IN THE MATTEROF

STATE OF MAINE, BUREAU OF GENERAL SERVICES, JUNIPER RIDGE LANDFILL EXPANSION City of Old Town, Town of Alton, Penobscot County, Maine #S-020700-WD-BI-N #L-024251-TG-C-N APPLICATION FOR MAINE HAZARDOUS WASTE, SEPTAGE AND SOLID WASTE MANAGEMENT ACT, and NATURAL RESOURCES PROTECTION ACT PERMITS and WATER QUALITY CERTIFICATION	))) EDWARD S. SPENCER) INTERVENOR))) PREFILED WRITTEN TESTIMONY) FOR BOARD OF ENVIRONMENTAL) PROTECTION PUBLIC HEARING) FILED JULY 29, 2016)

July 29, 2016 Edward Spencer Pre Filed Written Testimony

MAINE STATE WASTE HIERARCHY IN REGARDS TO CONSTRUCTION AND DEMOLITION DEBRIS (CDD) AND OVERSIZED BULKY WASTES (OBW)

One of the primary issues we need to be concerned with as the State Bureau of General Services (BGS) contemplates an expansion of our Juniper Ridge Landfill (JRL) is how our State Waste Hierarchy is applied to wastes entering JRL. The Department of Environmental Protection (DEP) is charged with evaluating any expansion, and in so doing consults laws and rules that set regulatory procedures and standards for landfills. Only in the past several years has our Waste Hierarchy become a criteria governing how we handle wastes in Maine, and this expansion procedure is the first time DEP will fully implement the Hierarchy as the rule of the State of Maine.

According to M.R.S.§2101, Maine Solid Waste Management Hierarchy mandates that from most preferred to least preferred, we should first strive for Waste Reduction at the Source, then Reuse, Recycling, Composting, Waste Processing (Waste to Energy, or WTE), and then Land Disposal. JRL is therefore the least desirable outcome for wastes in Maine. (BEP Informational Session handout from May 19, 2016, Page 16, Exhibit Spencer1)

In addition, under Recycling and Source Reduction Determination rules set forth in 38 M.R.S. §1310-N(5-A), it says that: "An applicant for a new or expanded solid waste disposal facility shall demonstrate that: (1) The proposed solid waste disposal facility will accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those imposed by this chapter and other provisions of state law…" (BEP Informational Session handout from May 19, 2016, Page 17, Exhibit Spencer1)

Wastes coming into JRL should therefore have been handled according to our Hierarchy from their source. Their source should be considered to be their Point of Discard. Environmental Protection Agency (EPA) and Resource Conservation and Recovery Act (RCRA) rules say that in regard to CDD material "The key concept is that of 'discard'" and relies on "the ordinary, plain English definition…i.e., discard means 'disposed of', 'thrown away' or 'abandoned'." (Federal Register, Page 6690Environmental Protection Agency 40 CFR Part 241 Additions to List of Categorical Non-Waste Fuels; Final Rule, Exhibit Spencer 2). In the same document it says "…the Agency reiterated the determination in the existing rules that the wood present in C&D debris is considered to be a solid waste prior to processing…" (Page 6696, Exhibit 2). In other words, 38 M.R.S. §1310-N(5-A) applies to the CDD material wherever it is discarded, which is the source. During Casella's operation of JRL, they have failed to fully identify the True Source of all wastes funneled into JRL. Instead they have said that Construction and Demolition Debris (CDD) and a derivative of CDD known in the waste industry as Oversized Bulky Waste (OBS) has come mostly from a processor located within the borders of the State of Maine. This processor they refer to as the "Generator" of the waste, and by this label the waste is considered Maine Waste, and thus eligible for disposal at JRL. However, now that our Waste Hierarchy is mandated as the law of the State, and therefore JRL, the rules require more information that identifies the True Source, or Point of Discard. They must also show how all these materials have been reduced at the source and recycled to the maximum extent possible.

Without identifying where the material coming into JRL actually became a waste, it is impossible for DEP as regulator to truly ascertain if that waste has been fully Reduced at the Source, as well as being

subjected to other requirements of our Hierarchy before being landfilled. It is absolutely vital that these provisions of State Law be fully enforced, given that permitted landfill space is extremely valuable. CDD and its derivatives have accounted for roughly half the wastes coming into JRL from its beginning in 2003. In fact, for the last 5 years (2011 through 2015) wastes categorized as Construction and demolition debris, Oversized bulky waste, and C&D process fines have when combined accounted for over 57% of JRL inputs. (This is from a table submitted in a letter from the Maine Department of Economic and Community Development (DECD) July 11,2016, Exhibit Spencer3).

In 2010 and 2011, OBW inputs to JRL are listed at 96,520 and 98,888tons, respectively. This may well be why DEP Commissioner Aho attached Condition 3 to her Public Benefit Determination (PBD) Partial Approval in 2012. DEP could see that this category of JRL Waste was increasing at an extremely rapid pace, with volumes of OBW amounts from 2007 being 9,649 tons, 2008 OBW being 21,405 tons, and 2008 OBW listed at 51,438. Were this increase from 2007 to 2010 to have continued at this pace through 2015, just the OBW portion of wastes entering JRL would have eclipsed the total tonnages into JRL by 2014. This had to have been of major concern to regulators.

Another factor in the increased volumes of OBW into JRL may be that Casella's Pine Tree Landfill (PTLF) in Hampden stopped taking waste at the end of 2010. When looking at the JRL waste volumes from 2011 through 2015 (post PTLF), we can see an odd statistical trend. While the tonnages of CDD, OBW, and CDD fines varied year to year by category, their combined tonnages varied less in total than individually. Combined tonnages of CDD, OBW, and CDD fines in that five-year period (2011 through 2015) only differ from a low of 361,527 tons in 2015 to a high of 374,686 tons in 2013. The next lowest combined tonnage was in 2012 with 367,566 tons into JRL. This seems remarkably consistent.

Since these three categories, comprising over 57% of JRL inputs in 2011 through 2015 are all different descriptions or derivatives of construction and demolition debris (CDD), it occurs to me that the total volumes stay about the same but the categories vary more by year. This raises these questions:

1. Who determines which category a truckload of waste is put into, and where does this determination take place? In other words, who is responsible for the accounting- is it Casella personnel at the actual JRL landfill, is it Casella personnel at their central facility in Maine, is it Casella employees at their various facilities from Pennsylvania throughout New York and New England, or is it whoever controls each individual truck throughout Casella's geographic region? Ideally there should be State auditors involved with properly accounting for wastes into state facilities.
2. Pine Tree Landfill was a commercial landfill. JRL is a state-owned landfill, with the Bureau of General Services (BGS) functioning as the titular state agency that owns JRL. The rules for the two are supposed to be different. A commercial landfill is allowed to accept wastes from anywhere in the country. Our state landfill(s) are restricted to Maine-generated wastes and not subject to the United States Commerce Clause. Why then did combined categories of CDD wastes into JRL increase so drastically after PTLF closed? If the wastes going into PTLF pre-closure were primarily Maine wastes, why weren't they already going to JRL? And if the increased volumes of CDD categories of wastes into JRL post-PTLF are truly Maine wastes only, what explains the increases at that time?
3. Why do OBW tonnages into JRL vary so widely over the lifetime of JRL? Since KTI (Casella's former CDD processing facility in Lewiston) was sold (2013) does the majority of the OBW still come through that facility?

In its letter of July 11, 2016 (Exhibit Spencer3), DECD (BGS is a part of DECD) argues that there should be no limit on OBW amounts into JRL post-expansion, as mandated by Commissioner Aho's PBD. OBW is a waste industry term meaning "Large items that may be difficult to process, such as mattresses, furniture, appliances, and certain other components of demolition debris." In her PBD Partial Approval, Commissioner Aho made it very clear that the PBD was conditional on there being a limit placed on OBW deliveries to JRL (Condition #3 of PBD Exhibit Spencer 4, pg. 29). Commissioner Aho also made it very clear in the PBD Conclusion #1 that the PBD was provisional on an OBW limit. Another relevant provision in the PBD is in Condition #4: "Periodic independent third party audits of CDD processing operations…". "The first such audit(s) shall occur prior to the disposal of OBW from these processing facilities in the 9.35 million cubic yard expansion."(Exhibit Spencer 4, pg. 29)

Also contained in the Conclusions of the PBD, #6 (Exhibit Spencer 4, Page 29) directs the State Planning Office (now the BGS as owner) and Casella to Amend their Operating Services Agreement. This was in response to her concerns that there were large amounts of CDD and CDD residues coming into JRL (including OBW) through Casella's KTI processing facility in Lewiston. This facility was sold to ReEnergy in 2013 and still accounts for most of the CDD imports into JRL. ReEnergy has made some progress in reducing the percentage of its waste inputs that are imported from out of state, but still the vast majority of wastes entering the Lewiston processor and continuing to JRL were not discarded in Maine. The original justification for these imports was to provide fuel for the Mill boiler in Old Town. Commissioner Aho noted in the PBD that the Old Town boiler was not functioning, and this continues to be the case today. The Nov. 2, 2006 Second Amendment to the OSA's Fuel Supply Agreement allowed CDD imports to be used for fuel for all boilers in Maine, whereas up until that time imports were only allowed to provide fuel for the Old Town Mill boiler. Despite these changes, there is little to no fuel from CDD being burned in any boilers in Maine. I believe that this is why Commissioner Aho mandated that the OSA be amended. However, Casella/BGS refuses to comply with the PBD directive, and their excuse is that "it is not an enforceable obligation".

My opinion is that until Casella/BGS comply with all the Conditions and Conclusions of the PBD, then any Expansion should be put on hold or denied until there is compliance. CDD in its various forms has been coming into JRL for almost thirteen years without adequate assurance of source reduction, perhaps categorized by convenience, and the Public has had to rely on Casella for accounting, with no help from our State agencies discernible.

In the DECD letter of July 11, 2016 Exhibit Spencer 3, pg. 2), which was signed by Michael Barden of BGS and Jeremy Labbe of Casella, here is how they describe OBW and its relationship to the economy:

"OBW generated by a CDD processing facility is a material that is generated as a result of recycling CDD. This is an activity that should be encouraged. As economic activity increases, CDD volumes increase, resulting in an increase in OBW generation, as evidenced in the volumes shown on the attached chart. Applying an arbitrary limit on OBW acceptance in the JRL expansion could have the direct result of limiting CDD recycling or causing an increased financial burden for CDD processing facilities in Maine."

They seem to be arguing that higher volumes of OBW into JRL is a very positive thing for Maine's economy. If this were the case, then why were OBW inputs into JRL at their highest (2010 and 2011) while the economies of the United States and Maine were struggling to pull out of the steepest Recession since World War 2? What's more, overall combined categories of CDD varied little during these years, but OBW deliveries to JRL were at their highest levels. Therefore OBW volumes did not

correspond with higher CDD outputs overall. Mr. Barden should be prepared to explain his statements at the Public Hearing this fall, if not before.

Furthermore, Barden and Labbe (Exhibit Spencer 3, Page 2) say that landfilling of OBW was the best way to handle OBW, according to the MEDEP Maine Materials Management Plan January 2014, Appendix C.(Exhibit Spencer 3,footnote pg.2) It needs to be pointed out that rules on Maine's waste hierarchy have changed since that date. Most of the materials in mattresses can be recycled into metal, wood, and fabric. Appliances have metal components, and the copper windings in their motors are among the most valuable of recycled materials. Furniture likewise can be taken apart and largely recycled. So we need to know how much effort was actually put into recycling at the true source of the OBW, which may well be beyond Maine's borders. It is also possible that wastes coming into Maine CDD processors are sent there to avoid stricter rules on landfilling in the jurisdiction where they were discarded.

To fully understand CDD waste volumes into JRL in the past and predict them in the future, should JRL be expanded, it is necessary to develop an overall comprehensive portrait of Casella's network of landfills throughout the northeastern United States. We have heard that Casella either owns or operates thirteen landfills in their network. How many of these are licensed to accept CDD? What are the volumes at those facilities? What are the volumes of OBW at Casella's non-JRL landfills? Do they also use CDD fines for "daily cover", and where do these fines come from? Where does the CDD that comes to JRL actually become a waste? Where are the Points of Discard? What are the rules on source reduction and recycling where these materials are discarded, and do they meet or exceed the standards and effectiveness of wastes required in Maine? DEP needs a lot more information from Casella/BGS before they can confidently assure the Public that our rules on Waste Hierarchy are being fully implemented both currently and in the future at the Juniper Ridge Landfill.

SITE GEOLOGY

Casella and DEP should be prepared to answer questions about the threat of subsidence underneath JRL. During the last glacier events concluding about 12,000 years ago, the weight of a mile-thick ice mass was so heavy that it depressed the surface of the earth. In places, the earth is still rebounding from that event. When I have raised this as an issue, it appears that nobody has taken it seriously, which could have cataclysmic consequences if the engineered construction of the landfill is compromised and, for example, the drains lose their positive slope.

How much does a mile of ice weigh compared to a landfill? We know that ice is slightly less heavy than water, which weighs about 8 pounds per gallon, or 62 pounds per cubic foot. Let's use a round number of 60 pounds per cubic foot. One acre is 43,560 square feet. One acre covered with one foot of water would weigh 60 times 43,560 which is 2,613,600 pounds. Converting pound into tons at 2000 lbs/ton equals approximately 1306.8 tons per acre of a foot deep of ice. So a one-mile high pile of ice would be 5280 feet (one mile) times 1306.8 tons which equals 6,899,904 tons. In the DECD letter of July 11, 2016(Exhibit Spencer3,table) there is a table with annual weights of wastes into JRL from 2003 to 2015. These total 6,382,878 tons of wastes into JRL through 2015, with future projections of an additional 700,000 tons annually. So if we include wastes deliveries to date in 2016, we can see that there has been about the same weight placed in JRL as there would be by a mile- thick pile of ice over one acre. It is important to note that the landfill currently covers over 50 acres. However, each 30-ton truckload of

waste into JRL is compacted again and again by machines that weigh over 100,000 pounds. Subsidence should be investigated.

DESIGN AND OPERATION OF THE PROPOSED EXPANSION

There are troubling aspects of siting and operating a huge landfill addition that would basically double the size of the current JRL. How much redundancy is built into the leachate collection system? What would happen if we had a multi-day rain event combined with power outages? Can that system of drains hold the weight of additional liquid, and for how long?

At the Milestone Meeting of December 18, 2014 Mr. Eric Stinehouse (sp?) of Sanborn Head gave an overview of landfill gas collection systems used at JRL and at an expansion. He gave descriptions of the horizontal and vertical gas collection lines used to suck gas out of the landfill. He mentioned that the "lower pipes may collapse". We need to discuss this at the Hearing. If some of the gas collection lines collapse, does that raise the risk of fire or explosion? Would it cause moisture buildup? Would it cause the waste to deteriorate faster or slower? Is there also a risk of leachate collection pipes collapsing?

The standard for landfill construction is that there must be a six-year travel time to "sensitive receptors". It sounds like that is how long it would take for any escaped toxins to get to an aquifer, etc. This does not inspire confidence; it is as if we are planning for a leak. If the liner system is breached, it is difficult or impossible to fix it with all the waste in place. From the beginning of a leak it may take 6 years to get to drinking water sources, but once that leak starts it will leak basically forever. So while JRL is called a "secure landfill", at the same time plans are in place that anticipate failure of the systems.

On April 10 2008, at a landfill site assignment hearing before the Board of Health in Southbridge, Massachusetts, David Bonnett, Civil Engineer, Landfill Site Professional, and Expert Witness for Casella Waste, testified under oath that, "All liners leak" Volume3 page 447 of the testimony(Exhibit Spencer5). This information is relevant to an expansion of JRL.

ODOR CONTROL/REPORTING

One of the more frustrating aspects of living in the vicinity of JRL is the procedure for reporting odors. There is a number to call at the landfill, and if you are lucky someone will answer it (394-4376). Then after giving your name and location, you are asked "What does it smell like?" They don't mention that this is actually a multiple choice quiz, and if it doesn't fit a category it will not be recorded as a legitimate complaint. They may ask if you'd like someone to visit, and if you agree then they will show up and measure for hydrogen sulfide gas, and that is all. They may also bring their "trained noses" into action, which is kind of ridiculous because anyone working at a landfill must suffer from olfactory fatigue which numbs one's sense of smell. I have also heard of Casella blaming the odors on the company that runs the on-site gas filtration system. Casella gets to decide what is a "legitimate complaint". That is like asking me, a logger, if my chain saw is too loud- not to me it isn't!

What can be done about this? We could ask the local police to write down the place and time when they smell odors that could be a nuisance to residents. They wouldn't have to necessarily do anything about it, just keep a record. There is a need for an objective measure of odors. I will enclose an article (Exhibit Spencer 6) I saw this summer about a device called The Nasal Ranger, which measures aromas in odor concentration units. This device was designed by St. Croix Sensory in Minnesota, and developed by Chuck McGinley. Over five years ago I attended a meeting with DEP that was intended to refine odor

rules in Maine. It appears that nothing came of that. What needs to be remembered is that there are other fugitive landfill gases besides hydrogen sulfide that can be deadly in sufficient concentration. There does not appear to be a warning system in place to protect citizens and workers.

STORMWATER MANAGEMENT

The Public and environmental systems may be at risk from insufficient preparations for extreme precipitation events at JRL after an expansion and at present. Not long after Casella started operating JRL in 2003, there was a very heavy rain that washed out the stormwater control systems and spread sediment off the landfill footprint. There is a conflict in DEP regulations because the criteria only calls for building for a 25-year precipitation event. Casella chooses to use the record rainfall for Orono in the last quarter century as a maximum event, which is 4.8 inches in a 24-hour period. Within the last five years a system of thunderstorms deluged Brownville Junction, only 35 miles north of JRL, with over 8 inches of rain in a few hours. This resulted in lots of damage, including washing out a railroad track.

An event of this magnitude will surely happen at JRL, and it could be at any time. The earlier event at JRL must have violated at least some of the Natural Resource Protection Act (NRPA) Standards. In the BEP handout from May 19, 2016,(Exhibit Spencer 1,pg6), some of the excerpts effected at that time, and in a future storm, would include Soil Erosion, Harm to Habitats and Fisheries, and Lower Water Quality. There is a conflict because rules only call for a 25-year flood threshold, and at the same time building to that lower standard will not adequately protect the environment and prevent harm to public welfare.

MONITORING GROUND AND SURFACE WATER, LEACHATE, AND LANDFILL GAS

If one reads through the JRL annual reports and the comments of DEP personnel such as Richard Behr, there is a commonly repeated event: a monitoring well will show some abnormal results and the monitors will conclude that it is due to construction activity at the landfill. Landfills are always under construction; JRL grows every day, year around. Why aren't there more objective measurements of water quality that are not influenced by construction activities? What if DEP staff was to go back and for every result where construction activity was blamed for unusual results, instead look at what could be happening to cause aberrations? Experts say that "All landfills leak", and any delay in tracking down possible breaches in the liner systems just reduces the opportunity to remedy the situation.

Leachate disposal is especially troubling in regard to an expanded JRL. Casella/BGS has been extremely lax in reporting changes to leachate disposal agreements. In their July 11, 2016 letter to DEP(Exhibit Spencer 3, pg.3), Michael Barden and Jeremy Labbe revealed that Casella had signed a new leachate disposal contract with the owners of the Old Town Mill in April. So three months after the fact they revealed this contract. During that period of time there were meetings on JRL expansion where Barden, Labbe, other Casella personnel and attorneys were present along with DEP staff and never mentioned that the leachate disposal contract had changed. This reminds one of back in November of 2006, when Casella signed new contracts for Fuel Supply and Leachate Disposal and incorporated them into the Second Amendment to the Operating Services Agreement (OSA). They never disclosed these changes, which drastically expanded CDD deliveries to JRL. Only through citizen inquiry were these changes made public, and not until 2008.

As part of the Legislative Resolve in 2003 that began State ownership of JRL, a Juniper Ridge Landfill Advisory Committee (JRLAC) was created. This is a group of eight citizens from the surrounding communities: 5 from Old Town, 2 from Alton, and 1 from Indian Island. Their role is supposed to be that of a place where local citizens can go to get information about JRL, both current operations and planned changes. Unfortunately, both agencies who have "owned" JRL, the State Planning Office and now the Bureau of General Services, have failed to inform the JRLAC in a timely manner of planned events central to the landfill's operation, such as the above-mentioned change in Leachate Disposal Agreement. This leaves the Public uninformed and without a place to go to ask questions and air grievances. JRLAC's role should be clarified before Expansion.

The Old Town Mill has not operated since last fall (2015). At bankruptcy court, it was sold to a group that tries to sell off individual mill assets and scraps the rest. Beginning last November, about 800,000 gallons of JRL leachate per month were taken to the Wastewater Treatment Plant at the Old Town Mill. It has been difficult to get specific information from DEP or others on how it was handled, but it was basically mixed with several smaller waste streams and then "batch released" into the Penobscot River. It is not clear if this leachate was treated at all during that time between Mill closure and new Leachate Disposal Contract before being sent downriver. How much was it diluted? Was the PH balanced to match the River's? The new contract says that Casella will get the leachate PH between 5 and 9 before putting it into the Mill system. This is a wide range of PH, and only tested twice a year. There is so much effort made to keep the very toxins in the JRL leachate out of the surface and groundwater at the landfill site, then it just gets dumped straight into the Penobscot River. There is a much larger and more capable wastewater treatment plant in Brewer that would be a far better disposal site. Apparently Casella is allowed to avoid better leachate treatment to save money. This is a great example of how Casella's welfare is protected at the expense of the Public Welfare that our DEP and EPA rules are designed to protect.

ALTERNATIVES ANALYSIS

Central to the NRPA Application, as well as the US Army Corps of Engineers Application, is something called an Alternatives Analysis. Shawn Mahaney of the Corps explained to me that to them, this is an attempt to determine if this activity, expanding room for wastes at JRL, is unavoidable and has any alternative to disposal and its accompanying destruction of wetlands.

Chapter 310 Wetlands and Waterbodies Protection

Section 5. General Standards.

A. Avoidance. "The activity will be considered to result in an unreasonable impact if the activity will cause a loss in wetland area, functions, or values, and there is a practicable alternative to the activity that would be less damaging to the environment…".(BEP Handout May 19, 2016 , Exhibit Spencer 1,p7)

Obviously, if there was less waste in need of disposal at JRL, there would be less pressure to expand, and any expansion would last longer. During the period of time between the Expansion Applications being submitted and accepted as complete for processing, DEP staff analyzed waste streams into JRL. In a letter from Michael Parker of DEP to Casella and BGS on Jan. 22,2016 (Exhibit Spencer 7,pg3), DEP staff presented "Chapter 400.4.N, Solid Waste Management Hierarchy". After looking at seven

categories of wastes into JRL, they commented "Of these seven categories, FEPR and MSW ash currently have no other viable management option." This was for 2014. FEPR (57,000 tons) and MSW ash (54,000) comprised only 19.8% of the total from these seven waste streams (559,000 tons). DEP staff did not say where else these wastes could go, but it sounds like at that point in time there was considered to be a "practicable alternative to the activity" of bringing most wastes to JRL. In addition, the PERC incinerator in Orrington where the FEPR and Ash come from is committed to burning one-third less MSW post-March 2018. Remember also that DEP's stated goal is to reduce statewide waste by 5% every two years.

SUMMARY

Essential considerations before any Expansion of JRL should be permitted should remember the basics:

38 M.R.S. §1310-N(1). Licenses.(ex1,pg11) The Department shall issue a license for a waste facility whenever it finds that:

Facility will not pollute any water of the State, contaminate the ambient air, constitute a hazard to or welfare or create a nuisance;

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; and

Practices are consistent with the State's solid waste management hierarchy.

Juniper Ridge should not be issued a permit for Expansion until Casella/BGS have fully complied with the Conclusions and Conditions of the PBD license from January 2012, including placing a limit on OBW deliveries, amending the OSA to reduce CDD imports from out of state, and conducting independent third-party audits of large CDD processing facilities. All concerns of the Public need to be considered carefully and alternatives discussed.

I affirm that this written pre-filed testimony is true and correct to the best of my knowledge and belief.

_____ _____

Signature Date

Edward S. Spencer

Intervenor

P.O. Box 12 Stillwater, ME 04489

cjkspencer@gmail.com

207-827-8359

July 29, 2016 Witness Credentials

My name is Edward S. Spencer.

1971 Graduate, Wilton High School, Wilton, Connecticut. National Honor Society Member. Tri-captain football team, captain and MVP lacrosse team 1971

1976 Graduate, Bachelor of Arts in Religious Studies, University of Virginia, Charlottesville, VA. Entered school fall 1971 as Engineering School candidate; changed majors, took 1973-74 school year sabbatical; returned with concentration in Eastern Religions. Started 4 years on Lacrosse team, NCAA National Champions in 1972; held school record for Games Played with 52. Played in 1976 North-South All-Star Lacrosse Game.

1977 Purchased land in Old Town, began homesteading.

1980 Married Cheryl Krupacs

1979-to Present: Owner and Operator of Spencer Tree, a low-impact logging company and part-time tree surgeon.

2003 to Present: Began to engage as a citizen activist upon learning that the Old Town Paper Mill's generator-only landfill located within two miles of our home had been changed without adequate public notice into a state-owned multi-waste facility and expanded by ten million cubic yards without a Public Hearing. Have attended every meeting of the Juniper Ridge Landfill Advisory Committee (JRLAC). Have engaged with the Old Town City Council on JRL issues on a regular basis. Traveled to Augusta to attend and participate in legislative activities of numerous committees, notably the Environment and Natural Resources Committee and the Government Oversight Committee, primarily on JRL-related topics. Have submitted many comments for public record on rulemaking opportunities. I have appeared before the Board at least a half-dozen times on appeal matters, and this is my second time as an intervenor in a Public Hearing on JRL licenses (the first was a Department jurisdiction Hearing with the issue of bringing unsorted MSW to JRL from southern Maine).

2014 Ran for State Legislature to represent Old Town and Indian Island, lost in Primary.

Spencer 1

BEP Informational Session

May 19, 2016

MAINE BOARD OF ENVIRONMENTAL PROTECTION

Presentation Overview

- **Juniper Ridge Landfill Proposed Expansion**
  - Kathy Tarbuck, P.E., Project Manager, Department of Environmental Protection (DEP), Bureau of Remediation & Waste Management (BRWM)
- **Natural Resources Protection Act**
  - Jim Beyer, Licensing and Compliance Manager, DEP, Bureau of Land Resources
- **Maine Hazardous Waste, Septage and Solid Waste Management Act**
  - David Burns, P.E., Director, Division of Technical Services, DEP, BRWM
- **Solid Waste Management Hierarchy and State Plan**
  - Emily Green, Assistant Attorney General
- **Public Hearing**
  - Cynthia Bertocci, Executive Analyst , Board of Environmental Protection

Spencer 1

Juniper Ridge Landfill
Proposed Expansion

Juniper Ridge Landfill

2013 Photograph Courtesy of Casella

Spencer 1

Juniper Ridge Landfill – Proposed Expansion

Solid Waste Landfill located on a 780 acre parcel in Old Town and Alton.

Acquired by State in 2004.

NEWSME Landfill Operations, LLC operates the landfill for the State under the terms of an Operating Services Agreement.

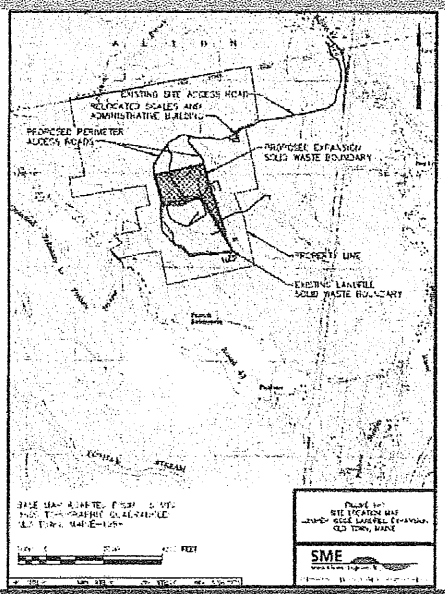
Existing permitted solid waste footprint of the landfill is approximately 68 acres.

DEP issued Public Benefit Determination for a 9.35 million cubic yard (54 acre) landfill expansion in January 2012.

NRPA and Solid Waste applications for the proposed expansion were accepted for processing in August 2015.

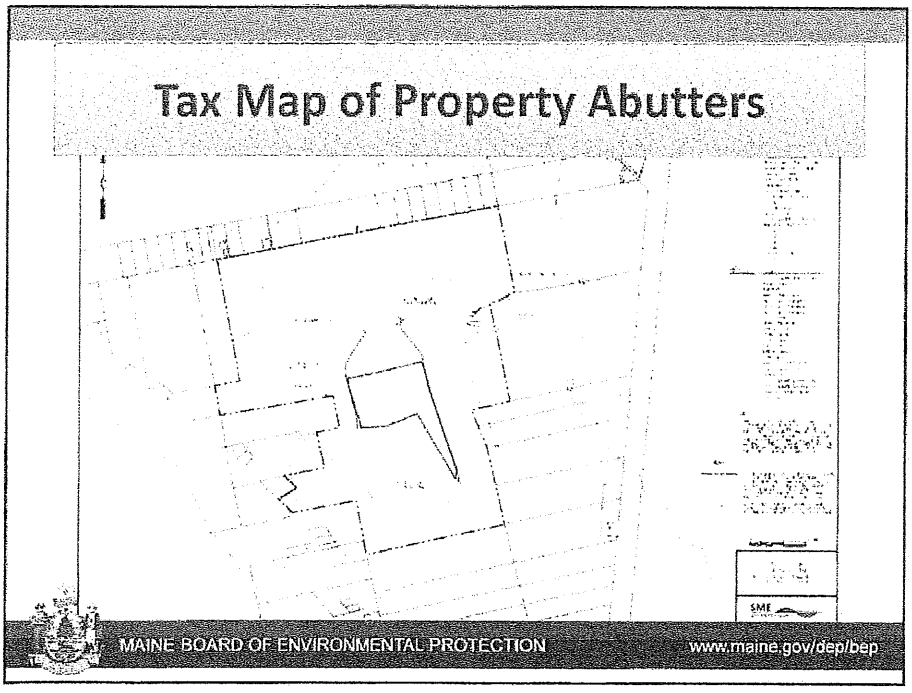
Proposed expansion also includes approximately 20 acres of infrastructure including roads, sedimentation ponds, scales, and buildings.

Site Location Map



Spencer 1


Juniper Ridge Landfill (source: DEP ArcMap)
MAINE BOARD OF ENVIRONMENTAL PROTECTION
www.maine.gov/dep/bep


Tax Map of Property Abutters
MAINE BOARD OF ENVIRONMENTAL PROTECTION
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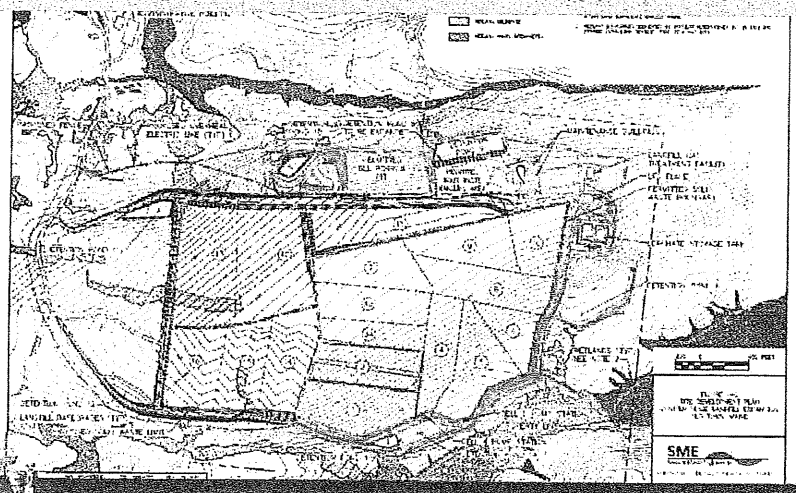
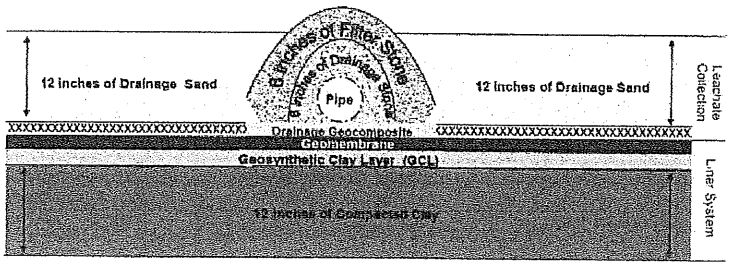
Spencer 1

Site Development Plan



Basic Elements of a Typical Liner System



Spencer 1

Natural Resources Protection Act

Natural Resources Protection Act

38 M.R.S. §§ 480-A through 480-JJ

§ 480-D. Standards (excerpts)

1. **Existing uses**: scenic, aesthetic, recreational, and navigational uses of the protected resource.
2. **Soil erosion.**
3. **Harm to habitats and fisheries**: significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life.
4. **Interfere with natural water flow.**
5. **Lower water quality.**
6. **Flooding.**

Spencer 1

Natural Resources Protection Act (cont.)

38 M.R.S. § 480-X. Alteration of Freshwater Wetlands.

38 M.R.S. § 480-Z. Compensation.

38 M.R.S. § 480-BB. Significant Wildlife Habitat.

Chapter 305. Permit by Rule (19). Activities in, on or over significant vernal pool habitat.

Chapter 310. Wetlands and Waterbodies Protection.

Chapter 315. Assessing and Mitigating Impact to Existing Scenic and Aesthetic Uses.

Chapter 335. Significant Wildlife Habitat.

Chapter 310 Wetlands and Waterbodies Protection (excerpts)

Section 5. General Standards.

A. **Avoidance.** "The activity will be considered to result in an unreasonable impact if the activity will cause a loss in wetland area, functions, or values, and there is a practicable alternative to the activity that would be less damaging to the environment..."

B. **Minimal alteration.** "The amount of wetland to be altered must be kept to the minimum amount necessary."

C. **Compensation.** "Compensation is the off-setting of a lost wetland function with a function of equal or greater value. The goal of compensation is to achieve no net loss of wetland functions and values..."

Chapter 310 Wetlands and Waterbodies Protection (excerpt)

Section 5D. No Unreasonable Impact.

(1) "Even if a project has no practicable alternative and the applicant has minimized the proposed alteration as much as possible, the application will be denied if the activity will have an unreasonable impact on the wetland. "Unreasonable impact" means that one or more of the standards of the Natural Resources Protection Act, 38 M.R.S. § 480-D, will not be met."

Chapter 310 Wetlands and Waterbodies Protection (excerpts)

Section 6. Wetland Compensation Standards.

Section 9. Application Requirements.

A. Alternatives Analysis. "A report that analyzes whether a less environmentally damaging practicable alternative, which meets the project purpose, exists."

B. Site Characterization Report.

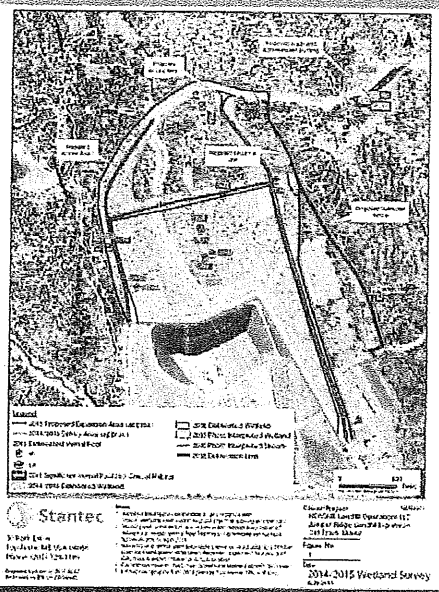
C. Activity Description.

D. Compensation Plan.

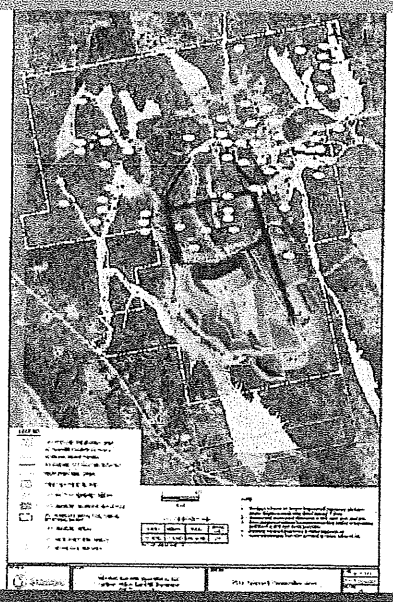
E. Covenant and Restriction or Conservation Easement.

Spencer 1

2014/2015 Wetland Survey



Proposed Preservation Area



Maine Hazardous Waste, Septage and Solid Waste Management Act

Maine Hazardous Waste, Septage and Solid Waste Management Act 38 M.R.S. §§ 1310-1310-AA

§ 1302 Declaration of policy (excerpts):

"...it is the policy of the State to pursue and implement an integrated approach to hazardous and solid waste management based on the following priorities: reduction of waste generated at the source, including both the amount and toxicity of the waste; waste reuse; waste recycling; waste composting; waste processing which reduces the volume of waste needing disposal, including waste-to-energy technology; and land disposal."

"It is in the public interest to aggressively promote waste reduction, reuse and recycling as the preferred methods of waste management."

§ 1310-N. Solid Waste Facility Licenses
(excerpts)

§ 1310-N(1). Licenses. The Department shall issue a license for a waste facility whenever it finds that:

- Facility will not pollute any water of the State, contaminate the ambient air, constitute a hazard to health or welfare or create a nuisance;
- Facility provides a substantial public benefit;
- 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; and
- Practices are consistent with the State's solid waste management hierarchy.

§ 1310-N. Solid Waste Facility Licenses
(excerpts)

§ 1310-N(1-A). Surface Water Protection.

§ 1310-N(2-A). Aquifer Protection.

§ 1310-N(2-F). Siting Standards.

§ 1310-N(3-A). Public Benefit Determination. [already obtained]

§ 1310-N(5-A). Recycling and Source Reduction Determination.

§ 1310-N. Solid Waste Facility Licenses (cont.)

§ 1310-N(7). Criminal or Civil Record.

§ 1310-N(9). Host Community Agreements. [already obtained]

§ 1310-N(11). Waste Generated within the State.

§ 1310-N(12). Citizen Advisory Committee Notification. [notice provided]

§ 1310-N. Solid Waste Facility Licenses (excerpts)

§ 1310-N(11). Waste generated within the state.

"...A solid waste disposal facility owned by the State may not be licensed to accept waste that is not waste generated within the State...

"Waste generated within the State" includes residue and bypass generated by incineration, processing and recycling facilities within the State or waste, whether generated within the State or outside the State, if it is used for daily cover, frost protection or stability or is generated within 30 miles of the solid waste disposal facility."

Spencer I

Solid Waste Management Rules

Chapter 400. Solid Waste Management Rules: General Provisions. Specify general criteria for title, financial ability, technical ability, air quality, water quality, natural resources, utilities, recycling, hazardous and special waste handling and exclusion plan, insurance, financial assurance for closure, etc.

Chapter 401. Solid Waste Management Rules: Landfill Siting, Design and Operation. Specify licensing and submission requirements for site assessment, engineering, contaminant transport analysis, quality assurance, landfill operations, etc.

Chapter 405. Solid Waste Management Rules: Water Quality Monitoring, Leachate Monitoring, and Waste Characterization. Specify standards for data collection, analysis, and reporting, etc.

Solid Waste Subcategories

Municipal Solid Waste (MSW):
(Ch. 400 § 1(NNNN))

Solid waste from household and normal commercial sources; and

includes front end process residue (FEPR) from processing of municipal solid waste.

Special Waste: (Ch. 400 § 1(Nnn))

Any solid waste generated by sources other than household or typical commercial establishments that:

- exists in such an unusual quantity or such a chemical or physical state;
- may disrupt or impair effective waste management or threaten public health, human safety, or the environment; and
- requires special handling, transportation and disposal procedures.

Spencer 1

Examples of Special Waste

(Chapter 400 § 1(Nnn))

Special waste includes, but is not limited to:

- Ash;
- Industrial and industrial process waste;
- Sludge and dewatered septage;
- Debris from non-hazardous chemical spills and cleanup of those spills;
- Contaminated soils and dredge materials;
- Asbestos and asbestos-containing waste;
- Sand blast grit and non-liquid paint waste;
- High and low pH waste;
- Spent media filter residue; and
- Shredder residue.

Solid Waste Management Rules (excerpts)

Chapter 401 § 1(C). Performance Standards and Siting Criteria.

(1) Performance Standards.

- Landfills may not contaminate ground water outside the solid waste boundary;
- Landfills must be designed and operated to not pose a bird hazard to aircraft;
- Time of travel to sensitive receptors must meet specified standards;
- Contaminant releases must not pose an unreasonable threat to sensitive receptors; and
- Disturbance of soil material must not affect ability to monitor water quality at the facility site.

(2) Prohibitive Siting Criteria.

(3) Restrictive Siting Criteria.

Solid Waste Management Rules (excerpts)

Chapter 405 § 2. Water Quality Monitoring

A. Standards for Ground Water Monitoring.
B. Standards for Surface Water Monitoring.
C. Types of Water Quality Monitoring:

- Site Characterization
- Detection Monitoring
- Assessment Monitoring

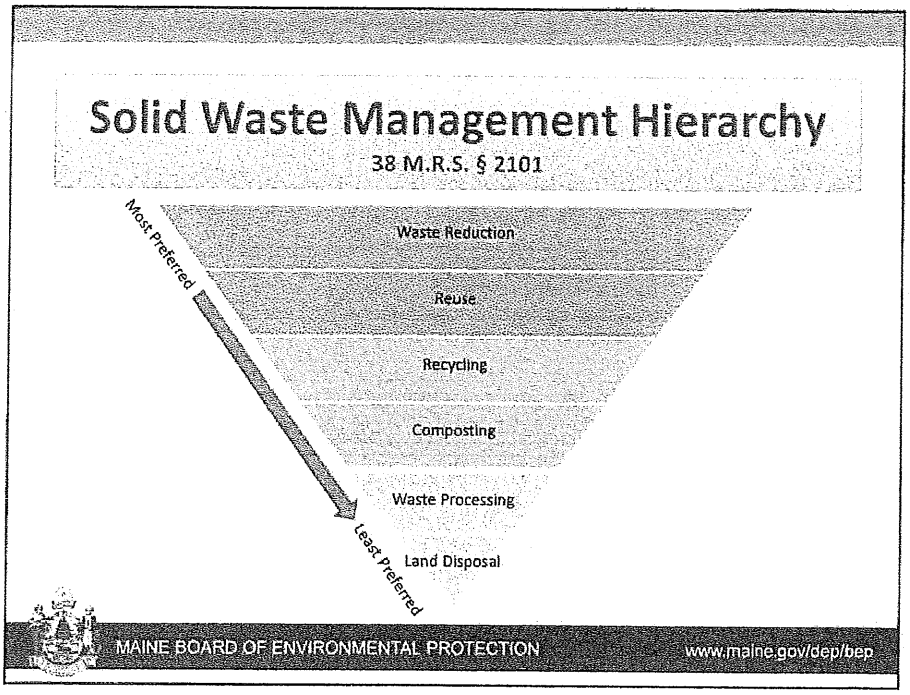
Chapter 405 § 3. Standards for Ground And Surface Water Data Evaluation and Reporting.

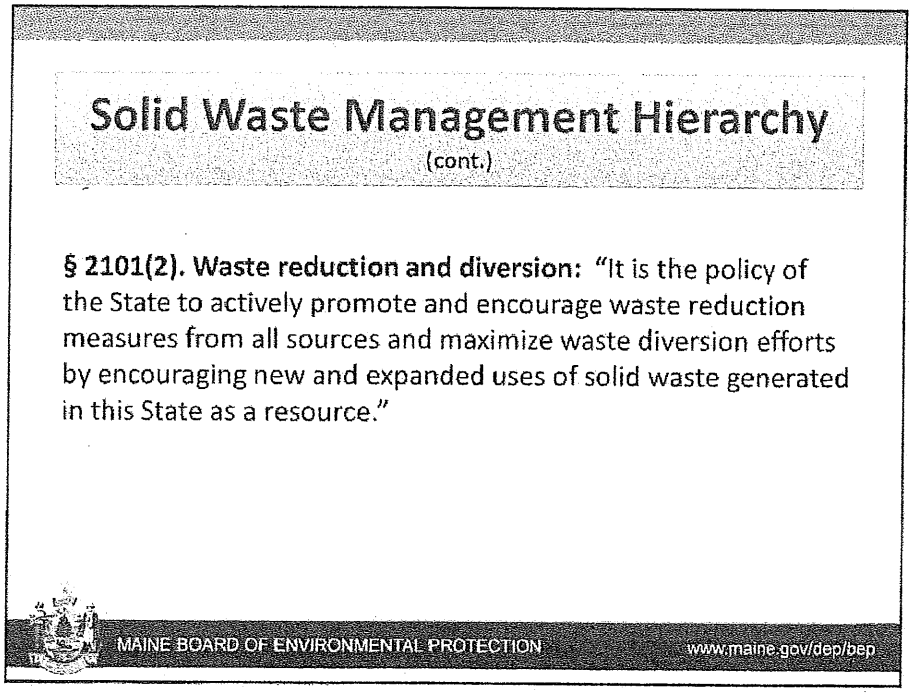
Chapter 405 § 4. Leachate, Leachate Collection And Leachate Detection System Monitoring.

Chapter 405 § 6. Solid Waste Characterization Program.

Solid Waste Management Hierarchy and State Plan

Spencer 1


Solid Waste Management Hierarchy
38 M.R.S. § 2101
Most Preferred
Waste Reduction
Reuse
Recycling
Composting
Waste Processing
Land Disposal
Least Preferred
MAINE BOARD OF ENVIRONMENTAL PROTECTION
www.maine.gov/dep/bep


Solid Waste Management Hierarchy
(cont.)
§ 2101(2). Waste reduction and diversion: "It is the policy of the State to actively promote and encourage waste reduction measures from all sources and maximize waste diversion efforts by encouraging new and expanded uses of solid waste generated in this State as a resource."
MAINE BOARD OF ENVIRONMENTAL PROTECTION
www.maine.gov/dep/bep

Waste Reduction and Recycling

38 M.R.S. § 2132 State Goals

1. **State recycling goal**. Recycle or compost, by January 1, 2014, 50% of MSW tonnage generated each year within the State. *(Updated to 50% by January 1, 2021 by PL 2015 c. 461.)*

1-A. **State waste reduction goal**. Reduce the biennial generation of MSW tonnage by 5% beginning on January 1, 2009 and by an additional 5% every subsequent 2 years. Baseline year 2003. *(Repealed by PL 2015 c. 461.)*

1-B. State waste disposal reduction goal. *Reduce the statewide per capita disposal rate of municipal solid waste tonnage to 0.55 tons disposed per capita by Jan 1, 2019, by an additional 5% every 5 years thereafter. Baseline is 2014. (Enacted by PL 2015 c. 461.)*

Note. PL 2015 c. 461 "An Act to Create a Sustainable Solution to the Handling, Management and Disposal of Solid Waste in the State" is not yet effective.

Recycling and Source Reduction Determination 38 M.R.S. § 1310-N(5-A)

"An applicant for a new or expanded solid waste disposal facility shall demonstrate that:

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

(2) The applicant has shown consistency with the recycling provisions of the state plan."

Spencer 1

Chapter 400 General Licensing Criteria

§ 4(N) Solid Waste Management Hierarchy

§ 4(N)(2) Submissions. "The application must include evidence that affirmatively demonstrates that the purposes and practices of the solid waste facility are consistent with the solid waste management hierarchy including, but not limited to:

(a) Solid waste disposal facility. Notwithstanding the provisions of section 6 of this Chapter, evidence that demonstrates that the waste has been reduced, reused, recycled, composted and/or processed to the maximum extent practicable prior to incineration or landfilling...Such evidence shall include, but is not limited to, a description of the reduction, reuse, recycling, composting and/or processing programs/efforts that the waste is or will be subject to, and that are sufficiently within the control of the applicant to manage or facilitate, including relevant metrics to evaluate effectiveness; and a description of ongoing efforts to increase the effectiveness of these programs/efforts."

Chapter 400(6) Recycling (excerpts)

§ 6. Recycling. "Except as provided below, in order to receive a license for a new or expanded solid waste disposal facility a person must receive a determination by the Department 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."

B. Requirements. "The recycling and source reduction requirements of this section are satisfied when an applicant demonstrates that all of 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; and

(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."

Spencer 1

State Plan

2014 State Waste Management and Recycling Plan Update

State Plan includes:

- Information on source, type and amount of waste generated in Maine;
- Potential opportunities for source reduction and recycling;
- Status of existing solid waste disposal and management capacity and potential for expansion of that capacity;
- Need for current and future solid waste disposal capacity; and
- Identification of short-term material management priorities.

Public Hearing

- Hearing in October.
- Intervenors: City of Old Town, Ed Spencer, Dana Snowman, and SSR LLC.
- Applicant and intervenors will submit pre-filed direct and rebuttal testimony for Board review prior to the hearing.
- Hearing in Bangor area, with opportunity for cross-examination of witnesses for the applicant and intervenors, and testimony by interested public.

Spencer 2

FEDERAL REGISTER

Vol. 81 Monday,
No. 25 February 8, 2016

Part III

Environmental Protection Agency

40 CFR Part 241
Additions to List of Categorical Non-Waste Fuels; Final Rule

Spencer 2

• Paper recycling residuals generated from the recycling of recovered paper, paperboard and corrugated containers and combusted by paper recycling mills whose boilers are designed to burn solid fuel.

• Creosote treated railroad ties that are processed and then combusted in the following types of units: Units designed to burn both biomass and fuel oil as part of normal operations and not solely as part of start-up or shut-down operations, and units at major source pulp and paper mills or power producers[2] subject to 40 CFR part 63, subpart DDDDD that combust CTRT and had been designed to burn biomass and fuel oil, but are modified (*e.g.* oil delivery mechanisms were removed) in order to use natural gas instead of fuel oil, as part of normal operations and not solely as part of start-up or shut-down operations.

(Refer to section V of this preamble or the regulatory text for a full description of the categorical listings).

Determining whether a material is a solid waste is of particular importance as it relates to CAA section 129. That section states the term "solid waste" shall have the meaning "established by the Administrator pursuant to the Solid Waste Disposal Act." *Id* at 7429(g)(6). The Solid Waste Disposal Act, as amended, is commonly referred to as the Resource Conservation and Recovery Act or RCRA. If a material is a solid waste under RCRA, a combustion unit burning that material is required to meet the CAA section 129 emission standards for solid waste incineration units. If the material is not a solid waste, combustion units are required to meet the CAA section 112 emission standards for commercial, industrial, and institutional boilers or, if the combustion unit is a cement kiln, the CAA section 112 emissions standards for Portland cement kilns. Under CAA section 129, the term "solid waste incineration unit" is defined, in pertinent part, to mean "a distinct operating unit of any facility which combusts any solid waste material from commercial or industrial establishments . . ." 42 U.S.C. 7429(g)(1). The courts have determined that the CAA unambiguously requires any unit that combusts "any solid waste material at all"—regardless of whether the material is being burned for energy recovery—to be regulated as a solid waste incineration unit. See *NRDC* v. *EPA* (489 F.3d 1250 (D.C. Cir. 2007)).

RCRA defines "solid waste" as ". . . any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and *other discarded material* . . . resulting from industrial, commercial, mining, and agricultural operations, and from community activities . . ." (RCRA section 1004 (27) (emphasis added)). The key concept is that of "discard" and, in fact, this definition turns on the meaning of the phrase, "other discarded material," since this term encompasses all other examples provided in the definition. In determining the meaning of discard, the courts have determined that the ordinary, plain English definition controls, *i.e.*, discard means "disposed of," "thrown away" or "abandoned." See *American Mining Congress* v. *EPA* 824 F. 2d 1177 (D.C. Dir. 1987); see 76 FR 15460 for a detailed discussion on the RCRA definition of solid waste and CAA section 129.

IV. Background

A. History of the NHSM Rulemakings

The Agency first solicited comments on how the RCRA definition of solid waste should apply to NHSMs when used as fuels or ingredients in combustion units in an advanced notice of proposed rulemaking (ANPRM), which was published in the **Federal Register** on January 2, 2009 (74 FR 41). We then published an NHSM proposed rule on June 4, 2010 (75 FR 31844), which the EPA made final on March 21, 2011 (76 FR 15456).

In the March 21, 2011 rule, the EPA finalized standards and procedures to be used to identify whether NHSMs are solid wastes when used as fuels or ingredients in combustion units. "Secondary material" was defined for the purposes of that rulemaking as any material that is not the primary product of a manufacturing or commercial process, and can include post-consumer material, off-specification commercial chemical products or manufacturing chemical intermediates, post-industrial material, and scrap (codified in 40 CFR 241.2). "Non-hazardous secondary material" is a secondary material that, when discarded, would not be identified as a hazardous waste under 40 CFR part 261 (codified in 40 CFR 241.2). Traditional fuels, including historically managed traditional fuels (*e.g.*, coal, oil, natural gas) and "alternative" traditional fuels (*e.g.*, clean cellulosic biomass) are not secondary materials and thus, are not solid wastes under the rule unless discarded.

A key concept under the March 21, 2011 rule is that NHSMs used as non-waste fuels in combustion units must meet the legitimacy criteria specified in 40 CFR 241.3(d)(1). Application of the legitimacy criteria helps ensure that the fuel product is being legitimately and beneficially used and not simply being discarded through combustion (*i.e.*, via sham recycling). To meet the legitimacy criteria, the NHSM must be managed as a valuable commodity, have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy, and contain contaminants or groups of contaminants at concentrations comparable to (or lower than) those in traditional fuels which the combustion unit is designed to burn.

Based on these criteria, the March 21, 2011 rule identified the following NHSMs as not being solid wastes:

• The NHSM is used as a fuel and remains under the control of the generator (whether at the site of generation or another site the generator has control over) that meets the legitimacy criteria (40 CFR 241.3(b)(1));

• The NHSM is used as an ingredient in a manufacturing process (whether by the generator or outside the control of the generator) that meets the legitimacy criteria (40 CFR 241.3(b)(3));

• Discarded NHSM has been sufficiently processed to produce a fuel or ingredient that meets the legitimacy criteria (40 CFR 241.3(b)(4)); or

• Through a case-by-case petition process, it has been determined that the NHSM handled outside the control of the generator has not been discarded and is indistinguishable in all relevant aspects from a fuel product, and meets the legitimacy criteria (40 CFR 241.3(c)).

In October 2011, the Agency announced it would be initiating a new rulemaking proceeding to revise certain aspects of the NHSM rule.[3] On February 7, 2013, the EPA published a final rule, which addressed specific targeted amendments and clarifications to the 40 CFR part 241 regulations (78 FR 9112). These revisions and clarifications were limited to certain issues on which the Agency had received new information, as well as targeted revisions that the Agency believed were appropriate in order to allow implementation of the rule as the EPA originally intended. The amendments modified 40 CFR 241.2

[2] 40 CFR 241.2 defines power producer as a boiler unit producing electricity for sale to the grid. The term does not include units meeting the definition of electricity generating unit under 40 CFR 63.10042 of the Utility Mercury and Air Toxics Standards rule.

[3] See October 14, 2011, Letter from Administrator Lisa P. Jackson to Senator Olympia Snowe. A copy of this letter has been placed in the docket for this final rule (EPA–HQ–RCRA–2008–1873).

Spencer 2

condition of this categorical non-waste listing. For further discussion, see section V.A.5 of this preamble.

The second regulatory addition is to specify the written certification requirements. As discussed in the proposal, to ensure the C&D wood is processed according to best management practices, it is important for the processor to certify they are meeting such best management practices using trained operators (79 FR 21013). The Agency has determined a written certification from the processor is a necessary mechanism for ensuring best management practices have been used and for indicating that the processor has used trained operators. The Agency recognizes contracts and purchase agreements can indicate a commitment to quality, but also specifications can vary according to the needs of one combustor versus another. More importantly, the contracts and purchase agreements that the Agency has seen do not show that C&D wood has been processed according to any particular best management practices, and consequently, cannot ensure that the resulting material is not a waste when combusted. Therefore, the written certification is finalized at 40 CFR 241.4(a)(5)(iv) and states "[a] written certification must be obtained by the combustor for every new or modified contract, purchase agreement, or other legally binding document, from each final processor of C&D wood and must include the statement: the processed C&D wood has been sorted by trained operators in accordance with best management practices." This certification will assist the combustor's determination that the C&D wood has been sufficiently processed to meet the conditions of this categorical non-waste listing. Refer to the section V.A.5 of this preamble for additional background.

4. Rationale for Final Rule

This section discusses the reasoning provided in the proposed rule and the reasons for the EPA's final determinations for the categorical listing of C&D wood. EPA adopts the reasoning in the proposed rule and further explains it in this preamble. Further explanations for the Agency's decision are provided in the Response to Comments below. The proposal, this section, and the Response to Comments all constitute the Agency's final determination supporting this rule.

a. Discard

When deciding whether an NHSM should be listed as a categorical non-waste fuel in accordance with 40 CFR 241.4(b)(5), the Agency first evaluates whether or not the NHSM has been discarded in the first instance and, if not so discarded, whether or not the material could be considered discarded because it is not legitimately used as a product fuel in a combustion unit. Based on the rulemaking record, as discussed below, the Agency has determined C&D wood is not discarded when: It is processed in accordance with best management practices described herein; it is legitimately used as a product fuel in a combustion unit; and when combustors of C&D wood have obtained a written certification from C&D processing facilities that the C&D wood has been processed by trained operators.

i. Processing of C&D Wood

In the April 14, 2014 proposed rule (79 FR 21012), the Agency reiterated the determination in the existing rules that the wood present in C&D debris is considered to be a solid waste prior to processing and that persons must transform the debris into a legitimate product fuel in order to burn the material as a non-waste fuel.[25] In accordance with 40 CFR 241.2, processing must include operations that transform discarded NHSM into a non-waste fuel or non-waste ingredient, including operations necessary to: Remove or destroy contaminants; significantly improve the fuel characteristics (*e.g.*, sizing or drying of the material, in combination with other operations); chemically improve the as-fired energy content; or improve the ingredient characteristics. Minimal operations that result only in modifying the size of the material by shredding do not constitute processing for the purposes of the definition.

Compared to mixed C&D debris, processed C&D wood will have significantly fewer contaminants and improved fuel characteristics. Specifically, the removal or exclusion of specified materials, such as creosote-treated wood (PAHs, dibenzofuran), pentachlorophenol-treated wood (pentachlorophenol, dioxins), CCA-treated wood (chromium, arsenic), other copper, chromium, and arsenical treated wood, plastics (chlorine), drywall (sulfur), lead-based paint (lead), as well as insulation and other materials containing asbestos,[26] will result in significant contaminant removal. In addition, the removal of concrete, aggregates, dirt, and other non-combustible material will significantly increase the material's energy value. Finally, grinding all remaining wood to a specified size will allow combustors to transport, store, and use processed C&D wood in the same manner as virgin wood and biomass materials.

For incoming C&D debris, processing facilities can use a variety of techniques to exclude or remove debris unsuitable for a product fuel. Typically, processors use some combination of source control, inspection, sorting, screening, and grinding to meet the specifications identified by their customers (*i.e.*, combustion facilities). The nature of the incoming C&D debris, the extent of material segregation prior to arrival at the processing facility, whether positive or negative sorting is employed, and the scale of the processing facility (*e.g.*, the degree of sorting and number of screening devices) help determine which combination of practices will be most effective. The Agency has determined that the best management practices, when performed by trained operators, addresses the variability within the industry such that C&D processing facilities will produce a non-waste product with contaminants that are no greater than clean wood and biomass, regardless of the characteristics that can influence the level of contaminants in the C&D wood. Thus, the Agency finds such processing meets the definition of processing in 40 CFR 241.2.

ii. Certification

Further, to ensure the C&D wood is processed according to best management practices, the Agency had proposed to require processors to certify they are meeting such best management practices using trained operators. This requirement has been finalized in this rule for the reasons discussed earlier in section V.A.3. of this preamble. Combustors must obtain a written certification for every new or modified contract, purchase agreement, or other legally binding document, from each

[25] This rulemaking does not change the waste status of C&D wood prior to processing, up to which point the material would likely be a solid waste subject to appropriate federal, state, and local requirements unless it meets the definition of "clean cellulosic biomass."

[26] CAA regulations provide additional safeguards to ensure asbestos is removed from buildings prior to demolition. Part 61, subpart M (40 CFR 61.145) requires that owners or operators of a demolition or renovation activity to inspect the affected building for the presence of asbestos prior to demolition or renovation and notify the Administrator. EPA notes, however, that the 40 CFR 61.141 definition of "facility" explicitly excludes "residential buildings having four or fewer dwelling units" thus, small residential buildings that are demolished or renovated are not covered by the Federal asbestos NESHAP regardless of whether the demolition or renovation is performed by agents of the owner of the property or whether the demolition or renovation is performed by agents of the municipality. See also the "Asbestos NESHAP Clarification of Intent" (60 FR 38725; July 28, 1995).

Spencer 3

STATE OF MAINE
DEPARTMENT OF ECONOMIC
AND COMMUNITY DEVELOPMENT

DECD
Maine Department of Economic and Community Development

PAUL R. LEPAGE
GOVERNOR

GEORGE C. GERVAIS
COMMISSIONER

July 11, 2016

Ms. Kathy Tarbuck P.E.
Division of Technical Services
Bureau of Hazardous Materials & Solid Waste
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333

Subject: Juniper Ridge Landfill Expansion Application, MEDEP #S-020700-WD-BI-N Follow-up on Department's July 1, 2016 Request for Supplemental Information on Oversized Bulky Waste Tonnage
Submission of Leachate Disposal Agreement

Dear Kathy:

As requested, we are providing the following information on the amount of Oversized Bulky Waste (OBW) included on Table 5-1 of Volume I of the Juniper Ridge Landfill (JRL) Expansion Application.

The topic of projected waste volumes used to design the Expansion was a subject covered during the pre-application milestone meeting process, specifically during the meeting held on October 16, 2014, milestone meeting #2. A summary of the information discussed during that meeting including waste volumes is included in Appendix A-3 of Volume I of the Application. We've attached these notes which include a summary table of the historical waste volumes by categories received at JRL since 2004 up through 2014[1]. We've also attached an updated table to include data from JRL for the calendar years 2014 and 2015.

As described during the milestone meeting process, the overall projected volume for all waste types proposed to be received in the JRL Expansion was established based on past tonnages and anticipated events. The tonnage for an individual category of waste was not intended to be considered the precise amount of, or a limit on, that particular waste type that would be accepted at JRL, but rather

[1] As identified on the table, the 2014 tons represent a straight line projection based on the tonnages received at the site through September of 2014.

Spencer 3

a reasonable projection used to establish an overall waste tonnage for which engineering design analysis such as cell size, landfill gas generation, and traffic could be evaluated. As described during the milestone meeting, the actual amount of the various material types received in the Expansion will be the result of market conditions at that time. Therefore, actual amounts of different waste types disposed in the JRL expansion may be greater or less than the projected amounts if future market conditions change.

As noted in Table 5-1 of Volume I of the Application, landfilling of OBW has a "High" ranking as the current management approach for handling this waste type in MEDEP Maine Materials Management Plan[2].

In terms of OBW acceptance as it relates to the licensing process, Condition 3[3] of the Public Benefit Determination Partial Approval (#S-020700-W5-AU-N, dated January 31, 2012) is derived from Finding of Fact #5.C. of the PBD Order, which states "The Commissioner finds that it is necessary and appropriate to establish a limit on the tonnage of OBW disposed in the expansion. If, and when, a license is issued for the construction and operation of an expansion, the Department will establish such a limit. The limit will be based upon the results of annual demonstrations required pursuant to 06-096 CMR 409.2.C, that waste processing facilities that generate residue requiring disposal will 'recycle or process into fuel for combustion all waste accepted at the facility to the maximum extent practicable, but in no case at a rate less than 50%,' submitted by CDD processing facilities that send OBW to Juniper Ridge Landfill for disposal." *Id*, p. 20.

OBW generated by a CDD processing facility is a material that is generated as a result of recycling CDD. This is an activity that should be encouraged. As economic activity increases, CDD volumes increase, resulting in an increase in OBW generation, as evidenced in the volumes shown on the attached chart. Applying an arbitrary limit on OBW acceptance in the JRL expansion could have the direct result of limiting CDD recycling or causing an increased financial burden for CDD processing facilities in Maine.

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[2] MEDEP Maine Materials Management Plan January 2014, Appendix C. The explanation of the ranking system used in Appendix C is that it provides a qualitative assessment of the comparative management options currently employed for the various components of Maine's solid waste stream. Therefore, a management option with a High ranking equates to the principal method used to manage the solid waste stream.

[3] Condition 3 was imposed at a time when KTI Biofuels, a Casella subsidiary, owned and operated the CDD processing facility in Lewiston. Since August 2013, that facility has been owned and operated by ReEnergy, which is not owned or operated by any Casella entity.

Spencer 3

STATE OF MAINE
DEPARTMENT OF ECONOMIC
AND COMMUNITY DEVELOPMENT

PAUL R. LEPAGE
GOVERNOR

GEORGE C. GERVAIS
COMMISSIONER

As long as an in-state waste processing facility that chooses to be a customer of the JRL Expansion makes its annual demonstration that it is recycling to the maximum extent practicable, and is thus meeting the recycling standard, no numerical limit on the OBW disposal at the JRL Expansion is warranted. Put simply, the JRL Expansion would be accepting OBW from facilities that have satisfied the Chapter 409 "maximum extent practicable" standard.

Finally, it has occurred to us that the Department may not yet have a copy of the Leachate Disposal Agreement NEWSME has entered into with MFGR LLC, the new owner of the Old Town Paper Mill and Wastewater Treatment Plant, for the treatment of leachate from JRL and the expansion. A copy of that Leachate Disposal Agreement, dated April 27, 2016, is attached and should be included in the application record for the expansion proceeding.

Should you have any questions on any of the above, please feel free to contact us.

Sincerely,

Michael Barden
Landfill Oversight Manager
Maine Department of Economic & Community Development

Jeremy Labbe P.E.
Engineer & Environmental Manager
NEWSME Landfill Operations, LLC

cc: Service List

Attachments:
Comparison of Waste Quantities Received at JRL Between 2004 and 2015.
Leachate Disposal Agreement, dated April 27, 2016

59 STATE HOUSE STATION • AUGUSTA • MAINE • 04333-0059
PHONE: (207) 624-9800 • FACSIMILE: (207) 287-2681

COMPARISION OF WASTE QUANTITIES
RECIEVED AT JRL BETWEEN 2004 AND 2015 AND PROPOSED EXPANSION TONNAGES

Waste Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Application Tonnages based on 700,000 tons/year	
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent
WWTP and miscellaneous bio solids/sludge material	26,686	35,336	36,286	61,262	72,275	70,265	58,558	51,053	49,270	64,559	54,214	65,708	70,000	10.0%
Contaminated soils			31,712	8,451	43,910	2,585	6,407	17,526	2,615	11,017	16,823	7,296	30,000	4.3%
Front-end process residue	393	45,644	105,139	74,763	117,118	84,727	125,250	103,306	94,178	53,654	57,048	57,920	54,000	7.7%
Municipal Incinerator ash		58,269	34,087	30,029	94,350	101,262	104,865	105,526	101,276	57,435	54,131	52,341	58,000	8.3%
Biomass and fossil fuel combustion ash	20,880		52,385	61,968	64,809	29,870	26,322	12,855	7,785	8,715	24,771	15,723	35,000	5.0%
MSW bypass and soft layer material		2,035	11,155	7,620	21,426	39,524	39,524	22,355	729	7,326	38,516	63,325	25,000	3.6%
Construction and demolition debris		76,088	163,581	143,453	125,790	104,309	145,488	149,744	150,706	167,418	199,451	203,363	195,000	27.9%
Oversized bulky waste		12,271	29,225	9,649	21,405	51,438	96,520	98,888	64,689	54,353	48,219	47,388	60,000	8.6%
Miscellaneous Waste	5,453	14,740	19,868	34,295	11,551	13,871	17,815	17,326	13,884	28,862	9,696	7,922	35,000	5.0%
C&D process fines (used as daily cover)		7,931	42,320	41,109	45,148	46,744	87,449	125,301	152,171	152,915	126,152	110,776	138,000	19.7%
TOTAL	**53,412**	**252,314**	**525,758**	**472,599**	**617,782**	**544,595**	**708,198**	**703,880**	**637,303**	**606,254**	**629,021**	**631,762**	**700,000**	100.0%

1. Waste received in 2004 consists primarily of pulp and paper mill waste
2. The waste received in 2005 was limited by the sludge mixing program

Spencer 3

Spencer 4

STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE OLD TOWN, PENOBSCOT COUNTY, MAINE JUNIPER RIDGE LANDFILL EXPANSION #S-020700-W5-AU-N (APPROVAL WITH CONDITIONS)	28)))))	PUBLIC BENEFIT DETERMINATION PARTIAL APPROVAL

approval of Phases I and III at this time would be inconsistent with local, regional or state waste collection, storage, transportation, processing or disposal as the additional capacity might undercut local, regional and state initiatives to encourage waste reduction, reuse and recycling.

BASED on the above Finding of Facts, the Commissioner makes the following CONCLUSIONS:

1. The proposed expansion of the Juniper Ridge Landfill in Old Town, Maine, will provide a substantial public benefit, provided the expansion is limited to the 9.35 million cubic yards associated with the Phase II area as described in the public benefit application, provided an annual limit on OBW disposal in the 9.35 million cubic yard expansion is established by the process described in Finding of Fact #5.C, and provided no more than 25,000 tons of MSW bypass from Maine Energy is delivered to the 9.35 million cubic yard expansion in any calendar year, unless authorized by specific conditions in a Department license for the 9.35 million cubic yard expansion.

2. The entire 21.9 million cubic yards of capacity proposed for expansion of the Juniper Ridge Landfill is not needed to meet the immediate or short-term solid waste disposal capacity needs of the State.

3. The 9.35 million cubic yards of capacity proposed for the Phase II area of the expansion of the Juniper Ridge Landfill is adequate to ensure the long-term disposal capacity needs of the State can be met.

4. The proposal for expansion of the Juniper Ridge Landfill is consistent with the State Plan, provided only the application for the capacity proposed for Phase II is submitted.

5. The estimated 9.35 million cubic yards of landfill capacity in Phase II only of the proposed Juniper Ridge Landfill expansion is consistent with local, regional or state waste storage, transportation, processing or disposal.

Spencer 4

STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE OLD TOWN, PENOBSCOT COUNTY, MAINE JUNIPER RIDGE LANDFILL EXPANSION #S-020700-W5-AU-N (APPROVAL WITH CONDITIONS)	29)))))	PUBLIC BENEFIT DETERMINATION PARTIAL APPROVAL

6. The Commissioner recommends SPO and Casella amend the OSA to address the significant quantity of CDD imported into Maine under the terms of the OSA, and the associated large volumes of processing residues delivered to the Juniper Ridge Landfill.

THEREFORE, the Commissioner APPROVES only the 9.35 million cubic yards of capacity estimated for the Phase II area as described in the noted application of the STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE, 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 invalidity or unenforceability of any provision, or part thereof, of this determination shall not affect the remainder of the provision or any other provisions. This determination shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

3. The applicant shall, if, and when, a license is issued for the construction and operation of the 9.35 million cubic yard expansion, comply with the limit, and any subsequent modifications to the limit, established by the Department in the license on the tonnage of OBW that may be disposed in the 9.35 million cubic yard expansion.

4. Periodic independent third party audits of CDD processing operations that are anticipated to transport more than 10,000 tons of OBW to the 9.35 million cubic yard expansion for disposal on an annual basis shall be conducted to verify the results of the demonstrations required under the provisions of 06-096 CMR 409.2.C, focused on the nature and volume of processing residues being sent to Juniper Ridge Landfill for disposal. Third party audits will be conducted by a qualified consultant selected by the Department in consultation with the affected CDD processing facilities and Casella. Casella shall reimburse the Department for the cost of the audits. The first such audit(s) shall occur prior to the disposal of OBW from these processing facilities in the 9.35 million cubic yard expansion. Audits will be conducted at 2 year intervals, unless or until the Department approves their discontinuation. .

Spencer 5

Telephone: 508-764-4252
Fax: 508-764-5407

Health Department
41 Elm Street

TOWN OF SOUTHBRIDGE

SOUTHBRIDGE, MASSACHUSETTS 01550-2638

March 31, 2016

Edward S. Spencer
P.O. Box 12
Stillwater, ME 04489

Dear Mr. Spencer,

We received your information request on March 29, 2016 for copies of testimony given at the 2008 Landfill Site Assignment Modification hearing (namely pages 445-449 of Volume 3) and have included those pages here as requested.

Please let us know if you require additional information.

Respectfully,

Anna Smith
Landfill Monitor

Cc: Andrew Pelletier
Health Director

On April 10, 2008, at a landfill site assignment hearing before the Board of Health in Southbridge, Massachusetts, David Bonnett, Civil Engineer, Landfill Site Professional, and Expert Witness for Casella Waste, testified under oath that, "All liners leak." (Vol.3, p.447 of the testimony.)

He followed by saying that that was why landfills have two liners. Then Atty. Pecci said that if all liners leak that would mean the second one would leak as well, right? There was a long pause as Bonnet realized what he'd said, so Atty. Pecci reminded him that this was a yes or no question, and Bonnett answered "Yes."

Spencer 5

Page 446

A. The tears certainly.
Q. Well, couldn't it be -- couldn't there be a pinhole in it for instance or a very small tear? We're talking about you said a seven acre site, correct?
A. That's right. And there are holes in the liner but the ones, as they're installing it, that is part of the quality assurance plan.
Q. Okay.
A. That you would go over it and the seams all get tested and --
Q. Are you familiar with the term free radical degradation?
A. Yes.
Q. Could you please define what that term is for us?
A. It is the chemical breakdown that can occur by pulling off usually it's double bonds from chemicals.
Q. Okay. So in other words the way plastic breaks down, is that?
A. It could be.
Q. Is that one way of describing it? And if this free radical degradation or plastic

Page 447

breakdown happened to either of these liners, because they're under -- because they are under the waste obviously there is no visual inspection that will pick that up, correct?
A. There is no -- no, because no one can see it.
Q. Right, that's my point. And would you agree that free radical degradation or plastic breakdown might cause a liner to leak?
A. All liners leak.
Q. Okay.
A. The reasons are different, and that's why we have a double composite liner so we can detect those leaks and then we have the monitoring systems that are outside the landfill that --
Q. We'll get to that, okay, but all liners do leak?
HEARING OFFICER KAPLAN: Kirstie, I have to interrupt you for a second. When you're both speaking she can only take down one of you. So you may want to make some pauses there.
MS. PECCI: I'm sorry.
Q. No, but if all liners leak then both

Page 448

liners will leak, correct? Yes or no, sir.
A. Ask that again.
Q. If all liners leak as you just said, then both liners will leak, correct, yes or no?
A. Yes.
Q. All right. Could you please define what a low molecule solvent is?
A. Pardon?
Q. Well, maybe it's better to say -- well, no, a low molecule solvent, are you familiar with that term?
A. Low molecule means it's probably a low density.
Q. And a solvent meaning?
A. Meaning it evaporates.
Q. And could solvents of this type be in the landfill?
A. I couldn't answer that.
Q. Okay. If they were in the landfill, isn't it true that solvents might pass through HDPE, the two liners?
A. They might evaporate.
Q. But they wouldn't pass through the liner?

Page 449

A. Not if they're a solvent. Typically solvents have low vapor pressures then dissolve into air.
Q. Well, if it's underneath -- if there is no air here and it's underneath tons of garbage I don't know how it evaporates, so I guess it would then eat through the plastic, correct?
A. The facility is, and I'm not sure where you're going with this, but the facility isn't, doesn't operate as a hazardous waste facility so it's --
Q. I didn't ask about hazardous waste though. Well, I can come back to that in a minute. I think maybe I'll make myself clear in a minute.
Can you replace the liner if there are leaks to it?
A. Can you replace?
Q. Can you replace -- it's underneath the tons of garbage, can you replace the liner if there are leaks to it?
A. I have knowledge of a landfill that has been deconstructed to --

Spencer 5

still. Is that a – it's not a piece of plastic like the HDPE liner is, what is it exactly?
A. It's strands of HDPE that tend to if you were to look from on top, it would be a pattern of crosses, and if you were to cut a cross section through, you would be able to see that water or liquids could pass laterally. And then it would have bonded to it, heat bonded, a geotextile.
Q. Okay. So that as you said, it's like a pipe but it's more just like a thick layer that water can run through with plastic on top and bottom? Okay. So it's like a wide pipe you would call it?
A. A flat drain.
Q. Just try to put it in terms, you know, because I haven't had a science class in 20 years, so. And then we got the HDPE liner which is 60 milliliters thick, correct?
A. Yes.
Q. And then the clay layer which is -- we said was as thick as the carpet?
A. The GCL.
Q. All right, the GCL or the clay layer

that is actually so a carpet width of clay layer, and then another drainage layer, another wide pipe if you will made with a plastic top and bottom, and then another piece of the HDPE liner, correct?
A. That would be the secondary liner.
Q. The secondary, okay. And at the bottom we got some compacted soil, correct?
A. Yes, that's a clay as well.
Q. Okay. And you did say that the plastic used in the two drainage layers are -- that's also HDPE plastic?
A. Yes.
Q. Okay, thank you. And when this is installed and the first plastic HDPE liner is put down, and it's over the low permeability soil, it's an uneven surface, correct?
A. When you say uneven?
Q. Well, it's not like a sanded wood table, it's a hole in the ground?
A. It's constructed using heavy equipment and it's relatively not flat, it's graded so that it drains and it ultimately what's important is all the layers are together

and so it is -- when I say it's relatively flat, it's relatively smooth with a pitch to it.
Q. Okay. And could you describe how this lining, this lining is laid out on the ground?
A. Sure. In the case of Southbridge, it would be excavated to the design grades, it would be compacted via a smooth drum roll or compactor would make sure that it is firm, tests would be performed, the geomembrane would come in a roll and it would have special equipment, gets laid out and then it gets welded together. And then subsequent layers would be placed using typically low ground pressure equipment so as not to damage the underlying materials, and it would be built up in sequence. The whole thing would be -- there are specifications like in normal construction, and there is a construction quality assurance plan that has to be followed which details certain tests that need to be performed to verify the installation.
Q. And can a liner have a stress crack or tears? How would that happen?
A. That is in theory, the polyethylene

will expand and contract based on temperature.
Q. I'm sorry, just to make sure we're on the same page. And the polyethylene is where?
A. The geomembrane.
Q. Okay.
A. For instance. The geomembrane, there has been lots of studies on geomembrane. The --
Q. I'm sorry, Mr. Bonnett, I'm actually just asking about, just to make sure we're all on the same page, I'm just asking about the HDPE first.
A. Yes.
Q. Okay. And I wanted to know if that liner could have stress cracks or tears on it and how that would happen. I didn't ask about the geomembrane.
A. That's two things. Tears would occur probably as a result of construction. That is why there is oversight. The environmental stress cracking is more of a long term problem that has been looked at with a lot of testing through EPA.
Q. Would either of those necessarily be visible by visual inspection?

Spencer-6

■ The Nose Knows

DAVE KOLPACK/AP

North Dakota Health Department environmental scientist Jane Kangas shows how to operate a smell detection tool in her office in Fargo.

Scientist sniffs out N.D. landfill trouble

FARGO, N.D. (AP) — Jane Kangas has the most valuable nostrils in North Dakota.

The environmental scientist's state-certified nose gives her the ability to decipher whether a landfill is meeting standards for odor control — needing just a whiff or two to determine whether it has reached peak reek.

Kangas conducts odor inspections for 25 landfills in eastern North Dakota, none more scrutinized than the one in Fargo, the state's largest city. Several years ago, complaints about the stench from the dumping ground were so common, the city received criticism from people who worked in a horse park with a 400-stall barn. The city has since cut down on the funk by installing wells to mine the methane gas and turn it into electricity.

"My job is very interesting because we talk to the public on a daily basis," said Kangas, who inspects the Fargo landfill at least once a week. "The odor part is such a small part of my job. I enjoy my job, so to go on an odor complaint, it doesn't bother me."

To make sure her olfactory senses stay sharp — "The older I get, the tougher it gets," said the 21-year veteran of the health department — she is required to annually attend odor school, where she is tested on a variety of scents.

The tool Kangas uses is called the Nasal Ranger, which looks like a radar gun with a nasal mask on one end. It is used to test everything from landfill smells to second-hand marijuana smoke in Colorado.

The device was designed by St. Croix Sensory, a consulting business in Minnesota that's run by Chuck McGinley, an environmental engineer who has trained odor inspectors since the 1980s.

The Nasal Ranger measures aromas in odor concentration units, which essentially is the odor compared to clean air. Anything over seven units is a violation according to a 1999 North Dakota law.

McGinley said each community has different expectations about an acceptable level of smell, what should be done about it and how much money should be spent to fix it.

"Odor is not like a speed limit," McGinley said. "It's more like observing and recording a habit of driving politely in the community."

Spencer 7

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

January 22, 2016

Michael Barden
Dept. of Economic & Community Development
59 State House Station
Augusta, Maine 04333-0059

Don Meagher
NEWSME Landfill Operations, LLC
2828 Bennoch Road
Old Town, Maine 04468

RE: Juniper Ridge Landfill Expansion; Application #S-020700-WD-BI-N

Dear Mr. Barden and Mr. Meagher:

The Department has the following comments on the applications noted above. In addition to these comments, I have attached comments from Richard Behr, Stephan Farrar, Victoria Eleftheriou and Ken Libbey, as well as comments from outside agencies.

- **Chapter 400.4.B, Financial Ability**: The projected total cost for the design and construction of the proposed expansion is $24.6 million. Construction of Cell 11, slated for 2018, is estimated at $6.24 million. A letter from Bank of America, N.A. was submitted with the application that demonstrates a secured credit facility of $190 million, of which $38 million is currently available to cover the costs of design and construction of the expansion. Staff comments that this secured credit facility is available for Casella Waste Systems, Inc. and all its wholly-owned subsidiaries, including NEWSME Landfill Operations, LLC. The cost of ongoing operations, estimated to be $7.0 million per year, will be financed by revenues generated from the operation of the landfill, such as tipping fees. Finally, the cost for closure and post-closure care of the facility is estimated to be $21.1 million. NEWSME Operations, LLC maintains a surety bond, currently in the amount of $21,072,243, for the closure and post-closure care of the landfill. Staff comments that the period for the primary surety bond (#853746) expired on September 12, 2015. A current Continuation Certificate needs to be provided and updated annually.

  In addition to the supporting documentation submitted with the application, staff accessed and reviewed the 2014 Corporate Annual Report for Casella Waste Systems, Inc. to verify financial commitments and environmental liabilities associated with other Casella subsidiaries. Finally, staff verified the status of bonds issued through the Finance Authority of Maine (FAME). FAME staff confirmed that the Casella makes payments to bondholders directly or through a trustee, that FAME has no direct exposure in the case

Spencer 7

of default on the bonds and that Casella is considered to be in good standing with no payment defaults. A copy of the correspondence with FAME is attached.

- **Chapter 400.4.D, Traffic**: Staff have reviewed all the statements and supporting information contained in Volume I, Section 3.4 and Volume I, Appendix E of the application. In addition, the Maine Department of Transportation (DOT) conducted a similar review of the same submittals. Both DEP and DOT comment that the slight increase (3 trips in the peak hour) will not result in the need to modify roadways or intersections in the vicinity of the landfill, that there are no high crash locations in the area that will be impacted by the proposed development and that a traffic study is not warranted. A copy of DOT's comments is attached.

- **Chapter 400.4.E, Fitting the Facility Harmoniously into the Natural Environment**: Staff have reviewed all the statements and supporting information contained in Volume I, Sections 3.5 and 3.6, and Volume I, Appendix F of the application. Staff comment that three Significant Wildlife Habitats are located within the boundaries of the property on which the expansion area is located, but are likely not to be impacted by the proposed development. Further, correspondence from the U. S. Fish and Wildlife Service (USPWS) notes that critical habitat for Atlantic Salmon (*Salmo salar*), a federally and Maine-listed endangered species, lies within the watershed of the project. Staff comment that a final determination by the USFWS or the Army Corps of Engineers on potential impacts to critical habitat of Atlantic Salmon associated with the proposed expansion has not been issued.

- **Chapter 400.4.F, No Unreasonable Adverse Effect on Existing Uses and Scenic Character**: Staff have reviewed all the statements and supporting information contained in Volume I, Section 3.6, and Volume I, Appendices F, G and H of the application. Staff comment that on bottom of page 7-6 of the Sound Level Assessment Report[1], there is reference to Figure 7-1 through 7-6. Staff could only locate Figures 7-1 and 7-2. This is likely a typographical error, however, if not, please submit the additional figures. Further, it is stated at the bottom of page 9-1 of the same Report that "Operational restrictions will be necessary in certain regions of the western expansion area during the one hour of nighttime operations in order to comply with the noise limits." For the purposes of compliance, the applicant should clarify which of the mobile equipment listed in Table 7-1 of the Report will not be operating in the western expansion area during the one hour of nighttime operations (6:00 a.m. to 7:00 a.m.).

[1] *Sound Level Assessment Report Juniper Ridge Landfill Expansion – Old Town, Maine*. Epsilon Associates, Inc., July 7, 2015

Spencer 7

Volume I, Appendix F of the application contains correspondence from the Maine Historic Preservation Commission stating that there will be no historic properties affected by the expansion and that a Phase I archeological investigation will not be required.

Staff comment that the Visual Assessment Report[2] was prepared using both the definition of "public viewing area" contained in 06-096 CMR 400.1.Ll and "scenic resource" contained in 06-096 CMR 315.5.H of the Departments rules. Further, the visual assessment study area was expanded out to a distance of 6 miles, well beyond the 2,000 feet specified in 06-096 CMR 400.4.F(3)(b) of the Solid Waste Rules and the City of Old Town's ordinance.

- **Chapter 400.4.G, No Unreasonable Adverse Effect on Air Quality**: See the January 20, 2016 memorandum from DEP Technical staff on the landfill gas management plans and operations.

- **Chapter 400.4.H, No Unreasonable Adverse Effect on Surface Water Quality**: Staff have not identified any facet of the siting or operation of the proposed expansion that would cause the facility to discharge any water pollutants that would affect the state classification of a surface water body. Further, staffs analysis shows that there are no "waterbodies most at risk from new development" within the watershed of the proposed expansion. Staff note, as stated by the applicant, the existing Stormwater Pollution Prevention Plan will need to be updated to include and address changes brought about by the proposed expansion.

- **Chapter 400.4.I, No Unreasonable Adverse Effect on Other Natural Resources**: The NRPA application submitted as part this overall project is still under review pending responses from outside reviewers, including Maine Inland Fisheries and Wildlife, the USFWS and the Army Corps of Engineers.

- **Chapter 400.4.N, Solid Waste Management Hierarchy** Staff have reviewed all the statements and supporting information contained in Volume I, Section 3.14 of the application. In addition, staff reviewed data contained in the 2013 and 2014 Annual Reports for the Juniper Ridge Landfill, the 2014 Annual Report for the Hawk Ridge Landfill and summaries of 2014 data for the generation, disposal and utilization of residuals in Maine. These last data were compiled by the Department from annual reports for calendar year 2014. In general, the information contained in the application regarding the application of the solid waste hierarchy adequately identified and addressed those wastes that are sufficiently within the control of the applicant to manage or facilitate. Staffs analysis of the summary of wastes accepted at JRL determined that seven categories of wastes accounted for 88.7% of the wastes accepted at the facility. These are mixed CDD (199,000 tons), CDD processing residue – fines (126,000 tons), FEPR (57,000 tons), MSW ash (54,000 tons), CDD processing residue -bulky waste

[2] *Visual Assessment Report Juniper Ridge Landfill – Old Town, Maine*. SMRT Architects and Engineers, July, 2015

Spencer 7

(48,000 tons), Municipal WWTP/POTW sludge (38,000 tons) and MSW (37,000 tons). Of these seven categories, FEPR and MSW ash currently have no other viable management option. CDD processing residue – fines and CDD processing residue -bulky waste are arguably largely generated from the processing of out-state wastes. However, these wastes are considered in-state wastes, as they are generated at processing facilities located in Maine and the fines are used as daily cover to the extent possible in accordance with the statutes and rules governing these wastes. The Department analyzed the use of fines as daily cover at JRL as part of its review of the Public Benefit Determination and noted no irregularities in this practice. Mixed CDD, the largest category of waste accepted at JRL, is generated at many sources in Maine, some of which are under the direct control of the applicant. Staff comments that the applicant should provide additional detail on current and future efforts to decrease the amount of mixed CDD sent to JRL. In reviewing the 2014 Annual Report, staff noted efforts by the applicant to divert MSW from the landfill to other facilities higher on the hierarchy, including ecomaine and MMWAC. Staff note that agreements between these facilities were executed late in 2014 and would not be reflected in the 2014 Annual Report. The applicant should continue to divert MSW to these facilities and provide data on the quantities of MSW diverted to these facilities in 2015. Finally, staff comment that 38,000 tons of Municipal WWTP/POTW sludge was accepted at JRL in 2014, of which approximately 28,000 was generated by Portland, South Portland and Rockland. By comparison, the 2014 Annual Report for the Casella-owned Hawk Ridge Compost facility accepted 27,000 tons of Maine-generated biosolids and 24,000 tons of out-of-state biosolids. Staff are aware that there is limited capacity for land applying and composting biosolids. However, the applicant stated that biosolids from Maine sources in excess of the limitations must be disposed in a secure landfill. Staff propose that a large portion of the Maine-generated biosolids could be managed at the Hawk Ridge facility if out-of-states sources were managed through options other than JRL.

- **Chapter 400.12, Civil and Criminal Disclosure Statement**: Staff comment that civil criminal disclosure must be expanded to include Casella Waste Systems, Inc., the parent company of both New England Waste Services of Maine, Inc. and New England Waste Services of Maine Landfill Operations, LLC. A cursory review of the organization of Casella Waste Systems, Inc. and its subsidiaries, as shown in Volume I, Appendix Q of the application, shows a direct link to the management and control of the various entities. Also, some of the documentation and agreements contained in the application, such as the letter from Bank of America, specifically name Casella Waste Systems, Inc. The expanded disclosure must address all the pertinent information on Casella's other subsidiaries, including those operating in other states and countries, as required in 06-096 CMR 400.12

As always, should you have any questions regarding these comments, please do not hesitate to contact the Department to discuss these items. Please note that responses to these comments

Spencer 7

should be submitted to Kathy Tarbuck, who will be taking over as the project manager for the combined applications.

Sincerely,

Michael T. Parker, Project Manager
Division of Materials Management

Attachments:

FAME Correspondence
DOT Comments
Comments of R. Behr
Comments of S. Farrar, et al.

Cc (via email): K. Tarbuck, MeDEP
V. Eleftheriou, MeDEP
S. Farrar, MeDEP
R. Behr, MeDEP
L. Caron, MeDEP
C. Bertocci, BEP
M. Booth, Sevee & Maher
T. Doyle, Esq., Pierce Atwood

IN THE MATTEROF

STATE OF MAINE, BUREAU OF GENERAL SERVICES, JUNIPER RIDGE LANDFILL EXPANSION City of Old Town, Town of Alton, Penobscot County, Maine #S-020700-WD-BI-N #L-024251-TG-C-N APPLICATION FOR MAINE HAZARDOUS WASTE, SEPTAGE AND SOLID WASTE MANAGEMENT ACT, and NATURAL RESOURCES PROTECTION ACT PERMITS and WATER QUALITY CERTIFICATION	) STEVE COGHLAN) EXPERT WITNESS FOR) EDWARD S. SPENCER) INTERVENOR))) PREFILED WRITTEN TESTIMONY) FOR BOARD OF ENVIRONMENTAL) PROTECTION PUBLIC HEARING) FILED JULY 29, 2016)

Witness credentials and scope of testimony

My name is Steve Coghlan, and my current position is Associate Professor of Freshwater Fisheries Ecology in the Department of Wildlife, Fisheries, and Conservation Biology at the University of Maine. I earned a BS and PhD in Environmental and Forest Biology from State University of New York College of Environmental Science and Forestry (Syracuse, NY) in 1998 and 2004, respectively, studying ecology and environmental sciences in general and fisheries and aquatic ecology in particular. My dissertation research focused on the juvenile ecology of Atlantic salmon and feasibility of their restoration in the Lake Ontario watershed, and my teaching responsibilities included fisheries biology, aquatic entomology, ichthyology, and ecology of Adirondack ecosystems. I worked as an NSF-funded postdoctoral researcher and adjunct assistant professor at Arkansas State University (Jonesboro, AR) from 2004-2006, where I used biochemical analysis to study migration and life history in trout and aquatic insects. In 2006 I joined the faculty at UMaine with my responsibilities split between teaching undergraduate and graduate students and conducting fisheries research relevant to the State of Maine. Much of my current research focuses on ecological effects of dam removals in the Penobscot River watershed, especially in the context of restoring endangered, threatened, or declining fish species and the ecosystems that support them. I teach four courses to more than 200 students a year: Freshwater Fisheries Ecology and Management, Biophysical Economics, General Ecology, and Ecological Statistics. Out of a department of 7 teaching faculty, I am responsible for ~40% of credit-hours delivered to undergraduate students. I serve as Director of the Maine Chapter of the Center for the Advancement of the Steady State Economy (CASSE), and in my capacity as Network Speaker I give public presentations describing the science of how our human economy interacts with local ecosystems and the entire ecosphere, while providing visions of a sustainable society that lives within the limits of nature. I would consider my “areas of expertise” to be the realms of freshwater fisheries ecology and biophysical economics, but I am educated broadly in ecology and environmental sciences, and I am fortunate to learn a great deal from my collaboration with other UMaine faculty who are experts in fields such as wetland ecology, conservation biology, and population biology.

My written testimony submitted as part of the application process for the JRL expansion adopts a “systems ecology” perspective of how landfills (and the expansion thereof) relate to the interconnections among the human economy and the natural environment from which we humans derive our sustenance and wealth, including fisheries and their supporting watersheds. Part of my discussion focuses specifically on Atlantic salmon, an endangered fish species whose federally-designated Critical Habitat is located within the watershed impacted by this expansion. The rest of my discussion takes a larger view of waste production as a consequence of economic growth, in which our economy continues to enlarge the scope of human impact at the expense of all non-human life and our entire planetary life-support system. These considerations are all the more important given rapid, destabilizing climate change we’re experiencing. I hope this avenue of discussion places the local issues surrounding one particular landfill, Juniper Ridge, in the context of issues facing our entire industrialized civilization on Planet Earth, in effect helping us to “think globally and act locally”. Finally, wherever appropriate, I identify what I perceive to be shortcomings in the application regarding conclusions drawn from some mix of “objective science” and “subjective values”. My testimony is based on my limited scientific understanding of natural processes that are governed and constrained by biophysical laws and principles, supported by empirical evidence whenever possible and consistent with theory when evidence is not yet available or impossible to obtain. I have tried to write my testimony for a broad audience of intelligent people, supporting my statements whenever possible with general and easily-obtainable references that themselves summarize or synthesize

entire fields of research. I have avoided writing a highly-technical tome to a narrow audience of specialists in a particular scientific field, full of impenetrable jargon and bogged down with references to primary literature inaccessible to many in the general public. The purpose of this testimony is hopefully to enlighten and educate, not to obfuscate and distract.

Atlantic salmon: a fish of forests and wetlands, not of cities and landfills

Along North America's eastern seaboard, Atlantic salmon once ranged from Ungava Bay in northern Canada southwards to Long Island Sound and the Connecticut River. Today, they are on the brink of extinction in the US and, with very few exceptions, populations have declined throughout the rest of their range in Canada and Europe. Landlocked native populations in the Lake Ontario watershed were extirpated by 1898, and sea-run populations in the Long Island Sound DPS and Central New England DPS were extirpated in the 1800s. The Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon, inhabiting 9 coastal watersheds, was listed as Federally Endangered in 2000, and the listing was revised in 2009 to include populations in portions of the Penobscot, Kennebec, and Androscoggin watersheds. Thus Maine harbors the last wild Atlantic salmon in the US, and the Penobscot River contains the largest river-specific population. Adult returns to freshwater streams have been too low to support sufficient natural reproduction for decades; number of spawners range from a few fish returning to the Denny's River to a few hundred in the Penobscot River. (See NOAA websites on Atlantic salmon for exhaustive literature review and supporting documents: http://www.greateratlantic.fisheries.noaa.gov/protected/atlsalmon/ http://www.nmfs.noaa.gov/pr/species/fish/atlantic-salmon.html)

Atlantic salmon have a long, complex life history that may encompass thousands of kilometers of geography. Spawning occurs in streams and small rivers; in the fall, adults dig nests in well-oxygenated gravel beds and bury eggs that overwinter protected from freezing, siltation, and predators. Fry emerge in the spring, disperse from nests, and defend territories in swift water from which they feed on drifting aquatic insects. Juveniles live in streams from 1 – 3 years, often moving extensively throughout a tributary system in search of high-quality habitat (cold water in forested landscapes). Once they reach a critical body size, they undergo a behavioral and physiological transformation called "smoltification" and prepare for a life at sea. As spring flows subside, smolts migrate downstream through the estuary and eventually out to the open ocean. Post-smolts may migrate as far north as Greenland where they feed for 1-2 years before returning to their home streams. Timing of transitions between habitats and life stages is critical, and is driven both by external factors (e.g., temperature, flow) and internal states (e.g., growth rate). Unlike Pacific salmon (*Onchorhynchus* spp.), Atlantic salmon are notgenetically programmed to die after spawning, and repeat spawners (especially females) are valuable because of their prior experience, large body size, and high fecundity. We could summarize this complicated sequence of events and critical habitats by stating a few basic needs: clean, cold water; free-flowing rivers; and a landscape containing intact, functioning forests and wetlands.

The reasons for the decline of Atlantic salmon, and many other sensitive fish species, are obvious and not surprising; they are entirely a consequence of the industrialized human economy and our relentless focus on increasing consumption, growth, and pollution (e.g., Limburg and Waldman 2009; Limburg et al., 2011). While salmon require cold, clean, free-flowing rivers embedded in a landscape of forests and wetlands, our industrialized economy heats and pollutes water, blocks rivers, and destroys forests and wetlands. Human activities that destroy Atlantic salmon and their rivers include pollution, deforestation, draining and filling wetlands, damming rivers, and overfishing; these impacts have been observed since medieval times, have increased in scope and magnitude with industrialization and European colonization of aboriginal lands, and have spread from Europe to eastern North America and now to Pacific salmon streams in western North America (Montgomery 2003). These disturbances often work in concert and are interactive – for example, deforestation might warm the river above the salmon's optimum temperature, causing increased

metabolic energy expenditure and reduced energy available for growth, migration, and reproduction. Destroying a wetland and/or replacing it with impervious surfaces might increase runoff of nutrients and toxic chemicals into the river, which reduces dissolved oxygen and further compromises the salmon's metabolic performance. Dams block a salmon's ability to evade stressful conditions and access cold, clean water, and dams themselves may warm the water even further or facilitate the invasion of more tolerant fish species that compete with salmon. Overfishing removes the largest, most valuable females first and hastens population decline. Recent increases in temperature and extremes in precipitation from anthropogenic climate change (i.e., "global warming") likely will reduce or eliminate coldwater habitat in the southern part of the Atlantic salmon's range (e.g., Maine) and decrease habitat quality throughout much of the remaining range (Jonsson and Jonsson 2009). Of course, positive feedbacks exists between all the aforementioned factors and climate change – e.g., economic growth that destroys forests and wetlands promotes additional warming, which results in more greenhouse gas emissions, which increases warming further, and so on. All these risks decrease the likelihood of salmon surviving to maturity or gaining enough energy for successful reproduction. Based on my understanding and interpretation of decades to centuries of historical, biological, and ecological evidence, I think it is fair to state bluntly that a large and growing human economy, through its increasing consumption of natural resources, increasing production of waste, and increasing disruption of natural ecological processes, is incompatible with naturally-sustaining populations of Atlantic salmon. If we really were serious about conserving Atlantic salmon (and other endangered species), then first and foremost we would slow the growth of, and then decrease, the human footprint on nature and give non-human species and natural systems the "ecological breathing room" necessary to recover.

<u>Will the Juniper Ridge Landfill Expansion impact Atlantic Salmon?</u>

Language throughout the Application and supporting documents states confidently that we should not expect any negative impacts on Atlantic salmon, or a variety of other valuable species, habitats, and ecosystems. E.g., "this activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life" (Volume V Page 8). Or, e.g., "These watersheds [containing Critical Habitat] will not be affected by the Expansion" (Volume V Page 53). In several cases, this conclusion is based on the premise that because Atlantic salmon don't live in the streams on JRL property, then they cannot be impacted – e.g., "A portion of the expansion area occurs within the broad area designated as Critical Habitat for Atlantic salmon (Salmo salar) listed under the Endangered Species Act (ESA), but the on-site wetlands do not contain any streams that would provide Atlantic salmon habitat" (Volume V page 262). Or, "Stantec also identified that the facility site falls within the mapped critical habitat for Atlantic salmon, which are protected under the final 2009 ruling issued by National Marine Fisheries Service (NMFS) and USFWS under the ESA. Specifically, the northeast portion of the facility site falls within the critical habitat for Atlantic salmon mapped by the National Oceanic Atmospheric Association. Stantec has evaluated the 780 acre parcel for natural resources in 2008, 2014 and in 2015. Although isolated forested wetlands occur within the facility site, and about two acres of these wetlands will be directly impacted by the expansion, there are no delineated or mapped streams in the 74-acre facility site, nor is the Expansion expected to result in impacts to mapped or delineated streams. Therefore, there are no expected impacts to Atlantic salmon or their critical habitat from the Expansion" (Vol I page 35).

Finally, in another instance, the language states conclusively that, "Based on review of the SWPPP prepared by the prior owner/operator of the JRL (Best Judgment, Criteria D of Addendum A of the MSGP), there is no reason to believe that there would be adverse impacts to endangered species due to stormwater discharge at the site. A Letter requesting a review and confirmation of no impacts on listed or eligible species or critical habitat was requested from the Maine Department of Inland Fisheries and Wildlife. A copy of the response is included in Attachment 12." (Volume 1 page

1453). Unfortunately, Attachment 12 (a letter from Assistant Regional WILDLIFE biologist Allen Starr) does NOT contain any sort of confirmation that Atlantic Salmon would not be affected, and does NOT even reference Atlantic Salmon.

I don't think that there's any way to draw such a conclusion about non-impact with such a high degree of confidence. Of course, any such conclusion drawn about an event that has not happened yet is tinged by subjective values and perception of risk. Certainly, if we could look into our crystal ball and guarantee that the landfill and its expanded area would NEVER leak, or storm runoff would NEVER reach the Penobscot River via Judkins Brook or Pushaw Stream, and that such water contained NO toxic chemicals harmful to Atlantic Salmon, then such statements are warranted. However, if our tolerance for risk to Atlantic salmon, an endangered species that has all but been eliminated in our state entirely by human impacts, was less and we wanted to err on the side of caution, we would not be so cavalier in drawing a conclusion of non-impact. What if there was a catastrophic breach of the containment liner from some low-probability event? What if there were an unprecedented storm event larger than the "once-in-25-years" or "once-in-100-years" considered in hydrologic simulations? (this is addressed below in discussion of climate change). What about effects on the rest of the Penobscot watershed, downstream of the landfill and the tributaries on JRL property, that do contain Atlantic Salmon? If we assume worst-case scenarios and an extremely unlikely but not impossible breaching or runoff event occurs, what sorts of toxins at what concentrations could we expect to drain into the Penobscot River? We already know that Atlantic salmon are extremely sensitive to, for example, various toxins in effluent from paper and pulp mills (such sludge is received by JRL; Volume Page 234); in fact, much of our knowledge of salmon physiology and metabolism comes from studies on salmon responses to paper and pulp effluent that provided the scientific rationale for the necessity of the Clean Water Act (Warren 1971). Much of the application for JRL Expansion focuses on the engineering details of the waste disposal and containment technology to assure us that these unlikely, catastrophic events won't occur, but I think we should be very cautious, and muster a healthy dose of skepticism, to rely on "advanced technology" to prevent or solve problems. I discuss technology further below, but suffice to say, human history is rife with example of technologies that don't live up to expectations, that fail (and spectacular technologies fail spectacularly!), and that actually cause worse problems than they solve (Huesemann and Huesemann 2011; Kunstler 2012).

In addition, there are two other Federally-listed fish species living in the lower Penobscot Watershed, downstream of JRL: Atlantic sturgeon (GOM DPS: threatened http://www.fisheries.noaa.gov/pr/species/fish/atlantic-sturgeon.html) and shortnose sturgeon (rangewide: endangered; http://www.fisheries.noaa.gov/pr/species/fish/shortnose-sturgeon.html). Even though their habitat does not extend upstream into watersheds on JRL property, shouldn't we consider downstream effects on their habitat? The letter from US Department of the Interior – US Fish and Wildlife Service (Volume 1, page 600) states that "Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species." I would argue that consideration of these 2 listed species should also be included in the Application. Also, the liquid leachate produced on JRL property and transported downstream to either Old Town or City of Brewer Wastewater Treatment Plants and discharged directly into the Penobscot River should be considered for all 3 of these federally-listed species, because the final discharge occurs in delineated or proposed Critical Habitat within the mainstem river. Volume 3 Page 55 states that "with the anticipated slight increase in leachate flows as a result of the Expansion (i.e., 48,000 average and 57,500 peak month) slightly more leachate will need to be hauled from the site. This increase represents about two to three additional trucks per day". The increase in average leachate hauled is 20% (48,000 compared to 40,000), which, to me, is more than slight. I suspect that this volume of leachate treated and discharged into the mainstem Penobscot River would alarm most reasonable citizens who value clean water, and there is no evidence in the Application that suggests such a volume is safe or prudent, other than it should conform to permitting regulations.

The First Law of Ecology: Everything is Connected to Everything Else

I believe that we should take a broader view of potential impacts that is more consistent with how individuals, populations, communities, economies, and ecosystems actually operate within a landscape. For a very long time, conservationists focused narrowly on single-species for restoration or rehabilitation efforts. For example, in response to declines of Atlantic salmon on the east coast and Pacific Salmon on the west coast, hatcheries were built to stock fry and smolts to compensate for losses of wild fish to pollution, dams, habitat loss, and overfishing (e.g., Saunders et al., 2006). Not surprisingly, without addressing the fundamental causes of decline, these efforts usually did not succeed; at best, hatcheries delayed total extinction in the short term, but at worst, masked the decline in wild fish from the general public's view while compromising the species' genetic variability with cookie-cutter fish ill-adapted to variable natural environments.

More recently, the Penobscot River Restoration Project (PRRP) is providing a world-class example of holistic river restoration that is founded on fundamental ecological principles (www.penobscotriver.org). The PRRP represents an unprecedented collaborative effort among local, state, federal, tribal, non-profit, and corporate entities that has tremendous grassroots support from local citizenry to heal past ecological wounds inflicted by our industrialized economy. First and foremost, the PRRP has improved access to thousands of kilometers of historic spawning and nursery habitat by removing 2 mainstem dams and improving fish passage at 2 other dams. Second, the PRRP has shifted focus from single-species (Atlantic salmon) to community- and ecosystem-level restoration. Under this paradigm, because Atlantic salmon co-evolved and co-existed for thousands of years with robust populations of other species like alewife, blueback herring, and sea lamprey, success of salmon is tied inextricably to success of those other species and restoration of their ecosystems. For example, upmigrating alewife are important because they act as "predation buffers" for downmigrating salmon smolts; predators on medium-sized silvery fish are much more likely to detect and eat one of millions of alewife swimming in large schools upstream while a few thousand smolts can swim downstream safely "under the cover of silver". In another example, spawning alewife and sea lamprey deliver huge quantities of marine-derived nutrients and energy to freshwater lakes and streams, thereby increasing productivity for juvenile salmon and entire ecosystems. So far, early results are promising; several sea-run species have increased in abundance, some by orders of magnitude, within the last few years, and these responses appear to be related directly to dam removal and improved quantity and quality of habitat (e.g., Hogg et al., 2013; Watson et al., 2015; www.penobscotriver.org).

I would argue that this proposed Expansion should be evaluated in the general context of ecological interconnectedness, and specifically in light of the Penobscot River Restoration Project. First, is it contrary to the stated goals and objectives of PRRP to expand JRL? Should we consider potential effects on alewife populations, who this year have returned to Pushaw Stream and Pushaw Lake in the tens of thousands (at least) to spawn, and likely will return in the millions? Should we consider potential effects on fish-eating birds drawn to the Penobscot by alewife and lamprey runs in close proximity to high-quality nesting habitat around the periphery of JRL property? Should we view the wetlands and vernal pools to be destroyed as parts of an interconnected watershed beginning to recover after centuries of overexploitation? Is it counterproductive to increase pollution load in one part of the watershed while we're trying to decrease pollution in much of the rest? I would argue that YES, digging a larger hole and dumping more trash in a landfill located in such close proximity to the Penobscot River, and also trucking and releasing more leachate downstream directly into the river, runs contrary to watershed-wide efforts to restore a river with a long history of misuse and abuse.

Looking at the larger issue of landfills in general, I believe we need a different worldview to better understand how our economy and the waste it generates relates to nature, and how that relationship in turn feeds back to affect our society. Our conventional way of thinking (sometimes called "neoclassical economics" or NCE) is usually insufficient and often

wholly inadequate for identifying environmental problems and valuing non-human goods and services – that is, natural resources, pollution sinks, and ecological services (see reviews in Daly and Farley 2004; Hall and Klitgaard 2010; Czech 2013). A thorough critique of this economic worldview is beyond the scope of this brief testimony, but two major points are important and sufficient here: first, neoclassical theory and the models that guide our approach to identifying and addressing problems don't acknowledge the biophysical reality of nature, but rather view "the environment" as some abstract entity that provides "free and inexhaustible gifts"; basically, "the economy" is viewed as the entire, whole system that can grow without limits. A minor tweak to this worldview is of "environmental economics", in which the environment is located within (a subsystem of) the economy (the larger system). Essentially, the NCE view of the economy is that of a perpetual motion machine: it requires no energy or material inputs and produces no waste outputs (or, a bit more refined, that waste from one process can be used as a resource for another process). It can grow without limits and faces no external constraints. The astute reader will see that this view of the economy is equivalent to a car that runs ever faster on its own exhaust or an animal that grows ever larger by feeding on its own waste. A second point, either implicitly or explicitly part of NCE theory, is that "technology" is some magical phenomenon that arises from human ingenuity and creativity, provides only benefits while incurring no costs, and never fails. An alternative worldview, "biophysical economics" (or BPE) views economies as subsystems embedded within the environment; the economy exists as part of nature, not the other way around, and both form an interconnected system (Odum 1973; Hall and Klitgaard 2010). Economies transform energy and materials into goods and services, fulfill human needs and desires, and emit waste; nature is the source for the energy and materials and the sink for wastes. We can think of our economy as an industrialized metabolic system, much like we think of organisms and ecosystems as metabolic systems, who rely on a throughput of energy and materials to maintain themselves and grow. These metabolic processes are governed and constrained by biophysical laws and principles – most notably the laws of thermodynamics and entropy. Thus, BPE acknowledges there are limits to growth on our finite planet – the size and performance of our economy is constrained by the quantity and quality of resources available, the capacity of the ecosphere to assimilate our waste, and complex ecological interdependence (often viewed as "ecosystem services") that regulates climate, recycles nutrients, creates topsoil, drives evolution of biodiversity, etc.

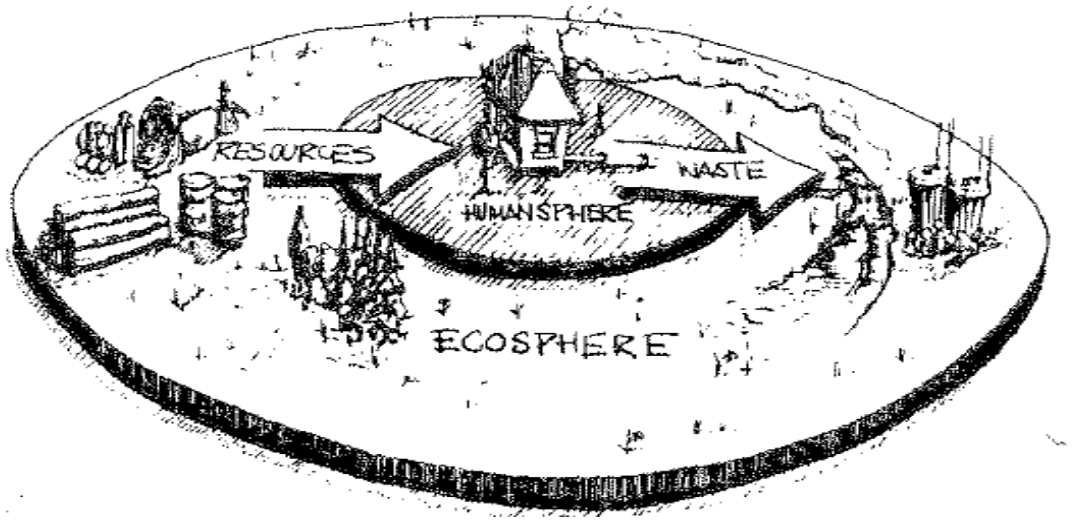

Figure 1. A simple drawing depicting the relation between our economy (the "humansphere") and our environment (the "ecosphere"; from Wackernagel and Rees (1996)

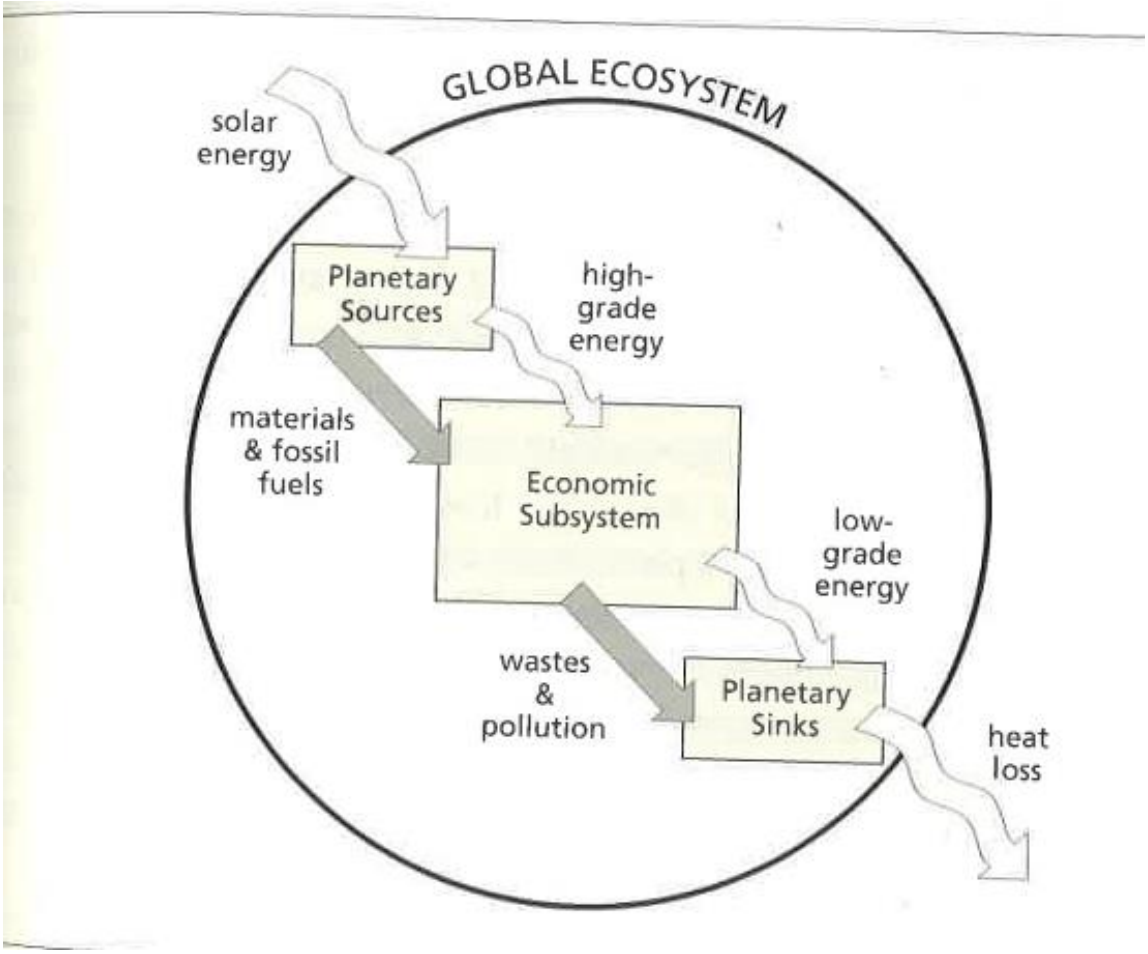

Figure 2. A slightly more detailed view of the relation between the economy and the ecosphere; from Meadows et al. (2004)

BPE was a natural outgrowth of the field of Systems Ecology that sought to quantify the connections among energy, economics, and the environment into one ecological system of interdependent actions (Odum 1973) Not coincidentally, the BPE view flourished in the early 1970s, at the dawn of ecological awareness and at same time as the US economy encountered its first serious limits imposed by energy shortages and pollution, during which conventional analysis from NCE failed miserably (e.g., Odum and Odum 2001; Hall and Klitgaard 2010). Important components of BPE and systems ecology were translated and popularized for the general public in the beginnings of the modern environmental movement by Barry Commoner's (1971) "Four Laws of Ecology": 1) Everything Is Connected to Everything Else – there is one ecosystem for all living organisms; what affects one affects all; 2) Everything Must Go Somewhere – there is no waste in nature and no "away" to which refuse can be thrown; 3) Nature Knows Best - humans have fashioned technology to improve upon nature, but such change in a natural system is usually detrimental; and 4) No Such Thing as a Free Lunch - exploitation of nature converts resources from useful to useless forms.

In the BPE view, technology is not magic, but a human contrivance that allows us to exploit nature more effectively, either by increasing flows of resources towards us and away from others (either away from non-human life, or away from other, unlucky humans who are too weak to resist, are in faraway lands out of our sight, or have not been born yet), or to project costs like pollution onto others (again, onto other living creatures or unlucky humans) (Catton, 1986;

Greer, 2015). Of course, technology follows biophysical laws such that there are limits to its effectiveness and scope, it comes with costs that often exceed benefits, and it fails - often spectacularly! (Huesemann and Huesemann 2011; Kunstler 2012). An economy run according to NCE principles with a relentless focus on creating new technology (which usually arise to combat problems caused by previous technologies!) for the sole purpose of growth is a gigantic "externalizing machine": it serves to maximize short-term gains that accrue to a few lucky participants by externalizing as many costs as possible to just about everyone else at the expense of long-term sustainability. In essence, our growth-obsessed, technocentric economy is designed to fail because it is driven to deplete its resource base and poison its environment as quickly as possible (Odum and Odum 2001; Meadows et al., 2004; Hall and Klitgaard 2010; Heinberg 2011; Kunstler 2012). The NCE model is incompatible with the biophysical reality of what is required for true sustainability of economies, societies, and our environment (Daly 1991; Costanza et al., 2014).

I would encourage Maine DEP and the Applicant for JRL expansion to consider very carefully who benefits from the expansion and who bears the costs. If the beneficiaries also bear the costs, we might consider the expansion in a different light than if all the benefits accrue to one group of participants but the costs are externalized on other groups that don't or can't share in the benefits. If the incentives surrounding expansion are such that large corporations benefit from decreased tipping fees and increased profits, or that far-away residents benefit from sending their garbage "somewhere else" cheaply, but the costs are borne primarily by local residents, future generations that have not yet been born but will be forced to deal with the consequences of a massive landfill that doesn't serve their needs, or by the non-human life and ecological systems in the surrounding landscape, then we cannot consider the expansion to meet conditions of equitability or sustainability.

If we choose to "think globally and act locally", we can see how landfills in general and expansion of JRL in particular relate to system-wide crises we're experiencing close to home and around the world. This is not an abstract thought experiment but an absolute necessity to respond intelligently to these problems - global warming, ocean acidification, water and soil pollution, biodiversity loss, fisheries collapse, peak oil, declining energy return on investment from fossil fuels, deforestation, wetland destruction, environmental racism, crushing poverty in the shadow of waste and opulence, financial instability, exploding debt and government bailouts, socioeconomic strife, political dysfunction - and many others. In essence, the BPE argument has been, more or less for 40+ years, that these crises arise as symptoms of an industrialized economy that has overshot the carrying capacity of our environment to provide resources and absorb wastes, and thus can no longer maintain growth, to provide all the necessities, luxuries, and standards of living demanded by a growing population (Odum and Odum 2001; Meadows et al. 2002; Hall and Klitgaard 2011; Heinberg 2010; Kuzyk 2014; Rees 2014).

In the early 1970s, systems scientists built the first computer models to investigate how the growing population and economy would interact with and respond to the limited carrying capacity of planet earth (Meadows et al. 1972,2004). They simulated several (up to 12) scenarios based on explicit assumptions about the size of various resource stocks and pollution sinks, allocation of industrial capital among various economic sectors, time lags between environmental signals and human responses, technology- and market-based solutions, and so forth. After 40 years of observational data to validate initial simulations, their "Business As Usual" scenario most closely matches our actual economic and ecological trajectory (Meadows et al. 2004; Turner 2008; Hall and Klitgaard 2010): specifically, we proceed along with no major policy changes and continue exponential growth in population size, economic throughput, resource consumption, and pollution. Growth eventually reaches limits imposed by the combination of filling of pollution sinks and declining quality of energy and materials as the best resources are exhausted. Growth in population and physical capital forces us to divert more capital, labor, and resources to cope with problems arising from this combination of constraints – most notably, pollution. Eventually so much capital is diverted to fighting overwhelming pollution and obtaining scarce, low-

quality resources, it becomes impossible to sustain further growth in industrial output. When industry declines, society can't sustain growth in output of other sectors – food, human services, other discretionary consumption, etc. – and when those sectors stop growing, population growth ceases, birth rates decline and death rates increase, and various indicators of human welfare decline. The scenario is best described as "overshoot and collapse". Other similar BPE-based modeling scenarios draw similar conclusions, although their foci are more on limits to sources rather than limits to waste sinks (Odum and Odum 2001; Hall and Klitgaard 2010).

In the context of JRL expansion, we should take home 3 major points from these and other BPE-based studies: 1) our population and industrialized economy have already overshot planetary carrying capacity, perhaps by orders of magnitude (Catton 1986; Wackernagel and Rees 1996; Meadows et al. 2004); 2) we are producing waste faster than can be assimilated by the environment, and consuming resources faster than can be regenerated naturally, and thus our current economic trajectory cannot be sustained; and 3) the only way to reduce waste production to sustainable levels is to shrink our economy and its metabolic throughput to a size that is sustainable on a finite planet (Daly 1991; Callenbach 2014). This 3rd point is especially relevant to the State of Maine's Hierarchy of Waste Management: our first priority must be on waste reduction, and the most effective way to reduce waste from the tailpipe of our economy is to limit the resources (energy and materials) input as fuel; it is far less effective to manage waste already produced than to avoid producing it in the first place! (e.g., Daly 1991). This link between economic activity and waste production should come as no surprise, and even is acknowledged explicitly, albeit in an offhand way, in the Application: Volume I Page 337-338 states "Overall, Maine's waste generation has decreased, and thus the disposal capacity needs have decreased. However, if the economy improves in the near term, the department agrees with the applicant that waste generation is likely to increase". I assume that "improve" is used synonymously with "grow"; unfortunately, that conflation of "getting bigger" with "getting better" is all too common within the NCE mindset.

If we have already overshot carrying capacity, there really are only two options to reduce resource input, waste output, and hence the size of our economy: collapse uncontrollably on nature's terms, or manage a controlled degrowth and maintain a steady state economy of a sustainable size (Odum and Odum 2001; Meadows et al. 2004). It's questionable whether we have time, ecological breathing room, and the political will to enact a managed decline, but in my opinion, that's preferable to an uncontrolled collapse. Certainly, we can and should take action to reduce our ecological footprint and strive towards sustainability, and Maine DEP has at least started that conversation (http://www.maine.gov/dep/sustainability/index.html). However, the failure to acknowledge and adapt to biophysical limits to economic growth at all levels of society and government is, in my opinion, an inexcusable and impassable barrier to addressing the existential crises we face on our deteriorating planet. In my opinion, we have absolutely no hope of achieving sustainability in waste disposal or in any other societal endeavor, or in dealing with our existential planetary crises, until we adopt a BPE view of our interconnected economic-environmental systems, face the hard reality of constraints imposed by nature, and work within those constraints rather than deny their existence. I encourage Maine DEP and all partners in waste management to rise to that challenge.

The Elephant in the Landfill: Climate Change

A glaring and inexcusable omission throughout the entirety of the Application is the failure to acknowledge and consider anthropogenic climate change (ACC, or "global warming") specifically in performance of expanded JRL facilities and generally in longer-term waste management planning. The evidence is no longer deniable or ignorable: ACC has been occurring, we're seeing its effects here in Maine and around the world, and the pace is faster, and effects more serious, than earlier models suggested (Hansen et al., 2014, 2016). ACC is probably the most consequential hazard that human civilization has ever faced, and along with the interconnected constraints of declining societal energy return on

investment and growth of unserviceable debt, threaten the existence of complex industrial societies on planet earth (Kunstler 2005; Heinberg 2010). ACC also represents a global externality of epic magnitude (Hansen et al., 2014) – the largest externalization of costs and internalization of benefits the world has ever seen. We have very little time, if any, to curb greenhouse gas emissions before we reach a tipping point into runaway climate change; some scientists think we have already passed the threshold of climate stability and resilience, beyond which self-reinforcing positive feedback loops take over and overwhelm stabilizing negative feedback loops and tip our climate into a state never experienced by the human species (Hansen et al., 2014, 2016). Obviously scientists can't predict with any certainty the DETAILS of future climate states, but they are confident in predicting the TRAJECTORY: overall, hotter with more variable / extreme precipitation (droughts alternating with floods) and more frequent / violent storms. We've already seen the probability distribution of temperatures shift significantly rightward, indicating that extremely hot years (say, 3 standard deviations greater than the historic mean) that were very rare in the past (<1%) are now occurring much more frequently today (~10%), and record high temperatures continue to be broken with regularity (for an excellent summary using the analogy of "loaded dice", see video interview with Dr. James Hansen: https://www.youtube.com/watch?v=TX2KyF0p-xU&feature=youtu.be). It's likely that we will also see a shift in the probability distribution of precipitation as more data become available, such that extremely heavy rains that once were rare events occur much more frequently now, and records continue to be broken by extreme events never before experienced in recorded history.

Any prediction of future landfill performance in withstanding extreme rainfall events and flooding should consider shifts in magnitude and frequency of storms and flood risks associated with a rapidly changing, unpredictable climate. However, this Application does NOT account for effects of ACC! For example, Volume I states that "As shown on the site surroundings map in Appendix M of this document, the Expansion is not located in a 100-year floodplain. As part of the design of the Expansion, post-development flow from a 25-year/24-hour storm event will be limited to pre-development levels. Appendix J of this document contains a Stormwater Management Plan for the Expansion, which describes the site setting, the pre- and postconstruction drainage plans and the stormwater structures design and routing that will limit postdevelopment runoff levels to predevelopment levels, demonstrating that this standard has been met." This type of conclusion drawn from simulation analysis is troubling because it is based on the assumption that future precipitation / runoff events and flood risks are the same as those experienced in the past, but all evidence suggests that the future is likely to be more extreme than the present. First, this map indicates the source of floodplain information was based on data from 1978, a full decade before Dr. James Hansen gave the first Congressional testimony indicating that he was able to detect the temperature signal of ACC through the noise of natural variability! Assessing the risk of flooding in the 2020s and beyond based on floodplains delineated from 40+ years earlier that have not been adjusted for ACC is misleading and dangerous. The map suggests that this historic floodplain nearly abuts the JRL property line towards the south, and is located within several hundred feet in many more places. Should we not anticipate the possibility that the likelihood of extreme flooding in the near future makes this floodplain delineation obsolete and the future floodplain may actually encroach upgradient and threaten the integrity of any containment structures nearby? The same could be said for delineation of wetlands – if precipitation patterns change and flooding risk increases upgradient, might we expect new wetlands to form closer to the facilities? Finally, if the frequency and magnitude of storms increase, shouldn't we anticipate for more extreme events with increasing frequency, such as what once would be considered 100-year or even 500-year storms? I believe that failure to account for changing patterns in precipitation and encroachment of floodplains consistent with ACC renders these simulations overly optimistic and underestimates the risk of a catastrophic breaching or runoff event.

ACC should also make us reassess the risk posed to all fisheries and wildlife habitat, including that for endangered Atlantic Salmon. As described previously, we should expect, for example, Atlantic Salmon individuals and populations to

be less resilient and more susceptible to stressors under a warmer, more hydrologically variable climate regime. Fish may be able to withstand small amounts of watershed disturbance or toxic chemical runoff under optimal conditions of temperature and flow, but tolerance to these stressors would decline if other stressors, like high temperatures, already compromised metabolic performance. Similarly, a small amount of wetland destruction might not affect nutrient retention or flood mitigation if the entire surrounding landscape was intact and functioning optimally, but might be significant if integrity of the surrounding landscape was already compromised by ACC. Functioning wetlands, and especially forested wetlands like those on JRL property in Maine, are important carbon sinks and are critical to climate stabilization and mitigating effects of ACC; however, once disturbed and dessicated, these wetlands become a source of carbon to the atmosphere (Mitsch and Gosselink 2015; Dr. Aram Calhoun, Professor of Wetland Ecology, UMaine – personal communication). Because of the inherent non-linear responses and threshold effects exhibited by ecosystems to climate forcing, we can't be certain that a small disturbance simulated under past (stable) climate scenarios will yield a reliably small response under future ACC scenarios.

How shall we value wetlands?

Valuing natural resources (e.g., wetlands) and the ecosystem services they provide (e.g., nutrient retention and assimilation, biomass production, flood control, water filtration, wildlife habitat, etc.) with conventional NCE metrics is problematic for a variety of reasons. Howard T. Odum, the pre-eminent scientist usually considered the intellectual grandfather of both Systems Ecology and Biophysical Economics, worked with colleagues and students for 40+ years to identify these problems and develop alternative valuation methods; much of his work focused on wetlands (Odum 1995; also visit the University of Florida's Howard T. Odum's Center for Wetlands and his former student Mark Brown's Emergy Systems websites for vast repository of literature: http://cfw.essie.ufl.edu/ and http://www.cep.ees.ufl.edu/emergy/index.shtml). The most obvious shortcomings are that we don't pay nature for the economic work it does for free, and nature does not participate in market transactions. We pay money only to humans for the work they do in exploiting, transforming, and selling goods and services that ultimately originate from free natural resources and ecosystem services. Market valuation is based on what people are willing to pay, and is determined by the human receiver according to perceptions of short-range needs and expected benefits. Usually, these perceptions of value are clouded by poor or missing information. However, real biophysical wealth that is created by nature should be assigned a donor-determined value – that is, a measure of what was required to make the good or service measured in non-arbitrary units (compared to arbitrary units of currency that fluctuate widely in perceived value and purchasing power). We should be very careful not to confuse recipient and donor values! In fact, often times the two values are related inversely: when natural resources are abundant and contribute greatly to economic work, they are assigned a value because of their abundance and perceived non-importance; when natural resources are scarce and contribute less to economic work, they are assigned a high value because of their perceived scarcity. How then should we value nature more objectively and reliably than with a recipient-determined price?

Odum's answer was eMergy (notice the "M" rather than "n" as in "energy"). eMergy is a contraction for "embodied energy" or "energy memory", and can be defined as the total amount of energy of various forms transformed directly and indirectly throughout the entire production process to create a good or service, whether natural or man-made. The energy required for the transformations is no longer in the product or service, but energy carries the "memory" of the transformations, and flows of energy carry eMergy. Of course, although all different forms of energy can be expressed in their heat equivalents, they are NOT equivalent in their ability to do work. Therefore, different forms of energy are expressed according to their "transformity", which is defined as eMergy of one kind of energy required to generate a product or service of another kind. The more energy transformation steps there are, the higher the Transformity. eMergy is expressed relative to solar energy baseline, in units of solar eMcalories (shortened to "semcal"), and

transformity is expressed as a ratio of seMcal / cal. For example, imagine a connected series of energy transformations in a hierarchy: say, sunlight → plants → coal → electricity, tracking the quantity of one kind required to produce the next. About 8,000 calories of sunlight is fixed into about 8 calories of plant biomass; 99.9% of the energy is degraded to waste heat following the 2nd law of thermodynamics. Of the 8 calories of plant biomass buried and subject to geological action, about 4 calories are transformed to coal; the remaining 50% is degraded into waste heat. Finally, burning 4 calories of coal in a power plant produces 1 calorie of electricity; the remaining 75% is degraded as waste heat. Thus 8,000 calories of sunlight is transformed into 1 calorie of electricity, with 7,999 calories lost to entropy. We could say that for this simple series of transformations, eMergy content of a 1 cal flow of electricity is 8,000 seMcal, and the transformity is 8,000. This shows that 1 cal sunlight is not equivalent to 1 cal electricity, even though the two values expressed in heat equivalents are the same. If we consider all the other inputs that are required to build the infrastructure of power plants, mine the coal, feed and clothe the workers, etc., we would find that transformity of electricity could be as high as 150,000! (Odum 1995). It should be clear that quantifying eMergy content and transformity captures the contributions of nature (and all other work) towards economic processes and evaluations, and thus is an objective measure of value.

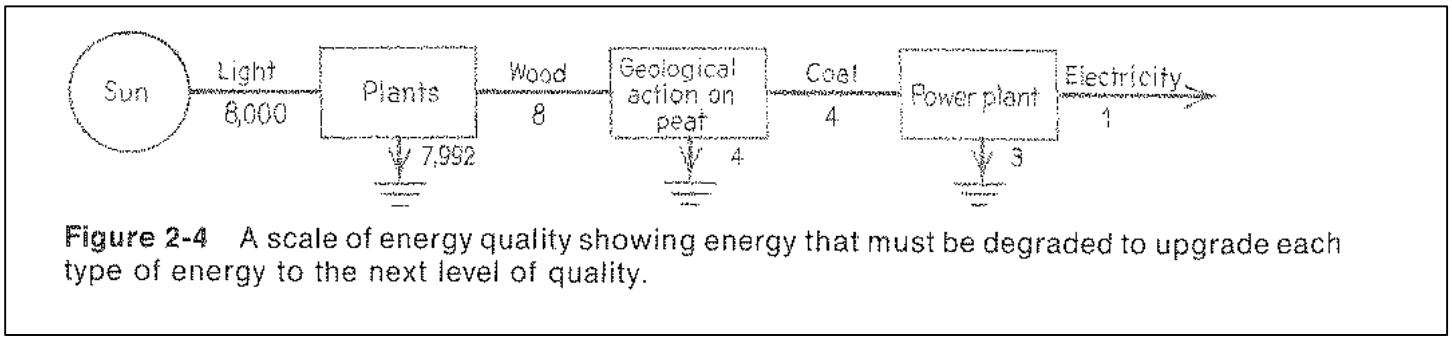

Figure 2-4 A scale of energy quality showing energy that must be degraded to upgrade each type of energy to the next level of quality.

Figure 3. A hierarchical diagram of energy transformations from low-quality sunlight to high-quality electricity, taken from Odum, H.T. and E.C. Odum. 1976. Energy Basis of Man and Nature. McGraw-Hill.

Not surprisingly, this method can be extended throughout the entire environment-economic system to account for the contributions of natural resources and free work provided by nature, plus human work, towards goods and services bought and sold in markets and other transactions. For example, combining information on the total eMergy flow through the system and the quantity of money exchanged via monetary transactions yields the metric of “eMdollars” – that is, the eMergy contribution that goes to support one dollar of gross economic product. Accounting for eMergy and eMdollars allows us to evaluate the “profitability” or relative costs/benefits of various economic decisions in terms of how real wealth is transacted among parties, and to estimate potential yields on various investments.

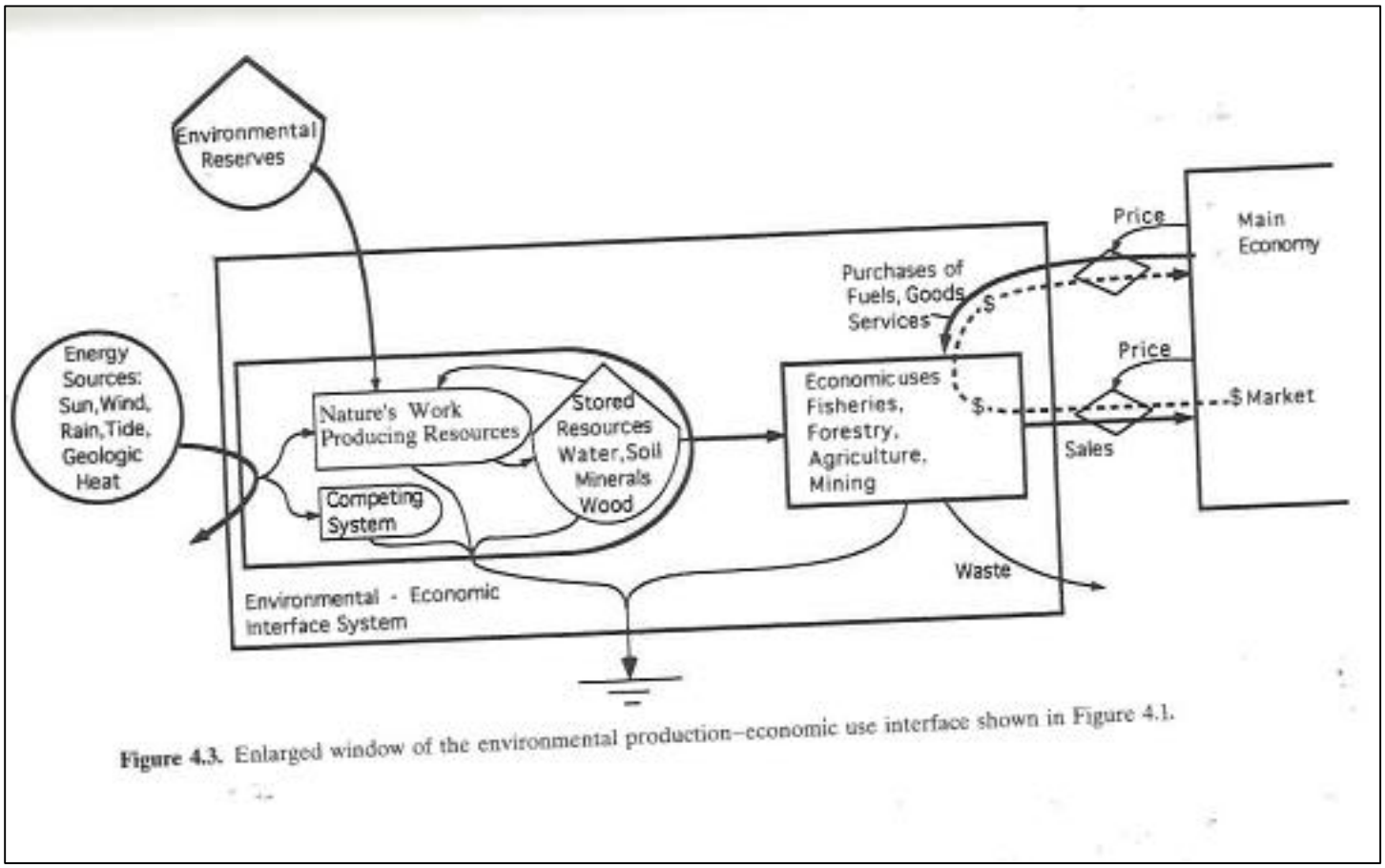

Figure 4.3. Enlarged window of the environmental production–economic use interface shown in Figure 4.1.

Figure 4. Systems-language model typical of that used in eMergy synthesis. From Odum 1995.

Many examples of using eMergy synthesis to value wetlands exist. In one case, Bardi (2002) concluded that wetlands are "extremely valuable"… and "provide between 2,295 and 6,430 em$/ha/yr of value to regional economies"; replacement values may exceed 1 million em$/ha. In another, Odum (1992) described a standardized procedure where one could estimate eMergy contributions coarsely, and thus value, of specific wetland types given some relatively easy-to-collect data. The point of calling attention to examples from this body of work is not to give an exhaustive review, nor to assert that the wetlands destined to be destroyed in the JRL expansion should be preserved because of high eMergetic value (to my knowledge, no estimates exist for these particular wetlands, but certainly could be made, given adequate research funding), nor to even suggest that wetlands might be valuable BECAUSE they can receive and process small amounts of stormwater (which is also evaluated with eMergy synthesis; Tilley and Brown 1998). Rather, the point is that eMergy synthesis is a well-developed, scientifically rigorous, and ostensibly objective valuation procedure, albeit one not considered in the Application. If the applicants were to conduct such a synthesis, we would have very useful information with which to value the impacted wetlands, and perhaps even to value the service provided by the landfill as well. As an aside, eMergy synthesis has also been used to evaluate the feasibility and profitability of recovering methane from landfills to generate electricity (Nepal and Campell 2012); I would encourage the Applicant to pursue this avenue as well.

One final point surrounding the idea of "wetland compensation". The Application describes compensation as "preservation of approximately 266 acres of the on-site parcel consisting of 57 acres of wetlands, 209 acres of adjacent upland, and 25 documented vernal pools". Although preserving this landscape certainly promotes the integrity and resilience of the Penobscot watershed, I don't agree that "compensation" = "preservation". How is not destroying a large part of the landscape equivalent to compensating for the destruction of a smaller part of the landscape? In my opinion, this is akin to a burglar compensating his victim by agreeing not to steal anything else.

Final Thoughts

Volume I page 31 states that "The Expansion has been located and designed to fit harmoniously into the natural environment." According to Dictionary.com, "harmonious" is defined as "forming a pleasingly consistent whole; congruous". Based on my scientific understanding of how nature functions and my personal relationship with the local area as a teacher, researcher, hunter, fisherman, forager, sustenance homesteader, and sustainability advocate, I see no way that JRL, expanded or not, could be considered as forming a pleasingly consistent or congruous whole with the natural landscape of forests, wetlands, and streams in the Penobscot River watershed.

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I affirm that this written pre-filed testimony is true and correct to the best of my knowledge and belief.

_____ _____

Signature Date

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