Boiler Improvements

The mill identified improvements to the boilers (No. 8 and No. 5) as potential areas for reducing the mill’s emissions profile. Specific details are provided below.

4.3.1.1 Natural Gas, No. 8 Boiler

This project added natural gas firing capabilities to the No.8 boiler as an alternative to burning #6 fuel oil. The upgrade allowed the natural gas fired burners and igniters to supply up to half the boiler’s rated steam flow. Use of natural gas, in lieu of #6 oil reduced the mill’s NO_x emissions. Additionally, the igniters significantly reduced startup emissions since improved ignitability of #6 oil was increased. This investment also reduced SO₂, particulates, and VOC emissions.

4.3.1.2. Additional Boiler Improvements

The mill undertook several projects independent and concurrent to BEIP to increase the performance of the facility’s boilers. These projects were undertaken in the spirit of BEIP, without impacting the BEIP financial allotment, and were aimed at increasing boiler efficiency and reducing the use of #6 oil. These projects included:

- **Modification to the O₂ trim on #8 boiler** - The air curve for the fuel to air ratio was reviewed and adjustments were made to improve the fuel to air mix and bring the combustion air into the boiler in locations that maximizes the combustion efficiency. This resulted in less carry over and more complete combustion of the grate fuel with reduced excess O₂.

- **Control damper adjustments on #8 boiler** - The clearances for the under-grate and wind box dampers were checked and minimum clearances were changed to reduce the amount of excess air going to the wind box. Original equipment manufacturer's minimum standards were followed for the current operation of the boiler; without the burning of coal. This helped improve the air distribution to the boiler.
- **Grate fuel burn rate optimization trials on #8 boiler** - Working with combustion specialists from International Paper, trials were conducted on the grate fuel system and combustion air. The plant installed draft gauges on various locations in the under grate air system and staff recorded how the modifications affected performance of the boiler. Utilizing gauges to optimize the combustion of grate fuels reduced the need for auxiliary fuel (#6 oil).
- **Installing hot water circulation on #5 boiler** - Prior to the installation of the hot water circulation system, #5 boiler was fired for 1-2 hours per day to keep it on warm stand-by. The re-circulation system takes steam from the main header and keeps the boiler heated without using #6 fuel oil. This effort reduced the mill's overall oil usage.

Using AP-42 estimates, the process improvements on the #8 boiler reduced NO_x emissions by 55 tons per year and SO₂ emissions by 195 tons per year (based on the average days of operation in 2002-2004). In addition, these projects reduced the mill's use of #6 fuel oil by approximately 3,863,000 gallons annually.

Installation of the of hot water circulation on the #5 boiler reduced use of # 6 fuel oil by 153,300 gallons annually, when in full operation.

Overall, these projects have significantly reduced air emissions from the mill's boilers and increased the efficiency of the mill. Depending on the price of oil, the savings to the mill could be significant (252 barrels per day for 327 days per year average = 82,404 barrels per year). These efforts, resulting in substantial reductions in fuel oil usage, reduced the BEIP estimated emission reductions attributed to natural gas firing.

4.3.2. Improved Broke Chest Control Schemes

The objective of this project was to improve raw broke inventory management through the installation of a cross tie with diversion valves to divert flow from No. 1 Paper Machine's calender and reel pulpers to the No. 2 Raw Broke Chest. The raw broke chests on Paper Machine 2, Paper Machine 4, and Paper Machine 5 are interconnected. This allows the chests to pump to and from each other for broke level management. When web breaks occur on the paper machine raw broke or waste paper is produced. If web breaks extend for long periods of time (30-60 min or more), the paper machine's raw broke chest can fill up and overflow. Paper Machine 4 and Paper Machine 5 have the ability to easily transfer raw broke to help prevent overflows to the sewer.

However, the valves around Paper Machine 2's raw broke chest are manual, and many times the operators cannot properly adjust these valves to prevent raw broke

overflows. This project replaced the current manual valves with automatic valves so that the mill could improve management of the raw broke inventories across all three machines.

This project was completed in the first quarter of 2004. As a result, the Paper Machine Raw Broke Chest overflows were decreased by an estimated 1.0 tons per day.

4.3.3. Paper Machines 1, 2, & 4 Cleaner Improvements

Cleaner cones separate good fiber from bad fiber and debris through centrifugal force. Keeping stock dilute is a key variable in the successful operation of cleaners. Poor operation leads to excess good fiber being rejected with the bad fiber and debris through the tips of the cones. Through this project, the mill installed EcoMizer tips on the quaternary cleaner stages of Paper Machine 1, Paper Machine 2, and Paper Machine 4. The tips work by adding water axially into the cleaners, preventing the stock from thickening and promoting good fiber separation. Preliminary data shows a reduction of approximately 2.2 tons per day of steady state sewer losses from the paper machine cleaners. This project resulted in less solids going to landfill.

4.3.4. Split Flame Tip Burners on #8 Power Boiler

Under this effort, the mill replaced former burner tips with new tips designed to give better range of firing rate and lower the boiler's NO_x emissions from oil firing. Split flame burner tips are a low NO_x design that reduced NO_x emissions by approximately 15% from No.8 boiler. The new tips provided the turndown capabilities of the J-11 tips, as well as the full capacity of the J-14 tips, both currently used at Bucksport. This project resulted in lowering NO_x and SO₂ emissions.

4.3.5. Coating Filter Upgrades – Paper Machine 4

This project replaced the former V-Auto filter system with two skid-mounted banks of Ronningen-Petter MCF filters (one bank for each coater head). The MCF filters are much smaller and retain significantly less coating volume compared to the current V-Autos during steady-state operation. In addition, the MCF filters utilize an automatic purge cycle that does not flush water through the filter canister, minimizing both coating loss and water usage. The size of the filters and the design of the purge cycle contribute to a substantial reduction in coating dumped to the sewers. The previous style of coating filters on Paper Machine 4 required draining and flushing at least once per day in order to keep the internal filter baskets clear and operational. The coating drained cannot be recovered, and contributes approximately 1.5 tons per day to sewer losses. The size and purge cycle of the new filters reduced the volume of coating lost to the sewer by approximately 0.54 tons per day, therefore reducing the amount of sludge that the mill sends to landfill.

4.3.6. Vacuum Seal Water Reuse

Existing wastewater streams on vacuum systems throughout the mill were surveyed. Several streams with minimal contamination potential were identified. This project provided the necessary piping and pumps to transport the identified streams to be recycled in Paper Machine 4's warm water system. The project installed a filtration

system to ensure contaminants are not carried into the warm water system. In addition to reducing mill water usage, this project resulted in energy conservation by minimizing the amount of heat used for water-heating.

The project reclaimed clean warm water from Paper Machine 4's Deculator vacuum pumps and Pre-condenser, Paper Machine 5's Deculator Vacuum Pumps, Paper Machine 4's Couch High Vacuum pumps seal water, and Paper Machine 4's Fourdrinier Vacuum pumps seal water. The reclaimed warm water is collected in a central tank, filtered, and sent to Paper Machine 4's warm water tank. Installed pipe and pumps allow the warm seal water to be used in place of cold mill water makeup in the paper machine warm water system. This project reduced heating demand by 315 MMBTU/day and reduced water usage by 580 gallons per minute.

The project was completed on June 28, 2007 with a current water savings estimated at 0.84 million gallons per day with the equipment operating at designed set points. There are no flow meters on the freshwater supplies to the two systems to identify the exact savings.

4.3.7. Paper Machine 5 Whitewater Strainer

The Bucksport mill investigated a two-stage pressure strainer system as a filtering application for paper machine white water. This process has the potential to replace the use of fresh water in some mill applications. The project is in the early stages of evaluation. The focus in 2008 is to budget, design, and install upgraded energy and flow measuring systems in order to determine the feasibility of implementing this project in its entirety.

4.3.8. Equalizing Chest – Additional Broke Storage

This project scope included piping changes, a pump, and a deflaker at the #2 paper machine raw broke chest to allow the ground wood equalizer chest to receive broke from both the central coated broke chest and the #2 paper machine raw broke chest. Equipment was also to be installed to allow coated broke to be pumped from the ground wood equalizing chest to paper machines 2, 4 and 5 coated broke chests and to allow raw broke to be pumped from the ground wood equalizing chest back to #2 paper machine raw broke chest.

After spending \$280,000 on equipment and engineering, the mill halted work on this effort since it became apparent through engineering and operational reviews, there were more cost effective management practices. In 2006/2007, the mill instituted best management practices (BMP) which resulted in significant reductions in sewer losses. As a result of the implementation of BMPs, total mill sewer losses have been reduced by 22% from 56 tons per day in 2001 to 43 tons per day in 2008.

4.4. BEIP Unique Decision-Making Collaboration

The process developed by the BEIP Project created a unique decision-making process for the mill. The process required the facility to look at the mill in new ways. It also allowed BEIP team members to look at the mill in a non-adversarial role and to examine which projects made the most sense for the facility from a variety of perspectives, environmentally, economically, and technically. Without input from

various sources, it is unlikely that the facility would have implemented the projects endorsed by the BEIP team. These actions demonstrate the facility's commitment to the BEIP process and to the continuous improvement of the facility's operations.

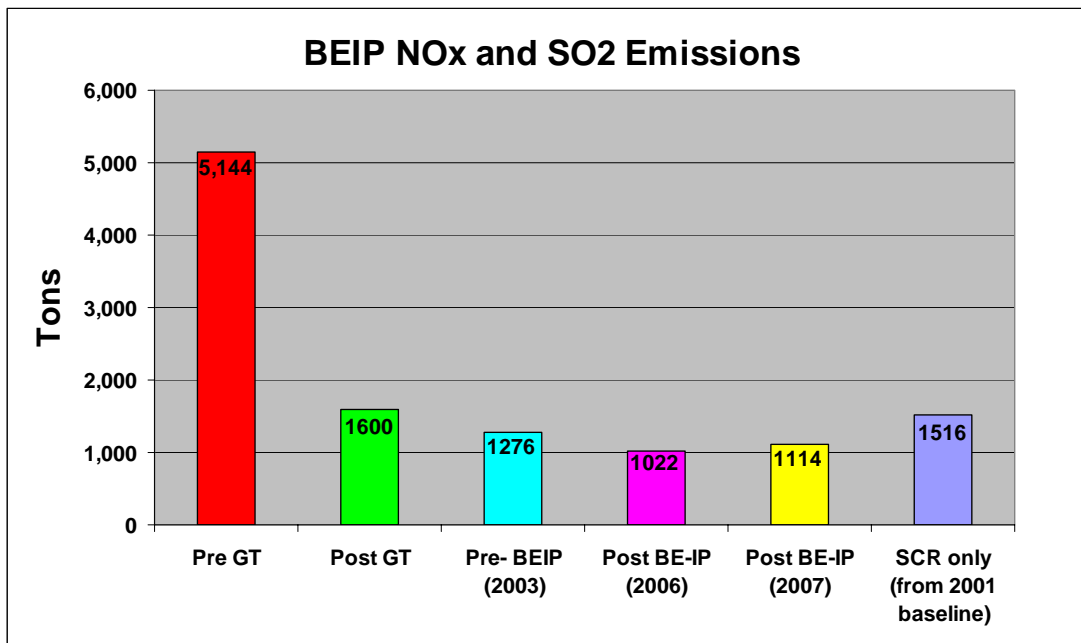
5. BENEFITS OF BEIP

The BEIP project created a variety of benefits for the facility, the participants, the community, and the environment. These benefits include a reduced environmental footprint, reduced mill operational costs, and additional ancillary benefits.

5.1. Environmental Benefits

Figure 4 shows the estimated NO_x and SO₂ emissions from the Bucksport Mill after implementation of the BEIP endorsed projects relative to the emissions (1) prior to the G4 Gas Turbine (G4), (2) after commissioning of G4, and (3) if SCR technology was installed on G4. In all cases, emission levels are well below the permitted limits for the facility. The NO_x and SO₂ emissions from the Mill are expected to be the lowest of any of the scenarios with the implementation of the BEIP endorsed projects.

Figure 4 -- Reductions in NO_x and SO₂ Emissions from the Bucksport Mill



The BEIP endorsed projects were also expected to achieve the NEPT NO_x and SO₂ emission goals for the facility, as shown in Figures 5 and 6. It is noteworthy that the SCR technology alone, if implemented, would not have met these goals. In addition, the BEIP endorsed projects would provide additional environmental benefits not realized by SCR technology. The impact of the BEIP projects on water use and landfill sludge reductions, relative to the mill's NEPT goals, are shown in Figures 7 and 8.

Figure 5 -- NEPT Goals and Emissions with BEIP Projects: NO_x

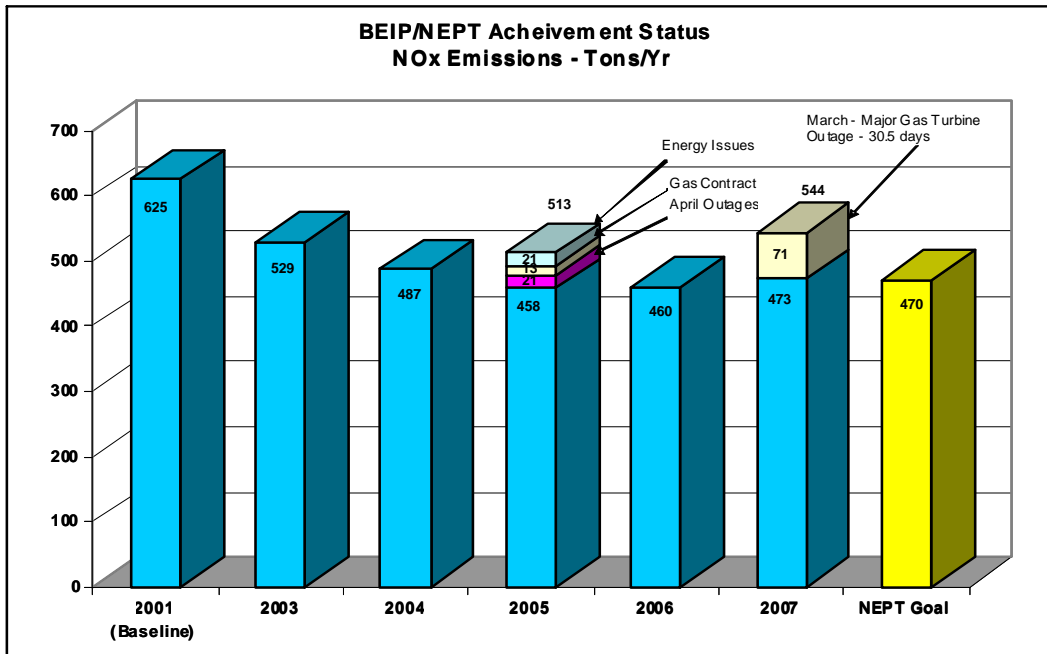


Figure 5. This graph shows NO_x emission reductions attributed to BEIP. As a result of the BEIP process, NO_x emissions were reduced 160 tons per year (tpy) or 25%, (excluding emissions attributed to an extraordinary event involving a 30 day shutdown of the gas turbine).

Figure 6 -- NEPT Goals and Emissions with BEIP Projects: SO_x

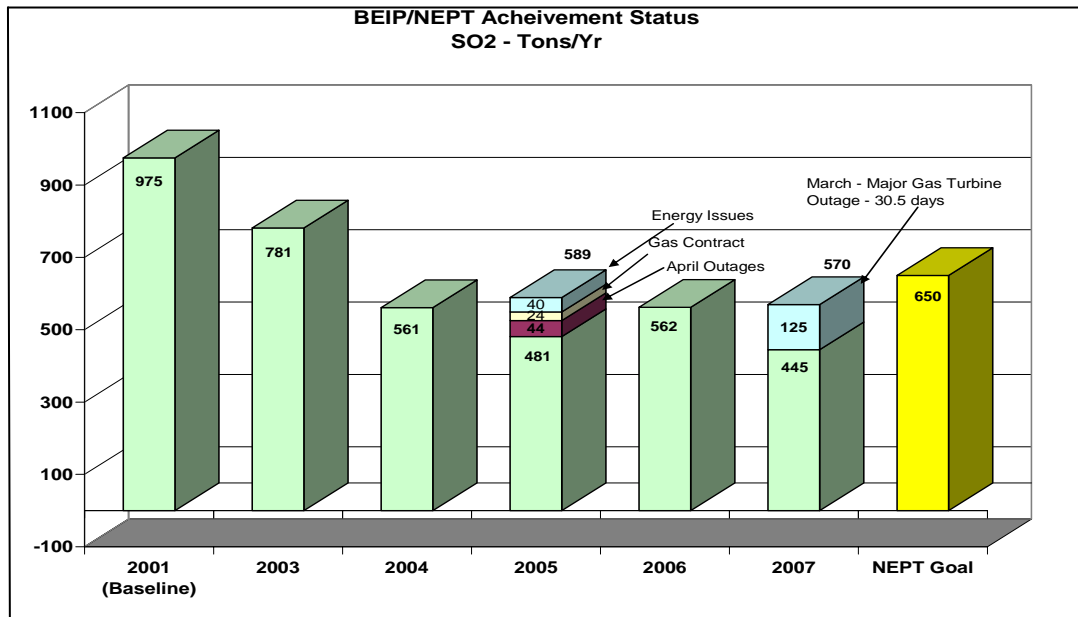


Figure 6. This graph shows SO₂ emission reductions attributed to BEIP. As a result of the BEIP process SO₂ emissions were reduced by an additional 472 tpy or 48%, (excluding emissions attributed to an extraordinary event involving a 30 day shutdown of the gas turbine).

Figure 7 -- NEPT Goals and Emissions with BEIP Projects: Water Use

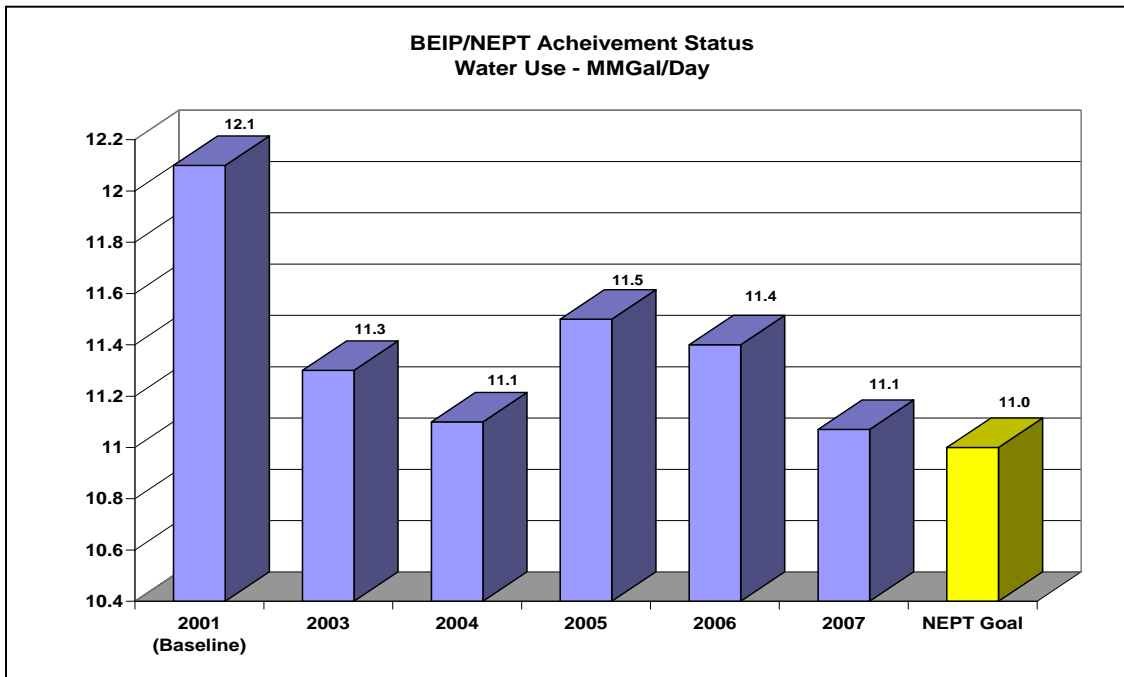


Figure 7. This graph shows the reductions in water use as a result of the BEIP process normalized to production. A reduction of approximately 1.0 mgd or 8% has been realized to date as a result of BEIP.

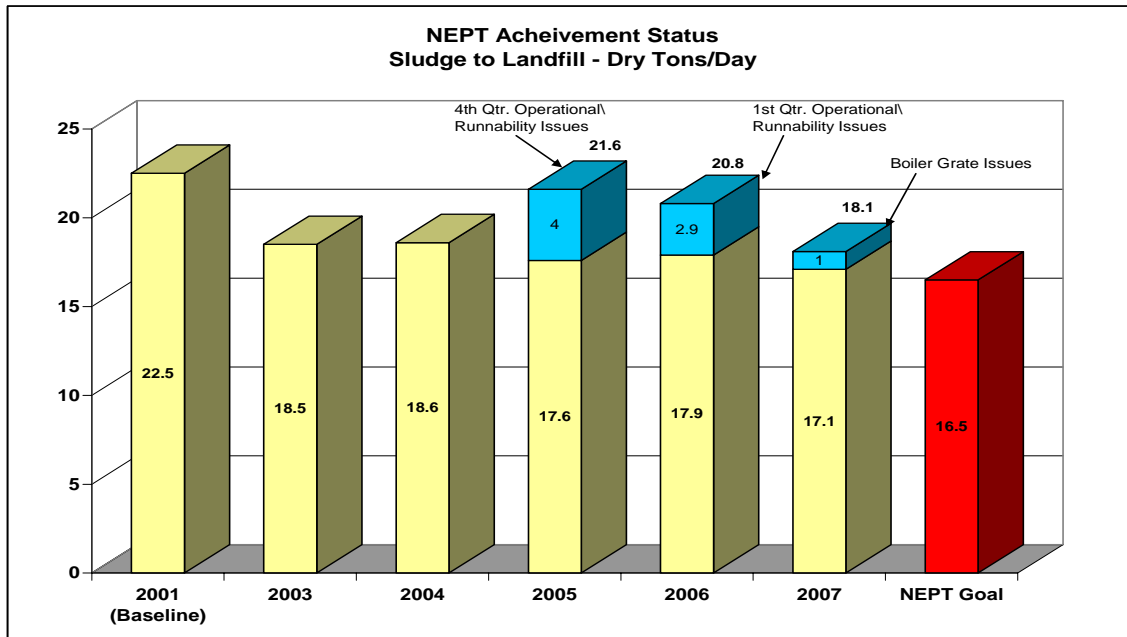
Figure 8 -- NEPT Goals and Emissions with BEIP Projects: Landfill Sludge

Figure 8. See section 4.3.8 for actions being taken to further reduce sewer losses which will decrease sludge to landfill

5.2. Economic Benefits

BEIP endorsed \$4,208,710 on the project portfolio based on project estimated costs. To date the mill has spent \$3,567,710 on the implemented BEIP projects versus a commitment of \$3,000,000. These projects have resulted in reducing mill operational costs by an estimated \$1,228,000. The total spending was 9% above the original funding, however, since the mill incorporated the BEIP process into the framework of the facilities capital allocation plan, the mill had flexibility in developing a site-specific capital plan. An increase in the BEIP commitment dollars was justified by the mill's NEPT commitments

5.3. Process Benefits to Participants

In addition to the obvious environmental and economic benefits of the BEIP process, the mill experienced several less obvious but still significant participant benefits. This project allowed the facility to build on its record of credibility and excellent environmental performance. As a result of the program, long lasting positive relationships have been built among the participants. The project involved approximately fifty mill personnel as well as two dozen personnel representing outside entities. Internally this created an environmental awareness within the mill and an excitement to support the program. Externally the BEIP team members from outside the mill came to better understand mill operations, and how pollutant reductions can be achieved either economically or without regard to economics, and the impact these decisions have on the financial well being of the enterprise. Mill personnel came to better understand State and

Federal regulatory agencies as well as what was important to environmental groups, non governmental organizations (NGO's) and private local citizens.

The BEIP process resulted in increased awareness of environmental issues facing the mill and more importantly what actions individuals could take to reduce the facility's environmental footprint. The BEIP process demonstrated that projects instituted to reduce the facility environmental footprint could also increase the facility's economic viability. As a result, there was excellent buy-in and support for the project, as evidenced by the fact that three of the nine major capital projects planned for the facility in 2005 were BEIP projects, and capital dedicated to BEIP projects exceeded the original \$3.0 million.

The involvement of several engineers at various times throughout the BEIP process resulted in a widespread awareness of what the BEIP process was attempting to accomplish – pollution prevention and increased economic viability. The BEIP process was widely supported from a management perspective with technical and financial resources.

The BEIP process resulted in many projects being identified, developed and implemented that may not have been considered if not for the resources, commitment, and focus of the effort.

Lastly, the Bucksport Environmental Innovative Partnership demonstrated that partnerships can work and can create results, both environmental and economic, that go far beyond what can be accomplished through typical command and control regulatory procedures. Creative and flexible regulatory structures can work providing there is commitment and trust among the participants.

5.4. Ancillary Benefits

The environmental benefits of the BEIP project go beyond the NO_x, SO₂, landfill sludge and water discharges. The substitution from oil to natural gas led to a significant reduction in particulate matter emissions, although this is not being tracked as part of the project. The efficiencies from optimizing #8 boiler and the #5 boiler reduced oil consumption saving tens of thousands of barrels each year and reduced CO₂ emissions by a corresponding amount. Reducing the discharge of fiber will reduce the amount of wood purchased and trees cut down. Each one ton saving in fiber will result in the savings of more than one ton of wood, assuming ground wood pulping. Each 34 tons of fiber saves more than an acre of forest.

Fiber and solids conserved in the paper making process reduces the number of rail cars and trucks that drive through town, improving the quality of life in Bucksport. Note that the original SCR requirement would have increased the number of trucks carrying hazardous constituents through town. Water savings reported will also save energy by not having to heat water that would have been discharged. Additionally, the water savings will reduce water drawdown from the three freshwater lake sources making an improvement in water levels in the summer, especially during dry years.

The health benefits of the BEIP project include ozone precursor reduction (NO_x) and fine particulate matter reduction that will result in less asthma triggers.

Ecosystem health will also benefit. The acid rain precursors of NO_x and SO₂ are being reduced, which will have a positive effect on forest and watershed health (lakes, wildlife, and waterfowl).

The BEIP project should help tourism. Visibility improvements in the local area and at Acadia National Park will result from reductions in PM₁₀ and PM_{2.5}. There will be no need to transport ammonia to the facility and cleaner air and cleaner water are better tourist attractions.

The BEIP projects will make significant improvements to the environmental, health, and ecosystem impacts from the mill. The improvements go beyond those of the Performance Track goals to encompass many other improvements, some of which are difficult to measure.

5.5. Overall BEIP Benefits

Clearly, the commitments made in the BEIP process have reduced the environmental footprint of the Bucksport facility while at the same time increasing the mill's viability. These benefits can be easily measured by the decreases in every aspect of the mill's impacts, from air emissions to water usage, to solid waste generation rates and by the reduced operating costs. The intangible benefits, created by this process will also continue to benefit the facility. The communications and willingness to consider new ideas will continue to encourage the facility to continually improve its operations.

Key benefits include:

- Communication among different groups both inside and outside the organization
- Greater understanding of the synergistic effects of projects
- Lessened concerns with partnership programs
- Greater willingness to work with other entities
- Increased credibility within the community
- Increased understanding by the community of the mill's needs and challenges
- Enhanced crossover and communication between the various media (air, water, etc) at DEP
- Realization that non-typical regulatory strategies (e.g., non-command & control) can result in greater benefits than command and control
- Greater understanding of corporate challenges

6. TRANSERRING THE BEIP PROCESS

Using a BEIP-type process with other facilities should be a viable option. The key parameters which made the project possible included keeping the necessary regulatory requirements, the allowance of regulatory flexibility, clear financial commitments, clear BACT or LAER environmental targets and confidence in the participants and the overall process. One of the biggest challenges will be for the participants to fully understand each other's positions within the framework of the process.

The critical factors that made the process work included the participation of 40-60 different people from within the Mill, a firm commitment from the Mill, a strong and consistent leadership within the Mill, participants that could ask questions and be 'Devils advocates', non-vested technical expertise, and buy in from all who participated.

Key elements that would be needed to use this process in future scenarios would be a charter that clearly defines the goals of the group and the parameters for decision-making, corporate management commitment, and willingness for both the Maine DEP and the facility to accept a certain amount of risk in using this format to solve a regulatory issue.

7. CONCLUSIONS/RECOMMENDATIONS

The BEIP process demonstrates that alternative approaches to the usual strict and narrow command and control regulatory process can provide better results and develop a comprehensive environmental plan for a facility. At the Bucksport facility, examining the entire facility's environmental footprint under a finite budget from both a financial and environmental perspective yielded greater environmental results than the normal approach.

This project was accomplished through public, government and industry inputs to the process. Allowing the public and environmental agencies a voice in determining how a facility's processes are modified can create a level of uncertainty for the facility. However, the consensus nature of the process creates a dialogue that builds credibility and understanding to push for the best interests of all parties. Another significant benefit of this approach is the need to incorporate the environmental impacts of mill departments that traditionally were not incorporated in air permitting issues. This educated the facility staff on the connection between mill activities and environmental impacts. Additionally, the benchmarking process highlighted the economic impact of their various activities.

Any time an approach other than that prescribed by regulations is contemplated, the additional time, resources and risk to achieve the goal must be considered. In this case, the outside agencies committed more time and resources to this effort than would traditionally be required for a standard permit. At the same time, the mill committed significant resources to develop and evaluate numerous alternatives. In return, the mill benefited from other team member's contributions and the development of projects that would not likely have been considered otherwise. At a time where there is significant competition for capital, it is imperative that the benefit to both the environment and the facility are maximized.

Although the results of this project are yet to be fully realized, the portfolio of BEIP endorsed projects has produced a greater and more widespread environmental benefit, while also generating a positive economic return from the \$3.26 million invested in multi-media projects, when compared to only installing SCR technology on G4 Gas Turbine.

Based on the success of this project, the team recommends that

- Facilities consider similar projects at other manufacturing locations within to capitalize on environmental and process efficiency improvement opportunities, while strengthening public and regulatory relations.
- The Team recommends that the Maine Department of Environmental Protection consider adopting this participatory model to encourage responsible parties throughout the State of Maine to improve the environmental performance of their operations. This concept should be applicable to a wide range of industries, and not only other Forest Products-based operations.

- The mill should follow through on the plan to track and regularly report on the progress of the BEIP Project Portfolio and compare the actual results to the estimated benefits.

Appendix A: BEIP Charter

Bucksport Environmental Innovation Partnership

Team Charter

April 29, 2004

I. Project Goal

The goal of the Bucksport Environmental Innovation Partnership (BEIP) is to develop an alternative approach to meeting environmental requirements. IP-Bucksport is subject to state permit requirements that mandate a reduction in NO_x emissions through the use of SCR control technology or an alternative technology. Utilization of this technology would lead to a reduction of approximately 149 tons of licensed allowed NO_x emissions but implementation of SCR would also have negative environmental consequences. The negative impacts of installing SCR include the introduction of the use of a hazardous material (anhydrous ammonia), an increase in PM emissions, and a decrease in turbine efficiency. This project, using flexible permitting, will achieve greater emission and discharge reductions than would have been realized by installing SCR, and at the same time will increase the facilities economic viability. IP has committed three million dollars to fund projects under BEIP. The mill's emission reduction goals include but are not limited to those that IP-Bucksport agreed to as part of their participation in the National Environmental Performance Track Program (NEPT). This project will concentrate additional focus within IP-Bucksport management to provide additional technical resources such as engineering from internal and external means to assure achievement of these goals. These reduction goals include:

- Reduction of actual NO_x emissions by 25 percent from 625 tons per year to 470 tons per year
- Reduction of actual SO₂ emissions 33 percent from 975 tons per year to 650 tons per year
- Reduction of fresh water use by 10 percent from 4.4 billion gallons per year to 4.0 billion gallons per year
- Reduction of the generation of landfill sludge by 38 percent from 27,634 tons per year to 20,000 tons per year

II. Project Partners

The BEIP will use a multi-participant stakeholder process to implement this project. The stakeholders will work together to draft project guidelines, identify issues and determine project activities. Representatives from International Paper (IP), Maine Department of Environmental Protection (ME DEP), Environmental Protection Agency (EPA), and the Northeast States for Coordinated Air Use Management (NESCAUM) have been involved in the initial project development. Efforts have been made to include representatives from the Town of Bucksport, the University of Maine, the Federal Land

Management (FLM) program, and the general public. Input and comment from the public will be encouraged. Each participant maintains a responsibility to participate in all project meetings and provide input to the process. Beyond general project responsibilities, the project partners will provide the following information.

- IP - work with the team to determine the technical, environmental and economic feasibility of BEIP project activities.
- ME DEP – determine regulatory requirements and ensure that the environmental benefits for the state of Maine are secured through this effort.
- EPA – ensure alignment of NEPT and BEIP efforts and liaison for EPA Headquarters innovation efforts.
- NESCAUM – technical resource to assess air quality impacts and advocate for regional environmental protection.
- Town of Bucksport – advocate for town to ensure public health and safety and protect the town’s tax base.
- University of Maine – technical resource to assess project activities.
- FLM – advocate to ensure the protection of federal lands.
- Public – encourage public comment on project activities to consider during the decision-making process.

III. Project Task Outline

The following outlines the basic tasks that will be undertaken by BEIP

Task	Participant	Timeline
Develop project overview	All project partners	September 2002 through March 2003
Identify alternative regulatory language or IP permit	All project partners	November 2002 through March 2003
Identify project activities	IP Bucksport, ME DEP, (University of Maine)	November 2002 through August 2003
Analyze proposed projects	IP Bucksport and (University of Maine)	March 2003 through August 2003
Determine projects to undertake	All project partners	May 2003 through December 2003
Implement Projects	IP Bucksport	Jan 2004 through June 2006
Measure/evaluate results of initial effort	All project partners	June 2005
Determine what, if any, additional Projects should be undertaken	All project partners	June 2005
Evaluate overall project	All project partners	June 2007

A. Identifying Project Activities to Propose

A technical group, headed by IP-Bucksport, will develop a preliminary list of potential projects. This list will be a complete listing of projects that could be undertaken that would result in increased environmental performance. The BEIP Project Team will review the complete list and determine what projects should proceed for a full-analysis.

B. Analyzing Proposed Activities

Using the list developed in the above task, IP will conduct a complete analysis of each proposed activity. At a minimum, the analysis will provide information on the primary selection criteria. Primary elements include:

- Impact on environmental goals
- Return on Investment (ROI)
- Pollution Prevention
- Potential for success (level of certainty)

When possible the analysis will also include data on secondary evaluation criteria. These criteria include:

- Emission or discharge reductions beyond those identified in goals
- Overall impact on environmental footprint
- Technical feasibility of activity
- Process Risks/Benefits of activity
- Potential for reduced environmental incidents
- Internal resources needed to conduct activity
- Effect on safety
- Effect on product quality
- Effect on energy use
- Impact on sewer losses

Analysis of proposed activities will be provided to the Project Team.

C. Determining Activities to Undertake

Once an analysis of proposed activities has been completed, the project team will review and discuss the analysis and determine which activities will move forward for implementation. The group will strive for consensus on project selection but when this cannot be achieved, Maine DEP and International Paper will resolve the dispute. The team has a budget of no more than three million dollars to complete project activities. Once the project team has decided to move forward on implementing an activity, the project team will be responsible for determining any evaluation criteria for the activity and any baseline measure that must be taken. In addition, IP will provide the Project Team with a timeline for implementation for activities that the Team has chosen to undertake. Furthermore, for each project the group will establish activity measures,

including defining measure parameters. This information will be used to measure the outcomes.

D. Evaluating Project Activities

Once IP-Bucksport begins implementation of a BEIP activity, it will gather environmental and economic impact. Optimally, a baseline measure will be taken prior to implementing an activity. On a quarterly basis, IP-Bucksport will provide an update on BEIP activities to the Project Team. The report will include information on implementation progress/issues, emission information, and ideas for additional activities. In addition, IP-Bucksport will develop and provide a final report to the BEIP Project Team within a year of completing project activities. The final report will use a variety of measures to judge the overall impact of the project.

Table A-1 BEIP Participants

Nehl Aldridge, Verso Paper
Mike Bilodeau, University of Maine
Bob Breen, Federal Land Management Bureau; Acadia
Grant Byras, International Paper
Dennis Castonguay, Mill Manager under International Paper
Jessica Clements, Verso Paper
William Cohen, Verso Paper
Marc Cone, Maine Department of Environmental Protection
Marc Connor, Verso Paper
Todd Corbin, Verso Paper
Rick Cyr, Verso Paper
Stephan Donnell, Verso Paper
Mike Farrington, Verso Paper
Ken Gallant, Verso Paper
Joe Genco, University of Maine
Rod Guillow, International Paper
Mike Handzel, Verso Paper
Greg Hanson, International Paper
Mike Haws, Mill Manager under Verso Paper
Jean Holbrook, EPA Region 1
Tanya Hovell, Maine Department of Environmental Protection
Jennifer Ireland, International Paper
Phil Johnson, NESCAUM
Dave Keene, Verso Paper
Eric Kennedy, International Paper
Richard Lizotte, Bucksport Energy, LLC
Joe Lynch, Verso Paper
David Manski, Federal Land Management Bureau; Acadia
Emily Nelson, University of Maine
Lou Ortiz, Verso Paper
Ted Perkins, Maine Department of Environmental Protection
Pam Person, Bucksport Bay Healthy Communities Coalition and CSE
Sterling Pierce, Maine Department of Environmental Protection
Glenn Poole, Verso Paper
Chris Rascher, EPA Region 1
Lisa Rector, NESCAUM
Larry Schaub, Verso Paper
Richard Soper, citizen representative
Ian Spencer, Verso Paper
Art Stickney, Verso Paper
Michel Sussman, Verso Paper
Kathy Tarbuck, Maine Department of Environmental Protection
Tom Thompson, Verso Paper

Appendix B: Revised Bucksport Permit

State of Maine Air Emission License Amendment

International Paper)	Departmental
Hancock County)	Findings of Fact and Order
Bucksport, Maine)	Air Emission License
A-22-71-AB-A)	Amendment #19

After review of the air emissions license amendment submittal, staff investigation reports and other documents in the applicant’s file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., Section 344 and Section 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

International Paper of Bucksport, Maine has submitted an amendment application for an alternative emission reduction project as a replacement for the requirement to install Selective Catalytic Reduction (SCR) control on the gas turbine. The amendment also includes a reduction in license allowed SO₂ and NO_x emissions.

Air Emission License A-22-71-C-R was issued on October 28, 1987, permitting the operation of emission sources associated with International Paper’s Bucksport facility. The license was subsequently amended on November 7, 1990 (A-22-71-D-M), February 10, 1994 (A-22-71-H-M), October 24, 1994 (A-22-71-I-M), January 17, 1996 (A-22-71-J-A), January 18, 1996 (A-22-71-K-A), February 3, 1997 (A-22-71-L-M), June 12, 1998 (A-22-71-O-M), September 14, 1998 (A-22-71-N-A), July 12, 1999 (A-22-71-P-M), August 30, 1999 (A-22-71-Q-M), May 15, 2000 (A-22-71-R-M), July 13, 2000 (A-22-71-S-M), October 20, 2000 (A-22-71-U-M), July 2, 2001 (A-22-71-V-M), September 28, 2001 (A-22-71-X-M), August 15, 2002 (A-22-71-Y-A), December 4, 2002 (A-22-71-Z-M), and March 11, 2003 (A-22-71-AA-M).

B. Emission Equipment

This amendment addresses the control requirement for the gas turbine which is rated at 1963 MMBtu/hr when firing natural gas and 2082 MMBtu/hr when burning fuel oil (0.05% sulfur)

C. Application Classification

The modification of a major source is considered a major modification based on whether or not expected emission increases exceed the “Significant Emission Increase Levels” as given in Chapter 100 of the Department’s regulations. The proposal submitted is expected to reduce emissions from the facility. Therefore, the modification is considered a minor modification.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in Chapter 100 of the Department regulations. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in Chapter 100 of the Air Regulations. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

B. Alternative to SCR

International Paper is licensed through amendment #8 (A-22-71-N-A) to operate a 175 MW combined cycle gas turbine.

The gas turbine was required to meet 6 ppm of NO_x within 21 months of startup or put into place one of two options, per condition (18) of amendment A-22-71-N-A:

(18) Control of NO_x Emissions

If within 21 months after startup, NO_x emissions from the gas turbine are not being controlled to a level at or below 6 ppmvd on a 24 hour block average basis, Champion (IP) shall, within 3 years after startup, either install non-SCR control technology or SCR control technology.....

International Paper has not been able to obtain 6 ppmvd NO_x on a regular basis. The monthly average has been approximately 7 ppm. The facility is currently licensed at 9 ppm, with the requirement to go down to 3.5 ppm with controls if 6 ppm cannot be met on a 24 hour block average basis.

As a result of not being able to consistently attain the 6 ppm after the 21 month startup period, International Paper explored the two options of SCR and non-SCR controls for the gas turbine. A BACT analysis was performed. Based on International Paper’s review of gas turbine controls, there is no proven alternative control equipment to SCR that would work with this type of turbine without significantly impacting the combustion configuration. SCR itself can cause

adverse environmental impacts in addition to NO_x reductions. The impacts are associated with the use of ammonia, which is considered a hazardous material. Operation of an SCR unit would increase the facility's use of a hazardous material and the risks associated with hazardous material storage, transportation, and disposal. The facility had previously eliminated the use of hazardous materials and wants to continue operating in this manner. Implementation of SCR control would also result in increased hazardous waste generation. Collateral environmental impacts of SCR may include acid deposition, nitrogen deposition, stratospheric ozone depletion, and reformation of the ammonia as fine particulates. Given the close proximity of the facility to Acadia National Park (Class I area) and the high likelihood of particulate formation from the ammonia, the Department determines that the addition of SCR to the turbine may have a negative environmental impact on air quality related values, including visibility, at Acadia National Park.

The economics of SCR for this application are significant. The incremental cost to go to 3.5 ppm NO_x could be as high as \$13,000 per ton. The Department determines that this is not cost effective.

In light of the high capital and operating costs of SCR and the environmental issues associated with the addition of ammonia, International Paper has proposed to undertake a collaborative effort with the DEP and other stakeholders to find an alternative project or projects in lieu of the SCR installation option. International Paper has proposed that the goals of the project(s) include greater pollution reductions in the mill, lesser environmental impacts than SCR, and a return on investment. These projects would not necessarily be limited to the gas turbine or NO_x. International Paper has committed three million dollars (\$3,000,000) for the project(s) resulting from this collaborative effort and a completion date of June 30, 2006.

In addition to proposing the alternative project(s) option, International Paper has committed to reduce its annual licensed allowed SO₂ and NO_x emission limits from the power plant sources (boilers #5, #6, #7, #8, and the gas turbine). NO_x would be reduced from 1574 ton/year to 1410 tons/year and SO₂ would be reduced from 3265 ton/year to 2800 tons/yr.

Calculations from the power plant sources:

NO_x

$$1574 \text{ tpy} - 164 \text{ tpy} = 1410 \text{ tpy}$$

1574 tpy: current licensed allowed from power plant sources

164 tpy: reduction greater than the equivalent tons of reducing gas turbine NO_x emissions from the existing 9 ppm limit to 3.5 ppm (the limit if SCR was installed)

Note that the reduction to 1410 tpy is also a 124 ton reduction from the pre-gas turbine baseline actual emissions.

SO₂

$$3265 \text{ tpy} - 465 \text{ tpy} = 2800 \text{ tpy}$$

3265 tpy: current licensed allowed from power plant sources

465 tpy reduction

Note that the reduction to 2800 tpy is also a 425 ton reduction from the pre-gas turbine baseline actual emissions.

The Department approves the collaborative effort to find alternative project(s) in place of installing SCR at International Paper to be completed by June 30, 2006, along with the licensed allowed reduction in SO₂ and NO_x effective with the issuance of this amendment.

The Department finds that the installation and operation of add-on SCR control technology for the combustion turbine is not considered BACT in this case.

III. AMBIENT AIR QUALITY ANALYSIS

According to Chapter 115 of the Department's regulations, the level of air quality analyses required for a minor modification shall be determined on a case-by case basis. Based on the information available in the file, previous modeling shows Maine Ambient Air Quality Standards will not be violated by this source.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-22-71-AB-A subject to the conditions found in Air Emission License A-22-71-C-R and subsequent amendments A-22-71-D-M, A-22-71-H-M, A-22-71-I-M, A-22-71-J-A, A-22-71-K-A, A-22-71-L-M, A-22-71-O-M, A-22-71-N-A, A-22-71-P-M, A-22-71-Q-M, A-22-71-R-M, A-22-71-S-M, A-22-71-U-M, A-22-71-V-M, A-22-71-X-M, A-22-71-Y-A, A-22-71-Z-M, and A-22-71-AA-M, in addition to the following conditions:

Condition (18) in air emission license A-22-71-N-A shall be deleted (requirements for SCR and non-SCR control options for NO_x).

The following shall replace condition (20) in air emission license A-22-71-N-A:

- (20) The combined emissions from Boilers #5, #6, #7, #8, and the gas turbine shall not exceed the following annual emissions on a 12 month rolling total:

Pollutant	TPY
PM	351
PM ₁₀	341
SO ₂	2800
NO _x	1410
CO	628
VOC	205

New Conditions

- (1) International Paper shall undertake a stakeholder process to develop an alternative project or projects that will result in overall emissions and environmental impact reductions equal to or greater than what would have been attained by adding SCR on the gas turbine. International Paper has committed three million dollars (\$3,000,000) to fund a project or projects at the Bucksport mill that will reduce its environmental footprint. The project or projects will be determined by a stakeholder group, based on

the capability of the project(s) to help meet agreed upon environmental goals, provide added value to the mill, assist the mill in meeting other environmental commitments, and decrease the risk of environmental incidents at the mill. The stakeholder process shall start as soon as possible with all projects completed by June 30, 2006.

(2) This amendment shall expire concurrently with Air Emission License A-22-71-C-R.

DONE AND DATED IN AUGUSTA, MAINE THIS 29 DAY OF April, 2003.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
DAWN R. GALLAGHER, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: February 19, 2003

Date of application acceptance: February 19, 2003

Date filed with the Board of Environmental Protection: _____

This Order prepared by Kathleen E. Molokie, Bureau of Air Quality.