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March 25, 2013

Mr. Michael T. Parker
Department of Environmental Protection
17 State House Station
Augusta, ME 04333-0017

RE: DEP Application #S-020700-WD-BC-A

Dear Mike:

I enclose the pre-filed rebuttal testimony of the Bureau of General Services (BGS) and NEWSME Landfill Operations, LLC (NEWSME). We will present five rebuttal witnesses, three of whom filed pre-filed direct testimony. It is my understanding that parties will be asked to present their rebuttal testimony at the same time as their direct presentation. As with our direct oral presentation, our witnesses will do their best to summarize and keep our oral rebuttal presentation to the most important points, but we will require an additional 30 minutes to present rebuttal in addition to the 90 we estimated for our direct. That should bring our total presentation to no more than 120 minutes.

Thank you for your continued attention to this matter.

Very truly yours,

Tom Doyle

Thomas R. Doyle

Enclosures (one original and one copy)

cc: Intervenor Service List (via email and USPS)

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

JUNIPER RIDGE LANDFILL BUREAU OF GENERAL SERVICES AND NEWSME LANDFILL OPERATIONS, LLC DEP AMENDMENT APPLICATION SOLID WASTE #S-020700-WD-BC-A OLD TOWN, PENOSBCOT COUNTY, MAINE	)	PRE-FILED REBUTTAL TESTIMONY of BUREAU OF GENERAL SERVICES (BGS) and NEWSME LANDFILL OPERATIONS, LLC (NEWSME)

MARCH 25, 2013

EXHIBIT LIST FOR PRE-FILED REBUTTAL TESTIMONY OF BUREAU OF GENERAL SERVICES AND NEWSME LANDFILL OPERATIONS, LLC

TAB

Brian Oliver

Waste Generation and Disposal Capacity Report for 2011, 3/13 ..... BGS/NEWSME #14
Comparison of Out of State Waste ..... BGS/NEWSME #15

Michael Booth

WMDSM Solid Waste Order #S-010735-WD-UW-N, 8/31/02..... BGS/NEWSME #16
Excerpt from Report Card for Maine's Infrastructure, ASCE, 12/6/12BGS/NEWSME #17

Jeremy Labbe

JRL Air Emission License, NSR #1, A-921-77-2-A, 11/26/12 ..... BGS/NEWSME #18

Donald Meagher

CV ..... BGS/NEWSME #19

Abigail Webb

CV ..... BGS/NEWSME #20
JRL Landfill Gas Collection Efficiency Calculations, 3/13 ..... BGS/NEWSME #21

Pre-Filed Rebuttal Testimony of Brian Oliver
Before the Department of Environmental Protection

Juniper Ridge Landfill

DEP Application S-020700-WD-BC-A

The purpose of my rebuttal testimony is to respond to the direct testimony of several other parties on the following issues: (1) the Disposal Agreement between the Penobscot Energy Recovery Corporation ("PERC") and Casella, particularly with respect to Casella's relationship to BGS and how the Agreement might affect out-of-state waste; (2) the economic issues apparently faced by two of the remaining incinerators in Maine and its relevance to this proceeding; (3) the application's compliance with the solid waste hierarchy; and (4) whether Casella will continue to comply with its obligations in various agreements with Old Town Fuel & Fiber ("OTFF").

I. PERC/Casella Disposal Agreement

The Sanborns refer several times in their testimony to the Disposal Agreement between PERC and Casella and its relationship to the amendment application, repeatedly claiming that BGS has somehow been duped by Casella with false information and that BGS should now withdraw the application. The Sanborns argue, for example, that the statement in the application "that 170,000 tons of out-of-state waste would be removed beyond Maine borders . . . was not in fact representative of factually accurate data known at the time of submission of the first application." *See* Sanborn Testimony at 27.

The precipitating event for the amendment application was the anticipated closure of Maine Energy, which took in approximately 170,000 tons of out-of-state waste in 2011. The amount of out-of-state waste that Maine Energy was accepting while it was operating is a matter of public record, and is presented in the facility's annual report to the DEP and in the State's

annual Waste Generation and Disposal Capacity Report For Calendar Year 2011. *See* BGS/NEWSME Exhibit #14. Obviously, when Maine Energy ceased to operate (as it did at the end of 2012), it would no longer be accepting MSW, let alone out-of-state MSW. Therefore, the elimination of 170,000 tons of out-of-state waste into Maine, by the closure of Maine Energy, was entirely accurate, and based on information known at the time of the application submission.

The Sanborns next assert, over several pages, that Casella somehow conspired with PERC to bring additional out-of-state waste into Maine, without the knowledge of the State, leveling various charges of negligence or neglect at Mr. McCormack, the Director of BGS. The nub of the Sanborns' complaint here is that the reduction in out-of-state waste as a result of the closure of Maine Energy will somehow be offset by the PERC/Casella contract through delivery of out-of-state MSW to PERC by Casella. *See* Sanborn Testimony at 27-29. This is incorrect.

The 170,000 ton reduction in out-of-state waste that used to go to Maine Energy is not affected by Casella's obligations to deliver out-of-state waste to PERC under the Disposal Agreement, as the Sanborns claim. Essentially the Disposal Agreement merely switches vendors for the delivery of a small portion of the out-of-state waste being requested by PERC. PERC has historically taken in more out-of-state waste than Casella's delivery obligation under Casella's prior agreement with PERC, and this occurred while Maine Energy was operating and also taking in out-of-state waste (i.e., the 170,000 ton reduction cited in the application). A total of 17,500 tons of out-of-state MSW have been contractually obligated by Casella to be delivered to PERC since 2001 and continue to be obligated (category 4 MSW in the new Disposal Agreement). The remaining 32,500 tons (category 5 MSW) will be made available to PERC by Casella if PERC operationally requires it. This is merely a change in vendors; if Casella weren't delivering it, other third party brokers would. This need for volume by PERC would have existed whether Maine Energy were operational or not and has no linkage to the 170,000 tons

formerly going to Maine Energy. As demonstrated in the attached table, *see* BGS/NEWSME Exhibit # 15, regardless of the source of out-of-state waste delivered to PERC, the net reduction in out-of-state waste coming into Maine as a result of the closure of Maine Energy and the PERC/Casella Disposal Agreement is nearly 200,000 tons per year, or an approximately 76 percent reduction.

The Sanborns also contend that the so-called "backfilled" tons in the Disposal Agreement, which are intended to remove a disincentive to recycling in those communities, would necessarily come from out-of-state waste. *See* Sanborn Testimony at 28. This is also incorrect.

Nothing in the Agreement suggests that the backfilled tons come out of categories 4 and 5 for MSW. *See* PERC/Casella Disposal Agreement § 3.1(d) & (e) (obligating Casella to supply 17,500 tons of out-of-state waste (Category 4) and to make commercially reasonably efforts to supply 32,500 tons of out-of-state waste (Category 5)). Those are separate and distinct Casella obligations under the Agreement and are not related in any way to the recycling provision. In fact, the only restriction is that the backfilled tons cannot be in-state solid waste from a Charter Municipality. *See* PERC/Casella Disposal Agreement § 5.3 at 15 (obligating Casella to supply backfill tons "*in addition to* the minimum quantities . . . prescribed under Section 3") (emphasis added). The application is seeking approval to dispose of up to 93,000 tons of MSW at JRL. However, other processing sites, including incinerators such as ecomaine and MMWAC, as well as other Maine landfills, will have the opportunity to compete for the in-state MSW that used to go to Maine Energy that is not under contract to Casella. If Casella does not retain these customers (and there is no guarantee that it will), then this in-state MSW is not available to Casella to backfill the tons taken away from PERC by recycling. Finally, Casella must pay PERC the same tipping fee rate when it replaces the recycled tonnage that the municipality in

question pays for the tonnage it delivers to PERC. Practically speaking, Casella has a financial incentive, and fully intends to supply this waste from in-state sources, but cannot contractually commit to this due to the reason cited.

II. Economic Concerns of Some Incinerators

Two of the remaining incinerators in Maine, MMWAC and ecomaine, present nearly identical direct testimony on the economic constraints of operating an incinerator, baldly arguing that the DEP should deny the application to prevent them from having to compete with JRL for MSW. *See* Deschene Testimony at 5 (stating that the pending application "will jeopardize the viability of . . . MMWAC, by providing an inexpensive option for disposal of MSW"); McGovern Testimony at 3 (stating "[h]owever inexpensive, the JRL option is short-sighted because it places the State's WTE facilities in jeopardy").

Mr. Deschene then goes on to allege that the MMWAC communities are somehow subsidizing communities that might choose to utilize JRL:

> As such, the members have paid a large price in order to support WTE as a disposal option, despite the less expensive option of landfilling. However, to the extent that JRL is permitted to be a primary disposal option for some of Maine's communities, MMWAC's members cannot be expected to forever subsidize those other municipalities who have the inexpensive option at a State-owned landfill.

Deschene Testimony at 4.

MMWAC's members are not in any way subsidizing the disposal costs of any other Maine municipalities. The tipping fees that the MMWAC members pay are the result of the costs (e.g., facility debt, expenses for operations and maintenance) and revenues (e.g., tipping fees, power sales) associated with the facility they use for disposal of their MSW, not the actions or solid waste management programs of any other Maine municipalities.

Both Mr. Deschene and Mr. McGovern acknowledge that the falling cost of electricity jeopardizes a key revenue stream for MMWAC and ecomaine, respectively. *See* Deschene

Testimony at 4; McGovern Testimony at 3. Both, therefore, want DEP to artificially increase the supply of MSW to them by denying the application in hopes that this new guaranteed revenue source can offset the loss of power sales revenue and thus allow them to stay competitive with other facilities.

The JRL amendment application, however, does not propose to serve as a disposal site for MSW from any Maine municipality under current contract to any of the three remaining incinerators. In fact, one of those three, PERC, has submitted testimony in support of the JRL application.

It is inappropriate, and indeed presumptive, for MMWAC, ecomaine, or any of their member municipalities to suggest that the disposal options of other Maine municipalities outside of their service areas should be limited to somehow force them to utilize and, in effect, subsidize MMWAC or ecomaine at a higher cost.

Both also ignore the fact that other Maine landfills (Tri-Community, Presque Isle, Hatch Hill, Crossroads, Bath, and Brunswick) are currently licensed to and do accept MSW from Maine communities. In other words, what is being proposed for JRL is already the norm at other landfills across the state. As indicated in Table 1 of the Waste Generation and Disposal Capacity Report for Calendar Year 2011, included at BGS/NEWSME Exhibit # 14, these landfills accepted 131,137 tons of MSW in 2011. Neither MMWAC nor ecomaine has claimed in its testimony that disposal of MSW at these landfills is jeopardizing the economic viability of their facilities.

Turning finally to what MMWAC and ecomaine characterize as a statutory basis for incinerators, both Mr. Deschene and Mr. McGovern state:

> Recognizing the WTE facilities require a steady supply of waste, the State adopted a measure allowing for the greater control of solid waste by municipalities in order to promote energy recovery. *See* 38 M.R.S. § 1304-B(2)

(allowing municipalities to enact flow control ordinances to direct waste to publicly-owned waste-to-energy facilities).

See Deschene Testimony at 3; McGovern Testimony at 2-3. Each then notes that his municipality has "enacted such an ordinance, which requires that all acceptable waste generated in the municipality be brought to" MMWAC or ecomaine, respectively, and then asserts that approving the pending application could undermine those communities' investments in incineration. *See* Deschene Testimony at 3; McGovern Testimony at 2-3. In other words, both seem to be suggesting some sort of detrimental reliance argument that would prevent the DEP from approving NEWSME and BGS's application.

As an initial matter, the flow control statute they cite merely allows *municipalities* to adopt flow control ordinances within their municipal boundaries. It has no applicability here. In fact, on the contrary, 38 M.R.S. § 1304-B(2) suggests that if the Legislature had wanted the solid waste hierarchy to function as a flow control scheme – necessarily preferring incineration over landfilling in all circumstances – it certainly knew how to do so. The fact that the solid waste hierarchy is not drafted in this way strongly suggests that the Legislature did not intend for it to be applied in this fashion, as Mr. Deschene and Mr. McGovern would evidently prefer.

III. Compliance with the Waste Management Hierarchy

Multiple parties argue, in essence, that the application should be denied simply because the MSW in question could be incinerated instead of landfilled. As explained in the application and my prior testimony, this is a cramped view of the solid waste hierarchy, which was never intended to be applied as a permitting standard to an individual applicant, but rather as a guide to inform the State in adopting legislation and rules regulating solid waste.

For example, both Mr. Kazar and Mr. Roche of MMWAC and ecomaine, respectively, rely heavily in their testimonies on the solid waste hierarchy in 38 M.R.S. § 2101, asserting that

it requires DEP to prefer their facilities over JRL (apparently without qualification). *See* Kazar Testimony at 4; Roche Testimony at 4; *see also* Kazar Testimony at 5 ("Therefore . . . unprocessed MSW should be disposed of at JRL *only in the event it is by-passed from the three remaining WTE facilities*") (emphasis added); Roche Testimony at 5 (same). The solid waste hierarchy cannot, however, be so rigidly and conclusively applied.

The repeated use of the word "policy" in the hierarchy itself and the characterization of the hierarchy as merely a "guiding principle" belie their attempts to use it as licensing criterion. 38 M.R.S. § 2101 ("It is the policy of the State to use the order of priority in this subsection as a guiding principle in making decisions related to solid waste management."). Likewise, the hierarchy espouses the need for an "integrated approach to solid waste management," which suggests a flexible analysis. *Id.* The hierarchy is not a mandate or a regulatory standard. It is, rather, a preference. After all, reading it as anything else leads to absurd results. What if MMWAC and ecomaine insisted on a tipping fee of $1 million per ton? Would the hierarchy *require* Casella to offer the waste to them at any price, regardless how high? Or what if MMWAC and ecomaine lacked the capacity to accept the waste in the first instance? Would the hierarchy nonetheless require that the waste pass through their hands, so that it could then be bypassed to JRL? Obviously the answer to these questions must be no, and so one must begin to draw lines about what is reasonable. Once that is acknowledged, Mr. Kazar's and Mr. Roche's arguments that this application necessarily conflicts with the hierarchy are unpersuasive.

Mr. Spencer takes a slightly different approach with regard to the hierarchy by focusing on various provisions in the Operating Services Agreement ("OSA") between Casella and the State of Maine for JRL as well as the 2004 DEP permit to assert that Casella knew it would have to comply with the solid waste management hierarchy. *See* Spencer Testimony at 3. The

unstated but clear implication is that he also believes the current application is inconsistent with the hierarchy.

On the contrary, as presented in the application and in our earlier testimony, Casella is accomplishing an enormous reduction in the amount of waste being managed in Maine by the closure of Maine Energy and by its agreement with PERC to send 30,000 tons of in-state MSW to that facility, displacing the same amount of out-of-state MSW. Casella is also further advancing the effort to encourage recycling in Maine through its agreement with Biddeford, its Disposal Agreement with PERC, its proposed recycling agreement with Old Town, and its agreement to site a new recycling center for Maine waste in Lewiston. As discussed in the pending application, Casella is involved extensively in electronic waste recycling, universal waste recycling, and residential and commercial recycling. Casella also owns and operates the largest composting facility in Maine.

IV. Casella's Contractual Commitments

Finally, Mr. Arnold testifies on behalf of OTFF about the effect of the pending application to accept MSW on Casella's ability to comply with three separate agreements between OTFF and Casella regarding: (1) landfill capacity; (2) leachate management; and (3) fuel supply. *See* Arnold Testimony at 2-3.

Nothing in the pending application will impact Casella's ability or willingness to comply with any of these agreements. Casella fully intends to comply with its contractual obligations to OTFF whether the pending application is approved or not.

Dated: 3/20/13

Brian G. Oliver

STATE OF MAINE

Brian Oliver, ss.

Personally appeared before me the above-named Brian G. Oliver and made oath that the foregoing is true and accurate to the best of his knowledge and belief.

Before me,

Dated: 3/20/13

Notary Public
Name:
My Commission Expires:

JOYCE N. WATSON
Notary Public, Maine
My Commission Expires September 23, 2017

Report to the Joint Standing Committee on Environment and Natural Resources 126th Legislature, First Session

Waste Generation and Disposal Capacity Report For Calendar Year 2011

Revised: March 2013

Contact: Melanie Loyzim, Director
Bureau of Remediation & Waste Management

Phone: (207) 287-7890

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 State House Station | Augusta, Maine 04333-0017
www.maine.gov/dep

Executive Summary

This report is submitted to the Joint Standing Committee on Environment and Natural Resources pursuant to 38 MRS §2124-A. (see Appendix A). It provides an overview of Maine's solid waste generation, diversion, and disposal activities for 2011, and a projection of how those activities will impact available solid waste disposal capacity.

The report includes a projection of the solid waste disposal needs of Maine for the next 3, 5, 10, and 20 years. The report also projects how the fill rate at each solid waste landfill could affect the expected lifespan of that landfill. In addition, the report assesses supracompetitive pricing and its possible implications on solid waste management costs.

The information in this report can assist policymakers with planning for future solid waste disposal capacity investment. This report evaluates Maine's progress toward our waste reduction and recycling goals and the impact on disposal capacity.

Highlights

Solid waste generation is largely tied to a combination of the strength of the economy, our consumption of goods, and economic development activities.

- Maine residents and businesses continue to generate about the same amount of waste, even as the economy recovers. Total municipal waste generation remained relatively flat from 1,777,498 tons in 2009 to 1,773,083 tons in 2011.

- At current disposal rates, Maine will need approximately 22.8 million cubic yards of landfill capacity over the next 20 years. There are currently 15.3 million cubic yards of licensed capacity available within the State.

- Maine has capacity in the various public-owned landfills and the commercial landfill together to provide for the disposal of the total wastes generated through 2020. However, not all facilities will have capacity to accept wastes for disposal through that time period.

- Recycling tonnage as reported by municipalities declined slightly from 2010 to 2011. However, the Department has been able to augment the data historically supplied to the State Planning Office by the municipalities with data from other sources. Using this more comprehensive data, Maine's recycling rate for 2011 is calculated to be 39.6%.

I. Introduction

In 2012, 2011 Public Law ch. 655 transferred many of the State Planning Office's ("SPO's") solid waste management and recycling responsibilities to the Department of Environmental Protection ("Department"). These responsibilities include development of the State Waste Management and Recycling Plan, assisting municipalities and businesses with managing solid waste, maintaining an information clearinghouse on recycling markets and services, assisting municipal solid waste incinerators in soliciting waste to meet contractual energy content requirements, review and approval of applications to establish disposal districts, tracking annual waste generation and recycling information from municipalities, and annually reporting to the legislature on the generation of solid waste in Maine, statewide recycling rates and available disposal capacity for solid waste.

Historically, the Department has been responsible for licensing and compliance of solid waste management facilities to ensure appropriate handling of materials. This traditional regulatory approach is designed to protect the environment and public health from pollution. Consolidation responsibilities for waste management planning and recycling provided the Department with an opportunity to apply a more holistic approach to waste management that encourages waste diversion and narrows the stream of waste materials ultimately disposed at landfills. While maintaining a traditional regulatory approach to waste mangement in the Solid Waste Division, the Department created a new Sustainability Division to incorporate the Department's waste diversion and recycling, pollution prevention, product stewardship, toxics reduction, and climate adaptation efforts. The Sustainability Division will coordinate with other Department programs to support the state's waste management hierarchy and other efforts to provide long-term resources for Maine.

By integrating recycling tracking systems together with the Department's broader-reaching oversight of waste handling facilities, systems and diversion programs, the Department has been able to develop a more comprehensive assessment of recycling and diversion of waste from disposal for this year's report.

Waste Management Hierarchy

Maine statute establishes a hierarchy for management of solid waste, to be used as a guiding principle in decision-making. 38 MRS §2101 states:

> It is the policy of the State to plan for and implement an integrated approach to solid waste management for solid waste generated in this State and solid waste imported into this State, which must be based on the following order of priority:
>
> A. Reduction of waste generated at the source, including both amount and toxicity of the waste;
> B. Reuse of waste;
> C. Recycling of waste;
> D. Composting of biodegradable waste;
> E. Waste processing that reduces the volume of waste needing land disposal, including incineration; and
> F. Land disposal of waste.

This report discusses the various efforts underway in Maine to divert wastes from land disposal, and provides an assessment of long-term landfill capacity based on current waste generation and recycling rates.

Methodology Utilized Within the Report

The most current, complete data available for this report is from the calendar year 2011, and comes from a variety of sources, including:

- recycling and waste management data submitted by municipalities to the Department in accordance with 38 MRS §2133;
- solid waste data from the public and private processing, composting, and disposal facilities' annual license reports to the Department in accordance with 38 MRS §1304-C, 2205, and 2232, and from other states which receive waste for disposal from Maine;
- data from annual reporting by manufacturers implementing product stewardship programs in Maine; and
- recycling data voluntarily provided by commercial entities.

The Department combines the tonnages of waste processed and disposed, as well as recycled, composted, and reused, to estimate the total quantity of solid waste generated in Maine.

The Department receives landfill capacity estimates from each of the public and private facilities, and annual reports of the amount of waste being disposed at each facility. The Department projects the amount of waste expected to be disposed over time at current disposal rates to estimate the projected life span of each facility. Those calculations are then totaled to provide an estimate of remaining capacity at a statewide level. Further decreases in solid waste disposal rates will, therefore, extend the life span of Maine's disposal facilities.

Lastly, state economic indicators are examined as an alternative to historical data to project future waste amounts. In the past, state economists found a strong correlation between Maine retail sales and waste generation.

Additional assumptions used in making these projections:

- Reuse, recycling and composting tonnages increase as waste generation increases, working towards the State's 50% goal;
- Exported waste tonnages remain at their decade median;
- Continued operation of and reliance on the three remaining waste-to-energy facilities, at their existing mix of tonnages (out-of-state waste, processed residues, etc.); and
- No significant change in municipally-operated landfills.

Factors that would significantly change the projections and assumptions include:

- significant closures or start-ups of waste processing or disposal facilities,
- major swings in market conditions for recyclables, and
- policy changes to increase public and private waste diversion.

One significant facility change occurred in 2012: the Maine Energy Recovery Company (MERC) waste-to-energy facility in Biddeford was sold to the City of Biddeford and subsequently ceased operations in December 2012. The in-state generated municipal solid waste that was being delivered to the facility is now being transferred to other disposal facilities, and the out-of-state waste which went to MERC is no longer brought into Maine. The impact of this closing on demand for disposal capacity in Maine cannot be fully accounted for until the review of proposed changes to other solid waste disposal facility licenses has been completed.

This report focuses on municipal solid waste (MSW) as defined by Maine law. MSW is comprised of household baggable waste and construction demolition debris, including such items as furniture, tires, and metal. The report does include some sludge and ash tonnages considered 'special wastes', since the disposal of those wastes at landfills impacts the disposal capacity remaining at the disposal facility, one of the metrics tracked. Special wastes are wastes that are generated by other than housholds or typical businesses and, due to their quantity or chemical or physical properties, require particular handling. They include primarily ashes, sludges, and some processing wastes. Industrial wastes are not included in this report. Industrial wastes are not part of the waste managed by municipalities.

This was the first year that all municipal solid waste management reports were submitted to the Department for a consolidated review and analysis. The Department has found that some avenues of waste diversion are not reported and, therefore, are difficult to quantify. To estimate recycling, the Department combines municipal, commercial and private recycling tonnages and adjusts the figures to eliminate duplicate counting of recyclables. The calculation is not a precise measurement. Some data are incomplete: as the reporting required by Maine law does not capture recycling by businesses directly through private brokers and waste management companies, and reporting by municipalities on their solid waste management and recycling is often incomplete. The Department will be establishing a strategy for more comprehensive analysis of Maine's waste stream in the 2014 revision to the state's Waste Management and Recycling Plan.

State Waste Management and Recycling Plan

In accordance with 38 MRS 2122, the Department is required to revise the state's waste management and recycling plan every five years. The state plan contains data on capacity needs and management options. The capacity report annually furnishes updates on those numbers. A key to achieving Maine's statutory waste management goals is having the data available for short-term course corrections (consistent with the state plan) when and where they are indicated by the findings in the capacity report.

The Department will be updating the State's Waste Management and Recycling Plan during 2013. The Department will conduct a broad evaluation of all activities in Maine that divert wastes from disposal and opportunities to support additional waste diversion through regulatory, voluntary, and market-based programs.

II. Municipal Solid Waste

Municipal Solid Waste Definition

Municipal solid waste (MSW) is waste typically generated by households and businesses. It includes household garbage and other waste including recoverable materials such as cardboard, newsprint, office and mixed papers, food waste, plastics, glass, metals, textiles, appliances, furniture, tires, wood waste, and yard waste, as well as construction and demolition debris.

Construction or Demolition Debris (CDD) are the wastes generated by building, remodeling and destruction activities and may include such wastes as wood and wood products, concrete and brick, gypsum board, shingles, and other common components of buildings. Maine includes CDD in its definition of MSW.

Municipal Solid Waste Generation and Management

Every day, approximately 4,800 tons of municipal solid waste are generated within Maine by residential and commercial activity. Maine residents, visitors and businesses generated an estimated 1,773,083 tons of municipal solid waste in 2011, as compared with 1,722,160 tons in 2010. Waste generation is a function of population growth, lifestyles, economic activity, and manufacturing and production practices.

The solid waste management system that receives and manages this waste is a blend of municipal and private service providers that has evolved over the past thirty years. Municipalities are responsible for providing "solid waste disposal services for domestic and commercial solid waste generated within the municipality and may provide these services for industrial wastes and sewage treatment plant sludge." (38 MRS § 1305).

Where each municipality is responsible for providing solid waste disposal services, there is a wide variety and level of systems and programs in place. These services may be provided by the municipality, or by a private contractor. For example, cities utilize curbside collection of trash and recyclables, while most towns provide a transfer station to which residents and businesses can deliver their trash and recyclables. Many municipalities have established cooperative or regional programs and facilities with neighboring municipalities in an effort to benefit from economies of scale.

The same regional approach may also be found with disposal facilities, with ownership varying from public (single municipalty to multiple municipalties) to corporations and even a blend of both, as in the case of the Penobscot Energy Recovery Company facility in Orrington.

Imported/Exported Municipal Solid Waste

Movement of solid waste across state lines is protected under federal interstate commerce laws from state and local restrictions, except that state-owned disposal facilities have the authority to place restrictions on the types of wastes they accept. Municipal solid waste is considered a commodity and is subject to fluctuations of supply and demand at the regional and national level.

In 2011, the following wastes were imported to Maine:

- 264,138 tons of municipal solid waste were brought into Maine and delivered to the four waste to energy facilities to meet their boiler operation needs. (See Table 4 for individual facility's tonnages.) The residuals from the combustion of this waste were landfilled.

- 250,132 tons of construction or demolition debris were trucked to facilities in Maine for processing and reuse, (35,173 tons of which were used as approved alternative daily cover material at a private landfill). The most common action was processing into a wood fuel product as a beneficial reuse activity. Those processing residues that could not be utilized as an alternative fuel were either utilized at landfills as alternative daily cover or were landfilled.

This 514,270 tons total is higher than the 467,725 tons of municipal solid wastes (including CDD) imported in 2010, but less than the 574,345 tons of wastes imported to Maine during 2009. The Department expects less future municipal waste imports due to the closure of the MERC waste incineration facility.

Exports of municipal solid waste and construction/demolition debris have continued to decline, from 43,153 tons in 2009 to 40,916 tons in 2010 and 35,989 tons In 2011.

III. Waste Diversion

Source Reduction

The Department provides technical assistance to businesses, commercial and industrial facilities to evaluate the type and quantities of wastes generated, and opportunities to reduce materials consumption. This assistance is provided during licensing, compliance reviews, and other collaborations with the Department.

Many manufacturers supplying products to Maine are implementing strategies to reduce materials use and waste throughout the lifecycle of their products. Waste prevention strategies reduce wastes generated during manufacturing and distribution, and produce goods that are more recyclable. Examples of common waste prevention activities include:

- reducing the packaging materials necessary for a product's safe transportation and sale to the consumer;
- downsizing packaging, such as smaller laundry detergent containers holding more concentrated product;
- eliminating duplicative packaging, e.g., a plastic bag within a sealed box; and
- the use of different packaging materials, such as substituting a plastic container for a glass container.

The Department also implements the Environmental Leader program, to promote and recognize efforts by Maine businesses to implement waste reduction and pollution prevention strategies. Businesses receive points toward Environmental Leader certification for practices such as: using only paper that has at least 30% post-consumer recycled content; recycling ink cartridges, used electronics, paper, plastic, glass, metal, cardboard, pallets; composting kitchen wastes; collecting vegetable oil and brown grease for bio-fuel or other energy generation; and eliminating use of styrofoam.

Diversion

The Department also implements many diversion programs, such as Dry mercuric oxide and rechargeable batteries, mercury auto switches, electronic waste, mercury thermostats, and mercury lamps. Details regarding these diversion programs are provided in the January 2013 *Implementing Product Stewardship in Maine* report.

Reuse

Maine residents and companies are adept at maximizing the value from everyday products. The saying 'use it up, wear it out, make it do or do without' has been the mantra for many generations. Reuse stores and businesses are located throughout the state, ranging from nationally established organizations such as Goodwill and the Salvation Army to more locally based operations such as the local thrift or 'gently used garment' stores. Construction supplies have their own reuse opportunities through enterprises such as the Maine Building Materials Exchange and the various ReStore resale outlet facilities operated by Habitat for Humanity. Additionally, many manufacturing and distribution operations 'reuse' materials or products, reducing the amount of

waste being generated; for example, reusable plastic delivery 'totes' for shipping products to retailers have replaced single use corrugated shipping cartons.

Many municipalities provide a 'too good to toss' facility at their transfer station or recycling center, supporting the concept that 'one person's trash is another person's treasure'. The ubiquitous 'yard sale' or 'lawn sale' opportunities that are prevalent throughout the state during the warmer months provide for a sizeable reuse opportunity for products and items that might otherwise continue sitting unused or be simply disposed of. And of course, there's the long-standing tradition of passing clothes along to younger members of a family or sharing with neighbors and friends, again, maximizing the value of products through reuse activities.

Most of these reuse activities occur without any tracking of materials exchanged. If a conservative estimate of 725,577 residences in Maine is used, and an average of one hundred pounds of product(s) are reused annually by each household, this totals 36,200 tons, and would add roughly another two percent to the state's calculated recycling rate.

In accordance with 38 MRS §1304, the Department implements programs encouraging innovative uses of waste materials. Department rules provide streamlined licensing requirements for industrial facilities substituting waste materials for virgin production materials and fuel, and conducting agronomic utilization of ash, sludge and compost. In 2011, beneficial uses occuring in Maine included the use of about 40,000 tons of oil-contaminated soil, 20,053 tons of asphalt shingles, 11,922 tons of sheetrock, and 1,053 tons of boiler ash by mineral materials production facilities in Maine in asphalt and concrete products. Many facilities with boilers and kilns are licensed to burn waste materials such as fuel chips from wood wastes and construction and demolition debris, tire chips, and sludge. More than 20,000 tons of waste materials were burned in licensed boilers in lieu of fossil fuels or biomass. Additionally, 80 waste generators (including muncipal waste water treatment plants and industrial facilities) are licensed to land-apply wood ash, biosolids (waste water treatment plant sludge), papermill sludges and other wastes to 136 agronomic utilization sites.

Composting

The Department provides technical assistance and licensing to municipal, commercial, institutional and industrial facilities that compost organic wastes generated on-site or collected from other sources.

There are almost 150 licensed composting facilities in Maine, including 27 that compost fish and food wastes, and 18 that compost sludge and septage. The volume of wastes diverted to these facilities is impacted by transportation costs. As more composting facilities operate across the state, shorter distances from the waste generators will increase the cost-effectiveness of commercial composting as a waste diversion strategy.

Over 100 facilities are licensed to compost leaf and yard waste, mostly at municipal transfer stations. The Department is actively engaged with more than a dozen towns that are establishing new composting operations, and expects that number to continue to increase. Municipal composting efforts generate soil amendments that are returned to residents, keeping nutrients within the communities where they are produced.

Processing

Processing facilities reduce the volume or change the chemical or physical characteristics of solid waste. Along with reducing the volume of the waste prior to disposal, processing facilities may create materials that can be beneficially used in place of virgin materials in construction products or projects, wood chips for fuel substitution, and commodities that can be sold for manufacturing of new products. Processing facilities include but are not limited to facilities that employ shredding, baling, mechanical and magnetic separation, or other stabilization techniques to reduce or otherwise change the nature of solid waste.

Examples of processing facilities include those that chip used motor vehicle tires and construction and demolition debris (CDD), and anaerobic digesters. In 2011, Maine waste processing facilities produced 25,090 tons of tire chips and more than 23,625 tons of CDD fuel chips to be used in place of fossil fuels and biomass.

Maine has two large-scale commercial CDD processors: KTI Biofuels in Lewiston and the CPRC Group in Scarborough. KTI Biofuels accepts clean wood products and CDD for processing for use as biomass fuel. In 2011, it received 177,581 tons of mixed CDD, of which 10,714 tons were generated within Maine. KTI also accepted 52,398 tons of clean wood waste, of which 10,770 tons were generated in-state. CPRC accepts multiple types of materials and ships out a variety of finished products from its Scarborough facilities, as well as offering mobile or 'on-site' services. In 2011, CPRC accepted 17,784 tons of used asphalt roofing materials, 11,308 tons from in-state sources. There are also several commercial wood chippers that move from site to site and are used to manage brush and clean CDD wood at municipal facilities.

There are two anaerobic digesters operating in Maine: Exeter Agri-Energy and McCain Foods. These facilities process waste materials generated on-site, and from other larger scale generators of organic wastes, such as farms, grocers, restaurants, and bio-fuel manufacturers. Methane gases produced by the waste digestion are used as a fuel source to generate heat and electricity for the facilities.

IV. Recycling

Statewide Recycling Rate

Recycling is defined at 38 MRS §1303-C as "the collection, separation, recovery and sale or reuse of materials that would otherwise be disposed of or processed as waste or the mechanized separation and treatment of waste, other than through combustion, and the creation and recovery of reusable materials other than as a fuel for the generation of electricity."

The statewide recycling rate has historically been calculated by dividing the total amount of MSW recycled (including estimates of composting, reuse, and beneficial use other than fuel substitution) by the total amount of in-state generated MSW. As described previously, this does not take into account significant amounts of materials that are diverted from disposal.

For comparison against previously published estimates, the Department estimates that 702,202 tons of materials were recycled in 2011, or 39.6% of the waste stream. This is an increase from the 665,315 tons recycled in 2010 as previously reported to the legislature. Much of this increase is due to the opportunity to integrate data from additional sources beyond those traditionally available to and utilized by the former State Planning Office.

The figures used to calculate the recycling and diversion rates for Maine-generated MSW & CDD are:

	tons
MSW landfilled in state (includes WTE ash)	368,774
MSW incinerated in state (does not include residues)	351,617
MSW disposed of out-of-state	30,796
Mixed CDD landfilled in state	262,938
Mixed CDD processed/disposed of out of-state	5,193
CDD processing residue- ME component	51,563
Subtotal waste disposed	1,070,881
Beneficial use of processed CDD as fuel chip	54,960
MSW recycled - reported by municipalities*	116,216
Other MSW recycled (computers and monitors, white goods, metals, tires, vehicle batteries)	273,623
Business waste recycled	284,419
MSW composted (includes leaf & yard waste)	27,944
Total MSW recycled & composted	702,202
Total MSW & CDD generated in Maine	1,773,083
Percent recycled	39.6%

Appendix B lists the quantities of materials recycled by waste type.

Progress Toward State Goal

In 1989, the Maine Legislature established a goal to recycle 50% of the state's municipal solid waste annually. The legislated date to achieve the goal was revised in 2012 and extended to January 1, 2014. Individual municipal and regional recycling programs are not required to achieve a 50% recycling rate, but they are required to demonstrate progress towards the goal.

Using previous, more limited data collection methods, the calculated recycling rate in 2011 would be 37%. Using this consistent calculation method, Maine's recycling rate has been fairly steady for the past ten years, ranging from a low of 34.8% in 2007 to a high of 38.8% in 2009. However, the rate calculated in this way did not include all forms of recycling that occur at the municipal level, nor statewide. As described above, utilizing additional data sources to account for recycling occurring outside the municipal sector and through product stewardship programs, Maine MSW recycling rate for 2011 is 39.6%. Note that this rate still does not account for much of the reuse of materials that occurs routinely in Maine. For example, many municipal transfer stations and recycling centers set aside areas for the exchange of used goods, such as furniture, toys and books that might otherwise be disposed of. Many Maine citizens also use larger exchange networks such as *Uncle Henry's* and Craigslist. The Department estimates that more than 36,000 tons of materials each year are reused in this manner.

The State remains committed to reaching the 50% goal in light of the value of reducing overall solid waste management costs, the positive impact on the environment, and a lessening of the need for additional solid waste disposal capacity. The Department created the Sustainability Division to focus resources on programs that will further the state's progress toward this goal.

In addition, the State has a goal to reduce the biennial generation of municipal solid waste tonnage by 5% beginning on January 1, 2009, and by an additional 5% every subsequent 2 years (38 MRS §2132(1-A). This is a biennial goal and the baseline for calculating this reduction is the 2003 solid waste generation data gathered by the former State Planning Office. In 2009, the tonnage of municipal solid waste generated was 1,777,498 tons and in 2011 generation was 1,773,083 tons, a decrease of 4,415 tons.

V. Disposal

In 2011, Maine's solid waste disposal facilities included: two operating state-owned landfills; one commercial landfill; nine municipally-operated landfills; 19 municipal construction and demolition debris (CDD) landfills; and, four waste-to-energy facilities. The State has another landfill site, known as Carpenter Ridge, located in T2 R8 that remains undeveloped.

Landfills

Landfills receive a variety of wastes. The types of wastes permitted for disposal differ among the facilities, as requested in their licensing applications. Included in that variety of wastes is: raw garbage; construction and demolition debris; residues, such as front end processing residue and ash from waste to energy facilities; contaminated soils; sludges; ash from biomass operations; and other special wastes. This report focuses on municipal solid waste, including construction and demolition debris, as well as the residues from the processing of those wastes.

However, in projecting the consumption of landfill capacity, the Department combined the tonnages of the various cover materials and the other special wastes that were landfilled, along with the municipal solid waste tonnages, to estimate the remaining life of the landfills since all these waste types consume landfill capacity. For that reason, those wastes and their impact on landfill capacity are included in this report.

The following table provides details on each of the landfills, the types and tonnages of materials received at each, and remaining disposal capacity, as reported to the Department.

This report provides information for the calendar year 2011. In September 2011, the State acquired the Dolby Landfills in East Millinocket as part of the effort to secure a buyer and operator for the paper mills in East Millinocket and Millinocket. The Dolby landfill's use and capacity is restricted to waste generated from operations at those mills, which is industrial waste, and is not part of the solid waste stream presented in this report.

TABLE 1- ACTIVE LANDFILLS, WASTE TYPES, TONNAGES AND REMAINING CAPACITIES - 2011 DATA								
Landfill	MSW (tons)	CDD (tons)	Special Wastes, Residues	Other cover materials landfilled (cubic yards)	Waste Fill Rate (tons)	Cubic Yards of Capacity Consumed (est.)	Cubic Yards of Capacity Remaining (est.)	Years of Licensed Capacity Remaining at current fill rate
Augusta (Hatch Hill)	26,438		450	17,719	26,888	56,711	1,075,366	17.9
Bath	10,282	1,575	339	18,300	12,196	38,340	298,800	8
Brunswick	3,543			500	3,543	14,286	349,678	24
Presque Isle	5,573	1,283	2,723	1,906	9,579	15,669	284,331	18
Tri-Community	14,460	2,566	1,962		18,988	42,003	1,704,366	41
ecomaine*			43,303		43,303	41,891	1,057,926	23.5
Lewiston		893	35,658		36,551	16,915	627,108	37
Crossroads	70,841	75,967	120,913		267,721	276,524	3,730,095	13
Juniper Ridge	125,565	150,536	427,759		703,860	689,044	5,866,775	8.5
MidCoast Solid Waste (Rockport)		2,822			2,822	7,950	73,175	9
Rockland		25,890			25,890	40,350	242,700	6
Totals	**256,702**	**261,532**	**633,107**	**38,425**	**1,151,341**	**1,239,683**	**15,310,320**	

*ecoMaine excavated 1,418 tons MSW to combust

Municipal CDD Disposal Facilities

There are 19 municipal land disposal facilities that accept locally-generated construction and demolition debris, inert fill, brush, and trees. These operations furnish a 'short-transport' option for the disposal of these wastes. These facilities landfilled a total of 38,579 tons of CDD in 2011, including the 28,712 tons in Rockland and Rockport as listed in Table 1.

The remaining capacity at individual CDD facilities varies, but conversations reflect that landfill space exists for an overall capacity for another 10-12 years. Seventeen of these facilities are small operations, with an operating area of less than six acres, which serve an immediate area's need for disposal of waste wood, construction or demolition debris, inert fill, and similar wastes. These facilities are of local importance, providing a 'nearby' disposal option for these wastes, often at low cost.

Finding acceptable alternatives to land disposal for CDD continues to pose problems in Maine's rural areas. These materials cannot be recycled or reused without investment in equipment, labor, and sufficient land area to aggregate and process them. Markets for processed CDD do exist, but given the often small scale that most Maine towns operate on, with low volume and dispersed facilities, rural operations do not often produce the scale needed for sustainable recycling efforts. CDD that has been processed to produce a fuel substitute product can be used for combustion at licensed industrial facilities. As of this report, RE-Energy (formerly Boralex), Gallop Power Greenville, Sappi (Westbrook), and Perma Treat Corporation are currently licensed for, and utilizing varying tonnages of this fuel substitute

Waste-To-Energy Facilities

In 2011, 31.5% of Maine's municipal solid waste was sent to waste-to-energy (WTE) facilities. Maine's WTE facilities received a total of 822,058 tons of MSW, of which 557,520 tons were from Maine sources, which represents an overall decrease in deliveries of 34,883 tons from 2010. Table 2 and Table 3 provide an overview of the four facilities and the management of the wastes delivered.

At the time of this report, the Maine Energy Recovery Company (MERC) waste-to-energy facility in Biddeford has been sold to the City of Biddeford and is now closed. The in-state generated municipal solid waste that was being delivered to the facility is now being transferred to other disposal facilities.

TABLE 2 - SUMMARY OF MAINE'S FOUR WASTE TO ENERGY FACILITIES - 2011										
FACILITY	MUNICIPAL TONS OF WASTE RECEIVED	COMMERCIAL TONS OF WASTE RECEIVED	SPOT MARKET WASTE TONS	OTHER TONS OF WASTE RECEIVED	TOTAL TONS OF WASTES RECEIVED	BYPASS TONS*	FRONT END PROCESS RESIDUE TONS*	METALS RECOVRED TONS	ASH TONS*	COMBUSTED TONS (Does not include residuals)
Maine Energy	55,019	199,692		4,565	259,276	3,261	42,690	6,226	50,051	157,048
ecomaine	63,567	68,030	36,328	9,353	177,278	874	N/A	3,301	41,891	131,212
Mid ME Waste Action Corp	37,484	14,313	19,732		71,529	10,572	N/A	2,077	17,673	41,207
PERC	196,420	105,959	11,596		313,975	164	60,624	9,152	55,565	188,570
TOTALS	**352,489**	**387,994**	**67,656**	**13,918**	**822,058**	**14,871**	**103,214**	**20,756**	**165,131**	**518,084**
					% of total received	*1.81%*	*12.56%*	*2.52%*	*20.09%*	*63.02%*

* Definitions for these residue streams are found on the next page

The following, Table 3, shows the breakdown of source of the wastes received by each Waste-To-Energy facility:

Table 3 - Source of MSW for Waste to Energy Facilities			
Facility	**In-state tons**	**Out of State tons**	**Total Tons**
ecomaine	174,312	2,966	177,278
Maine Energy	89,385	169,891	259,276
Mid Maine Waste Action Corp	71,410	119	71,529
PERC	222,813	91,162	313,975
Totals	***557,920***	***264,138***	***822,058***

Waste to Energy facilities combust municipal solid waste to generate electricity. That process generates residues that require disposal in a landfill, but the volume of waste requiring disposal is greatly reduced by as much as ninety (90) percent, and total weight by two-thirds, reducing the need for landfill capacity as compared with landfilling of unprocessed municipal solid waste. The four waste to energy facilities have a combined generation capacity of approximately 62 megawatts of electricity.

To produce the electrical generation contracted for, waste-to-energy facilities need to operate at maximum capacities. The seasonal nature of waste generation causes tonnage overage issues during the summer months and the need to "attract" additional tonnage during the winter months. Facilities bypass waste when they reach their daily operating capacity and acquire, often through importation, wastes to make up for shortfalls.

As there are changes in any of the current waste-to-energy facilities and their operations, there could be a reduction for both the demand for out of state waste and the disposal associated with its processing. For example, the closing of the Maine Energy incinerator in Biddeford will result in a decrease of about 50,000 cubic yards of ash needing disposal each year. Also the approximately 90,000 cubic yards of MSW from Maine previously managed by MERC (54,000 of which was actually incinerated) will need to be disposed of elsewhere, potentially fulfilling the needs of the other three WTE incinerators which imported about 95,000 tons of MSW in 2011.

WTE Residues

The waste-to-energy facilities produce by-pass waste, front-end process residue (FEPR), and ash. These residues, which require disposal in landfills, comprise approximately one-third of the waste processed by these facilities. The metals are recovered for recycling.

- *Bypass Waste:* Bypass waste is that portion of the municipal solid waste stream intended for delivery to, and incineration at a waste-to-energy facility, but diverted because the facility could not accept it. Solid waste is bypassed if there are operational interruptions or facility shutdowns, or if the facility reaches its operational capacity and cannot accept waste that it is contractually obligated to receive. The bypass waste is typically delivered to a landfill for disposal. This category also includes waste that cannot be processed by the facility due to size or composition.

- *Front-end Process Residue:* Maine Energy Recovery Company (MERC) and Penobscot Energy Recovery Company (PERC) use a refuse derived fuel technology and generate front-end process residue as a by-product of their operations. These facilities dispose of the front-end process residue at landfills. Front-end process residue (FEPR) is removed prior to incineration, and may include ferrous metals, glass, grit, and fine organic matter. Mid-Maine Waste Action Corporation (MMWAC) and *ecomaine* use a 'mass burn' technology and do not produce FEPR.

- *Ash:* Ash is a by-product of combustion, classified as a special waste, and is landfilled. The ash from MERC and PERC is disposed of at the Juniper Ridge Landfill. The ash from MMWAC is disposed of at the City of Lewiston's landfill and *ecomaine's* ash is buried at the *ecomaine* landfill.

V. Future Waste Processing and Disposal Capacity

At 2011 disposal rates, Maine will require an estimated 22.8 million cubic yards of landfill capacity over the next 20 years to manage the municipal solid waste that is directly landfilled, along with the residues generated by the three waste-to-energy facilities and other processing facilities that also require landfilling of residues. The following table illustrates projections of anticipated disposal capacity in Maine at 2011 fill rates, with no adjustment in projections of tonnages of waste being generated requiring disposal.

Table 4: Disposal Capacity in Maine

		3 Years	5 Years	10 Years	20 Years
WTE Facility Capacity	2011 Capacity – available (tons/year)	2014 Capacity – projected remaining (tons/year)	2016 Capacity – projected remaining (tons/year)	2021 Capacity – projected remaining (tons/year)	2031 Capacity – projected remaining (tons/year)
MMWAC – Auburn	70,000	70,000	70,000	70,000	70,000
ecomaine – Portland	170,000	170,000	170,000	170,000	170,000
Maine Energy - Biddeford	310,000	0	0	0	0
PERC – Orrington	304,000	304,000	304,000	304,000[6]	304,000
Total	**854,000**	**544,000**	**544,000**	**544,000**	**544,000**
Landfill Disposal Capacity at current fill rate	2011 Licensed Capacity – end of year (cubic yards)	2014 Licensed Capacity – end of year (cubic yards)	2016 Licensed Capacity – end of year (cubic yards)	2021 Licensed Capacity – end of year (cubic yards)	2031 Licensed Capacity – end of year (cubic yards)
State Landfills (2):					
Carpenter Ridge – T 2 R 8	Undeveloped	Undeveloped	Undeveloped	Undeveloped	Undeveloped
Juniper Ridge – Old Town	5,866,775	3,799,643	2,421,555	0	0
Juniper Ridge – Old Town (expansion being sought)	Unlicensed	Unlicensed	Unlicensed	Unlicensed	Unlicensed
Municipal Disposal Sites (9)					
7 - Municipal wastefills	3,712,248	3,211,221	2,877,203	2,042,158	372,068
2 - Municipal – 'ash'	1,685,034	1,508,616	1,391,004	1,096974	508,914
Commercial landfills (1)					
Crossroads - Norridgewock	3,726,343	2,888,515	2,329,963	933,583	0
Total	14,900,400	11,407,995	9,019,725	4,072,715	880,982

VI. Disposal Prices

Disposal Fees

Disposal expenses are comprised of collection and transportation costs and tipping fees on the disposal of waste. Disposal fees or tipping fees are a major factor in solid waste management costs for municipalities and businesses. Current disposal fees range from $40 to $135 per ton at Maine's landfills and waste-to-energy facilities. These have stabilized in most instances, allowing predictability for municipal budgeting and long-term planning.

Tipping fees at each of the four waste-to-energy facilities have been fairly consistent and reflect the commitment of the municipalities who either own the facility or have long-term contracts for disposal services.

The State, in its operating services agreement with Casella Waste Systems, established a ceiling for tipping fees that sets an upper limit on how much can be charged for wastes delivered to the Juniper Ridge Landfill, which has had a stabilizing impact on pricing for the disposal of similar materials at other solid waste facilities.

Tipping fees at waste-to-energy facilities are influenced by revenues received from the sale of the electricity they generate. The revenues reduce operating expenses, yielding a reduction in the tip fee charged for solid waste. Should electricity sales revenue drop, tipping fees may increase. Conversely, should the electricity sales value increase, the possibility exists that lower tipping fees, or maintaining current fees, would occur.

Supracompetitive Prices

Supracompetitive, as applied to *'prices,'* means prices that are higher than they would be in a normally functioning, competitive market, usually as a result of overconcentration, collusion, or some form of monopolistic, oppressive practice. State law requires the Department to determine whether changes in available landfill capacity have generated, or have the potential to generate, supracompetitive prices and make recommendations for legislative or regulatory changes as necessary.

Disposal capacity at Maine landfills is sufficient to meet current needs. At the time of this report, the disposal capacity situation does not appear to have generated supracompetitive disposal fees, because disposal prices have not experienced any significant changes during the last three years. The Department maintains a firm awareness of its responsibility to stay attuned to the possibility of supracompetitive pricing.

Appendix A

A. Legislative Reference

Title 38: WATERS AND NAVIGATION
Chapter 24: SOLID WASTE MANAGEMENT AND RECYCLING
Subchapter 2: SOLID WASTE PLANNING

§2124-A. Solid waste generation and disposal capacity report

By January 1, 2013 and annually thereafter, the department shall submit a report to the joint standing committee of the Legislature having jurisdiction over natural resources matters and the Governor setting forth information on statewide generation of solid waste, statewide recycling rates and available disposal capacity for solid waste.

The report submitted under this section must include an analysis of how changes in available disposal capacity have affected or are likely to affect disposal prices. When the department determines that a decline in available landfill capacity has generated or has the potential to generate supracompetitive prices, the department shall include this finding in its report and shall include recommendations for legislative or regulatory changes as necessary.

Beginning on January 1, 2013 and every odd-numbered year thereafter, the report submitted under this section must include an analysis of how the rate of fill at each solid waste landfill has affected the expected lifespan of that solid waste landfill.

Beginning on January 1, 2014 and every even-numbered year thereafter, the report submitted under this section must include an analysis of consolidation of ownership in the disposal, collection, recycling and hauling of solid waste.

The joint standing committee of the Legislature having jurisdiction over solid waste matters may report out legislation related to the report submitted pursuant to this section

Appendix B

Quantities Recycled by Waste Type

Recyclables reported by municipalities	Tons of each waste type
Aluminum cans/foil	1,183.60
Brown/amber glass	0.91
Clear glass	276.33
Co-mingled containers	1,018.84
Co-mingled paper & OCC	1,197.72
Computers and Peripherals	510.89
Corrugated carboard (OCC)	29,703.64
Green glass	1.40
HDPE (#2) plastic	883.57
LDPE (#4) plastic	288.08
Magazines (OMG)	147.80
Mixed electronics	80.45
MIxed Glass	2,384.40
Mixed newspapers & magazines	9,850.76
Mixed paper grade	7,293.39
Mixed plastics	969.39
Mixed recycleables/Single stream	39,019.35
Newspapers (ONP)	7,415.57
Office paper grade	860.01
PETE/PET (#1) plastic	450.90
PVC (#3) plastic	145.16
Steel Cans	1,016.74
subtotal reported by municipalities	**104,698.90**
Other recyclables	
Metals	84,405.00
Metals - ferrous	132,841.00
Metals - non-ferrous	7,179.19
WTE metal recovered	11,724.48
Batteries - rechargeable	17.14
Vehicle Batteries	2148.33
Tires	16,983.83
Monitors & TVs	18,324.00
subtotal other recyclables	**273,622.97**

Comparison of Out of State MSW Tonnage Before and After Maine Energy Closure and Implementation of Juniper Ridge Landfill Amendment Application

		Out-of-State MSW (tons)[1] 2011	Future
PERC			
	2001 Casella Agreement (category 4 MSW)	17,500	17,500
	2012 Casella Agreement (category 5 MSW)	-	32,500
	Delivered by 3rd parties[2]	73,662	41,162
	2012 Casella Agreement (category 3 MSW)[3]		(30,000)
	Subtotal	91,162	61,162
MMWAC		118	118
ecomaine		2,966	2,966
Maine Energy		169,891	-
TOTAL		**264,137**	**64,246**
Annual Net Reduction in Out-of State MSW to Maine Incinerators		**199,891**	
Percent Reduction		**76%**	

[1] Source: Waste Generation and Disposal Capacity Report For Calendar Year 2011

[2] Out-of-state waste delivered by 3rd parties in the future is reduced by Category 3 and 5 MSW

[3] 30,000 tons in in-state MSW (category 3 MSW) displaces out-of-state MSW

Pre-Filed Rebuttal Testimony of Michael S. Booth
Before the Department of Environmental Protection

Juniper Ridge Landfill

DEP Application S-020700-WD-BC-A

The purpose of this rebuttal testimony is to respond to Harry and Laura Sanborn's direct testimony on the Juniper Ridge Landfill (JRL) Amendment Application filed by the Bureau of General Services (BGS) and NEWSME Landfill Operations, LLC (NEWSME) to accept up to 93,000 tons per year of municipal solid waste (MSW) from in-state sources. In particular, I will explain: (1) why the Sanborns' so-called compromise solution is impractical and contrary to prior DEP interpretation of the Solid Waste statutes; and (2) that the American Society of Civil Engineers' report relied on by the Sanborns does not back-up their claims.

I. The Sanborns' Compromise Solution

The Sanborns' position appears to be that the solid waste hierarchy in 38 M.R.S. § 2101 dictates that the in-state MSW that would be accepted at JRL must first be directed to one of the remaining three in-state MSW incinerators instead of JRL, a state-owned facility designed to handle this material in an environmentally safe and efficient manner. They propose "a compromise solution." *See* Sanborn Testimony at 6. Using the 123,000 tons of MSW proposed in the initial application (which has since been reduced to 93,000 tons as a result of the Disposal Agreement with the Penobscot Energy Recovery Corporation (PERC)), they suggest that JRL be permitted to accept only 32,000 tons of MSW per year, and that the rest go to PERC. *Id.*

There are a number of practical limitations to this approach, not least of which are the contractual agreements between various private parties involved in generating, handling, and disposing of MSW. The State is not a party to these agreements and cannot modify or otherwise void them. Also, the waste generation rates in the State have very seasonal patterns that may or

may not be compatible with various facilities' operations when shifting the management options from one option to another. Nowhere in their testimony did the Sanborns provide, for example, any evidence that the incinerators they prefer could even handle the material as it is generated and on terms that are agreeable to the other parties to this discussion. In fact, as Mr. Oliver has testified, Casella was able to reach a Disposal Agreement with PERC, but not with ecomaine or Mid-Maine Waste Action Corporation. This demonstrates the fallacy of assuming that all of the disparate private and public parties integral to these facilities are going to be able to agree on terms.

Finally, other landfills that dispose of MSW have not been required in licensing proceedings to demonstrate that they have exhausted all management options higher on the hierarchy. There are currently six other landfills that routinely dispose of MSW, providing precedent for how the hierarchy has been addressed at other disposal facilities.

One example is Solid Waste Order #S-010735-WD-UW-N, which is Waste Management Disposal Services of Maine's Crossroads Landfill Phase 8 landfill expansion. In that order, DEP permitted Crossroads Landfill to accept MSW without any of the limitations currently part of JRL's permits. BGS/NEWSME Exhibit #16. Section 5 of that permit addresses that facility's compliance with 38 M.R.S. §§ 1310-N.1.C, 1310-N.5; 06-096 CMR 400.6; and 38 M.R.S. § 2101. Although the pending JRL application to accept additional MSW is not an application for a new or expanded disposal facility, and therefore the first two statutory provisions and DEP Chapter 400.6 do not apply to this proceeding, the Hearing Officer, over BGS and NEWSME's objection, has determined that the waste management hierarchy is a consideration. As stated in the Crossroads permit (pgs 8-9) regarding compliance of the facility with the hierarchy:

> By operation of law, all municipal solid waste generated in the State of Maine is subject to these voluntary and mandatory recycling and source reduction

> provisions and goals. Compliance with these goals and requirements is under the control and direction of the State, not the disposal facilities. There is no requirement that a solid waste disposal facility demonstrate or assume responsibility for the compliance rate of the generators of municipal solid waste with either the voluntary or mandatory recycling or source reduction provisions of the State of Maine.

This section goes on (pg 9) to describe a number of the programs that the permittee in that case undertakes to reduce the amount of solid waste that requires disposal. Consistent with this approach, Section 2.6 of the JRL application describes the recycling and source reduction efforts of NEWSME in the State of Maine. What is proposed is entirely consistent with the standards applied to other solid waste disposal facilities in the State of Maine.

II. ASCE's Report

The Sanborns' testimony includes a brief, but misleading, discussion of a report by the Maine Section of the American Society of Civil Engineers (ASCE), which was prepared by the ASCE on the status of the maintenance of and improvements to Maine's infrastructure. The Sanborns note in particular that the group took Maine to task for failing to meet its goal of 50% recycling by 2009. *See* Sanborn Testimony at 19. It is illogical, however, to argue that the entire state's failure to reach a goal in 2009 is somehow related to an application that was filed by two parties with the Department in 2012. More fundamentally, while the report acknowledges that Maine Energy was going to be shut down, there is nothing in the report that supports the Sanborns' contention that the in-state MSW associated with Maine Energy should be diverted to one of the other incinerators, or that doing so today would somehow change the grade assigned by the ASCE to Maine's solid waste infrastructure.

In fact, the report's recommendations have nothing to do with the Sanborns' desired outcome. Specifically, the report provides:

Maine ASCE makes the following recommendations:

- Continue state support to municipalities to enhance local solid waste management programs, with emphasis on cost-effective reuse and recycling, and support of household hazardous waste collection;

- Promote waste reduction, recycling, and beneficial reuse of waste products. This should include incentives for solid waste service providers for the development of new technologies, enhanced and new beneficial reuse of waste, and new markets for recyclables;

- Continue to review and update Maine's solid waste policies to reflect technological advances made in the solid waste industry, current or present-day public opinion, and current management policy, as well as Maine's variations in population density, waste generation rates, and type of waste generated;

- Respond to annual updates of the solid waste plan and capacity projections in a timely manner, recognizing the long time necessary for permitting and constructing additional (disposal) capacity; and

- Ensure that changes to solid waste management planning at the state level do not result in lost momentum.

See BGS/NEWSME Exhibit #17.

Not one of these conclusions or recommendations is tied to or even supports the Sanborns' conclusion that the additional MSW proposed to be taken to JRL should instead be disposed of at one of the State's three remaining incinerators.

Dated: 3/20/2013

Michael S. Booth

STATE OF MAINE
Cumberland, ss.

Personally appeared before me the above-named Michael S. Booth and made oath that the foregoing is true and accurate to the best of his knowledge and belief.

Before me,

Dated: 3.20.13

Nancy J. Seamans Wildes
Notary Public
Name: Nancy J. Seamans Wildes
My Commission Expires: July 30, 2019

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE HOUSE STATION 17 AUGUSTA, MAINE 04333

BOARD ORDER
IN THE MATTER OF

WASTE MANAGEMENT DISPOSAL SERVICES	)	SOLID WASTE ORDER
OF MAINE, CROSSROADS LANDFILL	)	
NORRIDGEWOCK	)	
SOMERSET COUNTY, MAINE	)	
LANDFILL EXPANSION – PHASE 8	)	
#S-010735-WD-UW-N	)	
(APPROVAL WITH CONDITIONS)	)	NEW LICENSE

Pursuant to the provisions of 38 M.R.S.A. Section 1301 et seq., the Maine Hazardous Waste, Septage and Solid Waste Management Act and 06-096 CMR Chapter 400 et seq., the Solid Waste Management Regulations (September 6, 1999), the Board of Environmental Protection (Board or BEP) has considered the application of WASTE MANAGEMENT DISPOSAL SERVICES OF MAINE (WMDSM) with its supportive data, staff summary, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

A. Application: The applicant, WMDSM, has applied to construct and operate a new secure landfill expansion (Phase 8) of its waste facility for the disposal of special waste and municipal solid waste ("MSW"). The proposed expansion will be constructed and operated in three phases (8A, 8B, and 8C), and involves the excavation and relocation of the existing MSW and Asbestos landfills. The proposed expansion will provide an additional 4 million cubic yards of disposal capacity and, at the projected disposal rates, 8.4 years of site life.

B. History: The Department of Environmental Protection (Department or DEP) originally issued a license to Elizabeth Lappie to construct and operate a 12.5 acre landfill for the disposal of municipal solid waste (MSW) on April 28, 1976 (DEP#49-2696-25220). Ownership and operation of the facility was transferred to Consolidated Waste Services (CWS) on December 30, 1983. Department Order #L-002696-07-A-M (January, 1984) approved the construction and operation of an asbestos landfill. Both the original MSW landfill and the asbestos landfill were constructed without an engineered liner system or leachate collection system. Department Order #L-010735-07-A-N, dated July 24, 1985, approved the construction and operation of a secure landfill for the disposal of special wastes (Phases I-VI), which included a leachate storage pond. A major failure of the underlying soils of the unlined MSW landfill led to the collapse of that landfill on August 14, 1989. Excavation and removal of stiff clay from the toe of the landfill during construction of a landfill expansion was the major cause of the failure (Volume IV, Part 1 of the Phase 8 application and testimony of Richard T. Reynolds).

WASTE MANAGEMENT DISPOSAL SERVICES OF MAINE, CROSSROADS LANDFILL NORRIDGEWOCK SOMERSET COUNTY, MAINE LANDFILL EXPANSION – PHASE 8 #S-010735-WD-UW-N (APPROVAL WITH CONDITIONS)	2))))))	SOLID WASTE ORDER NEW LICENSE

A woodwaste recycling facility was approved by the Department on December 29, 1989 (DEP #S-010735-7A-DO-M). Waste Management, Inc. (WMI), the parent company of WMDSM, purchased all properties and assets of CWS and received approval for transfer of all licenses on October 10, 1990 (DEP #S-010735-WR-EB-T). Another secure special waste landfill, Phase VII, was permitted for construction and operation on the site on July 22, 1992 (DEP #S-01735-07-P-N). The permit to operate Phases I-VI was renewed on November 13, 1992 (DEP #S-0101735-7A-FM-R). WMDSM received a license to construct and operate Phase X, a secure special waste landfill, on May 10, 1995 (DEP #S-010735-WD-IF-N).

On July 22, 1992, the applicant received approval for the closure of the MSW landfill (DEP #S-010735-WN-AG-N); closure construction was completed in 1993. WMDSM also received approval for, and completed closure of, the Asbestos landfill (DEP #S-002692-WD-AN-N, August 16, 1993) and Stage 1 of the Phases I-VI landfill (DEP #S-010735-WN-IK-N). A Leachate Storage Tank facility was licensed on May 5, 1993 (DEP #S-010735-WH-HU-N) to replace the leachate holding pond. Operation of the Leachate Storage Tank facility began on April 1994, and the leachate holding pond was subsequently decommissioned. On April 14, 1997, WMDSM received approval for the closure of Phase VII (DEP #S-010735-WN-QH-N), although closure did not occur. Phase X, Phase VII, and most of Phases I-VI currently are covered with interim 12, 20 or 40-mil geomembrane cover systems.

On October 16, 1997, WMDSM received approval for the construction and operation of another secure special waste landfill, Phases 9, 11 and 12 (DEP #S-010735-WD-OK-N). On January 29, 1999 WMDSM received approval to co-mingle MSW, including front-end process residue (FEPR) with other waste approved for disposal at the facility (DEP #S-010735-WD-SJ-A). Waste placement in Phase 11 began in 1998 and reached interim fill grades in February 2002. Phase 11 is currently covered with an interim 20-mil geomembrane cover system. Construction was completed and operation of Phase 9 began in 2001. Construction of Phase 12 began in 2002. Based on projected disposal rates, Phases 9 and 12 will be near capacity in 2004.

On March 29, 2001, the Department issued a Public Benefit Determination concluding that the development of the proposed Phase 8 secure landfill will provide a substantial public benefit provided WMDSM addresses in-state capacity needs as its highest priority. In the event the amount of all wastes accepted from out-of-state generators is more than 35% of the total waste disposed of at the

facility, WMDSM will report that to the Department. On April 5, 2001, WMDSM submitted an application to the Department for the construction and operation of the Phase 8 secure landfill expansion.

C. Summary of Proposal: WMDSM requests approval to construct and operate a secure landfill for the disposal of special waste and MSW totaling approximately 75 acres. The proposed expansion would provide an additional 4 million cubic yards of capacity, operating over an estimated period of eight years. Construction of the expansion is estimated to occur over three years and involve the excavation and relocation of the waste contained in the existing, unlined MSW and Asbestos landfills into the new, secure Phase 8 expansion. Following construction of Phase 8A, approximately half the waste contained in the MSW landfill will be excavated and relocated into the new 8A area. Again, following construction of Phase 8B, the remainder of the MSW and all the Asbestos wastes will be relocated into the new 8B area. A portion of Phase 8B and the entire Phase 8C, which includes the area once occupied by the MSW and Asbestos landfills, will receive new wastes accepted by the facility for disposal.

Construction of the expansion will incorporate the use of wick drains installed into the underlying clay soil layer. The use of the wick drains will expedite the consolidation and subsequent strength gain of the underlying soils. Groundwater collected through the wick drains will be managed and treated as leachate unless the Department approves an alternative management plan based on analyses of the underdrain water.

An active gas and odor management system will be installed concurrently with the construction and operation of the Phase 8 expansion. As waste is placed into the active areas, horizontal gas collector pipes will be placed within the waste at select intervals based on the radius of influence of the individual collector pipes. Header pipes connected to the individual collector pipes will convey the gas to a flare with a non-methane organic compound destruction efficiency of no less than 98%. In addition, as part of the excavation and relocation of the existing MSW landfill, new gas collection header pipes will be connected to the existing gas wells in order to create an active gas collection system to convey landfill gas (LFG) to a flare.

2. TITLE, RIGHT OR INTEREST

In accordance with Chapter 400.4.A, the applicant has submitted deeds for the parcels of property under its ownership and where the facility will be sited, filed with the Somerset County Registry of Deeds under the following book and page numbers:

Description	Book	Page
Norridgewock Map 17, Lot 13		
C. Blood to CWS, November 5, 1986	1303	47
E. & A. Emery to CWS, December 29, 1986	1317	250
D. & E. Andrews to CWS, July 30, 1985	1206	266
H. & E. Lappie to CWS, December 22, 1983	1116	71
H. & E. Lappie to CWS, December 22, 1983	1116	79
Norridgewock Map 14, Lot 16		
K. & B. Baker to Waste Management of Maine, November 20, 1992	1840	244
	1846	136
Norridgewock Map 14, Lot 16-1		
R. & E. Lancester to Waste Management of Maine, January 28, 1993	1861	98
Norridgewock Map 14, Lot 19		
L. Doyle to Waste Management of Maine, March 11, 1993	1871	62

The parcel identified as Map 17, Lot 13 of the Town of Norridgewock tax maps is where the proposed expansion will be constructed.

Waste Management, Inc. acquired all shares and assets of CWS on October 15, 1990. This transfer included all real property under ownership of CWS.

Therefore, the Board finds that the applicant has demonstrated sufficient title, right, or interest to the property on which the facility will be constructed and operated.

3. PUBLIC PARTICIPATION

On April 5, 2001, WMDSM submitted the application for the proposed secure landfill expansion. On April 30, 2001, the application was accepted as complete for processing. On May 3, 2001, at the request of the DEP, the Board of Environmental Protection found that the proposed project was one of significant public interest and involved a policy, rule, or law that the BEP had not previously interpreted and assumed jurisdiction of the application. Given the substantial technical issues associated with the application, the Board posted the application to public hearing.

A. Intervenors: Pursuant to the provisions of 38 MRSA §1310-S(3), the Town of Norridgewock requested and was granted automatic municipal intervenor status in the

proceedings. Pursuant to the provisions of 38 MRSA §1310-S(3-A), Mrs. Gloria Frederick, as an abutter to the facility, requested and was granted automatic intervenor status in the proceedings. Mr. Richard Sirois, a resident of Norridgewock, filed a petition to intervene pursuant to Chapter 30, Section 5 of the Department's regulations. On June 21, 2001, Mr. Sirois' petition to intervene was granted by the Board.

The Town of Norridgewock was awarded a $50,000 municipal intervenor assistance grant pursuant to the provisions of 38 MRSA §1310-S(4), A written agreement concerning administration of the grant was signed by the Town of Norridgewock on December 7, 2000. ENSR International and Bernstein, Shur, Sawyer & Nelson were hired by the Town of Norridgewock to review the application. An additional $50,000 in municipal intervenor assistance funds was requested by and granted to the Town, in accordance with 38 MRSA §1310-S(4).

Mrs. Frederick, Mr. Sirois, the Town of Norridgewock, and the consultants retained by the Town of Norridgewock participated substantially in the technical review meetings conducted during the Department staff's review of the application. The Town of Norridgewock's comments on the application were submitted directly to the Department, with a copy sent to the applicant. While Mr. Sirois and Mrs. Frederick (or Mrs. Frederick through her son Ron Frederick) actively participated in these meetings, they submitted their formal comments as part of their written prefiled testimony prior to the public hearing.

B. Public Hearing: While acknowledging that parties were free to comment on any part of the application as a whole, the following issues were the focus of prefiled testimony and the public hearing:

- Technical Ability,
- Provisions for Traffic Movement,
- No Unreasonable Adverse Effect on Existing Uses and Scenic Character,
- No Unreasonable Adverse Effect on Air Quality,
- No Unreasonable Adverse Effect on Surface Water Quality,
- No Unreasonable Risk that a Discharge to a Significant Ground Water Aquifer will Occur,
- Hazardous and Special Waste Handling and Exclusion Plan,
- Variances,
- Landfill Stability; and
- Waste Relocation.

The BEP required submission of written prefiled testimony by the parties by January 14, 2002, with supplemental prefiled testimony due on March 11, 2002. The Town of Norridgewock elected not to submit prefiled testimony. The public hearing was held on

March 26 and 27, 2002. Public comment sessions were held during the evening of both March 26 and 27. The hearing was continued to April 25, 2002 to allow submission of, and comment on, additional information on select issues. The hearing was continued until May 2, 2002 to allow additional testimony on the select issues and the record on the application was closed. On May 16, 2002, the BEP heard closing arguments from all parties and held deliberations on the application.

4. PUBLIC BENEFIT

In accordance with the provisions of 38 MRSA §1310-N(3-A) and 1310-AA, the Department issued a Public Benefit Determination for Phase 8 to WMDSM for the proposed project on March 29, 2001. The determination also modified the existing Phases 9, 11, and 12 Public Benefit Determination to reflect changes in waste generation and disposal that had occurred since the determination had originally been issued. The Commissioner found that the proposed Phase 8 expansion will provide a substantial public benefit in that it meets the short and long-term capacity needs of the State of Maine, is consistent with the State of Maine Waste Management and Recycling Plan (June, 1998), and is not inconsistent with local, regional, and state waste collection, transportation, processing and disposal.

The following conditions were included in the approval: (1) submit semi-annual reports documenting the amount of waste received from both in-state and out-of-state generators, the in-place density of the landfilled waste, the volume of airspace utilized in the report period and the estimated remaining permitted disposal capacity expressed in cubic yards, (2) notify the Department if the semi-annual capacity analysis conducted for any report period indicates that the total projected life of Phases 8, 9, 11, and 12 will be less than 11.9 years beyond June 1, 2000, that the amount of non-remediation special waste accepted from out-of-state generators is more than 25 percent of the annual total of waste disposed at the facility; or that the amount of all wastes accepted from out-of-state generators is more than 35 percent of the annual total of waste disposed at the facility, (3) submit a plan for collecting cathode ray tubes (CRTs) from discarded electronic products from Maine businesses and communities as part of the Phase 8 application, and (4) accept for disposal at the Crossroads landfill any Maine generated solid waste provided that the waste meets the facility's acceptance criteria as approved by the DEP and that the waste conforms to WMDSM's established business, administrative, and safety requirements.

5. RECYCLING AND SOURCE REDUCTION

In accordance with the provisions of 38 MRSA §1310-N(1)(C), §1310-N(5), and CMR 06-096 Chapter 400.6, the applicant must demonstrate that the volume of the waste and

the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled or incinerated. The applicant was exempt from this provision when the facility was used only for the disposal of special waste. It now applies to the municipal solid waste proposed to be accepted at the facility. In making this determination, the Department must ensure that the following requirements have been satisfied:

(1) Consistent with state recycling programs. The proposed solid waste disposal facility will only accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those imposed by provisions of state law.

(2) State Plan. Except for solid waste disposal facilities established prior to October 3, 1973, an applicant shall demonstrate compliance with the recycling provisions of the State Plan.

A. Consistency with State Voluntary and Mandatory Recycling and Source Reduction Programs.

38 MRSA §2132 states, in part:

1. State recycling goal. It is the goal of the State to recycle or compost, by January 1, 2003, 50% of the municipal solid waste tonnage generated each year within the State.

1-A. State waste reduction goal. It is the goal of the State to reduce the annual generation of municipal solid waste tonnage by 5% by January 1, 2003 and by an additional 5% every subsequent 2 years. This reduction in solid waste tonnage, after January 1, 2003, is a biennial goal. The baseline for calculating this reduction is the 1999 solid waste generation data gathered by the office.

2. Goal revision. The office shall recommend revisions, if appropriate, to the state recycling goal established in this section and shall establish a waste reduction goal. The office shall submit its recommendations and any implementing legislation to the joint standing committee of the Legislature having jurisdiction over natural resource matters.

The 50% recycling goal is not mandatory. See 38 MRSA §2133(1-A) ("Municipalities are not required to meet the state recycling goal...").

38 MRSA §2138, "Office Paper Recycling Program" states, in part:

> 1. Office paper recycling mandated. Any person employing 15 or more people at a site within the State shall implement an office paper and corrugated cardboard recycling program.
>
> The office [State Planning Office] may provide technical and marketing assistance and direction to entities within the State to assist with meeting this requirement. Municipalities and regional associations may assist employers in attaining the objectives of this section.

32 MRSA §1861, et seq., contains additional mandatory recycling provisions for beverage containers.

38 MRSA §2101, "Solid Waste Management Hierarchy" states, in part:

> 1. Priorities. It is the policy of the State to plan for and implement an integrated approach to solid waste management, which shall be based on the following order of priority:
>
> A. Reduction of waste generated at the source, including both amount and toxicity of the waste;
> B. Reuse of waste;
> C. Recycling of waste;
> D. Composting of biodegradable waste;
> E. Waste processing which reduces the volume of waste needing land disposal, including incineration; and
> F. Land disposal of waste.

The *State of Maine Waste Management and Recycling Plan* (June, 1998) ("State Plan"), states, "Waste reduction, also known as waste minimization or source reduction, rests at the top of the solid waste management hierarchy adopted by the State. As defined by Maine law, waste reduction means an action that reduces waste at the point of generation." (p.25) See 38 MRSA § 1303-C(44) (Waste reduction" means an action that reduces waste at the point of generation and may also be referred to as "source reduction.").

By operation of law, all municipal solid waste generated in the State of Maine is subject to these voluntary and mandatory recycling and source reduction provisions and goals. Compliance with these goals and requirements is under the control and direction of the State, not the disposal facilities. There is no requirement that a solid waste disposal facility demonstrate or assume responsibility for the compliance rate of the generators of

municipal solid waste with either the voluntary or mandatory recycling or source reduction provisions of the State of Maine. However, the disposal facility may not interfere with these programs. In particular, 38 MRSA §1304-B(4-A)(C) prohibits disposal facilities from entering into contracts with municipalities that would prohibit the municipalities from recycling those materials which the municipalities deem to be recyclable. With respect to waste generated out-of-state, the applicant, or any disposal facility, cannot be required to apply Maine law to municipal solid waste in a manner that violates the commerce clause of the U.S. Constitution.

While the recycling and source reduction requirements imposed on disposal facilities are limited, the applicant has taken a number of steps to facilitate recycling and source reduction. In 2001, WMDSM hired a recycling coordinator responsible for assisting municipalities and businesses in identifying new opportunities for recycling and to identify materials that can be diverted from the waste stream and recycled. WMDSM was also a sponsor of "Maine Recycles Week", a public awareness program focused on enhancing recycling within the public and business communities in Maine. Municipal recycling programs have also been enhanced through WMDSM's contacts with secondary materials markets and the presence of an on-site white paper and corrugated cardboard baling facility. In addition, WMDSM proposes to work with the State Planning Office to identify and promote opportunities for recycling in towns that utilize the facility for MSW disposal services. Currently, certain woodwastes received at the facility are collected and used as fuel in wood-fired power generation facilities. In 2001, approximately 2,620 tons of wood waste was diverted from the landfill through this operation. WMDSM used approximately 1,400,000 and 1,100,000 shredded tires in the construction of Phases 11 and 9, respectively. It is anticipated that construction of the Phase 8 landfill will utilize approximately 6,400,000 shredded tires. Finally, WMDSM will implement a program for the collection and management of cathode ray tubes, serving both individuals and businesses.

WMDSM also assists waste generators in source reduction efforts by conducting waste audits at customer's facilities and providing recommendations for reducing the amount of waste requiring disposal.

The Board finds that the disposal facility will only accept municipal solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those imposed by provisions of state law, within the meaning of 38 MRSA §1310-N, provided the applicant does not enter into contracts with municipalities that would prevent municipalities from recycling those materials which the municipalities deem to be recyclable or take other actions that interfere with a municipality's or other MSW generator's recycling and source reduction programs.

B. Compliance with the Recycling Provisions of the State Plan

According to the State Plan, two opportunities to reduce MSW are:

(1) modifying or responding to the consumer's preferences or demands (i.e. by communities and businesses providing waste reduction tips to households or by businesses providing financial incentives to customers), and

(2) technological advances in production processes which reduce waste generation (i.e. pollution prevention). (p.25)

"The MSW waste reduction goal of 10% is not a mandate, but a policy guide with the potential to serve as a planning tool for prolonging existing disposal capacity; currently, there are no regulatory incentives or costs for not reaching this goal." (p.26)

The two waste reduction programs described in the State Plan are the Waste CAP program by the Maine Chamber Business Alliance and the DEP's pollution prevention programs, both directed at businesses. (Appendix C)

The State Plan contains the following recommendations for state roles: expand current information and education efforts that promote waste reduction activities at local, regional and state levels, and continue pollution prevention assistance programs administered through DEP. (p. 27)

"If the state is to reach the goal of recycling 50% of the MSW stream, a variety of approaches and management techniques will need to be implemented. First, traditional recycling at the municipal level will require continued attention and technical assistance from the state in order to improve the quantity and quality of materials collected. Second, composting must manage a greater portion of the organics stream at the household, municipal and commercial level. Finally, a greater portion of the construction and demo debris (CDD) must be kept out of landfills by exploring and fostering effective management alternatives." (p. 28)

The focus for implementation and enhancement of recycling and source reduction programs is at the point of generation. The State, primarily the State Planning Office, is the lead agency in developing state-wide programs designed for implementation at the municipal level. This is accomplished through the issuance of recycling grants, providing information on the development of effective programs and identifying markets for recyclable materials. Neither the regulations nor the statutes assign this responsibility to the disposal facilities.

The Board finds that the operation of the WMDSM facility is consistent with the recycling provisions of the State Plan in that it provides disposal capacity for those wastes that cannot be recycled. The Board further finds that WMDSM has taken other measures consistent with the recycling provisions of the State Plan to facilitate recycling in the State.

Therefore, the Board finds that the volume of the waste and the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled, provided that the applicant does not enter into contracts with municipalities that would prevent municipalities from recycling those materials which the municipalities deem to be recyclable or take other actions that interfere with a municipality's or other MSW generator's recycling and source reduction programs.

6. FINANCIAL ABILITY AND FINANCIAL ASSURANCE

Chapter 400.4(B) of the Department's regulations requires the applicant to demonstrate the financial ability to "design, operate, maintain, close and (if applicable) accomplish the post-closure care of solid waste facilities in a manner consistent with all applicable requirements." The applicant has submitted cost estimates for the construction, operation, closure, and post-closure care of the proposed facility. As designed, this amount totals $47,845,428. Closure and post-closure care are projected to cost $9,199,000 and $9,011,130, respectively. The design, construction, operation and maintenance of the proposed expansion will be self-funded by Waste Management. In support of this, the applicant has submitted a 10-K Financial Report and 2000 Annual Report demonstrating that funds are available to carry out these activities.

The applicant proposes to obtain a performance bond to ensure adequate funding for the projected closure and post-closure costs. A performance bond already exists for this purpose for the existing solid waste disposal units located within the facility. Prior to accepting wastes in individual cells (Phases 8A, 8B, and 8C) of the proposed expansion area, the existing bond will be modified to include the projected costs for closure and post-closure care of Phase 8. The revised bond will be submitted to the Department prior to waste being placed in the expansion area.

Therefore, the Board finds the applicant has demonstrated adequate financial ability to design, construct, operate, maintain, and close the proposed facility, provided the applicant modifies the existing performance bond to include the projected closure and post-closure costs for each individual cell (Phases 8A, 8B, and 8C) of the proposed expansion and submits documentation of these revisions prior to placing waste in Phases 8A, 8B, and 8C, respectively.

7. LIABILITY INSURANCE

In accordance with the provisions of Chapter 400.10 of the Department's regulations, the applicant has submitted a copy of the most recent liability policy for sudden and accidental occurrences for the facility. Included in the policy are coverages for bodily injury and personal property damages in the required minimum amounts. The most current certificate of insurance will be submitted to the DEP annually and remain valid through the active life and closure of the facility.

Therefore, the Board finds the applicant has demonstrated adequate proof of liability insurance for sudden and accidental occurrences for the facility, provided WMDSM submits the current certificate of insurance to the DEP on an annual basis and the policy remains in effect throughout the active life and closure of the facility.

8. TECHNICAL ABILITY

Chapter 400.4(C) of the Department's regulations requires the applicant to demonstrate that it has the technical ability to "design, construct, operate, maintain, close and (if applicable) accomplish post-closure care of the solid waste facility in a manner consistent with state environmental regulations." WMDSM has made this demonstration through its development and operation of the other onsite landfills. Phases VII, X, 9, 11, and 12 were developed and operated solely by the applicant. Its parent company, WMI, owns and operates landfills throughout the United States and in other countries. WMDSM has an environmental engineering staff at the Norridgewock site that oversees environmental permitting and compliance for the facility.

The following firms prepared specific portions of the application and will provide oversight during construction and operation of the facility:

A. Richard T. Reynolds, Freeport, Maine – geotechnical engineering and analyses;

B. GeoSyntec Consultants, Boxborough Massachusetts – landfill design, geotechnical engineering, viewscape analysis;

C. Golder Associates, Manchester, New Hampshire – hydrogeological analyses;

D. Normandeau Associates, Bedford, New Hampshire – natural resources assessment;

E. GZA GeoEnvironmental, Inc., Portland, Maine – geotechnical and hydrogeological investigation;

F. Casey & Godfrey Engineering Consultants, Gardiner, Maine – traffic impact study; and

G. Resource Systems Engineering, Brunswick, Maine – noise impact study;

H. SCS Engineers, W. Nyack, New York – landfill gas management system;

I. Cambridge Environmental, Inc., Cambridge, Massachusetts – health risk assessment.

Detailed resumes of individuals and company profiles were submitted with the application affirmatively demonstrating the applicant's ability to design, construct, operate, and close the proposed facility expansion.

Intervenors questioned the applicant's technical ability in light of the 1989 landslide at the site and delays in the actions necessary to correct the landfill gas and odor issues present in 2001. The applicant and Department staff comment that the landslide occurred under the operation of the facility by the prior owner of the facility, CWS, that the applicant investigated the cause of the landslide, and the applicant has taken steps to avoid future landslides.

The proposed construction and relocation of wastes for the Phase 8 expansion is estimated to occur over a three-year period. Construction activity will occur almost all year round. The facility will also continue to operate Phases 9 and 12 while constructing the Phase 8 expansion. Due to the complex nature of portions of the project, the multiple activities going on concurrently, and the need for timely collection and dissemination of information, the Board requires the applicant to develop, at the direction of Department staff, a third-party inspection program to monitor construction activities associated with the waste excavation and relocation activities and subgrade preparation, in areas where waste previously existed, for the Phase 8 expansion. At a minimum, a licensed Professional Engineer will be selected and retained by the Department to work in this capacity. Duties for the inspector will include attendance at relevant construction meetings, documenting relevant construction activities, investigating and reporting on construction-related issues, meeting with local residents and town officials as necessary, and oversight and verification of air monitoring procedures. The applicant will be required to establish an escrow account to pay all applicable costs associated with this temporary position.

Therefore, the Board finds that the applicant has the technical ability to operate and maintain the proposed facility in a manner consistent with all applicable state environmental requirements, provided the applicant develops, at the direction of

Department staff, a third-party inspection program and pays all applicable costs associated with a third-party inspector, working on behalf of the DEP, to monitor construction activities associated with the waste excavation and relocation activities and subgrade preparation, in areas where waste previously existed, for the Phase 8 project.

9. TRAFFIC

Chapter 400.4(D) of the Department's regulations requires that the applicant "make adequate provision for the safe and uncongested traffic movement of all types into, out of, and within the proposed solid waste facility."

A. General Conditions: The applicant submitted a traffic study, dated December 2000, with the application. An updated traffic study (*Updated Traffic Study Phase 8 Crossroads Landfill Expansion*, Casey & Godfrey Engineers), dated December 21, 2001, was submitted that incorporated current accident data, factored additional traffic data into current and projected future conditions, and included updated construction-related traffic. Based on October 2000 data for vehicles accessing the facility, the maximum number of one-way trips were 93 (am peak hour) and 67 (pm peak hour). Using daily transaction records for 2000 to determine the highest monthly traffic volume, the facility would generate approximately 92 passenger vehicle trips and 47 truck trips during the am peak hour and 45 passenger vehicle and 37 truck trips during the pm peak hour.

A comparison of data from 1996 (Phases 9, 11, & 12 traffic study, March 7, 1996) and 2000, expressed in terms of passenger car equivalents ("pces"), demonstrated an increase of less than 100 pces of peak trips due to operational traffic (maximum increase was 91 pces for the am period). An increase of less than 100 pces is considered insignificant by Maine Department of Transportation (MDOT) standards and would not require a modification of a facility's existing Site Location Permit regarding traffic. Based on projected volumes of waste entering the facility as part of the proposed Phase 8 expansion, the number of pces will remain constant at the 2000 projected level (186 pces am peak hour and 119 pces pm peak hour) and would not require a modification of an existing permit in regard to traffic.

The main access to the facility is on Route 2 to the west of downtown Norridgewock. Route 2 has 12 foot paved travel lanes and 10 foot paved shoulders, is maintained by the MDOT, and has no weight restrictions posted on it. The maximum allowable load is 100,000 pounds, applicable to six-axle vehicles. Secondary access to the facility is off the Airport Road. The Airport Road has paved travel lanes and soil shoulders and is maintained by the Town of Norridgewock. An existing transfer station operated by WMDSM is accessed via the Airport Road. The majority of the vehicles accessing the

facility use the Route 2 entrance. All trucks hauling waste into the facility use the Route 2 entrance.

The applicant submitted a review of accident incidence data for four intersections conducted by Casey & Godfrey. Accident rates, expressed as a critical rate factor (CRF), were all less than 1.0, indicating locations with less than expected accident rates. No high accident locations (HAL), defined as eight or more accidents over a three-year period at a particular location, with a CRF greater than one, were identified in the vicinity of the facility.

Sight distances were re-evaluated for the existing access points. No new access points are proposed as part of this application. The sight distance from the Route 2 entrance is 900 feet in each direction. The posted speed limit is 55 mph at the entrance point. The base minimum MDOT sight distance for a 55-mph zone is 550 feet. Factoring in significant truck traffic, the minimum sight distance increases to 825 feet. The existing sight distance exceeds both these criteria.

B. Construction Traffic: While construction traffic is usually of limited duration and impact, the applicant evaluated the effects of construction traffic for this application. It is anticipated that the proposed project will generate 107 construction trucks per day. Over the course of a 10-hour workday, there will be an average of 10.7 trucks entering and exiting the facility per hour. Traffic from employees and contract workers will peak at the beginning and end of each workday. When combined with the new operational pces since the previous permit, the level of traffic peaks at 182 pces. As a result of this elevated traffic level, a minor traffic study was conducted in conformance with MDOT standards. Based on the study, there were no capacity concerns, expressed as level of service (LOS) for the Airport Road, Route 2 or Wilder Hill Road. No left-turn or right-turn lanes are warranted for either the Route 2 or Airport Road access points. No traffic signals are warranted at the study area intersections.

C. Waste Transporter Policy: In response to public and intervenor concerns about trucks arriving at the facility before the facility opens, the applicant has worked with the Town to develop Waste Transporter Rules and Regulations that are issued to all truckers and trucking companies that deliver waste to the facility, including trucks owned and/or operated by Waste Management. These rules stipulate that vehicles delivering waste will not normally, unless prior approval is granted, be allowed into the facility before 7:30 am even though the host community agreement specifies that waste deliveries can occur between the hours of 6:30 am and 9:30 pm and outside these hours for certain time-sensitive deliveries. Additionally, trucks are not allowed to line up along Route 2 or the interior access roads when the facility is not open. However, transport trucks owned and/or operated by Waste Management may leave the facility outside the hours stated

above. While the Town of Norridgewock has no ordinance that prohibits vehicles transporting odorous materials from entering the Town before 7:00 am, WMDSM will continue its voluntary efforts to discourage such vehicles from entering the Town of Norridgewock before 7:00 am. In the course of implementing this policy, each driver is required by WMDSM to read the policy and sign an acknowledgement form regarding the policy.

Therefore, the Board finds that the applicant has demonstrated that the roads and intersections in the vicinity of the proposed development have the ability to safely and conveniently handle all the traffic attributable to the proposed development. Site distances in all directions are adequate, no improvements to roads or intersections are necessary as part of the proposed development, and interior roads have been designed to provide safe traffic movement. The Board further finds that the Transporter Rules and Regulations proposed as part of the Host Community Agreement will limit the potential adverse impacts to area residents.

10. FITTING THE FACILITY HARMONIOUSLY INTO THE NATURAL ENVIRONMENT

Under the provisions of Chapter 400,4(E) of the Department's regulations, "the solid waste facility must have buffer strips of sufficient size and quality to adequately protect aquatic and wildlife habitat and the natural environment. The facility may not unreasonably adversely affect protected natural resources and rare, threatened or endangered plant and animal species."

A review of Maine Department of Conservation, Maine Department of Inland Fisheries and Wildlife, and U.S. Fish and Wildlife Service records demonstrates that there are no rare, threatened, or endangered plant or animal species or habitats that will be impacted by the proposed facility. There is a mapped deer wintering yard that traverses property owned by the applicant, but not within the proposed Phase 8 footprint. While upland sandpipers have been observed on adjacent parcels, none has been observed on the active or closed landfill areas.

A total of 0.35 acres of forested wetlands will be impacted by the proposed Phase 8 expansion. The applicant filed a Natural Resources Protection Act (NRPA) application with the Department, with a complete description of the wetlands, proposed impacts, siting alternatives, and mitigation plans. A separate NRPA permit (Department Order #L-20537-31-A-N) was issued on September 10, 2001.

The majority (90%) of the Phase 8 expansion will be sited adjacent to or overlie existing disposal facilities. Minimal clearing of vegetation will be done to construct a new erosion control structure (ECS-29). The largest earthen structure, the Mechanically Stabilized Earth (MSE) Berm, will be permanently vegetated soon after construction.

Erosion control structures have been designed to maximize surface water retention and the amount of unvegetated areas is minimized to the extent possible, minimizing the threat of discharge of sediments to nearby streams. A comprehensive Erosion and Sedimentation Control Plan was submitted as part of the application. The facility has not experienced a violation of erosion control standards since 1995.

Therefore, the Board finds that the facility will have sufficient buffers to adequately protect aquatic and wildlife habitat and the natural environment and that there will be no unreasonable adverse affects to protected natural resources, rare, threatened, or endangered plant or animal species.

11. NO UNREASONABLE EFFECTS ON EXISTING USES AND SCENIC CHARACTER

Under the provisions of Chapter 400.4(F) of the Department's regulations, the solid waste facility may not unreasonably adversely affect existing uses and scenic character. Factors to be considered include bird hazard to aircraft, historical sites, established public viewing areas, noise, and existing uses of neighboring properties.

A. Airport: The proposed expansion is located in close proximity to the Central Maine Regional Airport in Norridgewock. As such, the applicant has submitted a bird control plan as part of the site Operations Manual that includes detailed measures that will be implemented to minimize the presence of birds. These include the application of daily cover, minimizing active areas of waste, construction of overhead wire and distraction devices that inhibit bird flights into the active areas, trapping of birds, active scare devices, and consulting with animal control agents of the Department of Agriculture for alternative control measures.

Mr. Steve Whittemer, airport manager for the Central Maine Regional Airport located to the northwest of the proposed expansion, testified that the landfill has posed no hazard to the airport due to bird strikes or other hazards posed by the operation of the landfill. Mr. Whittemer also testified that the growth of trees in the areas around the airport, not the landfill, pose an obstacle to instrument landings by interfering with the glide path of planes.

The proposed final elevation of the landfill, which is approximately 410 above mean sea level (MSL), poses no hazard to aircraft nor interferes with the glide path of planes landing at the airport. Further, Mr. Poggi testified that WMDSM has obtained approval for the project under the Town of Norridgewock Airport Zoning Ordinance and has demonstrated that the facility will not interfere with air traffic.

B. Historical Sites: In a letter dated November 20, 2000, the State Historic Preservation Officer stated there are no historic, architectural, or archeological features of significance in the area of the proposed development.

C. Visual Impact: A visual impact analysis was submitted evaluating the existing conditions of the facility, the proposed visual impacts based on the design of the landfill and potential viewing areas, and conclusions. The report evaluated the visual impacts of the proposed development from four locations: the Airport Road transfer station, Route 2 near the wetland mitigation area, Route 2 near the site entrance, and from the Pion Road park. During the final stages of operations, until a final vegetative cover is established, the landfill mounds will be covered with synthetic materials or earth for a limited period of time. With the exception of this period, most views of the landfill will be obscured due to existing vegetative cover, extensive sight distances, changes in topography, and the low density rural populations with limited opportunity to view the landfill. Upon final closure, the landfill mass will appear as a grassy hill from all potential viewing areas.

D. Noise: On December 14, 2001, the applicant submitted a revised Sound Level Study that updated a previous study, dated December 22, 2000, which had been submitted with the application. The revised study identified protected and non-protected locations, as defined by the Solid Waste Management Regulations, around the proposed development. Ambient sound levels were documented at select locations around the existing facility. Predictions of noise levels attributable to the facility were also included in the study. The report states, "The estimated hourly sound level at receiver 13 is 68 dBA, ... which is 2 dBA below the 70 dBA limit under the Solid Waste regulation." Further, "The estimated hourly sound level at receiver 17 is 68 dBA, ... which is 7 dBA below the 75 dBA limit under both the Site Law and Solid Waste regulations." It is at both of these locations that the proposed solid waste boundary is located the closest to the property boundaries. Receiver 13 is located on the west of the proposed expansion, at the property boundary of Avis and Alice Emery. Receiver 17 is located on the east side of the expansion, at the property boundary of Totman's, Inc.

The applicable noise standards are found in Chapter 400.4(F) of the Solid Waste Management Regulations (the Site Law Regulations ceased to apply to solid waste facilities as of November 2, 1998). Conformance with the noise standards is predicated on construction of the MSE berm and Noise Control Berms. The Noise Control Berms will be constructed of waste material and placed at the outer edge of the waste disposal area near receivers 13 and 17. Once waste placement reaches the top of the MSE Berm, the Noise Control Berms will be constructed as part of waste placement operations. Subsequent waste placement in these areas will be performed behind the Noise Control Berms thereby reducing sound levels at receivers 13 and 17.. Other portions of the

landfill do not require the use of Noise Control Berms. While acknowledging the benefit of the Noise Control Berms, this activity involves waste disposal operations of the landfill, which is not a noise abatement activity. Based on a review of the data and the sequence of operations, it is evident that there will be a brief period of time, prior to completion of the Noise Control Berms, when the noise limits could be exceeded at locations of receivers 13 and 17. The applicant, while objecting to the applicability of the noise standards to the period of time that waste is placed to create the Noise Control Berms, requested a variance to the noise limits at these locations, citing the limited duration of the potential exceedences and the lack of permanent residences located near these locations. Additional information on this variance request is contained in Section 14 of this Order.

The Town of Norridgewock has requested that the Board require the applicant, as a condition of the license, to monitor sound levels generated by the routine operation of the Phase 8 landfill, particularly during periods of high decibel level activity, simultaneous phase/cell operation and operation in close proximity to the limits of the landfill.

Department staff comments that the predicted noise levels from the operation of the landfill assume all equipment operating simultaneously or in close proximity to the property boundary. These assumptions are found to be moderately conservative, yet the applicant has still demonstrated compliance with regulatory noise limits, provided the Noise Control Berms are installed and functional. Department staff recommends that the applicant conduct sound monitoring at receivers 13 and 17 following construction of the Noise Control Berms and submit the results of the monitoring to the Department and the Town of Norridgewock to demonstrate compliance with the noise provisions of the Solid Waste Management Regulations.

Therefore, the Board finds that the proposed facility will have no unreasonable effect on existing uses and scenic character, provided the applicant conducts a sound monitoring evaluation at receivers 13 and 17 following construction of the Noise Control Berms and submits the results of the monitoring evaluation to the Department and the Town of Norridgewock.

12. NO UNREASONABLE ADVERSE EFFECT ON AIR QUALITY

Chapter 400.4(G) of the Department's regulations requires a demonstration that the proposed facility will "not unreasonably adversely affect air quality." The regulations specifically require that the applicant control fugitive dust and nuisance odors.

A. Fugitive Dust: The applicant submitted a fugitive dust control plan as part of the Site Operations Manual. The majority of the interior and all local external travel ways are paved, limiting dust generation. Internal travel roads are swept and/or watered on a regular basis, and unpaved roads are watered regularly. Dust from waste is managed through the application of cover, the use of tarps on transport vehicles, and the select use of water as wastes are placed.

B. Asbestos: As part of the Phase 8 application, the applicant proposes to excavate and relocate all the waste in the Asbestos Landfill. A Maine-licensed asbestos contractor, hired by the applicant, will coordinate this work. A regulated work area, defined as the entire area or areas where asbestos materials will be impacted and extends to all areas where it is anticipated that airborne fiber concentrations may exceed 0.1 fibers per cubic centimeter (f/cc) of air as an 8-hour time weighted average (TWA), will be established in the area of operations. Within the regulated work area, all personnel will wear appropriate personal protective equipment to prohibit exposure to asbestos fibers, including respirators equipped with HEPA filters. Decontamination areas for personnel and equipment will be set up to prevent the release or migration of asbestos fibers beyond the regulated work area. Personnel working in the regulated work area will also wear individual monitoring equipment to ensure that respiratory equipment provides adequate protection to the prevalent fiber concentration.

Misting of the excavation impact area, in accordance with the federal National Emissions Standards for Hazardous Air Pollutants (NESHAP) as contained in 40 CFR, Part 61, will be conducted when the potential exists to disturb asbestos containing material. The wetting process makes the asbestos fibers heavier than air, keeps the fiber concentrations at an acceptable level for the respiratory protection worn by individuals in the work area, and prevents fibers from traveling outside the controlled work area.

In order to confirm that fiber containment practices are working and fibers are not being released beyond the regulated work area, airborne fiber monitoring will conducted at the boundaries of the work area. Sampling locations will be selected based on ambient air conditions and where the highest potential for fiber release exists. Collection and analysis of samples will be conducted in accordance with NIOSH Method #7400. Samples using this methodology will be analyzed onsite, with results available immediately. This method does not differentiate between asbestos and non-asbestos fibers that meet the dimensional criteria of the method. Instead, use of this methodology assumes that all fibers detected are asbestos and sets a criterion of 0.01 f/cc above previously established background levels for the project as an action level. A second methodology, called transmission electronmicroscopy, will be utilized and can determine specific asbestos fiber concentrations. This method requires samples to be sent offsite for analysis and results can be available in 24 hours.

If the monitoring results show there has been a release, at a concentration of 0.01 f/cc above previously established background levels, beyond the regulated work area, all work activity will cease immediately. Similarly, if visible emissions are detected within the work area, work will cease immediately. Work will not resume until the cause of the visible emission or the release beyond the work area is identified and corrected.

Under cross-examination by Mr. Sirois regarding the ability to detect a fiber release quickly enough to prevent offsite migration, Mr. Broadhead testified that a fiber non-visible release could be detected within a couple hours of release. For visible emissions, the detection would be immediate. Under cross-examination by Mr. Ron Frederick regarding notification of the public upon a fiber release, Mr. Broadhead testified that Waste Management would be notified immediately of a fiber release beyond the work area that exceeds 0.01 f/cc above previously established background levels. Mr. Poggi later testified that if there were any detections of asbestos fibers at off-site locations, it would be immediately reported to the Department and the Town. During the public hearing WMDSM was requested to provide notification protocols for use during the waste excavation and relocation activity and those were presented in exhibit WM-70.

The applicant submitted a Health and Safety Plan (HASP) that describes health and safety guidelines to be implemented during excavation of the asbestos. Included in the plan are provisions for key personnel and their responsibilities, a site specific work plan, environmental monitoring procedures, decontamination procedures, and an emergency response plan. Key personnel identified in the plan include the Project Manager, a WMDSM employee and the Project Health and Safety Officer, a non-WMDSM employee. Either of these individuals may enforce the provisions of the HASP, including the authority to suspend work practices that violate the provisions of the HASP.

A separate, detailed HASP will be prepared by the contractor selected for the asbestos relocation project, which will be submitted to WMDSM and the Department for review prior to initiating the asbestos relocation work.

C. Odors: The history of odors being emitted from the facility is unremarkable until the facility began accepting MSW for disposal in 1999. In December 2000, the Department began receiving odor complaints from surrounding residents that were attributed to the landfill and landfill gas. Over the course of several months, active gas collection and control measures were implemented for the active landfill area (Phase 11). Based on these events, there was considerable comment and concern regarding the potential for landfill gas generation and release, as well as potential health effects.
On behalf of the Department, CMA Engineers, Inc. (CMA) and Camp, Dresser & McKee, Inc. (CDM) reviewed the odor control plan, the air monitoring plan, and the

landfill gas management system design. This included review of the MSW and Asbestos waste relocation as they relate to these plans and the gas management system design, both temporary and permanent. CMA/CDM attended several project meetings during the application review, provided review comments, and participated in public hearings.

Construction-phase Landfill Gas (LFG) management: During MSW waste relocation, WMDSM will install a temporary LFG header pipe from a proposed temporary flare station near the existing asbestos landfill to the 22 existing MSW landfill passive gas wells. LFG from these 22 existing well locations will be drawn under vacuum into the header pipe and the LFG will be combusted at the flare. This system will be monitored for LFG parameters, and, as excavation approaches an existing well, LFG collection will be discontinued at the well based on either excavation proximity to the well or LFG monitoring results. As excavation proceeds across the MSW landfill, the temporary LFG management system will be systematically discontinued. Due to the nature of the waste in the existing Asbestos landfill, construction-phase LFG management will not be required during excavation of this waste.

Operations, closure, and post-closure LFG management: During operations in Phase 8, the LFG management system will be installed and activated in a manner that is coordinated with the landfill's cell development plan. WMDSM submitted a design for a proposed LFG Management System in a September 2001 report. Proposed LFG collection components of the LFG management system include: horizontal collectors, surface water leachate collectors, and vertical extraction wells. LFG from these system components will be routed through LFG header pipes to the proposed flare station near the relocated central pump station.

The applicant provided an Odor Control Plan that identified additional procedures to be utilized during waste excavation and relocation and during landfill operations to control the release of LFG and odors. These generally include limiting the area of excavation, the removal of smaller increments of final cover, monitoring and adjustments to the LFG system and use of daily and intermediate cover and misting with water and/or odor neutralizing agents as necessary. Included in the plan is an Odor Response Action Plan (Section 3.4 of the plan, Exhibit WM-62) that explicitly states the actions to be taken if odors are detected at the site boundary or at any off-site monitoring location or in response to odor-related complaints received by WMDSM. It is the purpose and intent of the Response Action Plan to prevent delays in responding to odor complaints and implementing appropriate corrective actions in the event odors are detected at the site boundary or at off-site locations. In addition, as stated in Exhibit WM-70, in the event landfill gas constituents or asbestos is detected beyond the property boundary and/or at off-site monitoring locations, WMDSM and/or its PHSO will immediately notify the

DEP, the Town of Norridgewock and any landfill neighbor who wishes to be notified of such results.

In addition to the proposed gas collection system, the applicant submitted a health risk assessment (*Assessment of Potential Risks to Human Health and Welfare Associated with the Proposed Expansion and Development of the Crossroads Landfill in Norridgewock, Maine*; March 7, 2002). In concert with the engineering design of the landfill, the risk assessment presented data on predicted gas generation rates, estimates of gases released into the air based on operations and collection and destruction efficiency, characterization of chemicals of concern, predicted 30-year average concentrations of exposure at abutting residences, and estimates of human health hazards from chronic (30-year) exposure. The report concluded that the lifetime cancer risk was less than 1×10^{-8}, the chronic hazard ratio for non-carcinogenic compounds was </= to 0.1, and the health hazard was greatest for hydrogen sulfide (HR = 0.1). The final conclusion of the report was that the "...emissions of landfill gas from Crossroads Landfill will not compromise the health of residents living in the vicinity."

The Maine Bureau of Health and the Department conducted a joint review of this risk assessment, and offered, in part, the following:

- inclined to agree that exposure to identified organic compounds in landfill gas are unlikely to be of significant health concern;
- questioned the selection of a toxicity value for chronic exposure to hydrogen sulfide that is higher than USEPA Reference Concentration;
- questioned the averaging of exposures over 30 years, given the temporal nature of predicted hydrogen sulfide generation;
- questioned the assumption of 87% collection efficiency;
- requested that additional assessments be performed of subchronic or acute health risks from exposure to hydrogen sulfide;
- questioned appropriateness of evaluated exposures only at residences rather than at the fence line, given Department policy on assessing exposures for criteria air pollutants; and
- expressed concerns about the limited data available to characterize hydrogen sulfide concentration in landfill gases.

In response to these concerns, the applicant reconsidered its selected toxicity value for chronic exposure to hydrogen sulfide, opting to instead rely on a guideline that is used by the State of California. This value is higher than either the prior selected value or the USEPA Reference Concentration. The applicant evaluated a 7-year chronic exposure period of maximal gas generation in addition to the 30-year exposure period used previously, using the highest measured value for hydrogen sulfide in landfill gas. The

applicant performed additional analyses to evaluate subchronic and acute hydrogen sulfide exposures. The applicant concluded that predicted hydrogen sulfide exposures would not exceed the California chronic guidelines or U. S. Agency for Toxic Substances and Disease Registry subchronic or acute guidelines for hydrogen sulfide. The applicant additionally provided a comparison of model predictions of hydrogen sulfide air levels against known ambient air monitoring data. This analysis implied that model predictions may over-estimate exposure to hydrogen sulfide, suggesting added conservatism in the applicants risk analysis.

During the public hearing, persons questioned how the gas collection efficiency, projected at 87%, would be achieved; how the destruction efficiency of the flare, projected at 98%, would be achieved or monitored; and what were the by-products, if any, associated with the burning of the gas. Greg McCarron, a witness for the applicant, testified that there is a US EPA regulation, 40 CFR 60.18, which limits the exit velocity of the gas from the flare. Another US EPA regulation, 40 CFR 60, Subpart WWW, assumes that 98% destruction efficiency is achieved by an open flare designed and operated in accordance with 40 CFR 60.18. In addition, landfill gas with higher percentages of methane, such as the gas generated from the Phase 11 landfill, has a higher heating value, resulting in a higher allowable exit velocity under 40 CFR 60.18. Mr. McCarron testified that the major products of combustion of the gas will be water and carbon dioxide, but provided no testimony on recombinant by-products. In response to a question from the audience, Dr. Green testified that the health risks associated with by-products of landfill gas flaring, while not zero, are quite small and would not change the results of her assessment. Finally, Mr. McCarron testified that the 87% collection efficiency, a weighted average, is achieved through a combination of factors. First, the US EPA AP-42 default value for collection efficiency is 75% for open, active areas of the landfill, with allowances for higher values based on site-specific conditions. AP-42 documentation notes that for closed and capped sections of landfills, 90% collection efficiency can be achieved, due in large part to the cover system. The Phase 8 expansion will incorporate such a cover system. The higher efficiency rate can also be achieved for those sites that utilize an engineered system to control landfill gas, such as that proposed for Phase 8. Finally, site-specific efficiencies can be confirmed through the implementation of a comprehensive surface sampling program. The applicant presented surface scan sampling data for the Phase 11 landfill that suggest that the gas collection efficiency is as high as 95%.

The Bureau of Health and Department staff reviewed the additional risk analyses and remained concerned about potential exposures to hydrogen sulfide. Of greatest concern were predicted acute exposures that were estimated to be within 80% of the acute toxicity guideline developed by the U.S. Agency for Toxic Substances and above acute toxicity values derived by California and North Carolina. The fact that predicted exposures

exceeded the U.S. EPA Reference Concentration for chronic exposure to hydrogen sulfide also remained a concern. The Bureau of Health and Department staff also expressed concerns about the continued reliance on high rates of hydrogen sulfide recovery and destruction. These concerns were lessened somewhat by the results of the comparative analysis suggesting model predictions of hydrogen sulfide exposures could be biased high, though this analysis was viewed as limited in scope and duration. To provide increased confidence that hydrogen sulfide exposures would not exceed levels of health concern, Department staff recommended, and the applicant agreed to, enhancing the gas collection system by decreasing the spacing of vertical collector pipes, the addition of landfill gas toe collectors, and additional horizontal collectors. In addition, the applicant will conduct periodic surface scans of the landfill, consistent with New Source Performance Standards (NSPS) regulations. The Bureau of Health recommended the installation of additional continuous monitoring equipment for hydrogen sulfide, for a total of 2 or 3, monitored by the Department, and the periodic collection and analysis of landfill gas for hydrogen sulfide in order to confirm model predictions and the findings of the comparative analysis, as well as provide a means of evaluating any future reports of odor concerns and rapidly assessing their significance.

Finally, WMDSM previously obtained an air emissions license from the Bureau of Air Quality Control for operation of the Phase 11 blower/flare station, which demonstrates that those emissions comply with the applicable provisions of Maine's Air Quality Control Laws. In addition, WMDSM is required to amend the license to include emissions associated with the Phase 8 landfill.

Therefore, the Boards finds that the proposed facility will have no unreasonable adverse effects on air quality, provided the applicant:

- notifies the DEP and the Town of Norridgewock immediately if any fiber release beyond the regulated work area exceeds 0.01 f/cc;
- immediately stops all work associated with the asbestos relocation if the monitoring results show there has been a release, at a concentration of 0.01 f/cc, beyond the regulated work area or if visible emissions are detected within the regulated work area. Work may not resume until the cause of the visible emission or the release beyond the work area is identified and corrected;
- decreases the spacing of vertical collector pipes;
- installs landfill gas toe collectors and additional horizontal collectors;
- conducts periodic surface scans of the landfill consistent with 40 CFR 60 Subpart WWW;
- installs and operates a total of 3 continuous monitors for hydrogen sulfide, to be monitored by the Department, at select locations, in order to confirm the model predictions;

- collects and analyzes representative samples of landfill gas from the Phase 8 landfill for hydrogen sulfide; and
- obtains approval from the Bureau of Air Quality Control for emissions associated with the Phase 8 landfill.

13. NO UNREASONABLE ADVERSE EFFECT ON OTHER NATURAL RESOURCES

The proposed facility will affect 0.35 acres of wetlands. The applicant has applied for and received approval for the wetlands disturbance (DEP # L-20537-31-A-N, dated September 10, 2001). No other protected natural resources will be impacted by the proposed facility.

Therefore, the Board finds that the proposed facility will have no unreasonable adverse affect on any other natural resources.

14. CIVIL AND CRIMINAL RECORD

Under the provisions of Chapter 400.12, "The Department may refuse to grant, or approve the transfer of, a license for a solid waste facility or activity if it finds that the owner or operator or any person having a legal interest in the applicant or the facility has been convicted of any criminal law or adjudicated or otherwise found to have committed any civil violation of environmental laws or rules of the State, other states, the United States, or another country. Such an adjudication or finding can be by means of a court order, or consent decree, or by means of an administrative consent order of agreement.

WMDSM has submitted a complete disclosure statement regarding past violations of environmental laws and regulations for facilities owned and operated by Waste Management, Inc. in New England. WMDSM operates the Crossroads Landfill only, with no holdings elsewhere in the United States or the rest of the world. WMDSM has not received a Notice of Violation, Administrative Order, Consent Decree, or civil penalty for non-compliance of environmental laws or rules in the past five years, nor has it been convicted of any criminal law. Similarly, WMDSM's affiliated transportation company, Waste Management of Maine, Inc., has not received a Notice of Violation, Administrative Order, Consent Decree, or civil penalty for non-compliance of environmental laws or rules in the past five years, nor has it been convicted of any criminal law.

Sally Wilder, a resident of Norridgewock, testified that the Securities Exchange Commission charged executives of Waste Management, Inc. with fraud. She is concerned that companies such as this, engaging in illegal practices, are allowed to operate a landfill in Norridgewock. The applicant testified that the former officers of

Waste Management responsible for these actions, which occurred during the 1990's, are no longer employed by Waste Management, Inc. and that a new management team has been put in place to prevent the problems of the past. The applicant also testified that no employees of WMDSM were involved in any of these activities.

Therefore, the Board finds that WMDSM has filed an accurate civil/criminal disclosure statement and that WMDSM has not received a Notice of Violation, Administrative Order, Consent Decree, or civil penalty for non-compliance of environmental laws or rules in the past five years, nor has it been convicted of any criminal law.

15. VARIANCES

The applicant has applied for three variances to the design and operational standards for solid waste disposal facilities. The requirements for obtaining a variance are set forth in Chapter 400.13 of the Solid Waste Management Regulations.

A. 300-foot Property Setback: Chapter 401.1(C)(3)(ii) requires a 300-foot setback between the solid waste boundary and the property boundaries. As shown on the Permit Drawings, there are two locations where the solid waste boundary will be less than the required 300 feet. One area is approximately 350 lineal feet measured along the proposed solid waste boundary along the southwest border of the proposed expansion. The closest residence to this location is 3,600 feet away. The proposed setback in this area would be no less than 100 feet from the property line. The variance is needed to extend the existing Phases 7 and 9 stability berm along the southwest edge of the Phase 8 expansion. Department Orders #S-01735-07-P-N and #S-010735-WD-OK-N granted similar variance requests in this location. The other area is approximately 900 lineal feet along the eastern perimeter of the existing MSW landfill. Department Order #49-2696-25220, dated April 28, 1976, approving the original MSW landfill, allowed for the establishment of the solid waste boundary at this location. The proposed setback in this area, a minimum of approximately 70 feet, would not decrease from the existing limit of waste in this location, there are no residences on the abutting property, and there are mapped wetlands along this section that would preclude further development. The closest residence to this location is 1,400 feet away.

Given the presence of wetlands in these locations that further limit development in these locations, the absence of nearby residential dwellings, and the need to extend the Phases VII and 9 stability berm, the Board finds the applicant has presented clear and convincing evidence that locating the solid waste boundary closer than 300 feet to the property boundaries complies with the purpose and intent of State law and rules.

B. Cross Sections: Chapter 401.2(H)(2)(a) and (b) require the submission of longitudinal and lateral cross sections to be taken at 100-foot intervals. WMDSM proposes to submit longitudinal and lateral cross sections in detail and number sufficient to accurately portray the development of the landfill during its various developmental stages. Department staff comments that the longitudinal and lateral cross sections, in concert with the Cell Development Plan provide sufficient detail to portray and describe the operation of the landfill.

Therefore, the Board finds the applicant has submitted longitudinal and lateral cross sections in detail and number sufficient to accurately portray the development of the landfill during its various developmental stages, and that the submission complies with the purpose and intent of State law and rules.

C. Noise Levels: As noted in Section 11 above, the applicant proposes to comply with the noise level provisions of Chapter 400.4(F)(2)(a)(i) through the use of MSE Berms and two Noise Control Berms constructed of waste and placed along the outer perimeter of the landfill near receivers 13 and 17. Department staff comments that this action, while having the benefit of noise reduction, is considered part of landfill operations. In addition, until the Noise Control Berms reach their design height, there may be exceedences of the noise limits. In support of its variance request, the applicant notes the limited duration and frequency during which noise-generating equipment operates in a specific location, the long distances to or absence of residences in the locations where the exceedences may occur, and the planned construction of the Noise Control Berms as a noise abatement action.

Given the limited duration and frequency during which noise-generating equipment operates in a specific location, the long distances to or absence of residences in the locations where the exceedences may occur, and the long-term benefit of the Noise Control Berms as a noise abatement action, the Board finds the applicant has presented sufficient evidence that noise abatement actions proposed by the applicant comply with the purpose and intent of State law and rules.

16. FLOODING

The standards relating to flooding are set forth in Chapter 400.4(M) of the Department's regulations. The proposed waste facility will not be located within a 100-year floodplain, according to the Federal Emergency Management Agency flood insurance map for Norridgewock. No alteration of surface water flows is proposed for the expansion.

Water will be used to control asbestos fiber release during excavation and relocation of the waste contained in the Asbestos landfill and as a component of any water-based odor control system, but not in quantities that will result in flooding.

Therefore, the Board finds that the proposed project will not unreasonably cause or increase the flooding of the alteration area or adjacent properties, nor create an unreasonable flood hazard to any structure.

17. ADEQUATE PROVISION FOR UTILITIES

Under the provisions of Chapter 400.4(L) of the Department's regulations, a solid waste facility may not have an unreasonable adverse effect on existing site or municipal utilities. Utilities potentially affected by the landfill expansion include on-site sewer and power, and off-site water and sewer. WMDSM currently uses an approved on-site subsurface sewage disposal system for wastewater generated at the existing office building. No change in this system is necessary because of the landfill expansion.

All leachate generated at the facility is collected and conveyed to an onsite leachate storage tank. The leachate is then trucked offsite to a permitted wastewater treatment facility. Currently, WMDSM has leachate disposal contracts with S. D. Warren Company and the Kennebec Sewer Treatment District for the disposal of 200,000 and 50,000 gallons per day, respectively. Department staff comments that the contracts for leachate disposal with S. D. Warren and the Kennebec Sewer Treatment District are due to expire and be renewed on July 31, 2002 and annually on November 1st, respectively. The applicant proposes to submit updated contracts upon renewal with the leachate disposal facilities.

Electrical power is supplied to the facility through common power distribution companies. Onsite back-up generators are located in critical areas in case emergency power is needed.

Water to be used to control asbestos fiber release during excavation and relocation of the asbestos waste will either be provided by an existing onsite well or brought in from offsite by tanker truck.

Therefore, the Board finds that the applicant has made adequate provisions for utilities and that the facility will not have an unreasonable negative impact on existing or proposed utilities in the municipality or area served by those utilities, provided the applicant submits to the Department updated contracts for leachate disposal upon renewal with the leachate disposal facilities.

18. PHASE 8 DEVELOPMENT SEQUENCE/OPERATIONS MANUAL

A. Construction and Waste Excavation/Relocation Sequencing: Construction of Phase 8 will be accomplished in three phases (termed Phases 8A, 8B, and 8C). Construction of lined areas is expected to occur during the spring-to-fall construction seasons, followed by excavation and relocation of existing waste from designated MSW Landfill and Asbestos Landfill areas to the newly constructed lined areas. Construction and waste excavation/relocation id estimated to occur over a three-year period. WMDSM currently anticipates beginning construction in 2002. Phase 8A will be constructed first, which includes construction of the landfill cell, relocating Central Pump Station, construction of a new force main, construction of ECS-29, and relocating the leachate collection sumps and extending the liner system for existing Phases 7 and 9. Waste will be excavated from the Phase 8B area and relocated to Phase 8A, then Phase 8B will be constructed. Waste will be excavated from the Phase 8C area and relocated to Phase 8B, then Phase 8C will be constructed, inclusive of proposed ECS structures 30 and 31. Asbestos waste relocated into Phase 8B will be placed in areas that are greater than 300 feet from the property line along the east side of Phase 8B. Soil that is in contact with waste or leachate and is excavated as part of the waste relocation effort will be utilized within the lined areas of the landfill unless otherwise authorized by the Department. The MSE Berm will be constructed in segments that will correspond to the Phase sequencing construction.

Waste presently in the Phase 8B area will be excavated and relocated to the lined Phase 8A area during the period from Fall to Spring. Waste presently in the Phase 8C area will also be excavated and relocated to the lined 8B area during the period from Fall to Spring.

The Town of Norridgewock and Mrs. Frederick have requested that the Board require all waste and other materials excavated from Phases 8B and 8C [MSW and Asbestos wastes] be placed within the final lined Phase 8 disposal area. All cover materials, with the exception of those in contact with waste, would be exempt from this requirement.

B. Operations: The lower lift of Phase 8A will only receive waste from the excavation and relocation of existing waste from the Phase 8B area. Phase 8B will receive a mix of waste from the excavation and relocation of existing waste from the Phase 8C area as well as gate receipts of new, incoming waste. Phase 8C will only receive waste from gate receipts of new, incoming waste.

Therefore, the Board finds that facility operations will be done in accordance with the approved Operations Manual and operating plan for each phase. As part of the application, WMDSM submitted revisions to the approved site-wide operations manual

that addressed general fill sequencing for each phase. Prior to operations in each phase, WMDSM will submit a phase-specific operating plan to the Department for review and approval. The phase-specific operating plan will incorporate operational concerns such as leachate and gas management, geotechnical requirements, and noise buffer requirements.

19. NO UNREASONABLE RISK TO GROUNDWATER

The applicant has submitted the appropriate Maine Geological Survey Significant Sand and Gravel Aquifer Map. The proposed facility does not overlie any significant sand and gravel aquifers. No aboveground or underground fuel storage tanks will be installed as part of the facility.

Generally, groundwater flows from north to south beneath the site. There is a groundwater high within the bedrock located to the north of the facility. Mill Stream, located west and south of the facility, also acts as a local groundwater divide. The Town of Norridgewock water supply well is located approximately 10,000 feet ENE of the landfill and the landfill does not discharge within the limits of the mapped sand and gravel aquifer in which the Town water supply well is located. Furthermore, Mr. Al Macdonald testified that the Town well receives most of its recharge from the surrounding sand and gravel deposit and the Kennebec River.

Testimony was presented by the applicant, specifically Mr. Al Macdonald, regarding the potential for Mr. Sirois' well to be impacted or influenced by the landfill. Mill Stream acts as ground and surface water divide between the landfill and Mr. Sirois' well. Mr. Macdonald stated that there is a groundwater high located north of the landfill with an approximate elevation of 300 feet MSL, dropping down to 245 to 260 feet MSL within the Phase 8 footprint. Along Mill Stream, the elevation is approximately 230 to 240 feet MSL. Mr. Sirois' well has a groundwater elevation of approximately 270 to 280 feet MSL. The potentiometric head levels at Mr. Sirois' property are approximately 20 feet higher than those at the landfill and 40 feet higher than the Mill Stream divide. Mr. Macdonald concluded that because of the large differences in hydraulic gradients, groundwater cannot flow from the landfill property to Mr. Sirois' property.

A. Working Mat/Underdrain: A granular working mat/underdrain layer will be placed beneath the liner system in the base areas of Phases 8A, 8B, and 8C. As the existing waste is removed from Phases 8B and 8C, a geosynthetic separator may be placed over areas of the exposed gray clay and the excavation will be backfilled up to the liner subgrade using a granular material. This will provide a working platform for the construction equipment, and will serve as a blanket underdrain to collect and convey water from the wick drains. Granular material is being used because it will not

require substantial compaction efforts to achieve the necessary stability for equipment and it will provide a layer that has a high enough hydraulic conductivity to transmit water from the wick drains to underdrain collection sumps.

Two separate sumps will be established in the Phase 8 area to collect water from the underdrain. The locations correspond approximately to the low areas of the base grades for Phases 8A and 8B/8C. The underdrain for Phase 8A will be isolated from the underdrain for the 8B/8C area. Solid pipes will convey the consolidation water from the underdrain sumps to wet wells located south of the Phase 8A perimeter berm. The consolidation water entering the wet wells will be handled as leachate unless routine testing indicates the consolidation water meets the criteria for discharge to the storm water management system. The water will not be discharged unless Department approval is received.

If the gravity underdrain system fails, an auxiliary access point to the underdrain collection sump is located in each cell of Phase 8. The auxiliary access point is located at the toe of the MSE Berm slope and includes an 18-inch diameter riser pipe that extends from the toe of the slope up to the leachate vault. This system is provided as a backup to the gravity and wetwell system for the underdrain collection system and will only be used if the gravity underdrain system fails.

In order to limit surface water or shallow groundwater outside the Phase 8 area from entering the underdrain, a shallow phreatic and surface-water cutoff will be installed near the exterior base of the perimeter berm. The cutoff will be installed to a depth of 5 to 12 feet below the undisturbed ground surface.

The Board finds that the Working Mat/Underdrain has adequate capacity to transmit water from the wick drains to the collection sumps. The Board also finds that there is adequate redundancy in the system in the event of failure of the primary underdrain collection sumps in that secondary underdrain collection sumps are located in each cell of Phase 8.

B. Wick Drains: As the working mat/underdrain layer is placed, wick drains will be installed in the Phase 8 base area. The purpose of the wick drains is to increase the rate at which the gray Presumpscot clay foundation material consolidates and gains strength.

The wicks will be installed by direct-push methods into the gray clay to a depth corresponding to approximately 12 feet above the glacial till layer. The installation will be done under strict Construction Quality Assurance (CQA) oversight to ensure the proper depth is attained. The lateral spacing of the wicks will range from 5 feet to

10 feet on center, with the depth ranging from about 20 feet to 80 feet. The wick drains will be installed in accordance with the revised *Wick Drain Work Plan* included in Volume VIII of the application. The work plan describes supplemental field investigation activities that will be performed to verify depths of the till layer and will be the basis for selecting design penetration depths of the wicks to ensure that the wicks are not installed through the entire Presumpscot clay layer. The objective of the work plan is to collect sufficient data points to establish the top of the till layer within the Phase 8 footprint within plus or minus 3 feet with a 95% confidence level. The field investigations will be completed in a phased approach. Phase 1 has been previously completed and submitted to the DEP and includes all areas in which wick drains will be installed, outside of existing landfilled areas. Phase 2 will be implemented during development of Phase 8B and Phase 3 will be implemented during development of Phase 8C.

The wicks will terminate within the underdrain layer beneath the Phase 8 liner system. Consolidation water from the wicks will drain into the underdrain layer where it will flow to one of the underdrain sumps. Wick drains will not be installed within the immediate area of the proposed landfill leachate sumps. Wick drains will be installed around the perimeter of the landfill leachate sumps at an angle to provide a release of pore water pressure at depth beneath the sumps.

Exact wick drain spacing will be determined prior to construction. In general, wick drains will be installed in a triangular pattern, except in areas of geotechnical instrumentation. At these locations, geotechnical instruments will be substituted for wick drains in order to minimize drainage effects of the wick drains on the geotechnical instruments. The depth of the wick drains will be based on the information obtained as a result of implementing the Wick Drain Work Plan, which is part of the construction documents for the project. In order to ensure adequate separation between the bottom of the wick drains and the glacial till layer beneath the site, the Board finds that the results of the Wick Drain Work Plan from each Phase must be submitted to the Department for review and approval prior to installation of the wick drains. Installation of the wick drains will be done in accordance with the Wick Drain Installation Plan, which is a required contractor submittal in accordance with the contract documents. WMDSM has agreed to submit a copy of the Wick Drain Installation Plan for each Phase to the Department after receiving it from the contractor.

Under cross examination by Mrs. Gloria Frederick regarding the rationale for excavating the waste from below groundwater level 13 years after the landslide instead of immediately after the slide, Mr. Scott Luettich testified that the installation of the wick drains and the strength gain of the underlying soils make excavation of

the waste feasible. This was further supported by the testimony of Mr. Richard T. Reynolds. Specifically, in the time following the failure of the MSW landfill, the underlying clay soils were remolded resulting in a gain in the strength of the clay soils. The installation of the wick drains will further enhance this strength gain.

During the application review process and the public hearing, questions regarding the potential for the wick drains to transmit contaminated ground water further into the clay soils and bedrock were posed to the applicant. Mr. Al Macdonald, testifying on behalf of the applicant, stated that the wick drain/underdrain system is designed to induce an upward gradient from the till through the clay into the underdrain layer. Even if a wick drain were installed through the clay and into the till, water would flow from the till into the underdrain layer. If a wick were to be installed incorrectly, it would be overdrilled to remove the wick and completely grouted to prevent cross-contamination. Finally, Mr. Macdonald testified that, of the 8,500 wick drains installed as part of the Phase 9 landfill, only 2 were installed deeper than the design depth. Neither of the wicks penetrated the till layer.

The Board finds that the wick drains will significantly improve strength gain of the underlying Presumpscot clay soil. The Board also finds that installation of the wick drains will not cause contamination of the underlying till and bedrock layers, provided that the results of the Wick Drain Work Plan are submitted to the Department for review and approval, and the wick drains are installed in accordance with the approved Wick Drain Installation Plan with continuous CQA monitoring.

C. Liner and Leachate Management System Design: The proposed landfill liner is a single composite liner system. The cross-sectional configuration of the liner system varies depending on its location within the expansion area. In areas where the Phase 8 expansion abuts existing Phases 7 and 9, the liner systems for these Phases will be connected to the proposed Phase 8 liner system. The existing leachate collection sumps for Phases 7 and 9 will be relocated to the southerly MSE berm near the area proposed for relocation of the existing Central Pump Station. The base landfill area between existing Phases 7 and 9 leachate collection sumps and the proposed area for relocation of these sumps will be lined with a double composite liner system meeting the approved design for Phases 7 and 9. In areas where the Phase 8 expansion abuts existing Phases 1-6, the liner system for Phase 8 will remain separate from the Phase 1-6 liner systems, and will be designed as presented below.

The liner and leachate management systems for the base and interior sideslopes of Phases 8A, 8B, and 8C include, from the bottom of the waste down:

- 12" of tire chips.

- 12" of drainage sand,
- A drainage geocomposite (double-sided on the sideslopes and single-sided on the base areas).
- A 60-mil (0.060-inch thick) textured HDPE geomembrane.
- An internally reinforced geosynthetic clay liner (GCL).
- 12" of compacted silt-clay barrier soil having a hydraulic conductivity less than or equal to $1x10^{-7}$ cm/sec.

On the interior sideslope berms, the barrier soil layer will be placed directly upon the granular common borrow used to construct the perimeter berms. The liner system on the base portion of the landfill will be placed directly over the working mat/underdrain layer.

The liner and leachate management systems for the overfill liner for Phase 8A over the westerly sideslope and top area of existing Phases 1-6 include, from the bottom of the waste down:

- 12" of tire chips.
- 12" of drainage sand.
- A double-sided drainage geocomposite.
- A 60-mil (0.060-inch thick) textured HDPE geomembrane.
- An internally reinforced GCL.

The liner system will be placed directly over the existing 12" granular intermediate cover layer.
The liner and leachate management systems for the overfill liner for Phase 8A over the easterly and northerly sideslopes of existing Phases 1-6 include, from the bottom of the waste down:

- 12" of tire chips.
- 12" of drainage sand.
- A double-sided drainage geocomposite.
- A 60-mil (0.060-inch thick) textured HDPE geomembrane.
- 12" of silt clay material having a hydraulic conductivity less than or equal to $1x10^{-5}$ cm/sec.

The liner system will be placed directly over the existing 12" intermediate cover.

Calculations and specifications for each of these materials have been provided to demonstrate that the liner will function to prevent migration of leachate from the landfill.

D. Leachate Collection System: The liner system for Phase 8A will convey leachate off the interior berm side slopes and Phase 1-6 slopes to the base where it will flow in a westerly direction via a perforated header pipe embedded in crushed stone and wrapped in a geotextile to the Phase 8A Leachate Collection System (LCS) sump. Along the east side of Phase 1-6, leachate will be directed to the narrow base area where it will be conveyed via a LCS header northward then westward to the Phase 8A sump. The liner system for Phases 8B and 8C will convey leachate off the interior side slopes to the base where it will flow into LCS headers. The LCS headers will be positioned on the base of the cell to facilitate leachate flow radially toward the 8B and 8C central LCS sumps.

The LCS consists of the single or double-sided geocomposite and 12-inch thick granular layer located directly above the geomembrane. A 12-inch thick layer of tire chips will be placed over the granular layer for mechanical protection. Leachate from upper lifts of waste placement will be conveyed via pipes to the tire chip layer. Calculations and specifications have been provided to demonstrate that the leachate collection system has the capacity to collect leachate and minimize leachate head build-up on the liner system.

In response to Department comments, WMDSM has committed to installing additional leachate collection pipes to increase the leachate collection system efficiency and to further minimize leachate head build-up on the liner system. The location and number of additional leachate collection pipes need to be finalized as part of the construction documents. WMDSM has also committed to providing a means for monitoring leachate head build-up on the primary liner, the design of which shall be finalized and submitted to the Department with the construction documents.

The Board finds that the leachate collection system meets the requirements of the regulations provided that additional leachate collection pipes are installed in order to minimize leachate head build-up on the liner system and provided a means is developed to monitor leachate head build-up on the primary liner system. The design for the additional leachate collection pipes and the means to monitor leachate head build-up must be submitted to the Department for review and approval.

E. Leachate Transmission System: Leachate and groundwater from the existing waste disposal units in the vicinity of the Phase 8 expansion currently flows into Central

Pump Station where it is then conveyed via a forcemain to the leachate storage tanks located along the main access road. Construction of Phase 8 will require that Central Pump Station be moved to a location outside of the Phase 8 footprint, just south of the Phase 8A perimeter berm.

A new double-containment leachate forcemain will be installed from the relocated Central Pump Station around the south end of Phase 10, then north to a point near the entrance to the Phase 8 area. The new forcemain will tie into the existing forcemain at this point. Leachate will continue on to South Central Pump Station, and then on to the leachate storage tanks. The existing forcemain, along with any pipe-bedding gravel, will be removed from the current Central Pump Station to the tie-in point. A temporary forcemain will be constructed from the relocated Central Pump Station to the proposed new permanent forcemain tie-in point. The temporary forcemain will pass up and over existing Phases 1-6. The temporary forcemain will be decommissioned once the MSE berm along the east side of Phase 1-6 and the new forcemain are constructed, both of which will be done as part of the initial Phase 8A construction work. The applicant has demonstrated that the leachate storage tanks have sufficient capacity to handle predicted leachate flows from the Phase 8 expansion, both during construction (waste excavation and relocation) and operations, in addition to the leachate flows from other landfill areas on site.

Relocating Central Pump Station will require that the existing leachate collection gravity pipes from Phases 1-3 be extended to the new locations. Construction of Phase 8 will also include decommissioning the existing perimeter toe drains around the MSW landfill and the Asbestos landfill. This will include removal of the toe drains as well as the Asbestos landfill lift station, the MSW landfill lift station, and the solid wall carrier pipes from these to the existing Central Pump Station. These toe drains will be decommissioned in stages that are coordinated with construction activities. Temporary sumps will be established where needed with pumps to convey flow from remaining segments of the toe drain to the leachate management system.

Therefore the Board finds that the proposed landfill expansion will not pose an unreasonable risk that a discharge to a significant groundwater aquifer will occur in that the landfill expansion is not located over a significant sand and gravel aquifer. The proposed landfill expansion does not pose an unreasonable threat to the quality of a significant sand and gravel aquifer which it does not overlie, or to an underlying fractured bedrock aquifer, in that the soils under the landfill expansion, the proposed design of the landfill expansion, the groundwater flow conditions, and the implementation of the Water Quality Monitoring Plan provide adequate protection to water quality.

20. SURFACE WATER QUALITY

A. Stormwater Management: Storm water will be controlled during the active and post-closure stages of the Phase 8 expansion using several storm water management basins. These basins also provide erosion and sediment control functions, and are referred to as erosion control structure (ECS) basins. Sheet runoff from covered landfill slopes will be collected in the cover system benches, which will convey the storm water to downchutes. The downchutes will be lined with riprap or similar erosion protection and will discharge into surface water conveyance structures that will direct the water by gravity flow to one of six ECS basins. Storm water will be detained by the ECS basins before being discharged to preclude excessive flooding of the adjacent wetland or downstream areas. The suspended sediment in the storm water will be retained and filtered by the ECS basins to limit transport of sediment off-site. The proposed stormwater management system includes:

- Swales on the landfill MSE berm that collect and direct runoff from the landfill and perimeter access roads to designated ECS basins;
- A phreatic ground water cutoff wall which minimizes stormwater run-on onto the landfill areas;
- Construction of three new ECS basins (ECS-29, ECS-30 and ECS-31) adjacent to the Phase 8 expansion;
- Upgrades to and expansion of one existing ECS basin (ECS-3B) located to the east of the Phase 8 site;
- Use of two existing ECS basins (ECS-21 and ECS-19) located to the south of Phase 10 and to the west of the current Asbestos Landfill, respectively;
- Construction of new, and enhancement of existing, site drainage systems to direct runoff to the upgraded ECS-basin system; and
- Decommissioning of four existing ECS basins (ECS-18, ECS-9, ECS-16, and ECS-20).

The Town of Norridgewock has requested that the Board require the applicant, as a condition of the license, to sample and analyze storm water within ECS Basins being impacted by waste relocation activities for total suspended solids and iron. Sampling should take place after a storm event of ½ inch of rain or greater, and prior to discharge to surface water bodies. In addition, the Town requests that the Board require the applicant to implement a regular schedule of inspections of the ECS basins during normal operations of the landfill.

Department staff comments that all water encountered in the waste relocation area will be managed as leachate, as stated in the application. The existing leachate collection systems will remain functional and be decommissioned in a sequential manner so as to

appropriately manage leachate and prevent the discharge of contaminated surface water to the ECS basins. In addition, the excavation and relocation work plan contains adequate provisions for directing uncontaminated surface waters into the ECS basins through the construction of diversion berms. In addition, WMDSM has a current NPDES permit that requires WMDSM, after a storm event that generates >0.1 inches of precipitation, following a period of 0 to 0.1 inches of precipitation for 72 hours, to visually inspect the stormwater outfalls and collect water samples to be analyzed for TSS and iron in the 2nd and 4th years of the permit period. If the results of the sampling are above the set limits for TSS and iron, WMDSM must evaluate its stormwater management procedures and modify them to achieve compliance with the discharge standards.

Department staff comments that surface water quality data from 1995 through 2000 show no impact to surface water quality attributable to landfilling activities. Six surface water monitoring points are identified in the application for inclusion in the Water Quality Monitoring Plan for the site and will be sampled three times during the year; April, August, and November. Finally, Department staff comments that facility personnel already monitor the condition of the ECS basins as part of their normal responsibilities.

Mrs. Frederick testified that Mill Stream and its tributaries have been impacted several times since the facility was first licensed. Specifically, Mrs. Frederick cited the 1989 landslide, sedimentation events, and the presence of sewerage fungus in the stream as having contributed to a decline in the water quality of Mill Stream.

Mr. Wilder, a resident of Norridgewock, testified that the quality of Mill Stream, located to the west and south of the facility, has degraded overtime. The Maine Department of Inland Fisheries and Wildlife (MDIFW) stopped stocking brook trout in Mill Stream, although, based on electroshocking surveys, water temperatures and dissolved oxygen levels, found Mill Stream suitable as a trout fishery except for the lack of deep pools. Mr. Wilder cited past siltation events of Mill Stream, some attributable to operation of the landfill, as one probable cause for the degradation of Mill Stream. In closing, Mr. Wilder asked that the applicant acknowledge the presence and value of Mill Stream, the fact that is used to be a high-quality trout stream, and encourage MDIFW to monitor Mill Stream for future redevelopment of fisheries habitat.

Department staff comments that there has been no erosion control or surface water discharges impacting Mill Stream since 1995. The applicant has made significant improvements in the management of surface water that has prevented discharges that could impact Mill Stream.

The Board finds that the stormwater management system for Phase 8 meets the requirements of the regulations and will prevent the discharge of sediments and other contaminants conveyed by stormwater from polluting the waters of the State and otherwise unreasonably affecting surface water quality.

B. Erosion and Sediment Control: The application includes an Erosion and Sedimentation Control Plan (ESCP). The objectives of the ESCP are to:

- Limit erosion associated with construction activities to the fullest extent practicable and reduce the quantity of sediment entering runoff.
- Contain runoff within the work area and convey it by means of swales and pipes to existing and proposed storm water structures.
- If needed, to convey storm water collected in the work areas by means of tanker trucks or pipes to existing infiltration basins for treatment.

The ESCP sets forth the requirements of the Contractor's work with respect to construction-phase erosion and sediment control, and is incorporated into the Contract Documents by reference in technical specification Section 02120, "Temporary Erosion Control." An ESCP will be submitted as part of the construction documents for each future phase. The ESCP incorporates by reference the Maine Department of Environmental Protection's and Cumberland County Soil and Water Conservation District's guidance document entitled "Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices," dated March 1991. Runoff from the Phase 8 area will be retained and filtered in the ECS basins prior to discharge.

The Board finds that the erosion and sediment control design for Phase 8 meets the requirements of the regulations provided that an Erosion and Sediment Control Plan is submitted as part of the construction documents for each phase of construction.

21. STABILITY

A. Mechanically Stabilized Earth (MSE) Berm Design: The disposal capacity provided by the expansion will be achieved by construction of a MSE perimeter berm around much of the expansion footprint. The berm will be constructed to a height of about 20 feet, with a total length of about 5500 feet. The MSE berm will tie-in to the existing perimeter berm at the southwest corner of Phase 7 and the west Phase 1-6 perimeter berm. Along the east side of the expansion footprint, the MSE berm will tie-in to the existing Phase 1-6 east perimeter berm and will be continuous around the east and north perimeter of the expansion until it ties-in to the Phase 9 perimeter berm.

The inboard side of the MSE perimeter berm will be sloped at 3 horizontal to 1 vertical (3H:1V) from the crest of the berm down to the base of the liner system. The expansion liner system will be secured in an anchor trench at the crest of the perimeter berm. The top of the perimeter berm will be 48 feet wide and will include leachate management and surface-water management facilities, and a 27-foot wide perimeter access road. The outboard side of the berm will be sloped at 1H:6V.

The outboard slope of the perimeter berm will be stabilized using a MSE system. The MSE system will include a soil reinforcement component and a facing component. The soil reinforcement component will consist of horizontal layers of geogrid reinforcement installed at vertical intervals in the berm soil. The facing component will consist of either: (I) welded wire mesh filled with gravel; or (ii) soil-filled welded wire mesh through which vegetation can be established. The MSE system is designed with provisions for a traffic guardrail with security fencing at the top.

The Department has requested that WMDSM demonstrate that a factor of safety of at least 2 against a bearing capacity failure of the MSE berm will be achieved during each stage of construction. Prior to beginning construction of the MSE Berm, WMDSM has committed to drilling test borings every 50 feet on center along the proposed alignment of the MSE berm in order to determine the thickness of the brown clay layer. The brown clay layer is stronger than the underlying gray clay layer, therefore the brown clay layer thickness is a significant factor in meeting the required factor of safety against bearing capacity failure. If the results of the test borings, which will be submitted to the Department for review, indicate the presence of a thin brown clay layer, staged construction, toe berms, or other means may be required in order to meet this factor of safety. WMDSM will re-evaluate the stability of the MSE berm after the results of the test boring program are available. WMDSM has committed to providing the results of the test boring program and the associated re-evaluation of the MSE berm stability to the Department for review and approval.

In accordance with the bearing capacity analysis, soil material for the MSE berm must have a unit weight of 120 pounds per cubic foot or less. Construction level documents must include provisions for this. Where average unit weights are referenced in the construction documents, specific language must be developed to reduce the potential for concentrated areas of higher unit weight materials unless justified by additional analyses. Monitoring provisions must be included in the CQA plan to address this requirement.

The Board finds that the MSE berm will meet the required factors of safety for stability provided that WMDSM drills test borings every 50 feet on center along the

proposed alignment of the berm to measure the thickness of the brown clay layer, and provided that WMDSM re-evaluates the stability of the MSE berm after the results of the boring program are available and takes measures to ensure a minimum factor of safety of 2.0 against a bearing capacity failure. The Board also finds that the MSE berm will function as designed provided construction level documents and the CQA plan are modified to restrict soil material for the MSE berm to soils having a unit weight of 120 pounds per cubic foot or less, unless justified by additional analyses.

WMDSM analyzed the stability of the proposed expansion for static and seismic conditions, with respect to failure planes through the waste mass, along interfaces of the liner system components, and through foundation soils. This analysis included consideration for construction and operational, intermediate, and final stage conditions. WMDSM also performed other related geotechnical calculations in support of this design.

On behalf of the Department, S.W. Cole Engineering, Inc. (SW Cole) reviewed the geotechnical aspects of the Phase 8 application as an Outside Reviewer. SW Cole attended several project meetings during the application review, provided review comments, and participated in the public hearings. Additional stability analysis work remains to be done and geotechnical monitoring results will need review as outlined below. WMDSM has agreed to perform the additional analyses and to provide funding for an Outside Reviewer to continue reviewing the geotechnical aspects of the Phase 8 expansion on behalf of the Department.

B. Static Stability Analyses: Five categories of slope stability analyses were performed, specifically (I) construction stability sections; (ii) waste excavation stability sections; (iii) fill or waste placement stability sections; (iv) liner system global stability sections; and (v) liner and cover veneer stability sections. Construction sections are sections along temporary cut slopes within existing waste or temporary fill slopes of new waste. These sections evaluate potential slip surfaces that pass through existing waste and into the foundation soils. Waste excavation sections are sections for cut slopes as the waste is excavated beneath the original ground surface during removal of the clay/waste mixture caused by the MSW landslide. These sections evaluate potential slip surfaces that pass through existing waste that is being excavated and into subsurface clays during construction. Fill sections are waste fill slopes that will become the final slopes of the landfill. These sections evaluate potential slip surfaces that pass through filled sections of Phase 8 and into foundation soils. Liner system stability sections evaluate potential slip surfaces that pass through the waste mass and along a particular interface of the liner system. Liner and cover system veneer stability sections evaluate the internal veneer stability of potential slip surfaces that

pass along components of the liner and do not involve foundation soils or the waste mass.

For the waste excavation sections, the results show that material may be excavated from existing waste grades below Elevation 260 ft to Elevation 240 ft with a maximum slope inclination of 6H:1V using a continuous slope. Alternatively, the excavation below Elevation 260 ft to Elevation 240 ft can be performed with a maximum slope inclination of 5H:1V using a stair-stepped slope with a maximum stair-step slope of 10 vertical feet. The contract documents for this expansion requires the construction contractor to submit a Waste Excavation / Relocation Plan, which will provide further detail on the methods, proposed for waste excavation to Elevation 240 ft. As a result of the 1989 landslide, waste from the MSW landfill was mixed with clay underlying the site down to as deep as about Elevation 235 ft. Although the intent of this expansion is to retrieve as much of this waste as possible, WMDSM will not excavate waste below Elevation 240 ft without receiving Department approval to do so.

For the fill sections, analyses accounted for staged loading and associated strength gain of the underlying clay soils. Up to four lift stages of waste are placed within a fill section. The stability of each lift stage is based on the estimated shear strength of the foundation soils that exist prior to that lift stage being placed, therefore strength gain caused by an individual lift stage is not accounted for during placement of waste in the individual lift. During and following each lift stage placement, pore pressure dissipation and settlement will be monitored to estimate clay strength gain as the clay consolidates and to determine when it is appropriate to place the next lift stage. Prior to placing each lift stage that will account for strength gain, WMDSM shall provide to the Department the results of pore pressure and settlement monitoring along with strength gain and stability analysis, which indicate that the slopes of the next lift stage will have a minimum factor of safety of 1.3. Following placement of all waste, and allowing for five years of consolidation and strength gain, final fill sections for the slopes have a minimum factor of safety of 1.5. The analyses are based on the waste densities determined through measurements at existing landfill units. During waste placement, WMDSM has proposed to measure actual waste densities and compare the density to the values used in the stability analyses. The construction specifications must be revised to include provisions for measuring the actual waste density as proposed in the application, Volume IV, Part 1.

Stability analyses have not been done for the pipe excavations that will be greater than 3 feet deep. WMDSM has listed the pipes that meet this criterion, and has committed to completing stability analyses for these pipes prior to construction in each phase.

Re-analysis of slope stability has been completed for each cross section identified as being critical for permitting decisions. Modifications must be made to the construction documents and cell development plan drawings to reflect the findings of the re-analysis work for the critical cross sections. Additional stability analyses remain to be completed for Construction Section C-10B and Fill Sections F-2, F-3, F-7, F-9, F-10, and F-11. WMDSM must demonstrate that the factors of safety for these remaining sections meet the requirements of Chapter 401 of the regulations. This demonstration must occur prior to construction of each affected phase of development.

During waste excavation and relocation, WMDSM will observe and monitor the amount of exposed clay surface adjacent to waste excavation slopes to ensure that the granular working mat/underdrain layer is incrementally backfilled as rapidly as possible. The construction documents must be modified to include requirements that state that the target width for this exposed surface will be 75 feet or less, with a maximum allowable width of 100 feet.

C. Seismic Stability Analyses: WMDSM evaluated the effects of an earthquake to verify that (I) for construction and operations periods, the minimum factor of safety is greater than 1.1 when subject to the 50-year frequency earthquake; and (ii) for the post-closure period, the minimum factor of safety is greater than 1.0 when subject to the 250-year frequency earthquake.

The analyses consisted of: (I) characterization of the design earthquake; (ii) evaluation of the response of the foundation soils and the landfill mass during the design earthquake; (iii) evaluation of the potential for accumulation of excessive permanent deformations in the liner system and final cover system of the landfill; and (iv) evaluation of the potential for liquefaction of the foundation soils. Based on the analyses, the Department finds that an appropriate design earthquake was selected for use, that liquefaction is not expected to occur, and that the Phase 8 foundation soils, liner system, and cover system are designed to resist the design seismic event for the site.

D. Related Geotechnical Calculations: WMDSM evaluated other geotechnical issues that relate to the stability of the proposed expansion. These issues include: (I) design and performance analysis of wick drains to be installed beneath the landfill liner system; (ii) analysis for bottom heave (hydrostatic uplift) of the clay during waste excavation; (iii) analysis for liner system heave following construction; and (iv) analysis of bearing capacity of the excavated clay surfaces for construction equipment.

Wick drain spacing and the coefficients of consolidation are significant factors in the rate of pore pressure dissipation of the clay. The analyses done by WMDSM utilized a wick drain spacing between 5 and 10 feet, depending on location, and a coefficient of consolidation of 40 ft^2 /year.

An excavation hydrostatic uplift analysis was done to calculate the lowest base grade elevation that would provide a factor of safety of 1.3 or greater against uplift of the confining unit during construction. Based on the analysis, the lowest elevation that results in a factor of safety of 1.3 is elevation 240 ft. WMDSM will not excavate waste below this elevation without receiving Department approval to do so.

A liner system hydrostatic uplift analysis was done to demonstrate that uplift pressure on the liner system due to ground water will not exceed the downward forces acting on the liner system from the weight of overlying soil and waste. An analysis was performed to calculate the thickness of waste that will offset the uplift pressure with a factor of safety of 1.5. Results of the analysis indicate that waste in the landfill needs to be placed to Elevation 260 ft in order to provide a factor of safety of 1.5.

Excavation bearing capacity was analyzed to determine the minimum thickness for the granular working mat underdrain layer that is necessary in order to operate heavy construction equipment above the glaciomarine clays. In areas beneath the site, a geosynthetic separator (geotextile or geogrid) may be placed beneath the granular working mat to enhance bearing capacity. Based on the analyses, the granular working mat is specified to be a minimum of 2 feet thick in excavation areas. In areas, the granular working mat will be several feet thick in order to meet the required liner system grades.

The Board finds that the stability of the landfill will meet the requirements of the regulations during construction, operations, closure, and post-closure in the manner proposed provided that: 1) waste excavation does not go below Elevation 240 feet without Department approval; 2) additional re-analysis of the stability sections noted above are completed prior to construction in each affected phase; 3) the granular working mat is a minimum of 2 feet thick in waste excavation areas; 4) the construction documents are modified to clearly indicate the acceptable amount of exposed clay surface allowable during waste excavation; 5) stability analyses are completed and submitted to the Department for review and approval for pipe excavations in excess of 3 feet; 6) consolidation monitoring, strength gain analysis and stability evaluations as noted above are completed prior to the addition of lift stages that account for strength gain; 7) the construction documents are modified to include provisions for measuring waste density during waste placement; and 8) the

services of an Outside Reviewer are funded by WMDSM to continue reviewing the geotechnical aspects of the Phase 8 project on behalf of the Department.

E. Settlement: WMDSM assessed total and differential settlement of the proposed liner and leachate collection systems. In addition, settlement at points in existing landfill liner systems (Phases 1-6, Phase 7, and Phase 9) were assessed to reflect additional waste placement over these existing landfills.

The magnitude of calculated settlement ranges from 0.5 to 5.1 feet, with a maximum differential settlement between two adjacent points of 4.6 feet. The post-settlement slope of leachate collection pipes ranges from 1.75 to 0.21 percent, and the post-settlement slope of the cross liner system ranges from 3.02 to 1.11 percent. These minimum slopes have been incorporated into the leachate generation and geocomposite drainage layer calculations. Both the pipe flow capacity and the maximum leachate head build-up on the liner system are acceptable under these settlement conditions. Based on the differential settlement calculated between adjacent points, the maximum long-term strain in the liner system is less than 0.03 percent, and the maximum short-term strain is 2 percent. These calculated strains are below the yield strain of HDPE geomembrane of 13 percent.

For Construction Section C-6, piezometers and settlement platforms need to be installed in the temporary terrace in order to monitor consolidation as described in a October 29, 2001 Memorandum from Richard T. Reynolds, P.E. to GeoSyntec Consultants addressing C-6 Revisions.

Settlement estimates need to be made for intermediate fill heights in areas where settlement devices are installed, as agreed to by WMDSM in a March 19, 2002 letter to the Department. The intent is to provide corroborative and redundant data to assist in monitoring clay consolidation and strength gain, using actual waste densities and clay consolidation parameters from the site's settlement devices.

The Board finds that the liner system and leachate management systems will meet post-settlement slope criteria and that predicted settlement will not cause excessive straining of geosynthetic components provided that piezometers and settlement platforms are installed in the temporary terrace along Construction Section C-6, and that settlement estimates are made for intermediate fill heights in areas where settlement devices are installed.

F. Geotechnical Monitoring Plan: WMDSM submitted a Geotechnical Monitoring Plan (GMP) in support of the application. The GMP addresses geotechnical monitoring during construction phases, operational phases, and post-closure phases of landfill development. WMDSM has committed to annual updates to the GMP to reflect

additional instrumentation associated with each Phase of the expansion. Details for installation of instruments will be submitted to the Department with the construction documents for each Phase. WMDSM submitted a letter dated August 3, 2001 that included a Table titled *Preliminary Schedule of Geotechnical Instrumentation Installation* that presents a schedule for installing the geotechnical instruments during the various phases of the Phase 8 development.

In response to Department concerns regarding the potential for instrumentation damage during landfill construction, WMDSM submitted information outlining measures to be taken to prevent damage. These measures consist of: surveying as-built locations of the instrumentation in order to avoid these locations during wick drain installation; vertical components of the geotechnical instruments will be installed with initial readings taken prior to nearby wick drain installation; horizontal components of the geotechnical instruments will be installed after the wick drains are completed; readings will be taken immediately after nearby wick drains are installed to assess whether any components of the instrumentation were damaged; and physical barriers will be installed around the geotechnical instrumentation to protect the instrumentation from construction traffic.

Geotechnical monitoring devices are read in the field by WMDSM personnel. The data from these measurements are then transmitted to a geotechnical engineer for interpretation of the results. In accordance with the GMP, alert levels are established. Exceedances of these alert levels require notification of the Department. For the existing landfill units, WMDSM uses both Richard T. Reynolds, P.E. and GZA GeoEnvironmental, Inc. (GZA) to review and interpret the monitoring results. Reporting to the Department is done by GZA. During the public hearing, WMDSM agreed to develop chain of command procedures that would clarify the roles and responsibilities of those people or firms responsible for timely geotechnical data monitoring, interpretation, and reporting in order to bring clarity to geotechnical decision-making during landfill construction and operations. The Board finds that clarification of these chain of command procedures and associated timeframes are necessary in order to ensure the stability of the proposed expansion and existing, adjacent landfill units.

During waste relocation and landfilling of new waste, WMDSM will monitor waste density to ensure that the density achieved approximates the density used in the stability analyses. This will be done through the use of large scale test pits in the waste. During the waste relocation phase of the project, this will be a component of the quality assurance program. The procedures are generally described in the facility operations manual that will be revised to provide additional detail regarding the procedures for use during the Phase 8 construction. The construction documents for

Phase 8 must include a plan outlining the frequency of the density monitoring program.

The Board finds that the Geotechnical Monitoring Plan meets the requirements of the regulations provided that the GMP is updated annually, the details for installation of instruments are submitted to the Department with the construction documents for each Phase, the instruments are protected from damage during construction, WMDSM provides additional detail on the chain of command procedures to clarify the roles and responsibilities of those people or firms responsible for timely geotechnical data monitoring, interpretation, and reporting and for monitoring waste density during waste relocation and submits that information as an amendment to the GMP prior to commencing waste excavation and relocation activities.

22. CONSTRUCTION DOCUMENTS

The Construction Documents for Phase 8 include the Permit Drawings, Specifications, and Quality Assurance Manual (QAM). The site-wide Specifications used for previous phases of construction have been modified to include the construction procedures that will be required for Phase 8. The existing site-wide QAM has been modified to describe the Construction Quality Assurance (CQA) procedures that will be required for Phase 8. Also included in the Construction Documents for Phase 8 are: the Test Pad Work Plan, the Wick Drain Work Plan, the MSW Landfill Health and Safety Plan (HASP), and the Asbestos Landfill HASP. For each Phase of the project, WMDSM will submit Construction Documents for Department review and approval. The Construction Documents submitted will include Construction-level Drawings, and revisions as necessary to the remaining Construction Documents listed above, as appropriate.

During the application review process, items were identified that need to be addressed during preparation of the construction documents for each phase of the Phase 8 project. The applicant presented a summary list of the identified items in a letter dated February 15, 2002 from GeoSyntec Consultants to Waste Management. This list compiles the items based on the correspondence and discussions from the Technical Review Sessions held at the Department between June 2001 and February 2002, and includes the written review comments received from the Department, SW Cole, CMA/CDM, and ENSR. The February 15, 2002 letter does not include items identified during the public hearings. WMDSM has committed to incorporating all items from the February 15, 2002 letter and the public hearings into the construction documents for Phase 8.

The Board finds that the Construction Documents meet the requirements of the regulations provided that Construction Documents for each Phase of the project are submitted to the Department for review and approval prior to commencement of relevant

construction activities. The Construction Documents must include Construction-level Drawings and revisions as applicable to the Specifications, Quality Assurance Manual, Test Pad Work Plan, Wick Drain Work Plan, MSW Landfill HASP, and the Asbestos Landfill HASP.

23. QUALITY ASSURANCE

The applicant's proposed Quality Assurance Plan (QAP) was submitted as part of application Volume VIII of VIII – Construction Documents. The Quality Assurance Manual (QAM) provides for inspection, testing, and certification by qualified CQA personnel separate from the applicant as required by the regulations.

The QAP includes requirements for conformance testing of all construction materials to assure that all materials will meet specifications and perform as predicted through the design process. The applicant has proposed to use a test pad program to define construction procedures necessary to ensure the attainment of in-place specifications for the soil barrier layer. As part of the construction documents, WMDSM has submitted a Test Pad Work Plan to be used for each phase of construction. The test pad program was developed to describe procedures to be used for constructing a soil barrier layer test pad for the Phase 8 expansion. The objectives of this test pad program is to confirm that the proposed silt-clay borrow soil, contractor personnel, equipment and procedures, CQA personnel and procedures, and in-place moisture-density/permeability relationships are able to meet project specifications prior to full scale barrier layer construction.

The Board finds that the Quality Assurance Plan (and the Quality Assurance Manual) meet the requirements of the regulations, provided the Test Pad Work Plan is used for each phase of construction.

24. CLOSURE DESIGN

The application includes a conceptual closure design meeting the standards of the Maine Solid Waste Management Regulations. From the top down, the design includes:

- 6" of topsoil
- 12" protective soil layer
- A double-side drainage geocomposite
- A 40 mil (0.04 inch-thick) HDPE textured geomembrane
- An internally reinforced GCL
- 12" of silt clay borrow having a hydraulic conductivity less than or equal to $1x10^{-5}$ cm/sec
- 6" of intermediate cover

After achieving final grades in the Phase 8 area and confirming the safety factor is in accordance with the Regulations, a final cover will be installed. One year prior to final closure, WMDSM must submit a complete closure application meeting the requirements of the Solid Waste Management Regulations in effect at that time. The Phase 8 final cover system will be installed over the entire Phase 8 area, upon confirming the long term safety factor, including the existing landfill units (Phases 1-6, 7, and 9) that will be overfilled as part of the Phase 8 expansion. Final cover system slopes for the expansion will range from 4.5H:1V to 5.5H:1V, with not more than 30 feet of vertical rise between cover system benches.

Therefore, the Board finds that the applicant has provided a conceptual closure design that meets the standards of the Maine Solid Waste Management Regulations. The applicant will submit for Department review and approval a complete closure application meeting the requirements of the Solid Waste Management Regulations in effect at that time.

25. HOST COMMUNITY AGREEMENT

The applicant submitted a copy of the Host Community Agreement entered into with the Town of Norridgewock, dated January 2002, as part of its prefiled testimony. The agreement includes provisions for host community fees and additional public improvements (salt shed and thermal imaging camera), property value guarantees, road maintenance, attorney's fees, liability insurance, and requirements for waste transporters. To address concerns of potential costs incurred by the Town to review, monitor, inspect, test or investigate issues of concern, the applicant will establish an escrow account, in aggregate amount of $160,000 payable over 8 years, for the benefit of the Town. Upon final closure of Phase 8, funds remaining in the account may be transferred into the Town's general fund without additional restrictions.

Therefore, the Board finds that WMDSM has entered into a host community agreement with the Town of Norridgewock that contains the provisions required by 38 MRSA §1310-N(9) and has submitted proof of such agreement.

26. WATER QUALITY MONITORING PROGRAM

The applicant has submitted a Water Quality Monitoring Program (WQMP), prepared in accordance with the provisions of Chapter 401.6(C) of the Regulations. The plan provides for the monitoring of ground and surface water, leachate collection and leachate detection systems, the underdrain collection system, locations of sampling points, the

parameters to be analyzed and the reporting of results. The WQMP is based on results of the groundwater flow modeling, the measured potentiometric surfaces in the phreatic aquifer, till and bedrock, and the designed leachate collection system. It is designed to provide detection monitoring downgradient of the Phase 8 landfill and provide early detection of water quality changes in the unlikely event of a release.

The proposed Phase 8 monitoring program includes twenty-eight groundwater monitoring wells, five upgradient and twenty-three down/side gradient. Four of the wells are new; B-629B, B-629E, B-630B and B630E. Both the upgradient and downgradient wells are screened in the phreatic, till and bedrock aquifers. The surface water monitoring program will include six existing locations. A separate underdrain sampling point will be established for Phase 8A and the Phases 8B/C underdrain sampling point will be combined.

The Town of Norridgewock has requested that the Board require the applicant, as a condition of the license, use leachate "fingerprinting" as a method for detecting failures in the liner system, by sampling groundwater from the excavated 8B and 8C Phases and comparing it to leachate generated from the final lined Phase 8. WMDSM will collect a sample from each underdrain sump prior to placement of waste in the new landfill cells to assist in developing a fingerprint of the groundwater in the area of the waste excavation.

The parameters to be analyzed for the Phase 8 expansion are unchanged from the existing facility-wide WQMP. Sampling will occur three times throughout the year, April, August and November.

In accordance with the provisions of 38 MRSA §1310-N(10), upon written request to the Department from the owner of any property abutting the solid waste disposal facility, the Department will require WMDSM to conduct biannual sampling and analysis of a private water supply well used by the requestor for drinking water.

Based on the foregoing, the Board finds that WMDSM has prepared a Water Quality Monitoring Program in accordance with the Regulations.

BASED on the above Findings of Fact, the Board makes the following CONCLUSIONS:

A. The applicant has demonstrated sufficient title, right, or interest to the property on which the facility will be constructed and operated.

B. WMDSM has demonstrated the volume of the waste and the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to disposal, provided that the applicant does not enter into contracts with municipalities that would prevent municipalities from recycling those materials which the municipalities deem to be recyclable or take other actions that interfere with a municipality's or other MSW generator's recycling and source reduction programs.

C. WMDSM has provided adequate evidence of financial capacity and financial assurance to meet air and water pollution control and other applicable regulatory standards, provided the applicant modifies the existing performance bond to include the projected closure and post-closure costs for Phase 8 and submits documentation of these revisions prior to placing waste in the Phase 8 expansion area.

D. The applicant has demonstrated adequate proof of liability insurance for sudden and accidental occurrences for the facility, provided WMDSM submits the current certificate of insurance to the DEP on an annual basis and the policy remains in effect throughout the active life and closure of the facility.

E. WMDSM has provided adequate evidence of technical ability, provided the applicant develops, at the direction of Department staff, a third-party inspection program and pays all applicable costs associated with a third-party inspector, working on behalf of the DEP, to monitor construction activities associated with the waste excavation and relocation activities and subgrade preparation, in areas where waste previously existed, for the Phase 8 project.

F. WMDSM has made adequate provisions for traffic movement of all types into, out of, and within the development area, provided that WMDSM implements the Transporter Rules and Regulations proposed as part of the Host Community Agreement.

G. WMDSM has made adequate provision for fitting the development harmoniously into the existing natural environment and the development will not adversely affect the existing uses, scenic character, or natural resources in the municipality or in neighborhood municipalities, provided the applicant conducts sound monitoring at receivers 13 and 17 following construction of the Noise Control Berms and submits the results of the monitoring to the Department and the Town of Norridgewock.

H. The proposed landfill expansion will not unreasonably adversely affect air quality, provided the applicant decreases the spacing of vertical collector pipes, installs landfill gas toe collectors and additional horizontal collectors, conducts periodic surface scans of the landfill consistent with NSPS regulations, provides for the installation and operation of a total of 3 monitors for hydrogen sulfide, at select locations, in order to confirm the

model predictions and periodically collects and analyzes representative samples of landfill gas from the Phase 8 landfill for hydrogen sulfide.

I. WMDSM has filed an accurate civil/criminal disclosure statement, and WMDSM has not received a Notice of Violation, Administrative Order, Consent Decree, or civil penalty for non-compliance of environmental laws or rules in the past five years, nor has it been convicted of any criminal law.

J. The proposed landfill expansion will not unreasonably cause or increase the flooding of the alteration area or adjacent properties, nor create an unreasonable flood hazard to any structure.

K. WMDSM has made adequate provisions for utilities, including water supplies, sewerage facilities, solid waste disposal and roadways required for the proposed landfill expansion, and the landfill expansion will not have an unreasonable adverse effect on the existing or proposed utilities or roadways in the Town of Norridgewock or the area served by those services, provided the applicant submits updated contracts for leachate disposal upon renewal with the leachate disposal facilities.

L. The proposed landfill expansion will be built on soil types that are suitable to the nature of the undertaking and will not cause unreasonable erosion of soil or sediment, nor inhibit the natural transfer of soil.

M. The proposed landfill expansion will not pose an unreasonable risk that a discharge to a significant groundwater aquifer will occur in that the landfill expansion is not located over a significant sand and gravel aquifer. The proposed landfill expansion does not pose an unreasonable threat to the quality of a significant sand and gravel aquifer which it does not overlie, or to an underlying fractured bedrock aquifer, in that the soils under the landfill expansion, the proposed design of the landfill expansion, the groundwater flow conditions, and the implementation of the Water Quality Monitoring Plan provide adequate protection to water quality.

N. The proposed landfill expansion will not pollute any waters of the State or otherwise unreasonably adversely affect surface or groundwater quality, contaminate the ambient air, constitute a hazard to health and welfare, or create a nuisance. Compliance with the intent of the Solid Waste Management Rules has been affirmatively demonstrated.

O. WMDSM has made adequate provisions for controlling erosion, provided the approved Erosion and Sedimentation Control Plan is fully implemented.

P. WMDSM has adequately addressed the stability of the proposed landfill expansion provided it monitors the facility in accordance with the approved Settlement and Stability Monitoring Plan.

Q. WMDSM has entered into a host community agreement with the Town of Norridgewock that contains the provisions required by 38 MRSA §1310-N(9) and has submitted proof of such agreement.

THEREFORE, the Board APPROVES the noted application and all variances of WASTE MANAGEMENT DISPOSAL SERVICES OF MAINE SUBJECT TO THE ATTACHED CONDITIONS, and all applicable standards and regulations:

1. The Standard Conditions of Approval, a copy attached as Appendix A.

2. The applicant shall not enter into contracts with municipalities that would prevent municipalities from recycling those materials which the municipalities deem to be recyclable or take other actions that interfere with a municipality's or other MSW generator's recycling and source reduction programs.

3. The applicant shall modify the existing performance bond to include the projected closure and post-closure costs for Phase 8 and submit documentation of these revisions prior to placing waste in the Phase 8 expansion area.

4. WMDSM shall submit the current certificate of insurance to the DEP on an annual basis and the policy shall remain in effect throughout the active life and closure of the facility.

5. WMDSM shall develop, at the direction of Department staff, a third-party inspection program and pay all applicable costs associated with a third-party inspector, working on behalf of the DEP, to monitor construction activities associated with the waste excavation and relocation activities and subgrade preparation, in areas where waste previously existed, for the Phase 8 project. WMDSM shall provide a copy of this submittal to the Town of Norridgewock and notice shall be provided to the intervenors of its submission to the Department of this document.

6. WMDSM shall implement the Transporter Rules and Regulations proposed as part of the Host Community Agreement.

7. The applicant shall decrease the spacing of vertical collector pipes, install landfill gas toe collectors and additional horizontal collectors, conduct periodic surface scans of the landfill

consistent with NSPS regulations, provide for the installation and operation of additional continuous monitoring equipment for hydrogen sulfide, at select locations, in order to confirm the model predictions and periodically collect and analyze representative samples of landfill gas from the Phase 8 landfill for hydrogen sulfide.

8. The applicant shall submit updated contracts for leachate disposal to the Department upon renewal with the leachate disposal facilities.

9. The applicant shall submit to the Department for review and approval a minimum of Sixty (60) days prior to commencing construction of each landfill phase as applicable:

   A. Construction documents, including Drawings, Specifications, Quality Assurance Manual, Test Pad Work Plan, Wick Drain Work Plan, MSW Landfill HASP, and the Asbestos Landfill HASP;
   B. A design for additional leachate collection pipes on the base of the landfill;
   C. A construction period erosion and sediment control plan;
   D. A geotechnical evaluation for the phase, including but not limited to, geotechnical instrumentation and monitoring plans for construction and operations periods, re-analysis of the remaining stability cross sections for the affected phase, modification of construction documents to clearly show the acceptable amount of exposed clay surface allowable during waste excavation, analysis of pipe excavations in excess of 3 feet, modification of construction documents to include provisions for measuring waste density during waste placement, and a proposal for continued funding for an Outside Reviewer working on behalf of the Department to review geotechnical aspects of the phase.
   E. A geotechnical monitoring plan that includes installation details for the monitoring instruments, provisions for protection of the instruments during construction, provisions for monitoring the unit weight of the soil backfill for the MSE berms, and chain of command procedures that clarify the roles and responsibilities of the people and/or companies responsible for timely geotechnical data monitoring, interpretation, and reporting;
   F. The results and interpretation of the Wick Drain Work Plan; and
   G. The results and interpretation of the MSE berm test borings, including additional bearing capacity analyses as necessary;

The requirement to submit the materials identified in this Condition a minimum of sixty (60) days prior to commencing construction of each landfill phase shall not apply to the following four construction activities proposed as part of Phase 8A and scheduled to occur during the year 2002:

1. Construction of Erosion Control Structure (ECS) #29;

2. West Central Pump Station and associated structures;

3. Construction of the MSE Berm along the south end of Phase 8;

4. Construction of the MSE Berm along the east side of Phase 1-6 of the existing special waste landfill.

With respect to these activities, the applicant must obtain Department review and approval of the final construction documents that pertain to each of those activities prior to commencing construction of the activity in question.

10. The applicant shall submit to the Department for review and approval a minimum of Sixty (60) days prior to commencing operation of each landfill phase:

    A. A phase-specific operating plan;
    B. A means to monitor leachate head build-up on the primary liner system;
    C. For Phase 8A only, a plan for installation of piezometers and settlement platforms in the temporary terrace along Construction Section C-6;
    D. A design for the landfill gas collection system efficiency improvements;
    E. A revised ambient air monitoring plan; and
    F. Procedures for a notification system to the Department, Town, and other interested citizens in response to action levels established in the ambient air monitoring plan.

11. The applicant shall submit to the Department for review and approval a minimum of sixty (60) days prior to commencing construction of each landfill phase a geotechnical assessment of the critical liner interfaces and a quality assurance conformance testing program for critical interface friction angles. The test results from the program shall be submitted for review and approval at least fifteen (15) days prior to commencement of construction of the geosynthetic lining system of each phase.

12. The applicant shall submit photographic documentation, record drawings and a final construction report for each landfill phase construction in conformance with the requirements of Sections 401.3.F, 401.3.G and 401.3.H of the Solid Waste Management Rules.

13. Prior to construction of a final cover system on Phase 8, the applicant shall submit to the Department for review and approval an application for a closure plan.

14. Concurrent with submittal of documents and letters to the Department, WMDSM shall send copies of these submittals to the Town of Norridgewock, with notice of such submittals provided to intervenors and other interested parties. Notification of construction and

WASTE MANAGEMENT DISPOSAL SERVICES OF MAINE, CROSSROADS LANDFILL NORRIDGEWOCK SOMERSET COUNTY, MAINE LANDFILL EXPANSION – PHASE 8 #S-010735-WD-UW-N (APPROVAL WITH CONDITIONS)	57))))))	SOLID WASTE ORDER NEW LICENSE

operational meetings shall be made to the Town of Norridgewock with opportunities for Town input and site access provided.

15. The applicant shall submit to the Department for review and approval a minimum of sixty (60) days prior to a new lift stage of each landfill phase, settlement estimates for intermediate fill heights in areas where settlement devices are installed, strength gain data, and updated stability analyses that support the proposed height of the next lift stage of landfilling.

16. During landfill construction and initial operations, the applicant shall designate one qualified person whose principal responsibility is to coordinate, coalesce, compare to action levels defined by accepted plans, and distribute monitoring data to the Department, and the Town of Norridgewock.

DONE AND DATED AT AUGUSTA, MAINE, THIS 31st DAY

OF AUGUST, 2002.

BOARD OF ENVIRONMENTAL PROTECTION

BY: _____
John D. Tewhey, Chairman

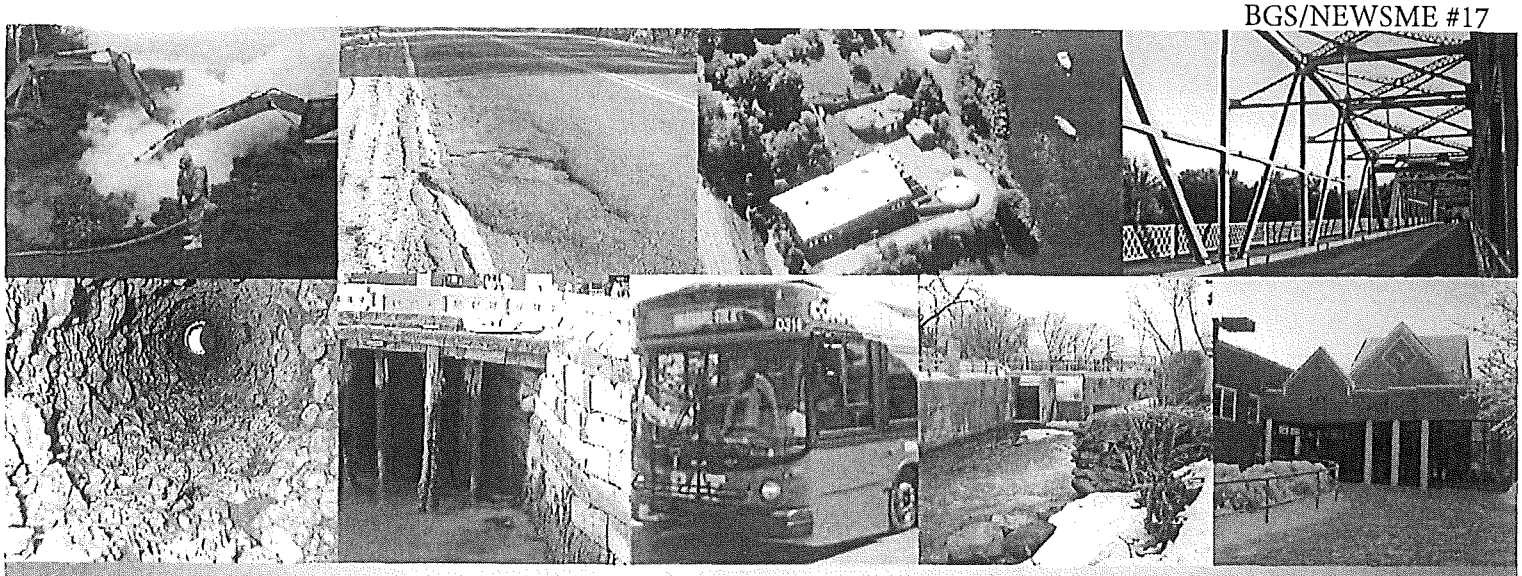
PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

Date of initial receipt of application: 04/05/2001.
Date of application acceptance: 04/27/2001.

Date filed with Board of Environmental Protection:

This Order prepared by Michael T. Parker, Bureau of Remediation & Waste Management.

XMP35748/mtp



Report Card for Maine's Infrastructure

December 6, 2012

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Maine Section
American Society of Civil Engineers

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2012 Report Card
FOR MAINE'S
Infrastructure

Issued December 6, 2012

SOLID WASTE

Grade: C-

Overview

Maine's solid waste disposal rate has declined since 2008; however, per-capita waste generation remains higher than the national rate. Recycling is stagnant and remains below state-established goals. Despite no new landfill capacity and closures of a commercial landfill and an incinerator, capacity exists to meet short term disposal needs; however, changes in policies and long term planning and investment are necessary to ensure that new disposal capacity is developed in a timely manner.

Background

In the late 1980s, the State of Maine enacted legislation that resulted in significant improvements to the way solid waste was managed. Since that time, solid waste management in Maine has continued to evolve, as the state strives to follow the hierarchy developed for disposal:

1. Reduction of waste generated at the source, including both amount and toxicity of the waste;
2. Reuse of waste;
3. Recycling of waste;
4. Composting of biodegradable waste;
5. Waste processing that reduces the volume of waste needing land disposal, including incineration; and
6. Land disposal of waste.

In the past two decades, the rate of recycling has more than doubled as public recycling services have been made available to nearly all of the State's population; toxic materials have been kept out of the waste stream by requiring recycling and special collection of certain hazardous materials like universal wastes; nearly all of the State's substandard landfills have been capped and closed to reduce their impact on the environment; and new landfills and expansions have been held to siting, design, and monitoring standards that help to protect the environment.

In accordance with the original legislation, periodic waste management plans have been developed, first by the Maine Waste Management Agency, and later by the Maine State Planning Office (SPO). The most recent plan entitled "Waste or Resource? Rethinking Solid Waste Policy" was issued by the SPO in 2009. The plan provided an assessment of current policies and a review of changes since the previous plan was issued ten years prior. The SPO has been responsible for gathering and reporting data on Maine's solid waste, and the 2009 plan included a summary of data through the previous years. In addition to the 2009 plan, the SPO issues annual reports on solid waste disposal. These reports summarize the results of facility annual reports to provide updated waste characterization, disposal rates, recycling rates, and capacity projections. The most recent report was issued in 2012, and contains data from 2010.

In 2012, in an effort to consolidate State government agencies, most of the solid waste management tasks previously under SPO jurisdiction were taken on by the Maine Department of Environmental Protection (DEP). The DEP's Bureau of Remediation and Waste Management will now contain a Sustainability Unit, which will be responsible for oversight of recycling, solid waste capacity, and other solid waste functions. In addition to solid waste, the group will be responsible for climate change, energy efficiency, and various topics related to sustainability. The DEP is optimistic that the new approach will allow for better decision making towards sustainability in Maine.

Condition and Adequacy

The condition of Maine's solid waste system was evaluated by comparing the State's waste generation rates to the available capacities for disposal – including landfill, incineration, and recycling.

MSW Generation Rates: In 2010, the SPO estimated that Maine residents and businesses generated 1.7 million tons of municipal solid waste (MSW), including bulky waste like construction and demolition debris. This equates to approximately 7 pounds per person per day. The United States Environmental Protection Agency (EPA) reports MSW without including bulky waste. Using the EPA definition of MSW, 1.4 million tons of MSW was disposed of in 2010, or about 5-1/2 pounds per person per day in Maine.

This disposal rate in Maine remains 30% higher than the national rate of 4.4 pounds per person per day; however, the rate is down from previous years. From 2005 to 2010, the rate of disposal has decreased by nearly 12%. From 1993 through 2001, waste generation increased by 42%, but from 2003 through 2007 waste generation growth leveled off, with an increase of only 1%. Since that time, waste generation has decreased, reflecting the economic downturn that began in 2008.

3Rs (Reduce, Reuse, Recycle): Maine's legislative goal was to achieve a 50% MSW recycling rate by January 1, 2009. Based on the most recent data from 2010, this rate has not been achieved, with only 38.7% of MSW recycled. However, this represents a slight increase over the prior five years, but Maine's recycling rate has remained relatively consistent, and under 40%, since 2001. Based on the EPA definition of MSW (excluding bulky wastes), the recycling rate in Maine was 44.3%, in comparison to the national rate of 34.1%.

The 2009 SPO waste management plan addressed why the state-established 50% recycling goal has not been met and made recommendations on how to achieve this goal in the future. Looking ahead over 20 years, just to maintain a 35% recycling rate, public and private programs would need to double their recycling handling capacities, and to achieve 50%, this would need to increase even more. To accommodate this increase, there would need to be capital improvements made by municipalities and private recyclers, higher staffing expenditures, and increased efforts to promote recycling to bring in the material to process. This promotion is currently ongoing throughout the state in the form of public education campaigns, emphasis on the ease of recycling with new technologies, and incentives like pay-as-you-throw, but further work will be necessary to ensure that there is enough waste to make improvements economically viable, and a higher recycling goal feasible.

Volume reduction (incineration): Until 2012, there were four Waste-To-Energy (WTE) facilities in operation in Maine:

- ecomaine (formerly Regional Waste Systems), Portland;
- Maine Energy Recovery Corporation (MERC), Biddeford;
- Mid-Maine Waste Action Corporation (MMWAC), Auburn; and
- Penobscot Energy Recovery Company (PERC), Orrington.

Note that the ecomaine WTE facility is separate from the ecomaine single-sort recycling facility. In July 2012, the Biddeford City Council voted to purchase and close the MERC facility, ending years of uncertainty on the future of the facility. The SPO's most recent published data on the WTE facilities is from 2010, and still includes data from MERC.

MERC and PERC utilize refuse derived fuel technologies (whereby the waste is processed prior to incineration), while the ecomaine WTE facility and MMWAC are mass burn technologies, which does not include waste processing prior to incineration. The four facilities produce approximately 62 megawatts of electricity.

In 2010, 35.4% of Maine's MSW was sent to a WTE facility. The total for 2010 represented a decrease of nearly 18,000 tons from the previous year. Of the total 856,941 tons of waste, 562,347 tons originated in state, and 294,594 was from out of state. Importation of waste is necessary to allow the WTE facilities to operate at an efficient burn rate in the incineration units. Bypass waste, front end process residue, and ash from the WTE facilities are all landfilled. In 2010, approximately 325,000 tons of these WTE residues were disposed of in landfills.

With the closure of MERC, the available capacity at Maine's WTE facilities will decrease. In 2010, MERC accepted 284,718 tons of waste, including 98,758 tons of in-state waste, and 185,960 tons of imported waste. It is anticipated that in-state waste that previously went to MERC will be processed in southern Maine, and will be transported to the

Juniper Ridge Landfill in Old Town for disposal without incineration, thereby consuming 2 to 3 times more disposal volume.

Landfilling and Disposal Capacity: In 2010, Maine's solid waste landfills included one state-owned landfill, one commercial landfill, ten municipally-operated landfills, and about 20 municipal construction and demolition debris (CDD) landfills. Several processing facilities/operations were also available for managing construction and demolition debris.

Twelve landfills accepted the majority of waste generated in Maine in 2010, including municipal waste, CDD, and ash from the four WTE facilities. Of the 12 landfills, six (Bath, Brunswick, Greenville, Hatch Hill in Augusta, Presque Isle, and Tri Community in Fort Fairfield) are municipally owned and are used primarily to dispose of MSW generated in the member communities; two (Lewiston and ecomaine in Portland) are municipally owned and operated by regional entities to dispose of residue from two of the WTE facilities; one (Crossroads in Norridgewock) is privately owned and accepts MSW and special wastes; two (Rockland and Mid Coast in Rockport) primarily accept construction and demolition debris; and one (Juniper Ridge in West Old Town) is owned by Maine, with its operation subcontracted to a commercial solid waste company.

In 2009, the Pine Tree Landfill in Hamden closed, and waste that used to be disposed of at that facility is now diverted to Juniper Ridge in Old Town. In its last year of operation, the facility accepted 413,207 tons of solid waste, including cover materials. Of that, 117,995 tons was MSW, CDD, and processing residues generated in Maine.

Municipal landfill closures have been continuing in the past few years. In 2008, the Caratunk, Forks, West Forks Landfill (CFWF) was closed. In 2007, its last year accepting waste, the facility only landfilled about 1,000 tons of waste. In 2012, the landfill in the Town of Greenville will be closed. This facility represented only 1,824 tons of capacity in 2010. These municipal closures and others in the future represent only a small impact on statewide capacity, but can have significant local impacts on municipalities which must find and fund other disposal options for their MSW.

With the 1989 ban on new commercial landfills, the legislature tasked the SPO with siting and developing new disposal capacity for Maine for MSW and special waste, depending on the needs identified through the SPO's periodic disposal capacity projections. In the 1990s, the State permitted a landfill on a site in the unorganized territory of T2 R8, outside of Lincoln, which is known as the Carpenter Ridge site. This permit is held in reserve in case Maine's estimated disposal capacity becomes less than six years. At that time, the SPO (or the acting solid waste authority) is required to notify the legislature and provide recommendations regarding construction and operation of the Carpenter Ridge facility. The anticipated capacity of this facility is not included in the SPO's most recent capacity projections. In addition, planned, but unpermitted capacity increases for the state-owned Juniper Ridge Landfill are no longer included in capacity projections.

In 2010, the SPO estimated that between 2010 and 2030, 22.6 to 25.7 million cubic yards of landfill capacity would be required to adequately dispose of the State's solid waste and the residue from its WTE facilities. Considering 2010 fill rates, applying no adjustments, and considering only the currently permitted landfill space, at the end of 2030, only 3.1 million tons of capacity will remain.

However, these waste generation projections, as well as the disposal capacity projections were based on the following assumptions which greatly impact capacities:

- Only the current waste disposal rates were assumed, with no adjustments in projections to account for fluctuation in waste generation or recycling rates that would be expected to increase over the long-term;
- Consistent annual waste to energy capacities were assumed, with no change accounted for over the 20 year span; this assumption is already incorrect as it included the MERC facility which was closed in 2012;
- The Carpenter Ridge landfill was maintained as undeveloped, and Juniper Ridge expansions as unpermitted.

Conclusions and Recommendations

Solid waste management has improved due to 1980s legislation and external influences since that time, resulting in:

- Enhanced protection of public health and the environment through the closure of obsolete facilities, reduction of toxics in the waste stream, and strict regulations governing solid waste facilities;
- Increased public awareness of solid waste issues and infrastructure;
- Development of new technologies, most notably single sort recycling;
- Achievement of reasonable recycling rates that are greater than the national average; and
- Provision of adequate disposal capacity based upon today's generation rates.

The economic slump during the past four years has resulted in disposal rates decreasing for the first time since the mid 1990s. While this reduction is a short term benefit, it can also represent a long term uncertainty. During the same four-year span, there has been no increase in landfill capacity and one WTE facility is slated to closure.

Today, the state's solid waste management system is adequate. However, to maintain adequate disposal capacity into the future, a number of issues need to be addressed:

- Solid waste generation rates remain higher than national levels;
- Recycling rates have stagnated and recycling goals have not been achieved;
- The loss of disposal facilities (capacity) has not been offset by expansions or new facilities;
- The responsibility for solid waste management planning at the state level has recently changed; and
- Though policy decisions are made at the State level, solid waste management is still the responsibility of and funded almost entirely by municipalities. Thus, state policy makers must consider the costs to local tax payers for solid waste management, yet strive to maintain environmental protection, especially as disposal facilities close and disposal options in some areas of the state become more limited.

Maine ASCE gives solid waste a grade of C-.

Maine ASCE makes the following recommendations:

- Continue state support to municipalities to enhance local solid waste management programs, with emphasis on cost-effective reuse and recycling, and support of household hazardous waste collection;
- Promote waste reduction, recycling, and beneficial reuse of waste products. This should include incentives for solid waste service providers for the development of new technologies, enhanced and new beneficial reuse of waste, and new markets for recyclables;
- Continue to review and update Maine's solid waste policies to reflect technological advances made in the solid waste industry, current or present-day public opinion, and current management policy, as well as Maine's variations in population density, waste generation rates, and type of waste generated;
- Respond to annual updates of the solid waste plan and capacity projections in a timely manner, recognizing the long time necessary for permitting and constructing additional (disposal) capacity; and
- Ensure that changes to solid waste management planning at the state level do not result in lost momentum.

Sources

- Code of Federal Regulations (CFR) Title 40: Protection of the Environment; Part 258 – Criteria for Municipal Solid Waste Landfills;
- Maine Revised Statutes Annotated (MRSA) Title 38; Chapters 13 (Waste Management) and 24 (Solid Waste Management and Recycling);
- Report entitled "Solid Waste Disposal Capacity Report for Calendar Year 2010," prepared by the Maine State Planning Office for the Joint Standing Committee on Natural Resources of the 123rd Legislature, and dated January 2012;
- Report entitled "Solid Waste Disposal Capacity Report for Calendar Year 2009," prepared by the Maine State Planning Office for the Joint Standing Committee on Natural Resources of the 123rd Legislature, and dated January 2011;
- Report entitled "Waste or Resource? Rethinking Solid Waste Policy – State of Maine Waste Management and Recycling Plan," prepared by the Maine State Planning Office, and dated January 2009.
- Fact Sheet entitled "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2010," prepared by the United States Environmental Protection Agency, dated December 2011.
- Article entitled "Biddeford council votes to close MERC," by Gillian Graham for the Portland Press Herald, dated July 18, 2012.
- Web site of the Waste Management and Recycling Program of the Maine State Planning Office, http://www.state.me.us/spo/, accessed October, 2012;
- Web site of the Bureau of Remediation and Waste Management, Maine Department of Environmental Protection, http://www.maine.gov/dep/waste/index.html, accessed October 2012;
- Maine DEP "Update on New Duties," email dated June 19, 2012.
- 2010 Maine Census

Pre-Filed Rebuttal Testimony of Jeremy Labbe
Before the Department of Environmental Protection

Juniper Ridge Landfill

DEP Application S-020700-WD-BC-A

The purpose of this rebuttal testimony is to clarify that the recent air license A-921-77-2-A, issued for the Juniper Ridge Landfill (JRL) on November 26, 2012, includes consideration of both the change in landfill gas (LFG) flows associated with the proposal of the pending JRL Amendment Application and the greenhouse gas emissions (GHGs) from the JRL facility. *See* BGS/NEWSME Exhibit #18. This testimony responds to Ed Spencer's direct testimony on certain air emissions aspects of the Application. *See* Spencer Testimony at 2-3 (arguing that disposal of MSW at JRL will have a greater impact on air quality than incineration, and thus, under the hierarchy, incineration should be required here).

In particular, I will explain: (1) that JRL air emissions, including GHGs, were quantified and evaluated in JRL's recent air emissions license application, and then approved by the DEP as part of the new air license, and (2) that the proposed MSW amendment was considered by both NEWSME and the DEP as part of the air licensing process.

On August 5, 2011, NEWSME submitted an application to license the existing large utility flare (flare #4) at maximum design capacity, at a new location at the JRL site, and the existing two backup flares (flares #2 and #3) to combust the landfill gases collected by the active gas collection and control system. As part of this licensing process, Sanborn Head performed an LFG generation rate sensitivity analysis using methods developed by EPA and commonly accepted for use by the industry and state environmental agencies around the country, including the DEP, for many years. Being based on the maximum capacity of flare #4, the LFG flow projections were intentionally conservatively high and accounted for LFG that could result from

additional waste that may be disposed at JRL due to the closure of Maine Energy. Sanborn Head then used the LFG generation projections to develop future projections of emissions, including GHGs. These emissions estimates were also based on methods developed by EPA and commonly accepted by the industry and state agencies throughout the country, including the DEP, for landfills and other types of facilities. Among other things, the emissions estimates demonstrated that emissions of GHGs from JRL would be below regulatory thresholds established by EPA and DEP air permitting regulations.

Sanborn Head then developed and submitted to the DEP for approval a modeling protocol that proposed using the most up-to-date EPA ambient air quality model, the aforementioned emissions rates, and a 5 year meteorological database for the area to determine whether future emissions from JRL would meet federal and state health-based ambient air quality standards. The DEP reviewed and approved the proposed modeling protocol. Sanborn Head then performed the modeling and provided the model inputs and results to the DEP as part of JRL's air license application. The model results demonstrated that JRL's emissions will meet federal and state ambient air quality standards, including EPA's new, more stringent standards for NOx, SO2 and CO, at and beyond JRL's fence line.

As part of the air licensing process, the public was given ample opportunity to review and comment on air emissions from JRL as follows: (i) in July 2011, JRL published a notice in the newspaper of a public information meeting; (ii) later in July 2011, JRL held a public information meeting, which was attended by several members of the public, including Mr. Spencer; (iii) in August 2011, JRL published a public notice of its intent to file the air license and announced a 20 day public comment period and opportunity to request a public meeting and/or hearing; (iv) JRL mailed a copy of the public notice of intent to file to abutters; (v) JRL republished notice of

intent to file in the newspaper for three consecutive weeks in April and May of 2012, which announced another 20 day public comment period; (vi) in October 2012, JRL published a public notice of the availability of the draft JRL air license for public review, a 30 day public comment period on the draft license, and the date and time a public meeting on the draft license would be held if a member of the public requested such a meeting. The draft license contained DEP's proposed findings that emissions from JRL will meet Best Available Control Technology requirements and federal and state ambient air quality and increment standards, and that GHGs from JRL will be below the EPA and DEP air permitting thresholds. Although some members of the public asked questions of NEWSME during the pre-filing public information meeting, JRL understands that the DEP did not receive any formal comments from the public during any of the three public comment periods nor any requests for additional public meetings or hearings on the air license application or draft air license. The new air license was not appealed, and is now final.

As a result, the DEP has determined that emissions from JRL will meet all DEP air quality and air permitting requirements, including the new EPA ambient air quality standards as modeled using EPA's most up-to-date model. In contrast, based on discussions with DEP Air Bureau staff, JRL does not believe that ecomaine or MMWAC, two alternative disposal sites, have yet similarly demonstrated that emissions from those facilities meet EPA's new, more stringent ambient air quality standards, nor that GHG emissions from those facilities are below EPA or DEP air permitting thresholds. As a result, of the disposal options that have been discussed in direct testimony in this proceeding, including those favored by Mr. Spencer, only JRL has demonstrated that it meets EPA's and DEP's most recent health-based air quality standards.

In summary, GHG emissions are regulated by the DEP Bureau of Air Quality, and have already been determined to meet applicable DEP requirements, as part of the recent air emission license process. Changes in landfill air emissions associated with the proposed MSW amendment were addressed in JRL's air license application and the public, including Mr. Spencer, had multiple opportunities to comment on GHG or other air emissions concerns during that process – opportunities that he did not pursue. The appeal period for the air license expired without any appeals being filed. Neither Mr. Spencer nor any other party should now be able to do an end-around on the appeal period for that license by challenging JRL's air emissions in this proceeding or otherwise arguing that JRL's air emissions somehow justify a decision under the solid waste hierarchy to deny this application in favor of incineration.

Dated: 3/21/13

Jeremy Labbe

STATE OF MAINE
Penobscot, ss.

Personally appeared before me the above-named, Jeremy Labbe, and made oath that the foregoing is true and accurate to the best of his knowledge and belief.

Before me,

Dated: March 21, 2013

Notary Public
Name: Maria J. Thibodeau
My Commission Expires: 6-6-15

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

State of Maine and
NEWSME Landfill Operations, LLC
d/b/a Juniper Ridge Landfill
Penobscot County
Old Town, Maine
A-921-77-2-A

Departmental
Findings of Fact and Order
New Source Review
NSR #1

After review of the air emissions license amendment application, 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

FACILITY	State of Maine and NEWSME Landfill Operations, LLC d/b/a Juniper Ridge Landfill (Juniper Ridge Landfill)
LICENSE TYPE	06-096 CMR 115, Major Modification
NAICS CODES	562212
NATURE OF BUSINESS	Solid Waste Landfill
FACILITY LOCATION	Old Town, Maine

Juniper Ridge Landfill is a solid waste disposal facility currently owned by the State of Maine (State Planning Office) and operated by NEWSME Landfill Operations, LLC.

B. Amendment Description

Juniper Ridge Landfill has submitted an application to permanently license the existing large utility flare (Flare #4) at a new location on site and the existing two backup flares (Flares #2 and #3) to combust the landfill gases collected by the active gas collection and control system. Flares #2 and #3 are not licensed to operate simultaneously with Flare #4. This license requires JRL to install and operate Total Reduced Sulfur (TRS) control equipment to reduce SO_2 emission rates. TRS is an aggregate of sulfur containing compounds, consisting of hydrogen sulfide (H_2S) as the primary compound along with other compounds such as mercaptans, ethyl methyl sulfide, and thipphene.

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C. Emission Equipment

The following equipment is addressed in this air emission license:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Max.Firing Rate (scfm landfill gas at 50% methane)	Fuel Type	Stack #
Flare #2	22.5	750	Landfill Gas	2
Flare #3	40.5	1350	Landfill Gas	3
Flare #4	106.5	3550	Landfill Gas	4

D. Application Classification

The modification of a major source is considered a major modification based on whether or not expected emissions increases exceed the "Significant Emission Increase Levels" as given in *Definitions Regulation*, 06-096 CMR 100 (as amended).

The emission increases for this license have been determined by subtracting the average actual emissions of the 24 months preceding the modification (or representative 24 months) or current licensed allowed, whichever is lower, from the maximum future license allowed emissions. The results of this test are as follows:

Pollutant	2009/2010 Baseline	Proposed Future Licensed Emissions (ton/year)	Change: Below or Above Significance Levels	Significance Level (ton/year)
PM	-	7.9	below	25
PM_{10}	-	7.9	below	15
$PM_{2.5}$	-	7.9	below	10
SO_2	-	449	above	40
NO_X	-	31.7	below	40
CO	-	172.6	above	100
VOC	0.1	40.0	below (39.9 tpy)	40
GHG including biogenic CO_2 (CO_2 eq)	38,133	97,356	below (59,223 tpy)	75,000
GHG excluding biogenic CO_2 (CO_2 eq)	3,135	8,004	below (4,869 tpy)	75,000

Based on the above comparison, this amendment is determined to be a major modification and has been processed under *Minor and Major Source Air Emission License Regulations* 06-096 CMR 115 (as amended) since the changes being made are not prohibited by the Part 70 air emission license.

Prior to submitting the major modification application, Juniper Ridge Landfill met and had contact with the Department various times for pre-application meeting purposes, held a public information meeting on July 27, 2011 at the Old Town City Council Chambers in Old Town, ME, and held a pre-submission meeting with the Department on August 5, 2011. The public notice of its intent to file the application was published on August 5, 2011 and the notice was republished on April 26, May 3, and May 10, 2012. The Federal Land Managers (FLMs) were notified of the project. The notification to the FLMs included a project summary, distances from the source to each of the Class I areas and the magnitude of proposed emissions increases on a pollutant-by-pollutant basis. In May 2011, an FLM representative from each of the affected Class I areas (Acadia National Park, Moosehorn National Wildlife Refuge, Roosevelt Campobello International Park, and Presidential Range/Dry River/Great Gulf Wilderness Area) determined that Class I Air Quality Related Values (AQRV) analyses would not be required.

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 *Definitions Regulation*, 06-096 CMR 100 (as amended). 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 06-096 CMR 100. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

Before proceeding with the emission requirements, the following is provided as background information.

Facility Description and Historical Information

The State of Maine (Maine State Planning Office) owns the Juniper Ridge Landfill which is currently operated by NEWSME Landfill Operations, LLC under a February 5, 2004 Operating Services Agreement.

The Juniper Ridge Landfill has a solid waste disposal facility license. Originally issued on July 28, 1993 to the previous owner of the landfill for the disposal of pulp and paper residuals generated by its paper mill, the current license was issued on April 9, 2004 to Juniper Ridge Landfill to accept construction and demolition debris, residues (ash, front-end process residue, and over-sized bulky wastes) generated by municipal solid waste incinerators located in Maine, municipal solid waste by-pass from the incinerators, water/waste water treatment plant sludge, and lesser amounts of non-hazardous wastes.

An active gas collection and control system and two utility flares were installed at the facility to control odors and to reduce greenhouse gas emissions and an air emission license was issued on December 20, 2005 (A-921-70-A-I). These flares minimize odors by combusting the landfill gas which contains total reduced sulfur compounds (TRS). The combustion process converts TRS to sulfur dioxide, which is significantly less odorous than TRS. As part of this 2011 application process, JRL submitted modeling results using EPA-approved models demonstrating that SO_2 emissions from the flares at the proposed licensed emission rates will not cause or contribute to ambient air quality impacts above health-based ambient air quality standards, including EPA's new NO_2 and SO_2 standards promulgated in 2010 and EPA's new CO standard promulgated in 2011.

Since the issuance of the initial air emission license, Juniper Ridge Landfill has tested and estimated the landfill emissions on an ongoing basis and has brought various sized flares on-site with the Department's approval as temporary activities as it investigated different control options. Juniper Ridge Landfill also submitted a BACT analysis on June 27, 2008 which is superseded by the current application.

This license amendment addresses the permanent operation of the large utility flare with two others to be used as back-up. The license amendment application was submitted in August 2011 and updated in October 2011 and January 2012 based on discussions with the Department and a request for additional ambient air quality analysis information.

TRS, H_2S, and SO_2 – Clarification of Terms Used

This license addresses the control of total reduced sulfur (TRS) present in the landfill gas. Based on actual periodic TRS grab sample tests performed at the facility, the speciation results show that H_2S is the primary TRS constituent of the landfill gas (approximately 99%) with the remaining 1% consisting of additional various sulfur containing compounds. This license includes requirements for total TRS as well as TRS measured as H_2S.

The combustion of TRS gases results in the formation of SO_2. The SO_2 emissions are directly correlated to the amount of sulfur in the landfill gas prior to combustion.

B. Landfill Gas Collection Rate

Projected gas emissions were estimated by a Landfill Gas Collection Rate Sensitivity Analysis conducted in February 2007 for Juniper Ridge Landfill. The US Environmental Protection Agency's (EPA's) Landfill Gas Emissions Model (LandGEM) was used and the input parameters were varied to assess a range of landfill gas collection rates. The sensitivity of estimated landfill gas collection rates to changes in degradable waste composition and changes in the two LandGEM input constants (methane generation rate (k) and methane generation potential (L_0)) were evaluated.

Fourteen sets of modeling results were generated based on two scenarios for waste composition and seven sets of model parameters. The LandGEM's landfill gas generation rates were converted to landfill gas collection rates based on estimated landfill gas collection efficiencies of 85% through landfill closure and 95% after closure. The projections indicated that the landfill gas collection rate will peak in the year 2018.

The measured flow rates at the landfill have generally followed the projections from the 2007 study. The projections show that the maximum landfill gas flow rate at the site will almost equal the rated capacity of Flare #4 in the year 2018 before beginning a downward trend.

C. New Source Performance Standards 40 CFR Part 60, Subpart WWW

Standards of Performance for Municipal Waste Landfills, 40 CFR Part 60, Subpart WWW contains requirements for municipal solid waste landfills that commenced construction, reconstruction, or modification on or after May 30, 1991. Those facilities having a design capacity equal to or greater than 2.5

million megagrams by mass and 2.5 million cubic meters by volume are subject to the appropriate rule requirements and have to obtain a Part 70 air emission license. Those facilities under the design capacity thresholds only have to submit a design capacity report.

Juniper Ridge Landfill's June 2004 Design Capacity Report included a finding that the design capacity was above 2.5 million megagrams by mass and 2.5 million cubic meters by volume. Therefore, the facility is subject to 40 CFR Part 60, Subpart WWW. A Part 70 license, A-921-70-A-I, was issued on December 20, 2005.

§60.752(b) sets forth requirements to either calculate the Non-Methane Organic Compounds (NMOC) annually to demonstrate the emission rate is below 50 megagrams per year or install a collection and control system. If the annual calculated NMOC emission rate increases to 50 megagrams or greater, a collection and control system is required. Closure of the landfill prior to reaching the 50 megagram emission rate involves a closure notification.

Juniper Ridge Landfill previously demonstrated that NMOC emissions are less than 50 megagrams per year, however, the facility installed and operates a gas collection and control system that reduces emissions of methane, NMOCs, Volatile Organic Compounds (VOC), Total Reduced Sulfur (TRS), and Hazardous Air Pollutants (HAPs). The facility's annual NMOC report dated June 8, 2012 indicates pre-control NMOC emissions greater than 50 megagrams per year, so therefore it must now comply with all applicable requirements of 40 CFR Part 60, Subpart WWW; including, but not limited to, submission of a NMOC control system design plan to the Department within one year and operation of an NMOC control system in compliance with 40 CFR Part 60, Subpart WWW within 30 months. Although the facility currently operates a gas collection and control system, the design plan shall be submitted by June 7, 2013 documenting that the NMOC collection and control system will meet all of the applicable requirements in 40 CFR Part 60, Subpart WWW. The NMOC collection and control system shall be operating in compliance with 40 CFR Part 60, Subpart WWW requirements by December 8, 2014 unless Tier 2 or 3 sampling demonstrates the emission rate is less than 50 megagrams per year.

D. Landfill Gas Collection and Flares #2, #3 and #4

The landfill gas generated at Juniper Ridge Landfill is collected and then flared. The facility is equipped with an active gas collection and control system which consists of gas extraction wells and horizontal gas collection trenches that connect by a system of gas conveyance lines to a vacuum blower and then to the flares.

The primary flare at Juniper Ridge Landfill is Flare #4, rated at 106.5 MMBtu/hr (3550 scfm). Flares #2 and #3 are to be used as back-up and are rated at 22.5 MMBtu/hr (750 scfm) and 40.5 MMBtu/hr (1350 scfm), respectively. The flare landfill gas flow rates were calculated assuming the landfill gas consists of approximately 50% methane and has a heat content of 500 Btu/scf. Flares #2 and #3 are not licensed to operate simultaneously with Flare #4. Flares #2 and #3 are expected to be operated together to handle the gas flow when used as back-up to Flare #4 and shall be limited to 100 hours per calendar year each. All flares will be relocated to the southeast end of the facility. During the relocation period for Flare #4, the operational restriction for Flares #2 and #3 will not be in effect.

BACT

Juniper Ridge submitted a BACT analysis as part of the license application with additional supplemental information submitted October 17, 2011 and January 19, 2012. EPA's RACT/BACT/LAER Clearinghouse and EPA's Landfill Methane Outreach Program (LMOP) website were both reviewed for requirements on similar units.

The BACT analysis summary for the landfill gas and flares is as follows:

Options for the control and treatment of landfill gas include combustion of the landfill gas, purification of the landfill gas, or a combination of the two. Combustion systems can consist of non-energy recovery equipment, such as flares and thermal incinerators, and energy recovery equipment, such as gas turbines and internal combustion engines, which generate electricity from combusting the landfill gas. Purification techniques including adsorption, absorption, and membranes can be used to process raw landfill gas to pipeline quality natural gas, for the purpose of producing fuel for combustion.

PM, PM_{10}, $PM_{2.5}$ – Particulate matter is considered a by-product of combustion and is not generally present in landfill gas. At this time, the industry standard does not include pre- or post-landfill gas combustion flare controls that are practical for controlling particulate matter emissions.

The BACT emission limit for PM, PM_{10}, $PM_{2.5}$ from Flare #4 was based on the AP-42 Table 2.4-5 factor (dated 11/98) of 17 lb/10^6 dscf methane, a 50% methane concentration by volume, and a rated capacity landfill gas flow rate to the flare of 3550 scfm. The BACT PM, PM_{10}, $PM_{2.5}$ emission limit is 1.81 lb/hr.

Flares #2 and #3 shall be limited to 0.38 lb/hr and 0.69 lb/hr of PM, PM_{10}, $PM_{2.5}$, respectively, based on each flares' rated capacity flow rate (750 scfm and 1350 scfm).

SO_2 – SO_2 is emitted from the flare as a result of the combustion of total reduced sulfur (TRS) compounds, primarily hydrogen sulfide (H_2S) found in landfill gas. Options to minimize SO_2 emissions include changing landfill operations to reduce the generation of TRS compounds and installing sulfur control technology to treat the TRS coming out of the landfill.

Juniper Ridge Landfill investigated ways of reducing generation of TRS in the landfill, including a zeolite alternative daily cover and a temporary geosynthetic membrane cover. The zeolite cover was tested during the fall of 2008 after being proposed under the innovative control technology provisions of 06-096 CMR 115 to meet BACT at that time. The findings from test results demonstrated that its use was not a viable option for controlling TRS compounds. A temporary geosynthetic membrane cover is currently being used today and has resulted in a reduction in the concentration of TRS compounds in the landfill gas. The average TRS concentration is estimated to be 3500 ppmv, as compared to 7000 ppmv in 2008. The 3500 ppmv average was based on tested grab samples prior to the most recent 2011 amendment submittal. The corresponding overall SO_2 emission rate is reduced by approximately 500 tons per year with the membrane cover.

The BACT analysis submitted by Juniper Ridge Landfill for this license amendment evaluated four TRS removal controls prior to combustion of the landfill gases. The technologies reviewed included Lo-Cat®, Sulfatreat®, Thiopaq®, and a caustic scrubber. Lo-Cat® is a TRS removal system (for primarily H_2S) on a large-scale that uses a regenerable catalyst in the iron-redox process to convert H_2S to elemental sulfur. Sulfatreat® is a smaller scale system which reduces TRS by reducing primarily H_2S concentrations using a solid scavenger. Thiopaq® is a bio-catalyzed gas desulfurization process. The caustic scrubber is a gas desulfurization system developed by Casella Waste Systems.

The cost estimates for each technology were based on reducing TRS down from 3500 ppmv (estimated worst case average without preconditioning) to 1000 ppmv after implementing the pre-conditioning technology. However, assessing control technology cost-effectiveness for landfill facilities contains uncertainties; including the prediction of future landfill gas production and TRS concentrations, estimations of the potential

emissions reductions and costs of the control options, and the achievement of a consistent level of control. There is limited historical information on the cost of installing and operating a sulfur treatment system at a landfill similar to Juniper Ridge Landfill for an extended duration.

The economic analysis was based on a 10 year life cycle of the capital cost of the equipment including installation and the annual operating cost. The calculation of a cost per ton of SO_2 controlled was based on amortizing the total capital cost over the 10 year period, adding the annual operating costs (utilities, chemicals, maintenance, and operating labor) and dividing this annualized cost by the estimated reduction in pollutant emissions. Information was obtained from Merichem Gas Technology Products (GTP), NEWSME, and by using engineering judgment.

The final summary for the four technologies is listed in the following table:

Landfill Control Costs and Emissions
(3500 ppmv TRS controlled to 1000 ppmv TRS)

	Lo-Cat ®	Sulfatreat®	Thiopaq®	Caustic Scrubber
Capital Investment Cost	$9,098,400	$3,328,800	$6,568,800	$2,518,800
Direct and Indirect Annual Operating Cost	$901,146	$2,456,352	$865,736	$2,154,940
Annualized Cost (10 yr, capital & Operating)	$2,672,892	$3,153,694	$2,148,853	$2,690,017
Annualized SO_2 Reduction (10 yr cycle)	288.5 tons	288.5 tons	288.5 tons	288.5 tons
BACT Cost Effectiveness	$9265/ton	$10,931/ton	$7448/ton	$9324/ton

Other Similar Maine Sources

Pine Tree Landfill in Hampden, Maine, uses landfill control technology operated by the same staff that operates Juniper Ridge Landfill. Controls on the closed Pine Tree Landfill include landfill gas combustion devices (gas-to-energy with three engines and a flare), a NATCO Thiopaq® sulfur treatment system to remove TRS prior to combustion, and a backup dual-compartment SulfaTreat® dry scrubbing system. This control was installed by Pine Tree Landfill to ensure SO_2 emissions would be maintained at levels meeting ambient air quality standards, would meet BACT, and would be protective of the engines.

Pipeline Project

A future project for SO_2 emission reductions from the landfill is to use the landfill gas as a fuel source. Juniper Ridge Landfill signed a proposed landfill gas pipeline agreement with the University of Maine, Orono (UMaine) in December of 2010. If the project moves forward, the landfill gas will be treated for sulfur removal at the Juniper Ridge Landfill facility and the cleaned gas will be conveyed to the UMaine to be fired in their boilers. The flare would have a reduced operating schedule in this scenario.

Additional Supplemental Information

Juniper Ridge Landfill's original SO_2 BACT proposal was the use of Flare #4 with an emission rate determined by the initial ambient air quality analysis results. The facility's BACT conclusion was based on the relatively high cost per ton of SO_2 removal, the uncertainty of quantifying future SO_2 emissions, the relatively unproven nature of the technologies available, the absence of entries in EPA's RACT/BACT/LAER Clearinghouse, and the lack of need for SO_2 removal to meet ambient air quality standards. Juniper Ridge Landfill also noted that the approximate average maximum TRS concentration of 3500 ppmv is equivalent to a sulfur content of 0.35% on a volume basis and approximately 0.4% on a mass basis. This is lower than the 0.5% sulfur content for #6 fuel oil required in Maine by 2018 through 38 MRSA §603-A and the 40 CFR Part 60, Subparts Db and Dc requirement for new sources of 0.5% sulfur.

Although Juniper Ridge Landfill believes the initial BACT proposal of no sulfur scrubbing was appropriate, Juniper Ridge Landfill submitted a revised, more conservative BACT approach after discussions with the Department regarding the Department's focus on the facility's total SO_2 emissions and possible license requirements for future SO_2 reduction; and the Department's request that Juniper Ridge Landfill revisit the ambient air quality analysis to account for different operating scenarios in addition to the projected maximum, including operations at lower flow rates.

The supplemental application information submitted by Juniper Ridge Landfill in their January 19, 2012 update included a revised BACT proposal consisting of the following: continued implementation of good operating practices to minimize formation of TRS gases (landfill waste moisture control, synthetic cover, daily cover, and infrastructure installation and operation); increased Flare #4 height; limiting maximum

daily short term H_2S concentration to 4500 ppmv; limiting total SO_2 emissions from Flare #4 to 449 tons/year; potential installation of future temporary sulfur removal equipment as reduction options are investigated; installation of future long-term sulfur removal equipment, as necessary, if the pipeline project proceeds; submittal of a report to the Department by July 1, 2016 updating landfill gas flows, TRS levels, emissions estimates, and the BACT analysis and implementation of any updated Department BACT determination by January 1, 2018.

The revised BACT level proposed (based on a maximum daily TRS concentration of 4500 ppmv, as H_2S) meets ambient air quality standards and is intended to address the actual projected landfill gas flow and concentration through 2013. The 449 tons/year limit as a result of the January 19, 2012 addendum is a reduction from 534 tons/year in the original 2011 application. The revised BACT limit results in a cost-effectiveness of approximately $7400/ton of SO_2 removed on a 10 year life cycle basis and $20,000/ton of SO_2 removed on a 2 year life cycle basis for the least costly of the TRS control options (Thiopaq®) reviewed in the original BACT. Costs were calculated based on 10 years to be comparative with the original BACT cost analysis. The 2 year life cycle cost basis was calculated specifically for only the years prior to the Phase 2 BACT requirements coming into effect. Juniper Ridge Landfill contends that significant capital expenditures are infeasible at the landfill until the technical parameters of the UMaine pipeline project are solidified. Requiring installation of a control technology prior to finalizing the details of UMaine pipeline project could result in a major control system overhaul or replacement to meet the final technical specifications needed to supply UMaine with acceptable treated landfill gas characteristics.

SO_2 BACT Conclusion

After review of the information submitted, the Department recognizes Juniper Ridge Landfill's ongoing proposed project to supply treated landfill gas to UMaine as fuel, which includes the development of a sulfur pre-treatment technology. As such, the Department concludes that a two phased BACT is appropriate. Phase 1 shall be in place prior to the UMaine project coming on-line, but not beyond the Phase 2 deadlines. Phase 2 shall be in place no later than June 1, 2015 if the UMaine project does not move forward. If the UMaine project does not begin actual construction by June 1, 2013, Phase 2 requires an amendment application

submittal to the Department by December 31, 2013. The Department's two phased BACT determination is as follows:

- **PHASE 1**
  (effective within 60 days of license issuance, but not beyond the Phase 2 deadlines):

  - Utilizing Flare #4 while maintaining compliance with a SO_2 emission limit of 157 lb/hr and using Flares #2 and #3 as backup. For purposes of this license, backup is defined as operating no more than 100 hours per calendar year for each of Flares #2 and #3. The Flare #4 lb/hr limit was based on a TRS concentration of 4500 ppmv, measured as H_2S, a maximum flare flow rate of 3550 scfm, and a maximum flare heat input of 106.5 MMBtu/hr. Compliance with the lb/hr limit correlates directly with the 4500 ppmv concentration of H_2S.

  - A maximum H_2S concentration in the landfill gas going to the flares of 4500 ppmv on a daily average basis. The H_2S concentration shall be demonstrated with colorimetric tube H_2S samples, on a sampling schedule as detailed in the periodic monitoring section of this license.

  - Total licensed allowed SO_2 emissions from the flares of 449 ton/year, based on a 12 month rolling total. The limit shall be demonstrated by sampling the TRS content of the landfill gas entering the flares, on a sampling schedule as detailed in the periodic monitoring section of this license, and calculating the amount of SO_2 emissions generated based on the TRS content. The monthly recordkeeping shall begin within 60 days of license issuance.

- **PHASE 2**
  (effective once the UMaine pipeline comes on-line; or if actual construction on the pipeline has not begun by June 1, 2013, additional control technology must be in place by June 1, 2015 at which time a maximum pre-flare gas TRS limit of 1000 ppmv on a 12-month rolling average basis shall be met):

  - If the UMaine pipeline project progresses to completion, the landfill gas shall be treated and then either be sent through the pipeline or sent to the flares, with a pre-flare gas TRS limit of 1000

ppmv on a 12-month rolling average basis. This averaging time allows for temporary spikes due to the nature of landfill operations. Six months prior to installing the long-term TRS removal system needed to obtain pipeline quality gas, Juniper Ridge Landfill shall submit a report to the Department that includes descriptions of the control equipment and updated landfill gas flow projections, TRS levels, and flare emissions estimates.

- If the UMaine pipeline project has not begun actual construction by June 1, 2013, Juniper Ridge Landfill shall submit an amendment application to the Department by December 31, 2013 proposing TRS or SO_2 controls to be installed by June 1, 2015. At a minimum, the proposal shall include control technology that reduces TRS to at least 1000 ppmv or equivalent SO_2 emissions on a 12-month rolling average basis prior to the flares.

- **Immediate Requirements:**

  - Continued good operating practices to minimize the formation and release of the TRS laden landfill gases. These practices include but are not limited to; minimizing landfill waste moisture and ambient landfill gas releases through the use of synthetic intermediate cover, or an approved equivalent, the appropriate use of daily cover, and the proper design, installation, maintenance and operation of landfill gas management system infrastructure in accordance with the Solid Waste Management Regulations. [06-096 CMR 115, BACT]

  - By May 31, 2013, operate Flare #4 with a top-of-casing elevation of at least 265 feet above sea level at the proposed location.

  - Flares #2 and #3 shall be limited to 33.09 lb/hr and 59.56 lb/hr of SO_2, respectively.

NO_X – Nitrogen oxides are considered by-products of combustion and are not generally present in landfill gas. At this time, the industry standard does not include pre- or post-landfill gas combustion flare controls that are practical for controlling nitrogen oxides.

The BACT emission limit for NO_X from Flare #4 was based on the AP-42 Table 13.5-1 factor (dated 9/91) of 0.068 lb/MMBtu. The NO_X emission limit is 7.24 lb/hr.

Flares #2 and #3 shall be limited to 1.53 lb/hr and 2.75 lb/hr of NO_X, respectively.

CO – Carbon monoxide is considered a by-product of combustion and is not generally present in landfill gas. At this time, the industry standard does not include pre- or post-landfill gas combustion flare controls that are practical for controlling carbon monoxide emissions.

The BACT emission limit for CO from Flare #4 was based on the AP-42 Table 13.5-1 factor (dated 9/91) of 0.37 lb/MMBtu. The CO emission limit is 39.41 lb/hr.

Flares #2 and #3 shall be limited to 8.33 lb/hr and 14.99 lb/hr of CO, respectively.

VOC – Landfill gases contain a small amount of non-methane organic compounds (NMOC) and a portion of the NMOC is made up of volatile organic compounds (VOC). The NMOC/VOC emissions result from the volatilization of organic compounds in the waste, with smaller amounts possibly being created by biological processes and chemical reactions within the landfill. Control of VOC emissions from landfills typically involves a gas collection system and a combustion device.

AP-42 Section 2.4 approximates that out of the total NMOC as hexane, 39% is estimated to be VOC for landfills that only contain municipal solid waste or very little organic commercial/industrial wastes. The result of Tier 2 NMOC sampling conducted at the Juniper Ridge Landfill in November 2011 showed an average measured concentration for NMOC, as hexane, of 873 ppmv. Therefore, VOC emissions were calculated to be approximately 340 ppmv, as hexane. AP-42 Section 2.4 also estimates that active gas collection and control systems have capture efficiencies of 60 -95% and flares typically destroy approximately 98% of the collected NMOCs, VOCs, and methane (see Table 2.4-3).

The BACT emission limit for VOC from Flare #4 was based on the Juniper Ridge Landfill estimate of 340 ppmv VOC, as hexane, a rated capacity flow rate to the flare of 3550 scfm, and a 98% flare control efficiency. The VOC emission limit is 0.32 lb/hr.

Flares #2 and #3 shall be limited to 0.07 lb/hr and 0.12 lb/hr of VOC, respectively, based on each flares' rated capacity flow rate (750 scfm and 1350 scfm).

Opacity – Visible emissions from each flare shall not exceed 20% opacity on a six (6) minute block average basis.

Greenhouse Gases – Greenhouse gases are emitted from landfills. The active gas collection and control system at Juniper Ridge Landfill reduces greenhouse gases by converting methane (CH_4) to carbon dioxide (CO_2). Although CO_2 is considered a greenhouse gas in general terms, methane has an estimated global warming potential 21 times greater than carbon dioxide. Landfill gas is typically 50% methane. In addition, EPA has deferred for three years the applicability for Prevention of Significant Deterioration (PSD) and 40 CFR Part 70 permitting requirements of CO_2 emissions from the combustion or decomposition of biogenic materials, including CO_2 from combustion of landfill gas. The final rule was signed on July 1, 2011. At this time, the appropriate control for landfill greenhouse gases is the use of the active gas collection and control system, including flaring or treatment of the collected gases.

Control Equipment

BACT control equipment for Juniper Ridge Landfill is the use of continued good operating practices to minimize the formation and release of the TRS laden landfill gases, and the use of an active gas collection and control system which includes Flare #4 (and Flares #2 and #3 as back-up) as Phase 1 control. Phase 2 BACT control includes pre-treatment using control equipment associated with the UMaine pipeline project or installation of control equipment to reduce TRS to 1000 ppmv on a 12 month rolling average basis by June 1, 2015 if the UMaine pipeline project does not begin actual construction by June 1, 2013.

Juniper Ridge Landfill shall meet a 95% uptime for all control equipment on a 12 month rolling total basis; including, but not limited to, schedule or unscheduled maintenance and repair and equipment malfunction. Periods of downtime due to maintenance, repair, and malfunction (not to exceed 438 hours per 12 month period) may be excluded when determining compliance with the H_2S and TRS ppmv limits. Juniper Ridge Landfill shall keep records documenting compliance with the uptime requirement.

Periodic Monitoring

Juniper Ridge Landfill shall maintain records of the operational hours of each flare, with documentation showing that Flares #2 and #3 do not operate simultaneously with Flare #4.

To demonstrate compliance with the Phase 1 4500 ppmv H_2S daily average concentration limit, Juniper Ridge Landfill shall sample twice in the same day (morning and afternoon, with at least 4 hours separating the two sample times) using colorimetric tubes and average the samples for that day. This sampling method shall occur at least two times each week, with at least three days between samples. However, if Juniper Ridge Landfill measures an average H_2S concentration of 4250 ppmv or more, then Juniper Ridge Landfill shall sample H_2S concentrations twice daily until the average daily measured concentration is less than 4000 ppmv for 7 consecutive days.

To demonstrate compliance with the 449 ton/year SO_2 limit and the 1000 ppmv TRS 12-month rolling average Phase 2 limit, Juniper Ridge Landfill shall sample the TRS content of the landfill gas entering the flare three times during a single day twice per month using a test method approved by the Department (such as laboratory analysis with ASTM Method D-5504). Juniper Ridge shall record the gas flow rates at the times the samples are taken. There shall be no fewer than 7 days between sampling events, unless lab scheduling or sample problems occur requiring a different frequency to accomplish two sampling events in one month. The average of the sampling results for each month, along with the associated gas flow rates, shall be used to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. The average of the sampling results for each month shall be used to calculate the TRS 12-month rolling average. Records for SO_2 shall be kept on a monthly and 12-month rolling total basis. Records for TRS shall be kept on a monthly and 12-month rolling average basis.

E. Annual Emissions

Juniper Ridge Landfill shall be restricted to the following annual emissions as the total allowable from all of the flares, based on a 12 month rolling total and calculated using the rated capacity of Flare #4 (106.5 MMBtu/hr, 3550 scfm of landfill gas with 50% methane) and the specific SO_2 annual limit:

Total Licensed Annual Emissions for the Facility in Tons/year
(used to calculate the annual license fee)

	PM	PM_{10}	PM2.5	SO_2	NO_x	CO	VOC
Total TPY	**7.9**	**7.9**	**7.9**	**449**	**31.7**	**172.6**	**40.0**

III. AMBIENT AIR QUALITY ANALYSIS

A. Overview

A refined ambient air quality modeling analysis was performed to show that emissions from Juniper Ridge Landfill, in conjunction with other nearby sources, will not cause or contribute to violations of National Ambient Air Quality Standards (NAAQS) for SO_2, PM_{10}, $PM_{2.5}$, NO_2 or CO or to Class II increments for SO_2, PM_{10} or NO_2.

The current licensing action for Juniper Ridge Landfill represents a major modification. Based upon the magnitude of proposed emissions increases and the distance from the source to any Class I area, the affected Federal Land Managers (FLMs) and MEDEP-BAQ have determined that an assessment of Class I Air Quality Related Values (AQRVs) is not required.

B. Model Inputs

The AERMOD-PRIME refined model was used to address standards and increments in all areas. If applicable, the modeling analysis accounted for the potential of building wake and cavity effects on emissions from all modeled stacks that are below their calculated formula GEP stack heights.

All modeling was performed in accordance with all applicable requirements of the Maine Department of Environmental Protection, Bureau of Air Quality (MEDEP-BAQ) and the United States Environmental Protection Agency (USEPA).

A valid 5-year hourly off-site meteorological database was used in the AERMOD-PRIME refined modeling analysis. The following parameters and their associated heights were collected at the Old Town Mill's meteorological monitoring site during the 5-year period 1991-1995:

TABLE III-1 : Meteorological Parameters and Collection Heights

Parameter	Sensor Height(s)
Wind Speed	10 meters, 76.2 meters
Wind Direction	10 meters, 76.2 meters
Temperature	10 meters, 76.2 meters
Standard Deviation of Wind Direction (Sigma A)	10 meters, 76.2 meters
Vertical Velocity	10 meters
Standard Deviation of Vertical Velocity (Sigma W)	10 meters
Standard Deviation of Vertical Wind (Sigma E)	10 meters
Delta Temperature	76.2 minus 10m

Per USEPA guidance, any small gaps (two hours or less) of missing on-site data were filled in using linear interpolation. Larger gaps of missing data (three or more hours) were coded as missing.

In addition, hourly Bangor NWS data, from the same time period, were used to supplement the primary surface data set for the required variables (cloud cover and ceiling height) that were not explicitly collected at the Old Town Mill's meteorological monitoring site.

Concurrent upper-air data from the Caribou NWS site were also used in the analysis. Missing cloud cover and/or upper-air data values were interpolated or coded as missing, per USEPA guidance.

All necessary representative micrometeorological surface variables for inclusion into AERMET (surface roughness, Bowen ratio and albedo) were calculated using AERSURFACE from procedures recommended by USEPA.

Point-source parameters, used in the modeling for Juniper Ridge Landfill are listed in Table III-2.

TABLE III-2: Point Source Stack Parameters

Facility/Stack	Stack Base Elevation (m)	Stack Height (m)	GEP Stack Height (m)	Stack Diameter (m)	UTM Easting NAD27 (km)	UTM Northing NAD27 (km)
CURRENT/PROPOSED						
Juniper Ridge Landfill						
• Flare	63.00	26.77*	--	1.81*	522.164	4980.129
U Maine						
• Stack #1	26.12	42.06	24.76	3.20	525.726	4971.533
• Stack #4	26.12	45.72	24.76	1.52	525.738	4971.564

Old Town Fuel & Fiber						
• Riley Boiler	25.17	45.42	106.89	2.74	528.864	4973.745
• #5 Boiler	27.68	54.86	89.99	2.29	528.723	4973.714
• Biomass Boiler	26.95	41.15	86.69	1.98	528.734	4973.635
• Recovery Boiler	24.87	76.20	105.94	2.95	528.866	4973.676
• Smelt Dissolving Tank	24.93	76.20	105.09	1.50	528.864	4973.688
• Lime Kiln	27.28	49.68	104.72	1.22	528.786	4973.828
• Gas Turbine	27.64	24.38	33.11	2.44	528.709	4973.504

* Flare effective release height and diameter, calculated per USEPA guidance

Emission parameters for the NAAQS and increment modeling are listed in Table III-3. For the purposes of determining PM_{10} and $PM_{2.5}$ impacts, all PM emissions were conservatively assumed to convert to PM_{10} and $PM_{2.5}$. For the purpose of determining NO_2 impacts, all NO_x emissions were conservatively assumed to convert to NO_2.

TABLE III-3: Stack Emission Parameters

Facility/Stack	Averaging Periods	SO_2 (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)	NO_2 (g/s)	CO (g/s)	Stack Temp (K)	Stack Velocity (m/s)
MAXIMUM LICENSE ALLOWED								
Juniper Ridge Landfill								
• Flare	All	19.74	0.23	0.23	0.91	4.96	1273.15	20.00
UMaine								
• Stack #1 – Scenario 2	All	-	2.19	-	6.02	-	450.00	1.66
• Stack #4 – Scenario 2	All	-	1.52	-	4.18	-	450.00	5.11
• Stack #1 – Scenario 6	All	12.35	-	-	-	-	450.00	2.08
Old Town Fuel & Fiber								
• Riley Boiler	All	1.62	0.93	-	6.17	-	499.80	10.23
• #5 Boiler	All	16.00	2.51	-	8.78	-	455.40	9.50
• Biomass Boiler	All	0.84	1.00	-	8.35	-	444.00	15.34
• Recovery Boiler	All	18.02	4.32	-	19.45	-	505.40	17.65
• Smelt Dissolving Tank	All	0.42	0.95	-	0.01	-	348.70	3.78
• Lime Kiln	All	0.89	4.15	-	4.54	-	338.70	10.30
• Gas Turbine	All	0.05	0.10	-	2.00	-	735.90	78.22
BASELINE – 1987								
Juniper Ridge Landfill								
• No sources existed in the 1987 baseline year; no baseline credit to be taken.								
UMaine								
• Juniper Ridge Landfill conservatively assumed no credit for UMaine sources existing in the 1987 baseline year.								
Old Town Fuel & Fiber								
• Juniper Ridge Landfill conservatively assumed no credit for OTF&F sources existing in the 1987 baseline year.								

BASELINE – 1977
Juniper Ridge Landfill
• No sources existed in the 1977 baseline year; no baseline credit to be taken.
UMaine
• Juniper Ridge Landfill conservatively assumed no credit for UMaine sources existing in the 1977 baseline year.
Old Town Fuel & Fiber
• Juniper Ridge Landfill conservatively assumed no credit for OTF&F sources existing in the 1977 baseline year.

C. Single Source Modeling Impacts

AERMOD-PRIME refined modeling was performed for a total of three operating scenarios that represented a range of maximum, typical and minimum operations. Modeling results for Juniper Ridge Landfill alone are shown in Table III-4.

Maximum predicted impacts that exceed their respective significance level are indicated in boldface type. No further modeling was required for pollutant/terrain combinations that did not exceed their respective significance levels.

TABLE III-4: Maximum AERMOD-PRIME Impacts from Juniper Ridge Landfill Alone

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Significance Level ($\mu g/m^3$)
SO_2	1-hour	**271.34**[a]	521.854	4980.715	65.73	**10**[b]
	3-hour	**174.20**	522.400	4979.950	59.37	**25**
	24-hour	**45.85**	522.400	4979.950	59.37	**5**
	Annual	**1.73**	522.500	4979.900	56.39	**1**
PM_{10}	24-hour	0.84	522.006	4980.462	66.31	5
	Annual	0.02	522.050	4980.400	65.87	1
$PM_{2.5}$	24-hour	0.84	522.006	4980.462	66.31	1.2
	Annual	0.02	522.050	4980.400	65.87	0.3
NO_2	1-hour	**16.09**[a]	521.854	4980.715	65.73	**10**[c]
	Annual	0.09	522.050	4980.400	65.87	1
CO	1-hour	87.68	521.854	4980.715	65.73	2000
	8-hour	43.53	521.450	4980.950	60.96	500

[a] Value based on the H1H (highest-1st-high) concentration from five years of meteorological data
[b] Interim Significant Impact Level (SIL) adopted by Maine
[c] Interim Significant Impact Level (SIL) adopted by NESCAUM states

D. Combined Source Modeling Impacts

For predicted modeled impacts from Juniper Ridge Landfill alone that exceeded significance levels, as indicated in boldface type in Table III-4, other sources not explicitly included in the modeling analysis must be accounted for by using representative background concentrations for the area.

Background concentrations, listed in Table III-5, are derived from representative rural background data for use in the Eastern Maine region.

TABLE III-5: Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)
SO_2	1-hour	24
	3-hour	18
	24-hour	11
	Annual	1
NO_2	1-hour	49

All background values derived from the MicMac Site, Presque Isle

MEDEP examined other area sources whose impacts would be significant in or near Juniper Ridge Landfill's significant impact area. Due to the applicant's location, extent of the significant impact area and other nearby source emissions, MEDEP has determined that two sources would be considered for combined source modeling: UMaine (Orono) and Old Town Fuel & Fiber (Old Town).

For pollutant averaging periods that exceeded significance levels, the maximum modeled impacts for all sources were added with conservative rural background concentrations to demonstrate compliance with NAAQS, as shown in Table III-6. Because impacts for all pollutants using this method meet all NAAQS, no further modeling analyses need to be performed.

TABLE III-6: Maximum Combined Source Impacts

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Back-Ground ($\mu g/m^3$)	Max Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	1-hour	146.77	--	--	--	24	170.77	196
	3-hour	174.21	522.400	4979.950	59.37	18	192.21	1150
	24-hour	64.46	525.700	4971.000	25.50	11	75.46	230
	Annual	2.90	526.500	4971.000	30.18	1	3.90	57
NO_2	1-hour	94.92	--	--	--	49	143.92	188

E. Increment

AERMOD-PRIME refined modeling was performed to predict the maximum Class II increment impacts. Juniper Ridge Landfill did not exist during the 1987 or 1977 baseline years, so their emissions are considered to be entirely increment consuming. In addition, Juniper Ridge Landfill conservatively assumed no credit

would be taken for any reductions from UMaine or Old Town Fuel & Fiber sources that existed during the baseline years.

Class II increment standards are in place for select pollutants at specific averaging times. With the exception of 3-hour, 24-hour and annual SO_2, all modeled maximum impacts for pollutants having increment standards were below their respective significant levels; therefore, no increment modeling was required for these pollutants (annual and 24-hour PM_{10} and $PM_{2.5}$, and annual NO_X). There are no Class II increment standards for 1-hour NO_X and 1-hour SO_2.

Results of the Class II SO_2 increment analysis for 3-hour, 24-hour, and annual averaging times are shown in Table III-7. All SO_2 modeled maximum impacts were below the increment standards. Because all predicted increment impacts meet increment standards, no further Class II increment modeling needed to be performed.

TABLE III-7: Class II Increment Consumption

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Increment ($\mu g/m^3$)
SO_2	3-hour	174.21	522.400	4979.950	59.37	512
	24-hour	64.46	525.700	4971.000	25.50	91
	Annual	2.90	526.500	4971.000	30.18	20

Federal guidance and 06-096 CMR 115 require that any major new source or major source undergoing a major modification provide additional analyses of impacts that would occur as a direct result of the general, commercial, residential, industrial and mobile-source growth associated with the construction and operation of that source.

General Growth: Very minimal increases in local emissions due to construction-related activities are expected to occur, as the proposed modification will involve relatively minor and short-lived general construction. Emissions increases due to additional traffic at the facility will be minimal, based on an insignificant increase in construction truck traffic in and out of the area.

Residential, Commercial and Industrial Growth: Population growth in the impact area of a proposed source can be used as a surrogate factor for the growth in emissions from combustion sources. Since the population in Penobscot County has increased approximately 1.9% between 1990 and 2009 and the modification will not create any new jobs, no new significant residential, commercial or industrial growth will follow from the modification associated with this source.

Mobile Source and Area Source Growth: Since area and mobile sources are considered minor sources of NO_2, their contribution to increment has to be considered. Technical guidance from USEPA points out that screening procedures can be used to determine whether additional detailed analyses of minor source emissions are required. Compiling a minor source inventory may not be required if it can be shown that little or no growth has taken place in the impact area of the proposed source since the baseline dates (1977/1988) were established. Very little growth has taken place in the area of Juniper Ridge Landfill since the baseline dates were established. In addition, no increase in Vehicle Miles Travelled (VMT) is expected as a result of the modification. No further analyses of mobile or area source growth are needed.

F. Impacts on Soils and Vegetation

Federal guidance and 06-096 CMR 115 require that any major new source or major source undergoing a major modification provide additional analyses of impacts on Soils and Vegetation. NAAQS, by their very nature, are designed to protect health and welfare, including their effects on water, vegetation, and soils, and are a useful benchmark for evaluating soil and vegetation impacts.

For completeness purposes, the maximum predicted concentrations were explicitly compared to the screening levels for sensitive species presented in USEPA's "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals," (USEPA 450/2-81-078, 1980), and "Air Quality Criteria for Oxides of Nitrogen, Summary of Vegetation Impacts" (USEPA 600/8-91/049b, 1993). The results of this analysis can be found in Table III-8.

TABLE III-8 : Maximum AERMOD-PRIME Soils and Vegetation Impacts

Pollutant	Averaging Period	Max Impact ($\mu g/m^3$)	Minimum Sensitivity Level ($\mu g/m^3$)
SO_2	1-hour	170.77	917
	3-hour	192.21	786
	Annual	3.90	18
NO_2	4-hour	143.92[a]	3760
	8-hour	143.92[a]	3760
	Annual	0.09	94 - 188
CO	1 week	87.68[a]	1,800,000

[a] Value based on the maximum 1-hour concentration

Since the maximum impacts do not exceed NAAQS or the EPA screening thresholds for sensitive soils and vegetation, the analysis demonstrates that there will be no harmful effects to soils and vegetation.

G. Visibility

Any perceptible changes in local visibility, in the form of plume blight, will be controlled by the opacity and PM limits set forth in the Specific Conditions section of the license.

H. Class I Impacts

The current licensing action for Juniper Ridge Landfill represents a major modification. Based upon the magnitude of proposed emissions increases and the distance from the source to any Class I area, the affected Federal Land Managers (FLMs) and MEDEP-BAQ have determined that an assessment of Class I Air Quality Related Values (AQRVs) is not required.

I. Summary

In summary, it has been demonstrated that Juniper Ridge Landfill will not cause or contribute to a violation of any MAAQS or NAAQS for SO_2, PM_{10}, $PM_{2.5}$, NO_2 or CO; or any SO_2, PM_{10} or NO_2 Class II increment standards.

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-921-77-2-A pursuant to the preconstruction licensing requirements of 06-096 CMR 115 and subject to the standard and special conditions below.

Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

SPECIFIC CONDITIONS

(1) TRS Laden Landfill Gas Minimization

Juniper Ridge Landfill shall continue to use good operating practices to minimize the formation and release of the TRS laden landfill gases. These practices include but are not limited to; minimizing landfill waste moisture and ambient landfill gas releases through the use of synthetic intermediate cover, or an approved equivalent, the appropriate use of daily cover, and the proper design, installation, maintenance and operation of landfill gas management system infrastructure in accordance with the Solid Waste Management Regulations. [06-096 CMR 115, BACT]

(2) Flare #4 Stack

By May 31, 2013, the elevation of the top of Flare #4 shall be at least 265 feet above sea level at the proposed location on the southeast end of the facility. [06-096 CMR 115, BACT]

(3) Flares #2, #3, and #4 Emissions and Operations

A. Emissions from the flares at Juniper Ridge Landfill shall not exceed the following [06-096 CMR 115, BACT]:

Unit	PM (lb/hr)	PM_{10} (lb/hr)	PM2.5 (lb/hr)	SO_2 (lb/hr)	NO_X (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Flare #2 (22.5 MMBtu/hr) back-up unit	0.38	0.38	0.38	33.09	1.53	8.33	0.07
Flare #3 (40.5 MMBtu/hr) back-up unit	0.69	0.69	0.69	59.56	2.75	14.99	0.12
Flare #4 (106.5 MMBtu/hr) primary unit	1.81	1.81	1.81	157.0	7.24	39.41	0.32

B. Visible emissions from each flare shall not exceed 20% opacity on a six (6) minute block average basis. [06-096 CMR 115]

C. Total SO_2 Annual Flare Emissions

1. Total SO_2 emissions from the Juniper Ridge Landfill flares shall not exceed 449 ton/year, based on a 12 month rolling total. [06-096 CMR 115, BACT]
2. Juniper Ridge Landfill shall sample the TRS content of the landfill gas to be flared three times during a single day twice per month using a test method approved by the Department (such as laboratory analysis with ASTM Method D-5504) and record the gas flow rate rates at the times the samples are taken. No fewer than 7 days shall be between sampling events, unless lab scheduling or sample problems occur requiring a different frequency to accomplish two sampling events in one month. The average of the sampling results for each month, along with the associated gas flow rates, shall be used to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. Records shall be kept on a monthly and 12 month rolling total basis. The monthly recordkeeping shall begin within 60 days of license issuance. [06-096 CMR 115, BACT]

D. Operation of Flares #2, #3, and #4

Flares #2 and #3 shall not operate when Flare #4 is operating. Flares #2 and #3 shall be used as backup to Flare #4, with backup defined for the purpose of this license as each of the Flares #2 and #3 operating no more than 100 hours per calendar year. The backup restriction on Flares #2 and #3 shall be in effect once Flare #4 is operational in its permanent location. Juniper Ridge Landfill shall keep records demonstrating compliance with the flares' operational restriction.

(4) Control Technology Requirements

A. Phase 1 - Effective upon license issuance, but not beyond the Phase 2 deadlines:

1. Juniper Ridge Landfill shall flare the collected gases. Flare #4 shall be used as the primary control unit, with Flares #2 and #3 as backup. Backup is defined for the purpose of this license as each of the Flares #2 and #3 operating no more than 100 hours per calendar year.

2. H_2S
   a. H_2S concentration in the landfill gas going to the flares shall not exceed 4500 ppmv on a daily average basis as demonstrated by the procedures in Condition (4)(A)(2)(b). [06-096 CMR 115, BACT]
   b. Juniper Ridge Landfill shall sample the landfill gas H_2S concentration twice in the same day (morning and afternoon, with at least 4 hours between the two sample times) using colorimetric tubes and average the samples for that day. This sampling method shall occur at least two times per week, with at least three days between samples. If a daily average H_2S concentration of 4250 ppmv or more is measured, then Juniper Ridge Landfill shall sample H_2S concentrations twice daily until the average daily measured concentration is less than 4000 ppmv for 7 consecutive days. Records shall be maintained on site documenting the H_2S measurements. [06-096 CMR 115, BACT]

B. Phase 2

1. If the pipeline has begun actual construction by June 1, 2013, the following shall be effective once the pipeline comes on-line [06-096 CMR 115]:
   a. Juniper Ridge Landfill shall treat the landfill gas and either send it through pipeline or send it to the flares, with a pre-flare gas H_2S limit of 1000 ppmv on a 12-month rolling average basis.
   b. Six months prior to installing the sulfur removal system needed to obtain pipeline quality gas, Juniper Ridge Landfill shall submit a report to the Department that shall include descriptions of the control equipment, and updated landfill gas flow projections, sulfur levels, and flare emissions estimates.

2. By June 1, 2013, if the UMaine pipeline project has not begun actual construction [06-096 CMR 115]:
   a. Juniper Ridge Landfill shall submit an amendment application to the Department by December 31, 2013 proposing SO_2 controls that minimally reduce TRS emissions to 1000 ppmv on a 12-month rolling average basis.
   b. By June 1, 2015 Juniper Ridge Landfill shall have installed, and be operating, pre-flare control technology that reduces TRS to at least 1000 ppmv on a 12-month rolling average basis. Emissions from the control technology shall then be flared.

3. To demonstrate compliance with the TRS limit of 1000 ppmv on a 12-month rolling average basis, Juniper Ridge Landfill shall sample the TRS

content of the landfill gas to be flared three times during a single day twice per month using a test method approved by the Department (such as laboratory analysis with ASTM Method D-5504). No fewer than 7 days shall be between sampling events, unless lab scheduling or sample problems occur requiring a different frequency to accomplish two sampling events in one month. The average of the sampling results for each month shall be used to calculate the TRS 12-month rolling average. Records shall be kept on a monthly and 12- month rolling average basis. The monthly recordkeeping shall begin within 60 days of license issuance. [06-096 CMR 115, BACT]

C. Control Equipment Uptime

1. Juniper Ridge Landfill shall utilize the flares at all times, unless all treated gases are sent through the UMaine pipeline, or switching is occurring between the primary flare and the backup flares. Switching to and from primary Flare #4 and backup Flares #2 and #3 shall be performed as expediently as possible. Records shall be maintained documenting the date and timeframe when no flaring occurs. [06-096 CMR 115]
2. Juniper Ridge Landfill shall meet a 95% uptime for all H_2S control equipment on a 12-month rolling total basis; including, but not limited to, scheduled or unscheduled maintenance and repair and equipment malfunction. Periods of downtime (not to exceed 438 hours per 12 month period) may be excluded when determining compliance with the H_2S and TRS ppmv limits. Juniper Ridge Landfill shall keep records documenting compliance with the uptime requirement. [06-096 CMR 115]
3. Per 38 M.R.S.A. §349.9 The Commissioner may exempt from civil penalty an air emission in excess of license limitations if the emission occurs during start-up or shutdown or results exclusively from an unavoidable malfunction entirely beyond the control of the licensee and the licensee has taken all reasonable steps to minimize or prevent any emission and takes corrective action as soon as possible. There may be no exemption if the malfunction is caused, entirely or in part, by poor maintenance, careless operation, poor design or any other reasonably preventable condition or preventable equipment breakdown. The burden of proof is on the licensee seeking the exemption under this subsection. In the event of an unavoidable malfunction, the licensee must notify the commissioner in writing within 48 hours and submit a written report, together with any exemption requests, to the Department on a quarterly basis. **State Enforceable Only**

(5) Juniper Ridge Landfill shall meet the applicable requirements of *Standards of Performance for Municipal Waste Landfills*, 40 CFR Part 60, Subpart WWW.

(6) Juniper Ridge Landfill shall submit an application to incorporate this amendment into the Part 70 air emission license no later than 12 months from commencement of the requested operation of Flare #4. [06-096 CMR 140, Section 2(J)(2)(c)]

DONE AND DATED IN AUGUSTA, MAINE THIS 26 DAY OF November , 2012.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Marc Allen Robert Cone for
PATRICIA W. AHO, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: August 5, 2011
Date of application acceptance: August 5, 2011

Date filed with the Board of Environmental Protection:

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

Filed
NOV 27 2012
State of Maine
Board of Environmental Protection

Pre-Filed Rebuttal Testimony of Donald Meagher
Before the Department of Environmental Protection

Juniper Ridge Landfill

DEP Application S-020700-WD-BC-A

I. Introduction and Qualifications

My name is Donald Meagher. I've worked in the field of solid waste management for approximately twenty-seven years: for eight years as Vice-President of Planning at the Eastern Maine Development Corporation and then for nineteen years in the private sector (Sawyer Environmental and Casella Waste Systems). A copy of my resume is attached. *See* BGS/NEWSME Exhibit #19. Certain pre-filed direct testimony from interveners in this matter attempts to argue that the amendment application should be denied because it is inconsistent with the State's initial Request for Proposals ("RFP") to operate the landfill, Casella's response to that RFP, and the Operating Services Agreement ("OSA"), and is therefore somehow inconsistent with the State's solid waste hierarchy. As an initial matter, none of these documents are part of the licensing criteria for a landfill application, and thus whether the application is consistent with them is not at issue in this proceeding. The purpose of my rebuttal testimony, however, is to demonstrate in any event that this position relies on a misreading of these documents, and should therefore be rejected.

II. Rebuttal Testimony

A. Kazar/Roche Testimony

Both Joseph Kazar, on behalf of Mid-Maine Waste Action Corporation ("MMWAC"), and Kevin Roche, on behalf of ecomaine, cite the identical portion of Casella's response to the State's RFP in 2003 as a basis for their position that the pending JRL application should be denied:

> The landfill will only accept MSW if bypassed from MSW incinerators or MSW under contract and with the written permission of the solid waste generator/responsible party (e.g. in instances when an existing MSW disposal facility is no longer available or financially viable, and [the MSW] is not disposed at a facility higher in the State hierarchy).

See Kazar Testimony at 4; Roche Testimony at 5.

Mr. Kazar and Mr. Roche are both misrepresenting Casella's proposal.

The statement above pertains only to MSW under contract to an MSW incinerator. The proposed application will not alter that commitment: no MSW under contract to one of the three remaining Maine MSW incinerators will be delivered to JRL unless bypassed with written permission of the generator/responsible party.

Mr. Kazar and Mr. Roche ignore the clear statement on page 27 of that same response to the State's RFP under the heading "Anticipated categories, sources, and amounts of solid waste" that includes the following:

Category	Source	Estimated Amount (yr.)
Non-contracted Municipal solid waste [3]	State of Maine	Up to 200,000 [tons]

See Letter and Response to Public Comments from BGS and NEWSME, Jan. 18, 2013 at Exhibit 4.

The footnote to the above waste category (page 28) confirms that the waste stream proposed in the pending application was clearly contemplated as part of Casella's proposal in response to the State's RFP:

> Incorporated in NEWSM's 30-year proposal [which the State accepted] is a forward planning assumption to accept up to 200,000 tons of municipal solid waste that may require disposal because the current disposal facility [e.g., Maine Energy] is no longer available or financially viable, and is not disposed of at a facility higher in the State Hierarchy.

Id.

Later in this footnote is an explicit statement addressing Casella's commitment not to interfere with MSW that is already under contract to another incinerator, as quoted by Mr. Kazar and Mr. Roche:

> This provision [up to 200,000 tons per year of Maine MSW going to the State-owned landfill] is not intended to, and will not be used to disrupt or destabilize the contractual arrangements, service areas, or waste stream supplies of any current solid waste disposal facility. However, the West Old Town landfill [now JRL] will be operated to help address future disposal needs of the state as the current providers of disposal are phased out.

The pending JRL amendment application is fully consistent with the above statement. The MSW proposed for disposal at JRL is not currently under contract to any other disposal facility, including MMWAC and ecomaine.

Further, no statement made in the State's RFP, Casella's proposal in response to the RFP, or the OSA can be the basis for a denial of the pending application. The State's RFP and Casella's response to it, while important expressions of intent and expectation, were simply precursors to the OSA. As stated on page 2 of the RFP, the State had full latitude in negotiating the OSA to deviate from the provisions of the RFP: "In addition, the State reserves the right to enter into negotiations with successful bidder(s) to modify the final project to reflect any changes found to be appropriate." In addition, as is common in many contracts, the OSA includes a specific provision stating that the OSA constitutes the entire agreement of the parties, "and supersede[s] all prior or contemporaneous negotiations, representations, understandings and agreements, whether written or oral, between the parties with respect to the subject matter hereof." *See* OSA § 24.9 at 51-52.

In any event, while the OSA is a binding agreement that provides for the rights and responsibilities of both parties to the agreement, the DEP Commissioner has already determined in the partial approval of the JRL Public Benefit Determination for the expansion that it does not itself establish licensing criteria:

> The Commissioner finds that the OSA is a contract between the State of Maine, acting by and through the SPO, and Casella; the Department is not a party to the contract. Findings of fact and conclusions of law made by the Commissioner on this application are based on standards and criteria set forth in the applicable law . . . .

See PBD at 5.

III. Spencer Testimony

Mr. Spencer also cites to the OSA in an attempt to support his view that the application should be denied because it is inconsistent with the solid waste hierarchy: "On Page 37 of the OSA, it reads '13.5 Casella covenants and agrees to operate Landfill and otherwise conduct all aspects of its business at the Landfill in compliance with all applicable laws and regulations and permits.'" Spencer Testimony at 3.

Mr. Spencer fails to recognize at least two key points.

First, the waste types that are allowed at the State-owned landfill, with respect to the OSA, are determined by the definitions "Acceptable Waste" and "Excluded Waste." "Acceptable Waste," according to the OSA, is "such material as may from time to time be legally accepted at the Landfill in accordance with applicable MDEP permits and other applicable laws and regulations, excluding, however, all Excluded Waste." *See* OSA § 1.2 at 1-2. The whole reason for submitting the pending application is to obtain an MDEP permit for this additional MSW. If the permit application is approved, the MSW will, by definition, be Acceptable Waste under the OSA.

Moreover, the definition of "Excluded Waste" does not specifically exclude any category of waste other than out-of-state waste and hazardous waste, neither of which is being proposed in the pending application for JRL. *See* OSA § 1.17 at 4-5.

Second, with respect to general compliance with the OSA, Mr. Spencer makes the same mistake that Mr. Kazar and Mr. Roche make. The OSA does not itself create permitting standards, and the DEP is not a party to that document. The applicant is, in fact, the State of

Maine, through its agent, the Bureau of Governmental Services. The State, as a party to the OSA, has the responsibility and authority to enforce the OSA. Clearly, the State would not be the applicant if it believed what was proposed was inconsistent with the OSA.

Dated: March 18, 2013

Donald Meagher

Donald Meagher

STATE OF MAINE

Penobscot, ss.

Personally appeared before me the above-named Donald Meagher and made oath that the foregoing is true and accurate to the best of his knowledge and belief.

Before me,

Dated: March 18, 2013

Maria J. Thibodeau

Notary Public

Name: Maria J. Thibodeau

My Commission Expires: 6/6/15

Donald A. Meagher, Jr.
282 Silver Road
Bangor, Maine 04401
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(207) 862-4200 ext. 230 (W)

EDUCATION Master of Regional Planning, University of Pennsylvania, 1975
Bachelor of Arts (biology), Beloit College, 1972

EXPERIENCE

2000 – present **Manager of Planning and Development, Eastern Division, Casella Waste Systems**
Legislative lobbying, solid waste services contract negotiation, identification of long range development needs, state and local permitting, media relations, point of contact for state regulatory agencies, community conflict resolution, administration of neighborhood and host community benefit program.

1997 – 2000 **Licensing and Compliance Manager, Eastern Division, Casella Waste Systems**
Responsible staff person for obtaining and complying with federal, state, and local laws, regulations, licenses, and approvals for all Casella facilities (landfills, transfer stations, tire and bulky waste processing facilities, composting and recycling facilities) in Maine.

1994 - 1997 **Planning and Development Officer, Sawyer Environmental Services**
Long range planning, legislative lobbying, environmental permitting and licensing, community relations, member of management team for solid waste disposal, transportation, and recycling company.

1986 - 1994 **Vice-President for Planning, Eastern Maine Development Corporation.**
Senior management for a private, non-profit economic development planning organization serving six counties in Eastern Maine. Administrative responsibilities include: staff supervision; project management; budget development, review and monitoring; client relations; intergovernmental coordination. Project responsibilities include solid waste management; landfill siting; legislative lobbying; conflict resolution; waste disposal service contract agreement administration. Staff support to several affiliated non-profit local government based organizations.

1983 - 1986 **Executive Director, Penobscot Valley Council of Governments, Director of Planning, Eastern Maine Development Corporation**
Organizational leadership and staff support to a Board of Directors for local elected officials: regional clearing house coordination; liaison with state government and legislature; newsletter and information exchange with member municipalities; press relations and coordination with local media; land use assistance to municipalities; bid specifications and procurement as part of cooperative purchase of materials by municipalities, grant and proposal writing; supervision and work load allocation of six person staff; workshops and training sessions for planning board and local officials; comprehensive planning; subdivision and site plan review; town-wide and shoreland zoning.

1980 – 1983 Land use consultant.

1975 – 1980 Assistant professor, Unity College, Unity, Maine.

Pre-Filed Rebuttal Testimony of Abigail Webb
Before the Department of Environmental Protection

Juniper Ridge Landfill

DEP Application S-020700-WD-BC-A

My name is Abbie Webb. I am Senior Environmental Analyst at Casella Waste Systems. I manage our company-wide greenhouse gas emission reporting and reduction projects. Casella has been measuring and reporting its carbon footprint since 2005. We began this reporting under the EPA Climate Leaders program, as a voluntary effort to understand and begin reducing our carbon emissions. We were the only solid waste and recycling company to join this program as a charter member. Through the program we developed a strong understanding of our carbon footprint and developed an emission reduction plan. Between 2005 and 2010 we reduced our carbon footprint by 45%. Our efforts were recognized in 2012 with a Climate Leadership Award issued by the US EPA and three well-respected environmental nonprofits, the Association of Climate Change Officers, the Center for Climate and Energy Solutions, and The Climate Registry.

I hold a Bachelor's degree in Environmental Geography from Colgate University and a Masters degree in Regional Environmental Planning from Cornell University. I have managed all aspects of our greenhouse gas monitoring, reporting, and reductions for the past six years. A My resume is attached as BGS/NEWME Exhibit #20. Based on my educational and professional background, I have been asked to address greenhouse gas related comments provided by Mr. Spencer in his pre-filed testimony.

Mr. Spencer argues that we have underestimated greenhouse gas emissions from Juniper Ridge Landfill, and that incineration necessarily produces less greenhouse gas emissions than

landfilling. *See* Spencer Testimony at 1. In support of these arguments, he has submitted a brief 2-page discussion, with reference to four papers on the topic of greenhouse gas emissions from incinerators and landfills. I am very familiar with each of these papers, and they are not relevant to the Juniper Ridge Landfill.

I. The Papers Relied Upon By Mr. Spencer Are Not Applicable to JRL.

One of the papers is Chapter 10 of the *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. The chapter is written by a well-respected international panel of scientists, coordinated by lead author Jean Bogner. It describes global climate change mitigation strategies specific to the waste management sector, and I would like to spend some time discussing it, as all three of the other papers Spencer cites reference it.

The Bogner chapter is often cited by those who advocate incineration over landfilling. Specifically, they commonly reference a passage on page 600, which discusses landfill gas recovery efficiencies, and states that "'lifetime' recovery efficiencies may be as low as 20%" (Bogner et al, pg 600). This is an important statement, given that recovery efficiency is the most important factor in determining greenhouse gas emissions from landfills. Unfortunately, we rarely see the full context of this statement, which is as follows:

> Intensive field studies of the CH4 mass balance at cells with a variety of design and management practices have shown that >90% recovery can be achieved at cells with final cover and an efficient gas extraction system (Spokas et al., 2006). Some sites may have less efficient or only partial gas extraction systems and there are fugitive emissions from landfilled waste prior to and after the implementation of active gas extraction; thus estimates of 'lifetime' recovery efficiencies may be as low as 20% (Oonk and Boom, 1995), which argues for early implementation of gas recovery. Some measures that can be implemented to improve overall gas collection are installation of horizontal gas collection systems concurrent with filling, frequent monitoring and remediation of edge and piping leakages, installation of secondary perimeter extraction systems for gas migration and emissions control, and frequent inspection and maintenance of cover materials.

(Bogner, pg 600).

In short, the authors are saying that lifetime recovery efficiencies may be as low as 20% at certain poorly designed and operated landfills, but that this can be remedied through best practices, such as early installation of gas collection infrastructure, the use of horizontal collectors, and frequent monitoring and maintenance of gas collection pipes and cover materials. All of these best practices are in place at the Juniper Ridge Landfill, and therefore the 20% worst-case scenario mentioned in the Bogner report does not apply to JRL.

The next report referenced by Mr. Spencer is a paper by Peter Anderson of the Center for a Competitive Waste Industry. His paper describes in more depth the argument mentioned by Bogner, which is that landfill collection efficiencies should be calculated on a "lifetime" basis, rather than as an instantaneous snapshot. Using this "lifetime" approach and a series of assumptions to represent an "average" US landfill, Mr. Anderson arrives at a calculated collection efficiency of 19% (Anderson, pg 3-4). Importantly, the assumptions in this scenario are as follows: no gas collection is installed for the first five years, moisture is intentionally added into areas not yet under active gas collection, collection efficiencies of only 50% are achieved even upon closure of the landfill, and gas collection is removed before gas production has subsided. None of these assumptions are true in the specific case of the Juniper Ridge Landfill.

The best practices in place at Juniper Ridge Landfill have been described in more detail elsewhere (please see Applicant's Response to Public Comments at 3-4), but I will summarize them here. First, Juniper Ridge aggressively installs horizontal gas collection piping as waste is placed in a cell. Second, synthetic geomembrane material is used as cover on over 90% of the area under intermediate cover. Third, NEWSME conducts routine surface methane emission

scans to assure the integrity and effectiveness of the landfill cover material and gas collection system. All of these practices are at the forefront of industry operating standards and ensure extremely high instantaneous and lifetime gas collection efficiencies. Thus, Mr. Anderson's paper does not apply to JRL.

Mr. Spencer also refers to the Kaplan et al 2009 paper in *Environmental Science Technology*, and a Sierra Club report on Landfill Gas to Energy. The Kaplan article is very similar to the Anderson paper, in that it makes the same types of assumptions about landfill operations that are not applicable to Juniper Ridge. The Sierra Club paper is about landfills with landfill-gas-to-energy power plants. This is also not applicable, as Juniper Ridge does not have a landfill-gas-to-energy power plant, and we have already implemented the best practices mentioned in the report. Neither of these papers applies to JRL.

II. Incineration does not universally produce less greenhouse gas emissions than landfilling.

The Bogner report's primary finding is that: "Existing waste-management practices can provide effective mitigation of GHG emissions from this sector: a wide range of mature, environmentally-effective technologies are available to mitigate emissions and provide public health, environmental protection, and sustainable development co-benefits" (Bogner, pg 587). The authors go on to list some of these technologies: landfill gas recovery, improved landfill practices, engineered wastewater management, controlled composting of organic waste, state-of-the-art incineration, expanded sanitation coverage, waste minimization, recycling, and re-use (Bogner, pg 587). Importantly, on the next page, the authors clearly state that the chapter does not "prescribe to any one particular technology" (Bogner, pg 588). This is an important point, because if this well-respected panel of scientists believed that incineration was clearly and universally preferable over landfilling, they would have clearly stated this in their report.

III. The best management practices at JRL ensure high collection efficiency.

Taking into account the best management practices I have described, Juniper Ridge Landfill achieves a high collection efficiency regardless of the calculation method. Bogner and Anderson describe two different methods for measuring collection efficiency: 1) an instantaneous value based on a single point in time, and 2) a lifetime value based on gas collection over time. As you can see in BGS/NEWSME Exhibit #21, at Juniper Ridge, both methods yield a value that is higher than 85%.

The collection efficiency equation established by EPA in 40 CFR Part 98, Subpart HH would be considered an instantaneous measure. Using this method, Juniper Ridge's landfill gas collection efficiency rate as of December 31, 2012, was 89.8%.

The collection efficiency model proposed in the Anderson 2008 paper would be considered a lifetime measure. Using the Anderson method, modified only to reflect the actual site conditions and best practices in place at JRL, Juniper Ridge's lifetime collection efficiency rate is 86.9%

Thus, with respect to Mr. Spencer's use of the studies that he has included with his direct testimony, I would like to make two points. First, from a greenhouse gas perspective, incineration is not always preferable to landfilling; because every landfill and every incinerator is different, this determination must be made on a site-by-site basis. Second, the rigorous best management practices in place at Juniper Ridge ensure that the concerns raised in Mr. Spencer's pre-filed testimony are not applicable to the Juniper Ridge Landfill.

Dated: 3/22/2013

Abigail E. Webb
Abigail Webb

STATE OF MASSACHUSETTS

Suffolk, ss.

Personally appeared before me the above-named Abigail Webb and made oath that the foregoing is true and accurate to the best of her knowledge and belief.

Before me,

Dated: March 22, 2013

Vera Burdick
Notary Public
Name:
My Commission Expires:

VERA BURDICK
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
February 18, 2016

Abbie Webb

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Education

Masters of Regional Planning, Cornell University (August 2009)

- Environmental Planning and Policy

Bachelor of Science, Colgate University (June 2004)

- Environmental Geography

Experience

Senior Environmental Analyst (June 2008 – Present)
Casella Waste Systems, Inc. (Boston, MA)

-Manage the company's greenhouse gas inventory and carbon reduction initiatives, as well as annual reporting under EPA Climate Leaders, EPA Mandatory GHG rule, and the Carbon Disclosure Project
-Track the company's sustainability performance and prepare an annual Sustainability Report
-Handle the company's carbon credit portfolio, coordinate documentation, verification, and monetization
-Promote environmental and sustainability "literacy" within the company (via monthly newsletter, quarterly webinars, training videos, and presentations to managers)

Environmental Compliance Specialist (May 2006 – May 2008)
Casella Waste Systems, Inc. (Ithaca, NY)

-Conduct facility-level audits for environmental compliance
-Support compliance training and education
-Support facility permitting and reporting (primarily solid waste, stormwater, air permits)

Skills

- Fluent in English, Proficient in French and German
- Proficient in MS Word, Excel, PowerPoint; Some experience in web design and database development
- Strong leadership and communication skills

Juniper Ridge Landfill
Landfill Gas Collection Efficiency Calculations
March 2013

Method 1: Instantaneous Collection Efficiency

Represents the "snapshot in time" collection efficiency as of December 31, 2012
Calculated using the EPA methodology established in 40 CFR Part 98 Table HH-3

Cover Type	Percent of Total Area	Collection Efficiency
A2: Area without active gas collection	0%	0%
A3: Area with daily soil cover and active gas collection	11%	60%
A4: Area with intermediate soil cover and active gas collection	7%	75%
A5: Area with final soil cover and/or geomembrane cover and active gas collection	82%	95%
Instantaneous Collection Efficiency		**89.8%**

Method 2: Lifetime Collection Efficiency

Represents the estimated emissions of a unit of waste over 100 years in the landfill
Calculated using the model proposed by Peter Anderson in his 2008 paper*

Time Interval	Landfill Cover Material & Collection Infrastructure	% of Total Generation	Instantaneous Collection Rate	% of Total Collected over Time Interval
Year 1	Daily Soil Cover with Gas Collection	6.8	60%	4.1
Years 2-9	Geomembrane with Gas Collection	40	95%	38.0
Years 10-40	Final Cover with Gas Collection	47.2	95%	44.8
Years 41-100	Final Cover with no Gas Collection	6	0%	0.0
Total		100		86.9
Lifetime Collection Efficiency				**86.9%**

Time Interval = Years following placement of waste in landfill
Landfill cover material and collection infrastructure = system in place during time interval
% of Total Generation: Portion of total greenhouse gas generated during each time interval
Instantaneous Collection Rate: EPA defined collection efficiencies for different cover scenarios
% of Total Collected over Time Interval: Portion of total generated greenhouse gas that is collected
Time intervals and cover scenarios represent a conservative scenario based on JRL's best practices. For example, geomembrane is often placed well before year two, and gas collection may continue after year 40.

*Anderson 2008. Comments to the California Air Resources Board on Landfills' Responsibility for Anthropogenic Greenhouse Gases and the Appropriate Response to those Facts.