



## Special City Council Workshop August 23, 2010

**5:30 p.m. to 6:00 p.m. - City Council Workshop**

A. Discussion of Proposed Anaerobic Digestion of Treatment Solids Project. Eric Labelle – 30 min



# City Council

## Workshop Information Sheet

Item #A

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**Council Workshop Date:** August 23, 2010

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**Subject:** Proposed Anaerobic Digestion of Treatment Solids Project

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**Information:** The reason why this must be placed on a workshop on August 23<sup>rd</sup> is because LAWPCA must commit to the State of Maine its intention of moving forward, and therefore must meet a strict state deadline. The presentation that the Auburn Council receives on August 23<sup>rd</sup> will be the same presentation the Lewiston Council hears on August 24<sup>th</sup>.

The Lewiston Auburn Water Pollution Control Authority (LAWPCA) has studied the feasibility and benefit of constructing and operating an anaerobic digester coupled with cogeneration. LAWPCA is presenting to the Auburn City Council of its findings and to answer questions. They will be presenting to the Lewiston City Council on Tuesday August 24<sup>th</sup>.

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**Financial:** The construction of the Anaerobic Digesters and Cogeneration Plant is estimated at \$16.6 million. The projected savings over the next 25 year is \$9 million to \$19 million depending on increased revenues from waste collected and treated.

The Maine Department of Environmental Protection (MDEP) and the 2010 Revolving Loan Fund (SRF) is interested in financing the project with 5% principal forgiveness. The LAWPCA Board will be discussing whether to express interest receiving funding from the MDEP at their September 8<sup>th</sup> board meeting to meet required timelines. Eligibility requirements for SRF mandate that the project be under construction by September 1, 2011.

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**Staff Requested Action:** No action is necessary. The purpose of the presentation is to inform the City Council about the findings of the study and invite discussion from the Council and the public.

**Do you require action at this meeting:** Yes  No

**If yes why:** N/A

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**Author:** Eric J. Labelle, P.E., Community Services Director

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**History:** As part of its long range planning efforts, the Authority (LAWPCA) identified anaerobic digestion as a promising technology to enhance its bio-solids utilization programs, to eliminate the need for landfill disposal of a portion of the treatment plant solids, to add overall facility capacity and to provide a source of renewable energy to the treatment plant while improving the "carbon footprint" of the treatment works. The Board of Directors approved a feasibility study, conceptual design and preliminary design by Camp, Dresser and McKee of Cambridge, Massachusetts.

A presentation was last made to the Auburn City Council on August 17, 2009. Since that time, preliminary designs, cost estimates, a value engineering assessment of the preliminary design, and refinement of estimated costs have been conducted which reflect the current figures.

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**Attachments:**

- Summary – Proposed Anaerobic Digestion of Treatment Solids Project

## **Lewiston – Auburn Water Pollution Control Authority Proposed Anaerobic Digestion of Treatment Solids Project**

### **Introduction**

As part of its long range planning efforts, the Authority identified anaerobic digestion as a promising technology to enhance its biosolids utilization programs, to eliminate the need for landfill disposal of a portion of the treatment plant solids, to add overall facility capacity and to provide a source of renewable energy to the treatment plant while improving the “carbon footprint” of the treatment works. The Board of Directors approved a feasibility study, conceptual design and preliminary design by Camp, Dresser and McKee of Cambridge, Massachusetts. The current opinion of probable cost for the project is shown below.

### **Project Recommendations:**

Two conventional, single stage, 65 ft diameter, anaerobic digesters and a smaller solids and gas holding tank should be constructed. Approximately 170,000 cubic feet of methane rich digester gas is expected to be generated per day. After scrubbing and conditioning, this gas can fire two 230 KW reciprocating engines to generate power and provide heat for the material sent into the digesters.

<i>Item</i>	<i>Estimated Cost</i>
Site Work	\$540,000
Yard Piping	\$420,000
Digester Equipment Building	\$3,900,000
Gas Conditioning Building	\$1,300,000
Anaerobic Digestion Tanks	\$1,900,000
Digested Solids Storage Building	\$1,020,000
Co-generation Engines	\$1,200,000
Waste Gas Burner	\$270,000
Electrical	\$2,100,000
Instrumentation and Controls	\$1,000,000
<b><i>Sub total Construction Cost</i></b>	<b>\$13,900,000</b>
Project Implementation	\$2,700,000
<b><i>Project Total</i></b>	<b>\$16,600,000</b>

### **Project Benefits**

The proposed project offers the Authority many operational benefits and cost savings. In addition, if the Authority chooses to there will likely be capacity to accept high BTU wastes that could significantly increase gas production without a concomitant increase in solids generation. Some of the most assured and salient benefits are listed below:

- A reduction of solids needing utilization or disposal of approximately 40%. This solid reduction will, in turn, lead to annual cost savings of approximately \$600,000.
- Eliminate the need to add lime to accomplish class B pathogen and vector attraction reduction for the portion of the Authority's biosolids that are land applied.
- Eliminate the need for transportation and tipping fees associated with managing that portion of the Authority's Biosolids production that exceeds capacity of the compost facility or land application program. Currently this is approximately 12% of the Authority's annual solids or 3,000 to 4,000 cubic yards.
- Provide operational flexibility and capacity to the treatment plant by providing a means to temporarily store waste solids when needed (such as due to wet field conditions affecting the land application program).

- Generate electricity and heat on site. The digesters, without supplemental materials from outside sources, are expected to provide approximately two thirds of the electricity used by the treatment plant.
- At current prices, the annual savings in electric power purchased is expected to be approximately \$315,000. However, the electricity used by the digestion system pumps, heat exchangers and other equipment reduces the net savings to approximately \$140,000.
- Reduces solids odors and volume, thereby making both the land application program and the compost facility operations more acceptable to residents abutting these sites.
- The project adds flexibility and capacity to the overall biosolids utilization and disposal infrastructure for the State of Maine by removing the volume of biosolids currently sent to landfills or private processing facilities.
- By removing approximately 2/3 of the power used by the largest electricity consumer in municipal operations in the Twin Cities, a significant renewable power source is added to the overall electric power grid while substantially reducing peak demand on the system.
- Approximately 15% of the total capacity of the digesters is expected to be available to accept off site wastes that have been difficult to dispose of such as sewage contaminated oils and grease, thereby enhancing Maine's waste treatment infrastructure.

**Projected Cost Savings**

The following table summarizes the projected cost savings to the Authority without consideration for possible labor savings resulting from decrease solids handling and transportation and without consideration for increased potential for additional savings realized as a result of treating wastes from outside sources that would increase gas production and possibly provide tipping fee income to the Authority.

<i><b>Annual Estimated Operating Costs</b></i>	<i><b>Current Biosolids Management</b></i>	<i><b>Biosolids Management with Anaerobic Digestion</b></i>	<i><b>Difference</b></i>
Solids Thickening and Dewatering	\$50,000	\$35,000	\$15,000
Lime Stabilization	\$120,000	\$0	\$120,000
Composting Operations	\$461,600	\$297,000	\$164,600
Treatment Facility Energy	\$583,000	561,400	\$21,600
Residuals Disposal	\$448,000	\$175,000	\$273,000
Secondary System Impact	\$0	\$25,000	(\$25,000)
Digestion System Operations	\$0	\$101,000	(\$101,000)
<b>Total Annual Biosolids Management Costs</b>	<b>\$1,662,600</b>	<b>\$1,194,400</b>	<b>\$468,200</b>
Value of Electricity	--	(\$140,000)	\$140,000
<b>Total Savings (rounded)</b>			<b>\$608,200</b>

Rev 3: 8/17/10

# **Presentation to Auburn City Council**

LAWPCA Proposed Digestion/Energy Recovery Project

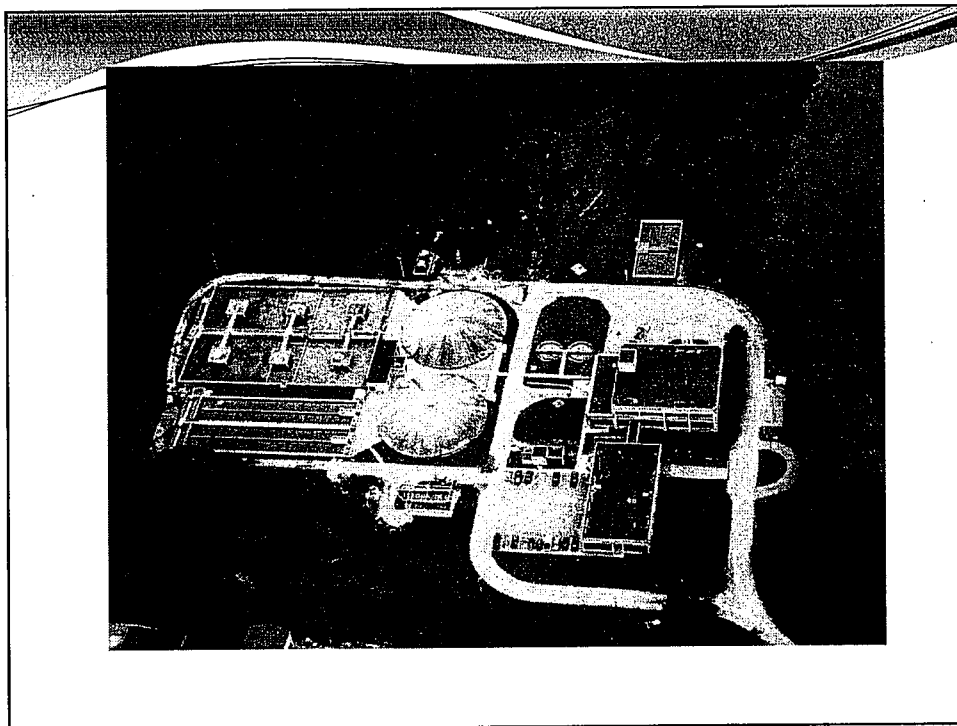
August 23, 2010

## **Presentation Outline**

- Who is LAWPCA?
- LAWPCA Infrastructure
- Current Wastewater Treatment & Biosolids Practices
- Proposed Digestion/Energy Recovery Project
- Operating Costs Savings
- Financial Analysis
- Project Benefits
- Timelines- How Did We Get To This Point?
- Questions

## Lewiston-Auburn Water Pollution Control Authority

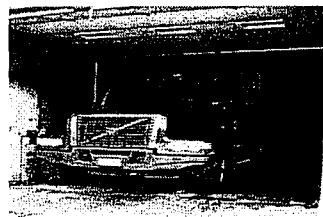
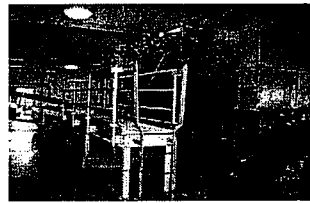
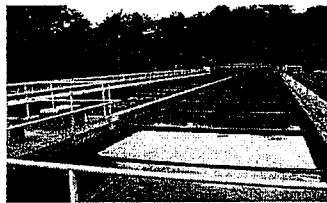
- Created by an act of the Maine Legislature in 1967 specifically to provide wastewater treatment to the “Twin Cities” of Lewiston and Auburn
- Operation started in 1974
- Designed to handle an average daily flow of 14.2 MGD, up to 32 MGD maximum
- Provide septic and holding tank waste treatment for 26 area communities
- Controlled by a 7 member board of directors



## Aging Infrastructure

- Some equipment original to plant (circa 1974)
- Electrically and Mechanically intensive equipment
- Facility operates 24/7
- Most equipment has <20 year life expectancy
- Capital Improvement Plan , Asset Management and preventative maintenance programs in-place to assess infrastructure

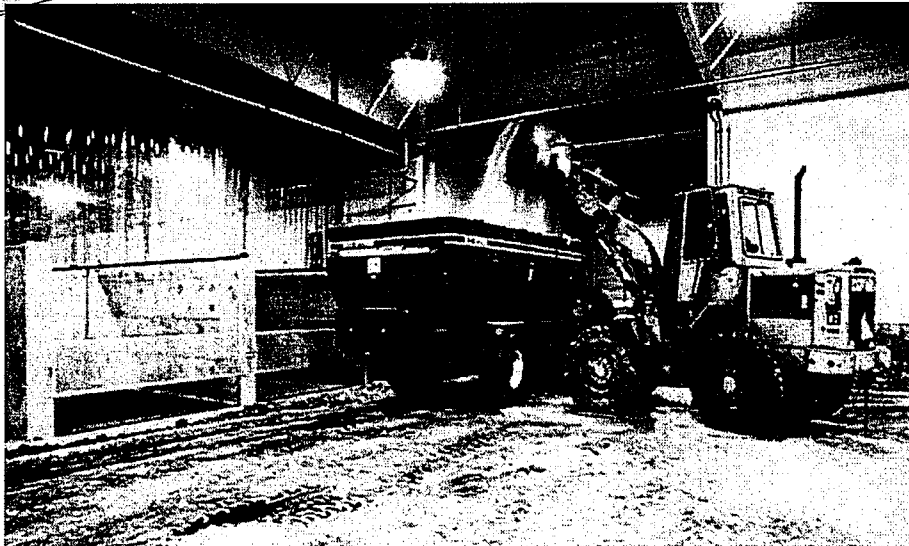
## Current Process



## LAWPCA Composting Facility



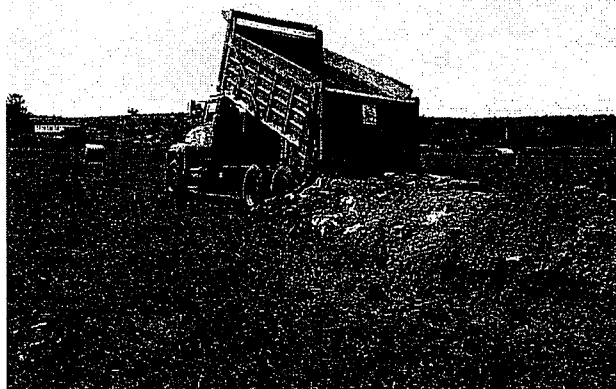
- Penley Corner Rd. in Auburn
- Started Operation in 1993
- Cost \$7.1 Million
- Handles approximately 55 % of biosolids produced





## Land Spreading

- 40-45 % of biosolids produced
- Remaining 5-10 % of biosolids are composted or land filled by outside contractors at a premium cost



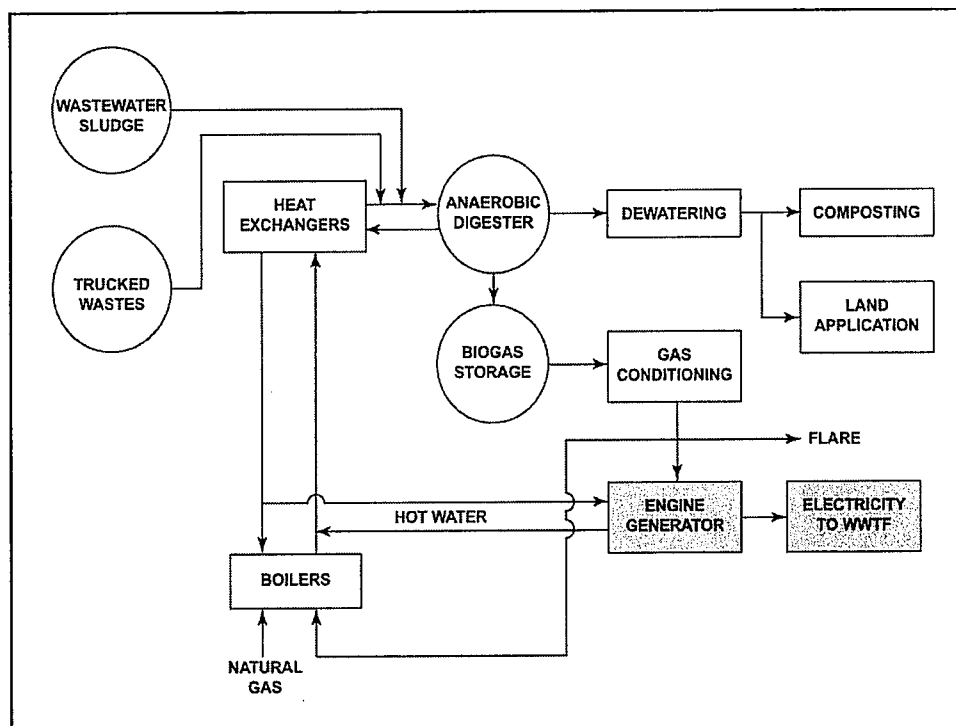
## Anaerobic Digestion/Energy Recovery Facilities

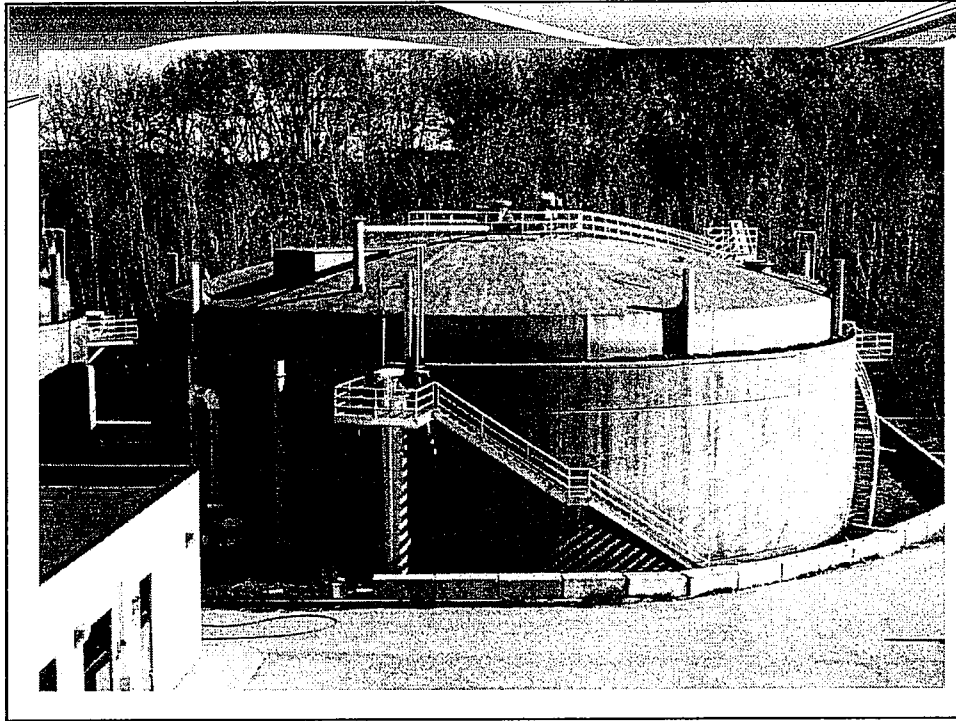
### Anaerobic Digestion

- Well established biological process used for over 75 years.
- Breaks down wastes in the absence of oxygen over a two week period at 95°F.
- Reduces total volume of wastes by 40 percent
- Produces approximately 170,000 cubic feet of biogas daily.

### Energy Recovery

- Engine generator burns the methane – rich biogas to produce electricity.
- Engine hot water used for digester heating.



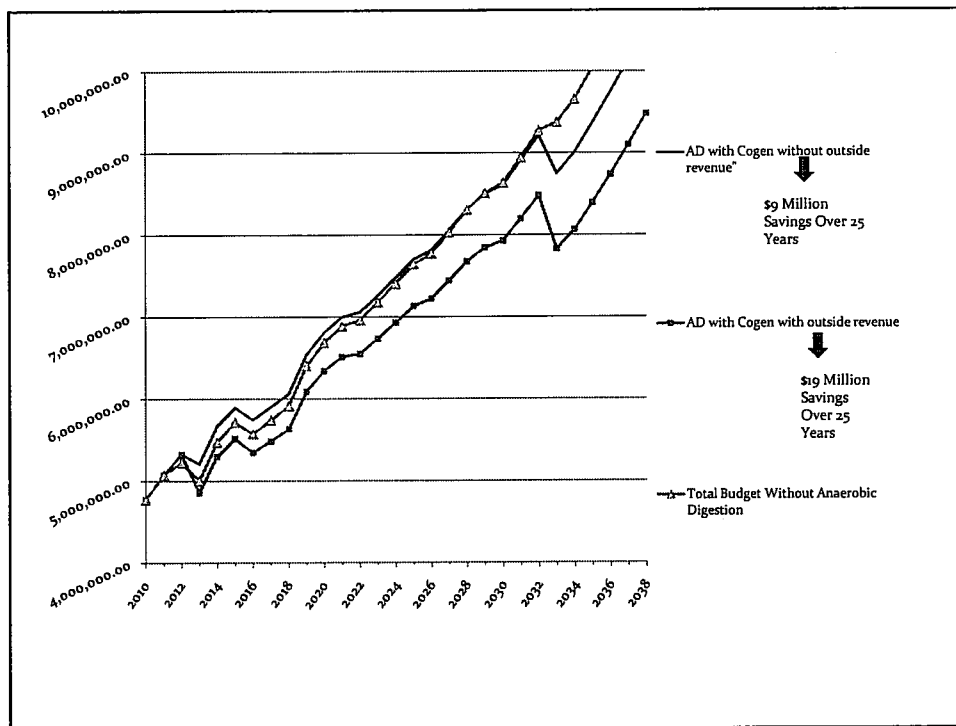


## Annual Biosolids Management Operating Costs


Annual Estimated Operating Costs	Current Biosolids Management	Biosolids Management With Anaerobic Digestion	Savings
Sludge Thickening and Dewatering	\$50,000	\$35,000	\$15,000
Lime Stabilization	\$120,000	\$0	\$120,000
Composting Facility Operations	\$461,600	\$297,000	\$164,600
Treatment Facility Energy	\$583,000	\$561,400	\$21,600
Residual Disposal	\$448,000	\$175,000	\$273,000
Secondary Treatment System Impact	\$0	\$25,000	(\$25,000)
Digestion System Operations	\$0	\$200,000	(\$200,000)
Cogeneration Energy Production	\$0	(\$315,000)	\$315,000
<b>Total Estimated Annual Biosolids Management Costs</b>	<b>\$1,663,000</b>	<b>\$1055,000</b>	<b>\$608,000</b>

# Anaerobic Digestion/Energy Recovery Project

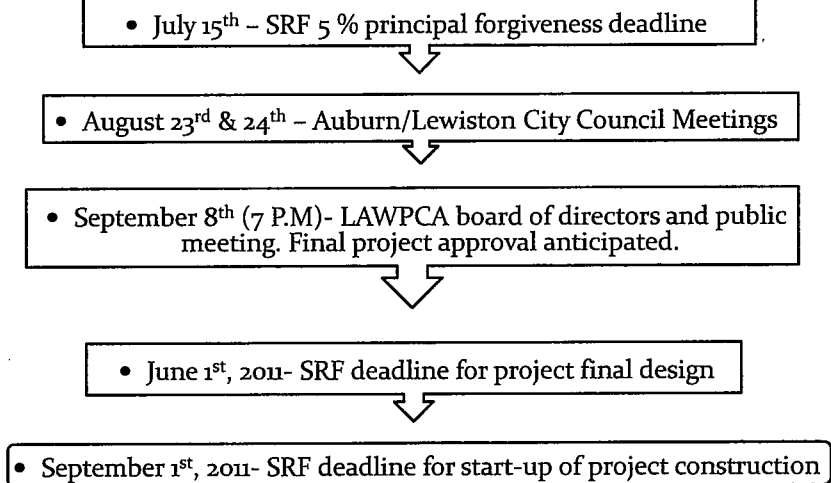
Basis of Financial Analysis	
Capital Cost	\$16.6M
SRF 5% Principal Forgiveness	\$0.79M
Annual O&M Savings	\$0.61M
Planning Period	20 Years
Federal Discount Rate	4.7%
Cost Escalation Rate	3%
Maine Bond Bank Rate	2%



## How did we get here?

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- **Fall 2008**- LAWPCA board explores ideas to address biosolids capacity.
  - **December 2008**- Board approves feasibility study; completed August 2009
  - **July 2009**-Members of LAWPCA board visit anaerobic digestion facilities in New Hampshire.
  - **August 2009**- Board approves conceptual design based on feasibility study; completed October 2009.
  - **December 2009**- Board approves 30% design on project.
  - **June 2010**- 30% design completed. Value engineering study on 30% design completed to ensure accuracy of results and to verify the project is on the right track.

## Anaerobic Digestion Time Line

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- July 15<sup>th</sup> – SRF 5 % principal forgiveness deadline
  - August 23<sup>rd</sup> & 24<sup>th</sup> – Auburn/Lewiston City Council Meetings
  - September 8<sup>th</sup> (7 P.M)- LAWPCA board of directors and public meeting. Final project approval anticipated.
  - June 1<sup>st</sup>, 2011- SRF deadline for project final design
  - September 1<sup>st</sup>, 2011- SRF deadline for start-up of project construction

## Why Now?

- 5 % principal forgiveness (\$790,000)
- 1-2% interest rate
- Great bidding environment for construction bidding services
- Biosolids capacity is currently maximized and the cost of processing is expected to rise

## Conclusions

- Solids Handling and Utilization make up approximately 25% of the Authority's O&M Budget.
- These Costs along with energy costs have been growing faster than other parts of the budget.
- The single largest constraint at the Lincoln Street treatment plant (and potentially industrial/commercial growth in the Twin cities) is daily solids handling and utilization capacity.
- Thus, a project that has the potential to significantly reduce solids and energy costs is a wise investment.

# Questions

