May 13, 2016

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Re: Juniper Ridge Landfill (JRL) Expansion Application Review

Dear Mr. Katsiaficas:

As requested, CES, Inc. (CES) has completed a review of the Juniper Ridge Landfill (JRL) Expansion Application (Application) submitted by the State of Maine Bureau of General Services (BGS), as the owner, and NEWSME Landfill Operations, LLC (NEWSME), as the Operator. The Application, dated July 2015, was prepared by Sevee & Maher Engineers, Inc. of Cumberland, Maine and is comprised of five volumes.

Volume I contains the completed Application for Landfill Expansion, a summary of the proposed project, Chapter 400 General Licensing Criteria, Chapter 401 General Licensing Requirements, and Chapter 2 Rules Concerning the Processing of Applications.

Volume II contains the Site Assessment Report which includes discussions of the site setting, site investigations, site geologic characteristics, site hydrogeologic characteristics, water quality and future monitoring, and the travel time analysis.

Volume III contains the Design Report which includes the design standards, Engineering Report, Contaminant Transport Analysis, plan and profile view drawings, Quality Assurance Plan, Construction Contract Bid Documents, Water Quality Report and Proposed Monitoring Program, Operations Manual, Landfill Construction Procedures, Construction Specifications, Construction Quality Assurance Manual, HELP Model Data, design calculations, geotechnical data, leachate quality and waste characterization, waste compatibility test results, Landfill Gas Design Report, and Cell 11 Design Drawings.

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Volume IV contains the facility's Operations Manual which includes the development overview, Cell Development Plan, operating procedures, inspection and maintenance procedures, record keeping and training requirements, Complaint Management and Response Plan, Stormwater Management and Erosion Control Plans, Waste Characterization and Acceptance Plan, Environmental Monitoring Plan, Gas Monitoring Operations and Maintenance Manual, Odor Complaint Management and Response Plan, Waste Inspection Plan, Geotechnical Monitoring Plan, and Liner Action Plan.

Volume V contains the Application for Natural Resource Protection Act Permit and Section 404-Clean Water Act.

The proposed Expansion is located to the north of, and is adjacent to, the existing licensed landfill and has a 54 acre footprint. The Expansion is proposed to be developed in six cells with a final elevation of 390 feet above mean sea level, matching the existing landfill's final waste grades, and 3:1 side slopes. This footprint provides an additional capacity of 9.35 million cubic yards which represents 10-12 years of waste acceptance based upon an estimated fill rate of 700,000 tons per year. The proposed landfill design includes both primary and secondary liner systems, leak detection, leachate and gas collection, and an underdrain system beneath 12.7 acres of the proposed area.

CES has reviewed the Application against the requirements of the State of Maine Solid Waste Management Regulations, for concurrence with technical assumptions and conclusions, and for constructability. During our review of the Application, the Maine Department of Environment Protection (MDEP) provided their comments on the Application to the Applicant, in a letter dated January 22, 2016. Following that effort, the Applicant submitted their Response to Comments, on March 7, 2016. CES has reviewed these comments and responses as part of our Application assessment.

In general, the Application was complete and thorough. Each section of the applicable regulations was addressed and we have not identified any issues that would prohibit the construction of the Expansion as it is proposed. Prior to our meeting with the Applicant on March 24th, we had identified four areas that required additional discussion with NEWSME and the State in an effort to better understand the intent of their statements or proposed design prior to finalizing our review comments.

The first of these issues dealt with the potential for groundwater to flow within the deep bedrock toward the homes on Route 43. While the Applicant has met all siting criteria, SME goes further than required and concludes that, *"there is not a direct hydraulic connection under existing conditions between the shallow and deep groundwaters beneath the Expansion and the water supply wells along Route 43"*. However, there does not appear to be any data presented to support the presence of a bedrock groundwater divide to the southwest between the site and

the residential wells. It seems more reasonable that the regional groundwater flow in bedrock in this direction is controlled by the main stem of Pushaw Stream to the southwest (not the small Unnamed Tributary). This is, in fact, the boundary condition used by SME in its groundwater flow model. While we agree that the risk to these wells is low due to distance, and the redundancies designed into the proposed landfill liner system, there is still potential bedrock groundwater flow from the site to the residential wells along Route 43 southwest of the site. Based on our review of the Application, the regulatory standards appear to be met without this stated conclusion; therefore, our concerns about this issue relate more to the potential need to monitor these residential wells in the future should there ever be a catastrophic failure of the designed systems. We do not believe that the conclusion made by SME poses a licensing concern but do caution that it should not be relied upon in the future as a basis to eliminate the need for monitoring if there is ever a significant release from the landfill without additional data to support it.

The second of these issues dealt with the proposed liner design and the ability to respond to leaks identified through the primary liner system. The proposed liner system contains a composite primary liner system containing an 80 mil high density polyethylene (HDPE) geomembrane, a geosynthetic clay liner (GCL), and 12 inches of clay above the leak detection system. While we agree that this design is protective and meets the requirements of the Solid Waste Management Regulations, we offer that, due to the inclusion of the 12-inch clay layer above the leak detection system, any damage to the membrane layer of the liner system will not likely be identified immediately. Due to the low permeable nature of the clay, any leakage through the membrane and the GCL will be slowed by the clay. During this time, waste placement will be ongoing and, therefore, it is probable that a significant amount of waste will be disposed of before the leakage is identified. At that time, it will be more difficult to make any repairs. Since the proposed design does meet the rules and has its own merit due to the level of protection that is offered by a composite system, it was worth a discussion with NEWSME about the design and their plan to respond to identified leaks prior to the completion of our review. During the meeting on March 24th, NEWSME committed to repairing any issues that are identified through flows in the leak detection system.

The third issue related to the Traffic Movement portion of the Application, and a situation that reportedly occurs that does not appear to be evaluated. When the weigh station is operational on I-95, trucks destined for JRL reportedly use Exit 197 and travel on Route 43 and the Bennoch Road (Route 16) instead of staying on the I-95 to avoid weighing. An assessment of this situation was not included in the Application. The relevant Solid Waste Management Regulation standard states, *"The major haul routes must be able to safely accommodate the number, weight and types of vehicles transporting waste to and from the proposed solid waste facility."* We recommended a discussion with the Applicant prior to finalizing our comments. During our meeting, NEWSME staff reviewed the protocol they use to communicate with the drivers concerning their haul routes. They do recommend that waste delivery trucks travel I-95

as much as possible but did confirm that, to save time, drivers will occasionally avoid the weigh station. It was also pointed out that since the weigh station is on the south bound section, these trucks are empty. The City pointed out that the concern lies mostly with the condition of the portion of the road that is maintained by the state and ask if the DECD, as the facility owner, could communicate with DOT to initiate more responsive road repairs. Following the meeting, Mike Barden sent an email to DOT to initiate these discussions.

The last issue related to the solid waste fees paid to the City of Old Town, by NEWSME, and the waste types that are exempt from this fee. It was our understanding, based on discussion with the City, that they do not receive fees on waste accepted at the landfill that is used beneficially during waste placement. The specific wastes that we were asked to evaluate include municipal solid waste, accepted as part of the "soft layer", and construction and demolition debris processing residuals (fines) accepted as daily cover. The specific language in the Host Community Agreement states that, *"materials approved in writing by MDEP for beneficial use at or on the landfill, …., or other materials that Casella accepts for beneficial use and for a tipping or disposal fee of $5.00 per ton or less, shall be exempt from the per ton fee."* CES is unsure whether CDD fines have been approved officially (have a Beneficial Use Permit) by the MDEP for beneficial use at the landfill. We are also not aware of the tipping fee charged for disposal of the fines or the MSW utilized in the soft layer. Since the amount of fines disposed of annually at JRL equals nearly 20% of the total waste stream, and MSW is proposed for continued use in the soft layer of the Expansion cells, we recommended a discussion with the Applicant to clarify this issue prior to finalization of our comments.

During the meeting, NEWSME confirmed that fees are paid to the City for all the MSW accepted at the landfill and offered to have their accounting staff review the figures with the City staff. They also stated that the tipping fee charged for the CDD fines was $4.00 per ton, making them exempt from the fee.

For ease of review, we have organized our comments, below, to follow the licensing criteria and requirements as they are presented in Chapter 400, Chapter 401, Chapter 405 and as they were distributed by the Board prior to the Pre-Hearing Conference in February 2016. Following each of the licensing criteria, we have provided a brief summary of the information that was provided in the Application and our comments as applicable.

Solid Waste Management and Recycling Law, 38 M.R.S. §2101

§2101. Solid Waste Management Hierarchy

BGS and NEWSME propose to meet the standards of the Solid Waste Management Hierarchy through the use of NEWSME's sister companies Casella Organics and Casella Recycling, LLC's Zero Sort facility in Lewiston as well as their waste acceptance criteria. Wastes proposed for

disposal within the JRL Expansion include, but are not limited to, residuals from incinerators, waste processing facilities, and recycling facilities. Many of these wastes are used within the landfill as daily/operational cover. The previously approved Public Benefit Determination (PBD) addressed the Solid Waste Management Hierarchy related to the proposed waste to be accepted. If the Applicant proposes changes to the types of waste accepted, the Applicant would need separate permit approval and may be subject to subsequent PBD process. The MDEP letters dated July 10, 2015 *(Clarification on Public Benefit Determination status)* and September 14, 2012 *(Commissioner's Letter to Juniper Ridge Landfill Operator On Need To Modify Public Benefit Determination)* address this situation.

Solid Waste Management Rules: General Provisions, 06-096 CMR 400 (amended April 6, 2015), as applicable

Chapter 400.4 General Licensing Criteria

A. Title, Right or Interest

A copy of the site deed was included with the Application.

B. Financial Ability

NEWSME uses a surety bond as financial assurance for closure and post-closure care for 30 years, as provided in the Operating Services Agreement with BGS. Cost estimates are updated annually and included in the Annual Report. State owned facilities are not required to provide financial assurance under the Solid Waste Management Regulations.

C. Technical Ability

A list of NEWSME staff, responsible for operation of the JRL, is included with the Application. All staff included have experience with operation of the landfill. NEWSME also proposes to continue to utilize specialty consultants for investigations, design, and operational recommendations of the Expansion. These consultants include: Sevee & Maher Engineers, Inc. (SME) for geology, hydrogeology and landfill design; Sanborn Head & Associates (SHA) for landfill gas design; Gorrill-Palmer (GP) for traffic assessment; SMRT, Inc. for visual assessment, Epsilon Associates for noise impact assessment; Stantec Consulting Services Inc. (Stantec) for wetland and other natural resources assessments; and Pierce Atwood LLP for legal counsel.

D. Provisions for Traffic Movement

The Applicant has identified the primary haul route as I-95 to Exit 199 and west on Route 16 for .1 miles to the JRL access road. Currently, 78 % of haul vehicles follow this route with the remainder using Route 16. It has been determined that trucks associated with the current site represent approximately 2.2% of the traffic on Route 16. JRL's policy is

to advise drivers to use I-95. Based on existing data for peak number of trucks and the proposed tonnages in the Application, it is expected that the peak design hour trips will increase from 28 to 31 in the morning and from 25 to 28 in the afternoon.

The assessment also determined that the current haul route has adequate capacity to handle the increase in truck traffic, that there are no high crash locations in the study area, and that adequate sight distances exist at the entrance to the site access road.

The additional traffic concerns discussed above have been relayed to both NEWSME and the State. Arrangements are being made to add additional signage to the alternate routes encouraging trucks to stay on I-95.

E. Fitting the Solid Waste Facility Harmoniously into the Natural Environment

NEWSME hired Stantec to identify and inventory any wetlands, potential significant wildlife habitats, unusual natural areas, vernal pools, and rare, threatened and endangered (RTE) species at the project site. Stantec did not directly observe State or Federally listed RTE plant or wildlife species on-site. Stantec did identify the forested area on the site as being within the range of the northern long-eared bat (NLEB), which were recently listed as threatened. Stantec did conduct an acoustic survey to determine the presence or absence of the NLEB and did not detect the presence of the NLEB at the site.

Stantec also identified that the site falls within the mapped critical habitat for Atlantic salmon. They evaluated the 780-acre parcel for natural resources and there are no delineated or mapped streams in the 74-acre facility site and the Expansion is not expected to impact any mapped or delineated streams. Therefore, there are no expected impacts to Atlantic salmon due to the Expansion.

There will be filling of just over two acres of freshwater wetlands due to the proposed landfill cells and perimeter berm and .1 acres of clearing impacts due to the relocation of the perimeter fence and electric line. The impact is spread out over four areas and they are not designated as Wetlands of Special Significance.

There were 14 vernal pools identified; one of these met the criteria to be considered a Significant Vernal Pool. The SVP will not be directly impacted but clearing for the electrical line is within the 250-foot critical terrestrial habitat surrounding the pool. This is covered by the Permit-by-Rule standards of NRPA.

Twelve of the vernal pools met the definition of a vernal pool as provided by the Programmatic General Permit (GP) for the Army Corps. Six of the Corps regulated vernal pools will be directly impacted by the Expansion. To address this, a

compensation plan has been established for the project. The plan includes the preservation of 266 acres on-site with approximately 57 acres of wetlands and 25 documented vernal pools.

CES staff commented that, to meet the minimization of impacts standard, the Applicant should have listed or considered co-locating the perimeter fence and utility line with access road. Staff also notes that, the Applicant did not provide a narrative along with the PBR notification form, indicating that the applicable Standards will be met.

F. No Unreasonable Adverse Effect on Existing Uses and Scenic Character

This section of the Application includes an analysis of the existing uses of the area, the required setbacks, and a noise study conducted by Epsilon Associates. The proposed Expansion will not change the existing uses of the area since a licensed landfill already exists at the location. The Applicant was also able to demonstrate that they could meet all of the Siting Criteria in the Solid Waste Management Regulations and that the required buffers are present around the Expansion area.

Epsilon's sound assessment showed that the noise standards in the Regulations would be met for the Expansion areas modeled. During night time hours, when they are operating within 60 feet of the solid waste boundary on the western side of the Expansion, they will be limited to equipment with a combined sound pressure level of 77dBA or less.

Based on discussions with neighbors during the milestone meetings, NEWSME has replaced original backup alarms on landfill operating equipment with broadband backup alarms. These alarms have less abrupt sounds.

G. No Unreasonable Adverse Effect on Air Quality

A gas management operations and monitoring plan was submitted with the Application. The plan includes the installation of horizontal and vertical extraction wells during waste placement with regular well tuning. There is also an on-site gas treatment facility for removal of hydrogen sulfide from the collected gas prior to gas destruction in the flare to meet the facility's air permitting requirements.

Continuous ambient air monitoring for hydrogen sulfide is conducted at four off-site locations for comparison to the State of Maine Ambient Air Guidelines.

NEWSME also has an Odor Complaint Management and Response Plan that discusses odor control measures and procedures for responding to odor complaints from the public.

During the March 24th meeting, we expressed concerns regarding the differing rates of hydrogen sulfide and methane production. The intent of this discussion was to ensure that enough methane would be present to enable the capture and destruction of the hydrogen sulfide gas as it is being produced. Additional information, including a study presented by Russell Anderson of SCS Engineers at the 2009 SWANA Landfill Gas Symposium and actual gas production numbers measured at the Pine Tree Landfill, was provided by NEWSME. These studies demonstrate that hydrogen sulfide production is accelerated compared to methane production and that the sulfide source is consumed prior to the peak production of the methane. This demonstrates that sufficient methane will be present to capture and destroy the hydrogen sulfide that is produced for the life of the landfill.

During and following the meeting, we were provided with the 2014 and 2015 Annual Air Monitoring Evaluation Reports for the Juniper Ridge Landfill. These reports present the data gathered from the four Single Point Monitors located around the landfill. During our initial review of the data, we identified an area of concern involving the methodology utilized by NEWSME for handling non-detect values, which account for more than 80% of the readings annually, when calculating averages. These averages are currently used by the MDEP to compare with the Ambient Air Guideline for H2S established by the Maine Department of Health and Human Services Center for Disease Control. We requested additional information from NEWSME to support the methodology used in calculating annual averages and suggested alternate analysis methods. Our discussions with NEWSME staff led to the use of an alternate method for calculating exposure, based on the site data, wind direction, and published background levels of naturally occurring H2S. This revised analysis was provided to us and confirmed that based on the monitoring conducted around the landfill, levels of H2S do not exceed the acute or chronic exposure guidelines established for H2S.

To ensure that the facility continues to perform this analysis in this manner, and demonstrate continued compliance with Maine Solid Waste Management Rules, Chapter 400 Section 3.D. which states, “that the solid waste facility will not contaminate any water of the State, contaminate the ambient air, constitute a hazard to health or welfare, or create a nuisance”, we recommend that this analysis be a condition of the solid waste license for annual comparison to the AAGs.

H. No Unreasonable Adverse Effect on Surface Water Quality

The landfill Expansion has been designed with adequate leachate management capacity to collect all liquid that falls within the waste placement areas. Operational practices also include placement of intermediate cover on a regular basis to divert clean stormwater away from the operational areas. All impacted surface water is collected and treated and the quantity is limited by appropriate cover usage.

A portion of the proposed waste will be placed over the northern edge of the existing landfill footprint above the completed 3:1 slopes. The existing landfill and historic leachate pond have underdrain systems that are monitored and discharge without a Waste Discharge License (WDL). The facility does have a Multisector General Permit (MSGP) and a current site Stormwater Pollution Prevention Plan (SWPPP). In accordance with their SWPPP, uncontaminated groundwater is an allowable non-stormwater discharge.

I. No Unreasonable Adverse Effect on Other Natural Resources

This item was addressed under item E above.

J. Soil Types That Are Suitable and Will Not Cause Unreasonable Erosion

An Erosion and Sedimentation Control Plan was included with the Application that includes the stabilization practices required for disturbed site soils in order to minimize potential erosion. All measures will be in place prior to soil disturbance.

K. No Unreasonable Risk That a Discharge to a Significant Ground Water Aquifer Will Occur

To meet this criterion, the Applicant must demonstrate that the site does not pose an unreasonable risk of discharge to a significant groundwater aquifer. This is shown by demonstrating that it does not overlie a significant sand and gravel aquifer, does not pose a threat to the quality of a sand and gravel aquifer, and does not pose a threat to the quality of an underlying fractured bedrock aquifer.

The closest mapped sand and gravel aquifer is a mile to the east of the site and there are no stratified sand and gravel deposits mapped within the site so the Expansion does not overlie, or fall within 300 feet of, a significant sand and gravel aquifer. The potential for the Expansion to pose an unreasonable threat to an on-site stratified sand and off-site bedrock was evaluated through the time of travel and contaminant transport analysis. These demonstrate that, due to the design of the landfill liner system and imported base soils, the facility does not pose an unreasonable risk of discharge to a significant groundwater aquifer.

L. Adequate Provision for Utilities and No Unreasonable Adverse Effect on Existing or Proposed Utilities

The Applicant proposes to continue to utilize on-site sanitary wastewater systems for landfill personnel and water supply needs will be met by existing sources. A new well and disposal system will be designed and constructed when the scale and office building are relocated.

The leachate generated in the Expansion will continue to be treated at the Expera Specialty Solution Mill in Old Town or the City of Brewer wastewater treatment plant. Leachate disposal contracts were included with the Application.

M. Not Unreasonably Cause or Increase Flooding

A Stormwater Management Plan was included with the Application that included stormwater modelling calculations to ensure the appropriate sizing of all stormwater management infrastructure to prevent an increase in flows leaving the site as it is developed.

Chapter 400.6. Recycling

As was discussed above many of the wastes proposed for disposal in the Expansion are residuals from other waste processing facilities or are utilized within the landfill for daily cover.

Chapter 400.7. Host Community Agreements and Municipal Intervenor Grants

A. Host Community Agreements

Copies of the Host Community Agreements with the Town of Alton and the City of Old Town were included in the Application.

NEWSME's Host Community Agreement with the City of Old Town discusses, among other things, the fees that are to be paid to the City for the approved wastes disposed of in the landfill. It also discusses which waste types are currently exempt from this payment. Those wastes include materials that are approved by the MDEP for beneficial use and other materials that are accepted at the landfill for beneficial and for a tipping fee of less than $5.00 per ton.

B. Municipal Intervenor Grants

Notification of the Application was sent to Old Town and Alton. Old Town was also sent a description of their rights to apply for intervenor status and receive grant monies to assist them in their review of the Application. Alton has previously agreed that they are not a host municipality so they are eligible to be granted intervenor status

Chapter 400.9. Hazardous and Special Waste Handling and Exclusion Plan

A Hazardous and Special Waste Handling and Exclusion Plan was included in the Operations Manual.

Chapter 400.10. Liability Insurance

A current certificate of insurance, maintained by NEWSME, for the JRL facility was included as Appendix P of the Application.

Chapter 400.11. Financial Assurance for Solid Waste Disposal Facility Closure and Post-Closure Care and Corrective Action

A. Financial Assurance for Closure and Post-Closure Care

NEWSME uses a surety bond as financial assurance for closure and post-closure care for 30 years, as provided in the Operating Services Agreement with BGS. Cost estimates are updated annually and included in the Annual Report. State owned facilities are not required to provide financial assurance under the Solid Waste Management Regulations. A detailed cost estimate for closure and post-closure was not included in the Application.

CES recommends that a detailed cost estimate be reviewed to ensure that potential costs associated with corrective actions or remediation during the post-closure period are included.

Chapter 400.12. Criminal or Civil Record

A. Full Disclosure

BGS and NEWSME provided the required disclosure statements.

Chapter 400.13. Variances

A. Variances Affecting Site Standards, Facility Design, and Construction

In this Application, NEWSME is requesting a variance to construction practices for placement of barrier and base soils. Current Rules require that these soils be placed with a *"maximum allowable compacted lift thickness of 9 inches"*; the Applicant is requesting a variance to allow these materials to be placed in a compacted lift thickness of 12 inches. This practice has been used at JRL for the construction of Cells 7, 8, and 9, approved through the use of construction change orders, and proven to meet the required performance criteria through test pad programs. Testing of the soils will be performed to demonstrate that the performance criteria will be met, during Expansion

construction, following similar test pad programs. We agree that this is a reasonable approach given current construction equipment capabilities.

B. Variances Affecting Operation

No operational variances are being sought.

Solid Waste Management Rules: Landfill Siting, Design and Operation, 06-096 CMR 401 (amended April 12, 2015), as applicable Chapter 401.2. Application Requirements

A. General Information

NEWSME included figures containing the following information within the Application:

- Site location map,
- Shoreland resource protection and 100-year floodplain zones,
- Site watersheds,
- Freshwater wetlands,
- Surficial geology,
- Medium intensity soil types,
- Earthquake epicenters,
- Significant sand and gravel aquifers,
- Site investigation map, and
- Wetland delineation.

B. Site-Specific Investigation

Site specific investigations performed to support the siting and design of the JRL Expansion include:

- Soil borings,
- Test pits,
- Geophysical surveys,
- Groundwater observation wells,
- Piezometers,
- Pumping tests,
- Groundwater velocity testing,
- Physical testing of soils and bedrock,
- Collection of groundwater levels, and
- Groundwater age-dating.

The results of the investigations were compiled to form a complete hydrogeological description of the Expansion site. The investigations showed that the Expansion area is underlain by a dense glacial till deposit that varies in thickness and is underlain by competent bedrock.

As required for an Application for Expansion, a summary of the ground and surface water quality data, to date, was included.

C. Site Assessment Report

As discussed above, the required maps and figures were included in the Application.

As required, Time of Travel Calculations were performed to show that the site meets the required six years for groundwater to travel from the bottom of the landfill liner system to the identified sensitive receptors. NEWSME utilized the allowed offset credits, for liner system and base soil design, as well as calculated times of travel through the existing site soils and bedrock. With the inclusion of the uniform low permeability soil below the liner system and the leak detection system, NEWSME is allowed a credit of five years. When added to the existing site travel times, the total travel times ranged from 6.2 years to 53.7 years.

D. Design Standards for Landfills

The construction for the Expansion will require both excavation and fill of the native soils in order to provide the necessary base grades. Any excavation in areas with less than five feet to bedrock will be limited to removal of the organic and vegetative soils only. Areas with less than 10 feet to bedrock will be constructed with an additional layer of low permeable soil. The depth of soils to bedrock is from 2 to 62 feet with an average depth of 25 feet. A one-foot layer of low permeability clay (less than $1X10^{-7}$ cm/sec) will be placed over the entire footprint below the secondary liner.

An underdrain sand layer will be placed under 12.7 acres of the Expansion footprint where water levels are above base grades. Average soil depths in these areas average 36 feet. Discharge from the underdrain system will be monitored annually for compliance with the Facility's detection monitoring program, and monthly for specific conductance and flow.

Liner System Requirements

The liner system is proposed to consist of a composite primary liner, a leak detection system, and a secondary liner.

The primary liner will consist of;

- An 80 mil high-density polyethylene (HDPE) textured geomembrane,
- A geosynthetic clay liner (GCL), and
- A 12-inch clay layer (hydraulic conductivity less than $1X10^{-7}$cm/sec).

The leak detection system will consist of;

- A 12-inch layer of sand,
- 6-inch diameter perforated HDPE piping, and
- A geocomposite drainage net.

The secondary liner will consist of;

- A 60 mil HDPE textured geomembrane,
- A GCL (in areas where there is less than 10 feet to bedrock), and
- A 12-inch clay layer with a hydraulic conductivity less than $1X10^{-7}$cm/sec (in areas with less than 10 feet to bedrock).

Improvement Allowance System

The Applicant proposes to utilize the Improvement Allowance Table to meet the required intent of the six year groundwater time of travel performance standard. The addition of a leak detection system underlain by an HDPE liner provides a two year offset that was utilized for areas of the landfill will greater than 10 feet to bedrock. The addition of a leak detection system underlain by a composite liner system provides a three year offset that was utilized for areas with less than 10 feet to bedrock.

Base Preparation below the Liner System

The Applicant proposes to meet all of the standards for base soils and, as described above, has requested a variance from the requirement for placement of minimum 9-inch lifts. They are proposing placement in 12-inch lifts.

Leachate Conveyance System and Storage Structure Standards

NEWSME has designed the Expansion so that each proposed cell will drain to a collection sump at that cell's low point. Cells 11, 12, 14, and 15 are designed with temporary sumps. Cells 13 and 16, the northern most cells on the east and west sides of the Expansion were designed with permanent sumps. This design allows for the Expansion to be constructed without any penetrations which have an increased chance of leakage. As landfill construction progresses to the north, leachate piping from the previous cell will tie into the new cell's collection system. The leachate collection system was sized to limit the head on the liner system to less than 1-foot, and will be monitored with pressure transducers. The leachate collection system in each cell consists of:

- HDPE collection piping (6 to 8 inch diameter),
- One foot of drainage sand, Filter stone and drainage stone (around the piping), and
- Geocomposite drainage net.

Once leachate is pumped from the cells, it will be carried in a dual-walled forcemain around the perimeter of the landfill footprint to the facility's existing 921,000-gallon leachate holding tank.

All cells within the Expansion area are designed with a leak detection system. The system is designed to detect leaks from the primary liner within 30 days. The leak detection system consists of:

- One foot of drainage sand,
- Crushed stone,
- Perforated HDPE pipe, and
- Geonet drainage composite.

During the initial operation of the landfill the leak detection system will also carry consolidation water that will come from the primary liner's clay layer as well as water that may have fallen on the detection system during construction, prior to liner placement above. A liner leakage plan has been proposed for monitoring the flows in the system.

E. Alternative Design Process

NEWSME has not proposed any alternatives to the minimum design standards and requirements.

F. Engineering Report for Landfills

An Engineering Design Report was included with the Application. The Report included;

- A discussion of the design standards,
- Geotechnical evaluation,
- Water balance,
- Action Leakage Rate/ Response Action Plan,
- Gas Management,
- Cell Development,
- Waste Characterization,
- Surface water controls,
- Contaminant Transport Analysis,
- Quality Assurance Plan,
- Construction Contract Bid Documents,
- Water Quality Report and Proposed Monitoring Program,
- Operations Manual, and
- Landfill Construction.

The geotechnical evaluation for the Expansion included the stability and settlement assessments required. The assessments were performed using actual data from site investigations and previous cell construction at JRL. The slope stability assessment included an analysis of both static and seismic conditions during construction, operation, and post-closure. All calculated factors of safety exceeded the minimum requirements. The settlement assessment evaluated the proposed wastes and foundation soils. Based on the calculations, settlement is not expected to pose a risk to the liner or cover systems. A geotechnical monitoring plan, including pressure transducers within the cells and visual inspections of the liner, waste and cover systems, has been prepared to evaluate the systems during construction, operation and post-closure to confirm the findings of the calculations.

The water balance performed for the Expansion included modeling performed using EPA's Hydrologic Evaluation of Landfill Performance (HELP) Model to simulate leachate production. Analyses were performed for three conditions including; an open active filling condition with 10 feet of waste, 90 feet of waste with soil intermediate cover, and post closure with a final cover system. The calculations performed showed that the estimated yearly flows from the entire facility ranged from 13.8 million gallons per year during Cell 15 operation to 22.9 million gallons per year during Cell 12 operation which has the largest operational area. These flows were used to size the leachate collection system.

Action Leakage Rates (ALR) were developed for the site based on calculated flow rates through predicted holes in the primary liner with an assumed value of one foot of head on the liner system. Using the values specified, ALRs of 4.6 gpad (ALR-I) and 92 gpad (ALR-II) were proposed for the Expansion cells. These ALR values were proposed as the minimum rates that would trigger interaction with the MDEP to determine appropriate responses. Leak detection flows that exceed ALR-I will trigger additional weekly measurements. If these follow-up readings confirm the initial reading, the MDEP will be contacted and additional monitoring will be required. Leak detection flows that exceed ALR-II will indicate a potential leak in the primary liner system and additional investigations will be developed and the MDEP will be contacted immediately.

The waste types proposed for disposal in the Expansion are the same materials which are currently being disposed of in the existing cells at JRL. The design assumed a disposal rate of 700,000 tons per year broken down as follows:

- WWTP and miscellaneous sludge (10%);
- Front-End Process Residuals (FEPR) (7.7%);
- Contaminated Soils (4.3%);
- Municipal solid waste ash (8.3%);
- Biomass and fossil fuel ash (5%);
- Municipal solid waste by-pass from incinerators and soft layer (3.6%),

- Construction/demolition debris (27.9%);
- Oversized bulky waste (8.6%);
- C&D process fines (used for daily cover) (19.7%); and
- Miscellaneous waste (oversized bulky waste, fines, contaminated soil, spoiled food, etc.) (4.9%).

Since there are no proposed changes to the waste, there will be no significant changes to the physical or chemical characteristics of the waste stream.

A Sedimentation and Erosion Control Plan as well as a Stormwater Management Plan were submitted with the Application. All stormwater structures were sized using HydroCAD modeling software.

Landfill gas generation rates were calculated using USEPA's Landfill Gas Emissions Model (LandGEM). LandGEM calculated gas production rates using disposal rates and the percentage of degradable waste but assumes a gas consisting of 50% methane. Gas collection infrastructure was then sized for landfill gas collected at 40% methane. This lower methane percentage predicts a higher flow rate but is supported by the facility's current practices of gas management for odor mitigation. Based on the model, the peak collection rate will occur in 2031, when the Expansion reaches capacity. Hydrogen sulfide (H2S) is a gas produced at the landfill that, is not modelled for, but is collected with the methane and sent to the Facility's flare. Treatment of the gas for H2S is required by the Facility's Air Permit so the gas is sent through a Thiopaq treatment system prior to destruction in the flare.

Prior to the March meeting, CES staff noted that geomembrane puncture calculations and geomembrane anchor trench calculations to evaluate pull-out or rupture control modes were not performed. Calculations were provided following the meeting.

CES staff notes that the lower level Action Leakage Rate that was calculated for the Expansion leak detection system is highly conservative. Due to the low level of flow that triggers a response, and the amount of liquid that is expected in the system due to consolidation water from the clay above, the Applicant proposes to use a combination of flow rate and specific conductance to differentiate between leachate and consolidation or construction water. This monitoring plan is robust and is an appropriate approach to monitoring.

G. Contaminant Transport Analysis

The Contaminant Transport Analysis was performed with three hypothetical scenarios which considered worst case failures of the engineered systems. These scenarios include:

- Complete failure of the liner system;
- Leaky landfill base; and
- Leaky leachate force main.

An analysis of the leachate holding tank was performed with the Application for vertical increase.

In the case of a complete failure of the liner system, it was assumed that the primary and secondary liner systems did not exist and leachate was allowed to drain directly into the underlying soils. Using a leakage rate of approximately 92 gallons per acre per day (gpad) it was calculated that the concentrations at the receptors did not exceed applicable groundwater or surface water quality criteria after six years.

In the case of a leaky landfill liner, it was assumed that the primary liner was not present. Using the leakage rates calculated for the first case, leakage through the secondary liner was calculated to be at a rate of 4.6 gpad. Based on this analysis, the concentrations at the receptors at six years were non-detect.

For a leak in the force main, it was assumed that the leak would be detected within one week. This is when leachate would be observed at the ground surface at the trench location. The standard for a leak from a leachate line is that concentrations not exceed water criteria at receptors a time of three years. The analysis showed that concentrations are not exceeded in three years.

H. Plan View and Profile View Drawings

All plan and profile view drawings were included with the Application.

I. Quality Assurance Plan

A Quality Assurance Plan was prepared for the Expansion and includes:

- Construction Quality Assurance (CQA) measures to be implemented,
- Relationship between the Quality Assurance Plan, construction quality control, and contract bid documents,
- Responsibility, authority, roles and responsibilities of all parties involved,
- CQA personnel qualifications,
- Inspections and testing requirements,
- Sampling requirements,
- Recordkeeping and reporting requirements, and

- A list of descriptions of all items requiring CQA certifications.

J. Construction Contract Bid Documents
Bid documents are included in the Application.

K. Water Quality Report and Proposed Monitoring Program
A copy of the JRL 2013 Annual Water Quality Report and an updated Environmental Monitoring Plan were included with the Application.

L. Operations Manual
NEWSME submitted a revised Operations Manual to address waste placement and operations in the Expansion footprint.

Chapter 401.3. Landfill Construction

NEWSME agrees to follow all regulatory requirements during construction of Expansion Cells.

A. Pre-Construction Conference
A Pre-construction conference will be held prior to construction. The MDEP will be given at least 7-day notice prior to the conference.

B. Quality Assurance Plan
A Quality Assurance Plan has been developed to monitor all construction and is included in the Application as discussed above.

C. Liner Installation
Prior to installing any liner, NEWSME will evaluate the installation procedures to ensure the integrity of the installed liner.

D. Changes from Approved Plans and Specifications
NEWSME agrees to receive approval from MDEP for any proposed changes to the approved plans and specifications. Any changes that are necessary during construction will be handled as a change request to the MDEP which will be considered approved if a response is not received within five working days.

E. Weekly Inspection Reports
Weekly reports will be prepared by the quality assurance team responsible for construction and provided to the MDEP within one week of the completion of the construction week.

F. Photographic Documentation

Photographs will be taken during the construction project and included in the Final Construction Report.

G. Record Drawings

Record drawings will be prepared and sealed by a State of Maine Professional Engineer. The drawings will be submitted to the MDEP within 45 days of completion of the construction.

H. Final Construction Report and Commencement of Operations

A final construction report will be completed to address all requirements of the Solid Waste Regulations and submitted to the MDEP within 45 days of completion of the construction.

Chapter 401.4. Landfill Operations

A. Operations Manual

NEWSME submitted a revised Operations Manual that included the following:

- Site history,
- Requirement for certified copies and annual review,
- Requirement for operator training and certification program,
- JRL organizational structure,
- JRL development including cell construction, intermediate cover, final cover, and stormwater/erosion control systems,
- Cell development plans,
- Acceptable wastes,
- Hours of operation,
- Compaction requirements,
- Daily cover requirements,
- Leachate management,
- Landfill gas management,
- Inspections,
- Equipment requirements,
- Hazardous and Special Waste Handling and Exclusion Plan,
- Litter control,
- Environmental Monitoring Plan,
- Geotechnical Monitoring Plan,
- Record retention,
- Odor control,
- Complaint Management and Response Plan,

- Gas system operations, and
- Annual reporting requirements.

Solid Waste Management Rules: Water Quality Monitoring, Leachate Monitoring, and Waste Characterization, 06-096 CMR 405 (amended April 12, 2015), as applicable

Chapter 405.1. General

Water quality monitoring has been conducted on this site since 1990. NEWSME has submitted a revised Environmental Monitoring Plan to detail the proposed monitoring for the Expansion area.

Chapter 405.2. Water Quality Monitoring

A. Standards for Ground Water Monitoring

The Expansion will include 43 monitoring locations including; background and downgradient piezometers and wells, additional surface water sampling points, and leak detection and underdrain monitoring points. The Applicant is proposing to install the monitoring locations as the Expansion construction progresses.

An underdrain is also proposed under 12.7 acres of Cells 12 and 13. This system will also be monitored.

Twenty-three new monitoring wells will be installed to monitor the Expansion area and will be screened according to the site's local geology. The proposed well locations were chosen based on groundwater flow directions, potential site sensitive receptors, and the location of major site leachate pumping stations.

Protocol for sampling of groundwater monitoring wells has been established.

CES staff comments that monitoring wells should be installed early enough to obtain background information at each location prior to construction and waste placement.

B. Standards for Surface Water Monitoring

Two additional surface water locations are proposed to monitor runoff impacts to nearby streams and wetlands. One location is proposed to be northeast of the Expansion footprint, the other is proposed to the northwest of the Expansion footprint. The final locations will be chosen with the assistance of the MDEP.

Protocol for sampling of surface water has been established.

Chapter 405.3. Standards for Ground and Surface Water Data Evaluation and Reporting

An annual statistical analysis is performed of the site water quality data. This analysis is submitted to the MDEP in the facility's Environmental Monitoring Report. Laboratory data is submitted to the MDEP electronically following each sampling round.

Chapter 405.4. Leachate, Leachate Collection, Leachate Detection System And Leachate Treatment

Residue Monitoring

Flows from each cell are pumped to the leachate storage tank. Site leachate will be sampled three times per year to characterize the quality and provide information to be used when reviewing other site data. The discharge from the independent pump stations can be monitored separately if necessary.

Each cell will have an individual leak detection sump and will be sampled separately. The discharge will be monitored for flow and quality. These locations will be monitored monthly and compared to the levels established in the liner action plan.

Chapter 405.5. Standards for the Installation, Construction and Maintenance of Wells and Piezometers, and for the Advancement of Borings

Protocol is established at the time of installation and plans are submitted to the MDEP.

Chapter 405.6. Solid Waste Characterization Program

A. Applicability

JRL's Special Waste Characterization Program is included in the facility's Operations Manual.

B. General Program Requirements

JRL's Program describes the requirements for waste characterization for first time and ongoing waste disposal. It includes analytical requirements as well as frequency of testing.

The Program also includes a reference list of wastes that are acceptable and unacceptable for disposal within the landfill.

C. **Specific Analytical Requirements for the Disposal or Beneficial Use of Solid Waste**
As discussed above, the Program includes all analytical requirements as well as the frequency of testing.

Should you have any questions or require further explanation of the information presented, please contact us.

Sincerely,
CES, Inc.

Denis St. Peter, PE
Project Manager / President

DSP/gdr