



RESPONSE TO PUBLIC COMMENT
Application to Modify Permit #DES-SW-SP-03-002
North Country Environmental Services, Inc. (NCES)
NCES Stage IV- V Landfill
Trudeau Road, Bethlehem, New Hampshire
August 15, 2014

On February 13, 2015, the New Hampshire Department of Environmental Services (DES) received an application from North Country Environmental Services, Inc. (NCES) to modify Permit #DES-SW-SP-03-002 to authorize a vertical and lateral expansion of the company's landfill on Trudeau Road in Bethlehem, New Hampshire. The expansion, referred to as Stage V, has a total design capacity of 1,903,000 cubic yards, a projected life expectancy of 5.3 years, and overlies existing landfill areas referred to as Stages I, II, III and IV.

DES held a public hearing on the application in Bethlehem on April 17, 2014 and kept the public comment period/hearing record open through May 19, 2014. During that time period, a number of people raised questions and expressed concerns about the application, permitting requirements and procedures, facility operations, current site conditions and other issues of concern.

On August 15, 2014, DES issued its decision to approve the requested permit modification. In making its decision, DES considered the many public concerns expressed during the public comment and hearing process. A compilation of those concerns and the agency's response is provided in this document. The information is organized and grouped as follows.

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I. Permitting

(1) Decision makers at DES are appointed and, therefore, are not objective when making a decision on the application.

DES makes its decisions to issue or deny solid waste facility permits based on the criteria and procedures provided in the New Hampshire Solid Waste Management Act (RSA 149-M) and the New Hampshire Solid Waste Rules, Env-Sw 100 – Env-Sw 2000 (Rules). Applications are reviewed by licensed professional engineers, licensed professional geologists, and other qualified professionals to determine whether the proposed facility meets applicable siting, design, operating, closure and other requirements specified in the statute and the Rules. Proposals that meet the specified requirements are approved. Those that do not are denied.

(2) Granting a permit to expand the NCES Landfill is not in keeping with the purpose of RSA 149-M, which states, in pertinent part: “It is the declared purpose of the general court to protect human health, to preserve the natural environment, and to conserve precious and dwindling natural resources through the proper and integrated management of solid waste.”

RSA 149-M (the NH Solid Waste Management Act) is comprised of 60 sections. DES works within the full framework of RSA 149-M to achieve the stated purpose of the Act. Thus, in making its decision to grant the Stage V permit to increase the capacity and extend the operating life of the NCES Landfill by an estimated 5.3 years, DES had to consider many factors. Those factors included: that landfills, although least preferred, are a necessary component of the integrated system endorsed by the General Court in RSA 149-M:3 for solving New Hampshire’s solid waste disposal problems; that the need for landfills to be part of the integrated system is unlikely to change within the proposed lifespan of Stage V; that 156 NH municipalities currently rely on the NCES landfill to dispose of some or all of their waste; that the NCES Landfill, through its many affiliates and customers that practice recycling and promote use of other waste management options higher on the hierarchy prior to landfilling, is part of an integrated system for managing solid waste, as endorsed by the statute; and that the proposed plans for building and operating the Stage V Landfill properly meet or exceed state and federal requirements for solid waste landfills, which are protective of the human health and the environment. Thus, DES does not agree that approval to increase the capacity of the NCES Landfill and extend its anticipated operating life by 5.3 years is contrary to the purpose of RSA 149-M.

(3) The original landfill at this site was exempt from current siting requirements. This is the worst possible location for a landfill. The landfill should never have been sited here.



The original unlined landfill at this site, which NCES removed in 1993, and Stage I of the existing landfill, which was permitted in 1987, both predated the siting criteria provided in the current Rules. Even so, Stage I conforms to the current siting requirements in the Rules, as do each of Stages II - V.

(4) We have no way of knowing what is actually going into the landfill. There should be testing for radioactive materials. We have no idea what is in the wastes, which could include, for example, contaminated soils.

NCES inspects all waste coming into the landfill and implements measures to restrict acceptance of prohibited wastes. Those measures include: customer education and signed agreements regarding rules and regulations for use of the facility, specifically including acceptable and non-acceptable wastes; routine visual inspection of each load by trained operators looking for unacceptable materials when loads are discharged from the delivery vehicle onto the working face and as the waste is spread out at the working face; and more intensive inspection of 5 percent of the incoming loads, selected when trucks first arrive at the scale house, before obtaining permission to go to the landfill. Selection for intensive inspection is done both randomly and based on the type of waste, accounts serviced, or the hauler's record of reliability.

Special wastes, such as contaminated soils, are profiled in advance of being disposed of at the landfill. The related documentation is submitted to landfill operators in the form of a Special Waste Profile and reviewed before authorization for delivery is provided. Profiling typically includes characterization of the special waste using due diligence, plus laboratory analysis of representative samples to ensure that the waste is non-hazardous and of a type and form that can be accepted by the landfill. When the loads arrive at the landfill, trained facility operators visually inspect the waste to ensure that its physical composition is consistent with the previously provided and accepted Special Waste Profile description, as well as consistent with the waste tracking documents that travel with the waste during transportation from the site of generation to the landfill.

Because radioactive wastes are highly regulated from cradle to grave, they are unlikely to be sent to a solid waste landfill.

(5) What is the actual life of the landfill? There seem to be conflicting statements about that.

In New Hampshire, landfill permits specify a volume, referred to as "air space," that the facility is allowed to fill with waste. Thus, the lifespan of a landfill depends on the rate at which the facility accepts waste for disposal in the permitted airspace and the density of the waste following its placement and compaction in the permitted airspace. Landfill permits also specify a



minimum operating life to ensure that there is adequate disposal capacity pursuant to RSA 149-M:11 for waste generated in New Hampshire. The Stage IV Permit issued in 2003 required the NCES Landfill to operate in a manner that provides disposal capacity for at least 10.5 years. Using a typical compaction rate of 1620 pounds per cubic yard and a waste acceptance rate of 290,000 tons per year, the Stage IV landfill is expected to reach its permitted capacity in 2016. Using the same compaction and acceptance rates, the Stage V landfill area is expected to provide an additional 5.3 years of capacity beyond the 2016 Stage IV completion date. Thus, with the added airspace provided by Stage V, the NCES landfill is expected to reach capacity 6.5 years from now, in 2021.

(6) How has DES applied its environmental justice policy to the review of this application?

The DES Environmental Equity Policy directs the agency to recognize and consider the fact that areas predominantly occupied by minority and low income populations historically have faced an inequitable share of risks for environmental hazards. The Environmental Equity Policy establishes a guiding principle for DES decisions. In applying this guiding principle during review of the Stage V permit application, DES compared the economic demographics in Bethlehem to those in other NH communities, using data published by the NH Department of Employment Security, available on that agency's website. According to the data, the median income and percentage of population living below the poverty line in Bethlehem does not differ significantly from other communities in NH. Additionally, according to United States census data and data provided on the EPA Environmental Justice website, minority populations are not concentrated in Bethlehem. Therefore, a landfill located in Bethlehem does not place an inequitable risk on low income or minority populations.

(7) There should be financial assurance for catastrophic events.

The Rules currently require landfills to provide financial assurance in the amount necessary to cover the cost of facility closure and scheduled post-closure care of the landfill. The applicable requirements for providing financial assurance for corrective action at RCRA Subtitle D landfills, including the NCES Landfill, are as specified in 40 CFR 258 Subpart G. Those requirements are triggered when any of the contaminants listed in 40 CFR 258 Appendix II are detected above the applicable groundwater protection standard. Those levels are not exceeded at the NCES Landfill site. Therefore, the NCES Landfill is not currently required to provide financial assurance for corrective action, but would have to provide it if groundwater quality were impacted at levels specified in the federal rules. Notwithstanding the applicability thresholds of these federal requirements, DES agrees that additional up-front financial assurance for potential future corrective action would be helpful. For that reason, during this past legislative session (2013-2014), DES supported House Bill 1151, which called for the formation



of a legislative committee to study the need and options for providing financial assurance for corrective action, and to make recommendations related thereto. The House passed the bill, but the Senate recommended that it be sent to interim study, so it was not enacted. DES is examining the preferred options for requiring financial assurance for potential corrective action at RCRA Subtitle D Landfills in anticipation of drafting administrative rules to accomplish this.

II. Impacts to Surrounding Area and Beyond

(8) The landfill destroys the peace and quiet of the area. There is often a lot of noise.

The Rules (ref. Env-Sw 1005.01) require solid waste facilities to "...be operated and maintained in a manner that controls to the greatest extent practicable...noise." To date and in conformance with Env-Sw 1005.01, NCES has instituted the following measures to mitigate noise:

- The facility and its contractors are using static back-up alarms on their equipment, instead of beeping alarms. These alarms sound like static, similar to a radio frequency that is not tuned in, and help to reduce off-site noise impacts.
- NCES is grading the surface of its access roads to reduce banging resulting from truck traffic.
- NCES maintains a 24-hour telephone system for receipt of noise and other complaints, which allows those complaints to be relayed to landfill operators for investigation and timely response.

In addition to the above, NCES hired a consultant to study noise conditions in the vicinity of the landfill. A report of the study recently submitted to DES indicates that during the 28-day study period, noise levels in the neighborhood where noise complaints most often originate were less than US EPA guidelines and World Health Organization guidelines for residential areas, and that overall sound levels include contributions from sources other than NCES. That being said, DES recognizes that noise from the landfill remains a concern for neighbors of the landfill. DES will continue to monitor noise complaints and work with neighbors and NCES to identify any additional measures that NCES can implement to further mitigate noise.

Additionally, under the terms of the Stage V permit, DES has required NCES to mitigate early morning construction noise by delaying the start of construction activities until 7:00 AM or later.

(9) The landfill obstructs the view of the natural surroundings for many who live near it.



The Town of Bethlehem and NCES have agreed that the maximum height of the closed and capped landfill shall not exceed 1483 feet above the North American Vertical Datum of 1988 (NAVD88), which means the height of the Stage V landfill is limited to an elevation that is not greater than 10 feet higher than the permitted height of Stage IV. RSA 149-M and the Rules do not provide an explicit restriction on the height of a landfill, although its height is usually limited by design criteria. The permitted design plans for Stage V conform to both the local height restrictions and DES design criteria.

(10) There are often unpleasant odors that come from this landfill that impact the surrounding area.

The Rules (ref. Env-Sw 1005.01) require solid waste facilities to "...be operated and maintained in a manner that controls to the greatest extent practicable...odor."

To date and in conformance with Env-Sw 1005.01, NCES has instituted the following measures to mitigate odor:

- NCES uses daily cover to control odors at the working face;
- NCES has installed a new flare and larger blowers to better control the facility's active gas management system;
- NCES conducts quarterly extraction point balancing and monitoring, landfill cover integrity checks, landfill surface monitoring, gas probe and leachate structure monitoring and total reduced sulfur (TRS) sampling;
- During construction, NCES uses a gas tarp to help keep odors from escaping the landfill;
- NCES is in the process of installing the permanent cap over the eastern slope of the landfill;
- NCES maintains a 24-hour telephone system for receipt of odor and other complaints, which allows those complaints to be relayed to landfill operators for investigation and timely response.

In addition to the above, NCES hired a consultant to review the adequacy of odor control measures at the NCES landfill with respect to industry standards. The consultant concluded in its report that odor control practices at the facility do meet industry standards, and that the facility is being operated and maintained in a manner that controls odors to the greatest extent practicable. Despite these practices, DES understands that landfill odors remain a concern for several commenters. Consequently, under the Stage V permit, DES has required NCES to retain a qualified consultant to conduct a study to determine if there are additional methods available to control odors at the landfill.



(11) There is a cancer cluster of people who live near the landfill.

As DES has stated in the past, the State of New Hampshire takes very seriously the health concerns of its citizens due to potential hazards in the environment. In 2008, in response to local residents' health concerns about the number of people living in the Bethlehem area who had been diagnosed with cancer, the New Hampshire Department of Health & Human Services, Office of Health Statistics and Data Management (HSDM) began an investigation of cancer in the Bethlehem area. The investigation comprised an analysis of cancer incidence and cancer mortality data in Bethlehem and several adjacent communities. The investigation was conducted in accordance with a protocol that HSDM developed to evaluate potentially elevated levels of cancer or other diseases in a community or specific geographic area.

The study, which was based on an analysis of observed vs. expected cancer rates, found elevated rates of several different cancer types in the Bethlehem area. HSDM, however, did not find any association between the types of cancer identified in the community and exposure to chemical sources of contamination in the environment. In their report, HSDM concluded that based on the incidence and types of cancer found, there was nothing to suggest that any common factor, either environmental or non-environmental, was related to the overall occurrence of cancer in the Bethlehem area.

In addition to the main study, HSDM conducted a Medical Records Review of Bethlehem residents diagnosed with cancer during this time period. This activity was conducted to address the issue of whether the elevated cancer rates in Bethlehem were related to any hereditary, behavioral, life-style, occupational, or environmental factors. Although HSDM was not able to obtain the medical information for all of the subjects involved in this review, HSDM did not find a common factor, environmental or otherwise, related to the occurrence of these cancers in the Bethlehem area.

The referenced reports are available at:

<http://www.dhhs.state.nh.us/dphs/hsdm/cancer/documents/bethlehem.pdf>

<http://www.dhhs.state.nh.us/dphs/hsdm/cancer/publications.htm>

(12) The landfill has caused a decline in property values.

Property values depend on many factors. DES acknowledges that zoning and allowable local land uses can affect property values, sometimes resulting in an increase or a decrease in market value. The NCES Landfill is an allowable local land use and its effect on property values is a local land use issue that is not within the scope of DES permitting authority.

(13) The landfill is having an adverse effect on tourism.



DES can find no data indicating that tourism is being adversely impacted by the NCES Landfill. The Travel Barometer for fiscal year 2013, which can be obtained by visiting the Department of Resources and Economic Development website, shows that there was an increase in visitors to the state's ski areas and that spending on rooms and meals were up in Grafton County.

(14) The landfill has caused the number of wildlife in the area to be diminished.

DES could not find data or other information to substantiate this claim.

(15) The landfill should not be sited so close to the White Mountain National Forest.

The landfill is sited on private property. There are no restrictions on siting a landfill adjacent to national forest property.

(16) There should be an evacuation plan for residents near the landfill and NCES should provide the funding.

In the event of a hazardous materials/waste incident at the NCES Landfill, the facility operators are required to notify local, state, and in some cases, federal response agencies, including: Bethlehem Fire Department, National Response Center and DES (or State Police dispatch after regular business hours). In NH, local fire departments are designated to be the "first responders" to hazardous material/waste (hazmat) incidents. The highest ranking fire official on scene serves as the "incident commander." After responding to the scene and evaluating the situation, the incident commander, usually the fire chief, may elect to call and mobilize regional or state hazmat resources. Decisions on response actions and whether or not evacuation is necessary are made by the incident commander after consultation with his support groups. DES would provide oversight for development of long-term remediation plans.

DES has considerable experience dealing with hazmat incidents. These incidents include hazardous waste transporter accidents, spills and fires. There are set procedures in place at the state level to address them. Since the NCES Landfill is permitted to receive only solid waste, regulated hazardous wastes should not be sent to or received at the landfill. However, in the event a hazardous waste or material is inappropriately transported to the facility and is released, trained local fire officials, with the support of trained regional and DES support teams, should be capable of properly responding.

Depending on the circumstance, state and local costs associated with a hazmat incident can be recovered from the responsible party under the provisions of RSA 147-A:9 and RSA 154:8-A.



III. Landfill Failure

(17) Adding more capacity could cause the landfill to fail, including a massive slope failure that would cause the landfill to slide into the Ammonoosuc River. If it collapsed, it could damage the Ammonoosuc and Connecticut Rivers.

Solid Waste Rule Env-Sw 805.03 requires landfill permit applications to include a stability analysis prepared by a licensed professional engineer. To satisfy permitting criteria, the study must show that the subgrade has "...sufficient structural integrity to support the facility under all anticipated loading conditions during all phases of construction, operation and closure." The rule further specifies that "...engineering measures shall be incorporated in the design when necessary to ensure stability of the landfill during all phases of construction, operation and closure." The required stability analysis for Stage V is provided in Section VI of the permit application. It addresses the requirements of the Rules by assessing the stability of the landfill waste, liner system, and capping system under static (the weight of the landfill itself) and seismic loads. The seismic stability was evaluated in conformance with federal requirements. These analyses, prepared by licensed professional engineers and reviewed by other licensed professional engineers at DES, show that the landfill is stable with safety factors for static and seismic stability greater than the minimum required of 1.5.

IV. Air Quality Impacts

(18) Air quality has been diminished because of the landfill. The landfill emits toxic chemicals that are impacting public health.

The NH Air Toxics Control Program, enacted in 1987 and revised in 1996, protects public health by reducing human exposure to toxic air pollutants. The program is codified in NH RSA Chapter 125-I, Air Toxics Control Act and in the NH Code of Administrative Rules, Env-A 1400, Regulated Toxic Air Pollutants (RTAPs). DES establishes Ambient Air Limits (AALs) for RTAPs for the express purpose of protecting public health. DES employs a well-established risk assessment methodology to develop health-based standards for RTAPs, utilizing the most current toxicological data and health effects information available from the scientific literature. The emission impacts from the existing landfill have been evaluated and shown to be less than the AALs.

The AALs are reviewed and updated annually, also employing a well-established methodology to ensure that they are consistent with the most current research findings for each chemical. Based on this established methodology, DES has determined that these limits for the Regulated



Toxic Air Pollutants are protective of public health, and are appropriate for the regulation of these pollutants.

(19) Even if air emissions from the landfill are below regulatory limits, the landfill should still not be allowed because it is doing harm.

NCES must obtain a permit from DES to monitor and control emissions associated with the proposed expansion of the landfill. As part of the review of the permit application, DES will evaluate all RTAP emissions expected to be produced by the landfill and determine the facility's ability to comply with the AALs. Compliance with the AALs helps to ensure that air quality in the Bethlehem community is protected.

V. Public Benefit and Recycling

(20) NCES is not helping to implement the hierarchy and goals. NCES does not recycle or promote recycling. NCES does not have a single-stream recycling facility in Bethlehem that meets the waste reduction requirements. DES is just focused on landfilling.

In its Stage V permit application, NCES presents detailed information about its efforts to promote recycling and waste diversion through its many affiliates. RSA 149-M and the Rules do not require facilities that comprise an integrated waste management system to be physically or geographically located together. In fact, the statute and the Rules contemplate regional solutions to solid waste problems. Based on data provided in annual reports submitted to DES by the various recycling facilities and transfer stations affiliated with NCES, approximately 39% of the municipal solid waste (MSW) stream entering those facilities is managed by recycling methods and, therefore, not landfilled at NCES. DES finds this to be consistent with implementation of the hierarchy and goals in the statute.

(21) The DES denial of a permit for Phase III-North of the Mt. Carberry Landfill means that there is not a 20-year shortfall of disposal capacity for New Hampshire generated waste. Doesn't this mean that the NCES application for new capacity in Stage V also fails the test of public benefit pursuant RSA 149-M:11?

The permit application to expand the Mt. Carberry Landfill into an area referred to as Phase III-North was denied because it sought approval for landfill capacity that would not be utilized in the region until perhaps the year 2048, well beyond the 20-year planning period specified in RSA 149-M:11. Consequently, the decision to deny the Phase III-North permit application has no bearing on the permit application for NCES Stage V, which will be used for disposal of New



Hampshire generated waste well within, rather than beyond, the statutory 20-year planning period.

(22) There are other options for waste disposal in New Hampshire, namely the Mt. Carberry Landfill in Success Township near Berlin, NH and the Turnkey Landfill in Rochester, NH. Both have adequate capacity.

DES found that the proposed NCES Stage V would provide a public benefit because it would provide landfill capacity for New Hampshire generators of solid waste, would be part of an integrated waste management system, and would be consistent with the state and district plans. The statute and the Rules provide no grounds for denying a permit application on the basis that other facilities of the same type may already exist in the marketplace elsewhere in the state. In fact, when considering a proposed facility's ability to serve a New Hampshire capacity need, the statute and the Rules explicitly require DES to consider the size and location of a facility, in addition to its type. For that reason, DES does not believe the statute intended to restrict development of facilities of the same type in different locations.

(23) NH does a very bad job with the hierarchy and waste reduction/recycling goals. Permitting more landfill capacity decreases the incentive to recycle.

New Hampshire generates approximately 1.5 million tons of solid waste per year, of which approximately 35% is recycled. Currently, most of this waste is managed at six lined landfills and one commercial waste-to-energy facility in the state.

Per RSA 149-M:3, incineration, including waste-to-energy methods, and landfilling are the least preferred methods of waste management. Source reduction and recycling are the most preferred methods. Accordingly, DES is committed to promoting source reduction and recycling through education and outreach within the confines of its limited resources. Although approximately 80% of solid waste is potentially recyclable, achieving and sustaining that level requires markets for recyclable materials to be stable, viable, and economically and environmentally sound. Even under the best circumstances, not all materials are suitable for recycling, reuse, or incineration, and therefore a portion of all solid waste must be landfilled.

(24) Does the town vote for the settlement agreement factor into public benefit in any way?

No, the town vote at a special town meeting on January 17, 2012 to approve the amendments to the Bethlehem Zoning Ordinance that were embodied in the November 22, 2011 Settlement Agreement and Mutual Release of Claims between the Town of Bethlehem and NCES is not a factor in the determination of public benefit. The factors considered are those stated in the response to comment (22), herein.



(25) NCES is “fast filling” Stage IV.

The permit issued for the NCES Stage IV Landfill required the facility to provide at least 10.5 years of capacity for New Hampshire solid waste generators. NCES has met this permit condition.

(26) Is there information on landfill capacity in New Hampshire and how much remains?

Yes. NH solid waste landfills are required to monitor and report information about remaining capacity. In the case of the NCES Landfill, as of an October 9, 2013 aerial photogrammetry survey, the facility had 939,439 cubic yards of capacity remaining. Compaction rates and acceptance rates vary day to day; however, assuming a compaction rate of 1620 pounds per cubic yard and the most current monthly waste acceptance rates provided by NCES, the landfill had approximately 688,936 cubic yards of remaining capacity at the end of May 2014. Statewide, the remaining permitted landfill capacity in New Hampshire at the beginning of 2014 was approximately 20,452,430 cubic yards.

VI. Groundwater Protection and Aquifer

(27) There have been leachate leaks during construction in the past at the landfill. What assurances are there that this won't reoccur?

During the Stage IV Phase I construction, a power outage prevented the pumps in the leachate management system from pumping contaminated storm water from the work site, resulting in the discharge of contaminated storm water into the adjacent storm water detention pond. To respond to that occurrence, NCES has required its contractors to provide backup pumps with an alternative power supply during subsequent construction activities at the NCES landfill. There has not been a repeat of the incident at the NCES landfill.

(28) What proof is there that the liner is not leaking? DES had concerns in the past; what has changed? NCES has a history of leaks.

There are a series of engineering controls in place to monitor both the primary and secondary liners for leachate. The primary (top) liner serves as part of a leachate collection system and the secondary (bottom) liner serves as part of the leak detection system for the primary liner. In addition to these engineering controls, the site is monitored via the Groundwater Release Detection Permit (GRDP), the purpose of which is to monitor groundwater quality for early detection of possible impacts due to landfill operations and/or liner issues. Under the GRDP,



NCES is required to provide routine detection monitoring for the purpose of determining whether or not a release has occurred from the facility. If the detection monitoring indicates that the concentration of a regulated contaminant exceeds its background concentration, NCES is required to implement assessment monitoring, which is a more rigorous monitoring protocol than detection monitoring. When assessment data confirm that the concentration of a regulated contaminant in groundwater is above background concentrations, NCES is required to develop and implement a corrective action plan (CAP) to identify, eliminate and prevent the discharge or ongoing release of regulated contaminants to soil, groundwater, or surface water.

Previously at the NCES Landfill, both the release detection monitoring and the assessment monitoring detected contaminants at concentrations above background concentrations in certain groundwater monitoring wells. Consequently, DES required NCES to develop a CAP. DES approved the CAP on May 19, 2010. Several significant remedial activities under the approved CAP have been implemented over a period of time (see report entitled “Corrective Action Plan (CAP) Amendment,” prepared for NCES by Sanborn, Head & Associates, Inc., and dated February 27, 2014, for a full description of the extent of remedial activities). There has been a resulting improvement to groundwater quality and NCES is currently in compliance with the conditions of the CAP. This approved CAP will remain in effect until the final performance standard of restoration of site groundwater quality at monitoring well MW-402U to background conditions has been attained. Current data do not indicate a release from the liner system. Groundwater monitoring will continue under the Groundwater Release Detection Permit to monitor ongoing conditions at the NCES Landfill.

(29) All landfills leak. This one will eventually.

The standard geomembrane landfill liner design required by the Rules is a double liner system comprised of 60-mil geosynthetic membrane liner material. The primary (top) liner serves as part of a leachate collection system and the secondary (bottom) liner serves as part of a leak detection system for the primary liner. This arrangement conforms to federal standards (See 40 CFR 258) for landfill design and is consistent with requirements around the country.

Commenters noted that various engineers have stated that all liners leak. It is probably more accurate to state that all liners will have imperfections that can result in leaks. These imperfections can include pinholes, imperfectly welded seams, and construction-related damage such as tears or holes. Whether or not these imperfections will result in a leak will depend on their location, the severity of the defect or damage, and the overall design and management of the leachate collection and removal system for the landfill. Primary liner systems are designed to quickly move large quantities of leachate off of the liner and into leachate collection and removal systems. In so doing, the system prevents the buildup of leachate on the primary liner, which



helps to ensure that there is no driving force to move leachate through a liner defect. The secondary liner is similarly designed to efficiently drain any leachate that does make it through the primary liner, and move it to collection and removal systems. Further, even if leakage from the secondary liner does occur it may not be of sufficient magnitude to adversely impact groundwater quality.

Commenters also expressed concern about the long-term integrity of the liner material, which in the case of the NCES landfill is a material known as “high density polyethylene” or HDPE. HDPE has been used successfully to line landfills in the United States and in New Hampshire for over 25 years, and to date has an extensive record of reliable performance.

While it is true that the long-term performance of this liner material is not yet known definitively, there is research that addresses this question. The Geosynthetics Institute (GSI) has issued a white paper that presents the results of a decade-long research project, funded partly by the EPA, which studied the life expectancy of landfill liners. Through the research, GSI found that the liner degrades through oxidation, which occurs in three stages. The first stage is the time for the depletion of antioxidants in the material; the second stage is the time for the onset of oxidative damage; and the third stage is the time for loss of 50% of the physical properties of the material, which is considered to be the end of the material’s service life. An important factor described in the paper is that the speed of each of these stages is highly temperature-dependent.

The GSI research shows that the life expectancy of liners ranges from 69 years at 40° C to 446 years at 20° C. GSI also monitored the temperature of the liner of a landfill in Pennsylvania and estimated its life expectancy to be between 166 and 446 years. These results are consistent with other research that DES has reviewed. Ongoing gas well monitoring at the NCES Landfill shows that temperatures in wells within the landfill waste mass average around 27° C. At this temperature, the GSI research suggests a liner life expectancy of between 166 and 265 years. Since the liners, particularly the secondary liner, are somewhat isolated from the waste, their temperature should be lower, and closer to the ambient temperature of the ground, which is less than 15° C. Therefore, the GSI research suggests that the life expectancy of the secondary liner material may be much greater.

(30) Petroleum products are leaking out of the heavy equipment on-site and running off with the surface water. Isn’t DES concerned about that?

The DES has not seen any indication of petroleum products leaking out of heavy equipment on-site and monitoring data shows no evidence of groundwater or surface water impacts from leaking petroleum at the NCES landfill site.



(31) According to the Government Accountability Office, landfills comprise over one-third of sites on the National Priorities List (NPL). This shows how dangerous landfills are.

The existence of a number of former municipal landfills on the Superfund program's National Priority List (NPL) does not support the contention that landfills constructed and operated pursuant to modern standards are inherently dangerous. Historically, many forms of industrial wastes were disposed of in unlined landfills, either because other disposal facilities were not available or because parties were not aware of the risks to groundwater posed by such disposal practices. Moreover, prior to 1993, there was no federal requirement that solid waste landfills be constructed with liners or other features to capture leachate and prevent groundwater contamination. Particularly in the early years of the Superfund program (the 1980s), some communities requested that EPA include their old municipal landfills on the NPL, even though the groundwater contamination associated with them was not particularly significant, because they mistakenly believed that there would be federal grants to municipalities under the Superfund program to help close and cap municipal landfills. For these and other reasons, the universe of landfills on the NPL is not generally comparable to modern landfills that include a double liner, a leachate collection system, and a leak detection system; and no reasonable inference of the level of risk associated with such modern landfills can be drawn from the fact that a number of older, unlined landfills are included on the NPL.

(32) Many people depend on the aquifer for their water. This landfill could contaminate the aquifer and water supplies. Isn't this a major concern?

At this time there are no data to indicate that any existing drinking water wells are at risk of being contaminated by the existing facility.

There is a groundwater contamination plume attributable to the former unlined landfill that was removed in 1993 by NCES. The plume is contained within a well-defined and delineated groundwater management zone established for the site. There are also no data to indicate that this plume places any private wells at risk of contamination.

(33) Allowing a landfill to be sited on top of an aquifer is counter to the Model Groundwater Protection Ordinance that DES endorses.

The Model Groundwater Protection Ordinance was developed to provide an example of an ordinance that complies with state laws and is consistent with current approaches to groundwater protection. It is a tool that municipalities may use to protect certain aquifers if they so choose. As noted below, the siting of the landfill atop the aquifer does not violate any state laws.

(34) The landfill sits on one of the largest aquifers in the Northeast and should not expand.



Stratified-Drift Aquifer at NCES's Property

The following describes the stratified-drift aquifer that underlies the NCES facility.

The NCES facility is located on a stratified-drift aquifer. In New Hampshire, stratified-drift aquifers are potentially valuable sources of groundwater depending on their water quality, size (lateral extent and saturated vertical thickness, which determines storage), transmissivity (capability to transmit groundwater, which is relatively high in coarser sands and gravel) and hydraulic connection to dependable sources of adjacent good quality surface water.

In the statewide groundwater reconnaissance conducted by the U.S. Geological Survey in the 1970's, the NCES property on Trudeau Road was within an area designated as an area "inferred to be underlain by medium to very coarse sand or sand and gravel with sufficient saturated thickness to have high potential to yield water."¹ This conclusion was based on the presence of sand and gravel at the land surface and a 1954 test well southwest of the intersection of Route 302 and Trudeau Road.

Subsequent, more detailed investigations by the USGS, including subsurface drilling logs, demonstrate that there is not enough coarse granular material with sufficient saturated thickness to have high potential to yield water.²

This more recent report shows that the stratified-drift aquifer in this area is a little less than 4 square miles in area. About 60 percent of the area is in the adjacent Gale River watershed and is not characterized relative to its potential productivity. The portion of the aquifer in the Ammonoosuc River watershed is characterized as having a transmissivity generally less than 1000 ft²/day and a saturated thickness of productive material generally less than 20 feet. One small area in the western part of the NCES property has a saturated thickness of 40 feet and a transmissivity greater than 1000 ft²/day. In addition, a small area west of the intersection of Route 302 and Trudeau Road has a saturated thickness of 80 feet and a transmissivity reaching 2000 ft²/day. (Major stratified-drift aquifers in the state have transmissivity greater than 2000 ft²/day and saturated thicknesses greater than 40 feet).

Potential production from the aquifer beneath the NCES facility is small. The area contributing groundwater to the site is very small because it is near the upper reaches of the groundwater

¹ Cotton, J.E., 1975a, Availability of ground water in the middle of Connecticut River basin, west-central New Hampshire: U.S. Geological Survey Water Resources Investigations Report WRI 76-18, scale 1:125,000, 1 sheet)

² Flanagan, S.M. 1996, Geohydrology and water quality of stratified-drift aquifers in the Middle Connecticut River Basin, west-central New Hampshire. U.S. Geological Survey Water-Resources Report 94-4181, 224p, 8 pls.



basin flowing northward to the Ammonoosuc River. Most of the groundwater in the aquifer south of the site flows southerly within the Gale River watershed. The saturated thickness (storage) of the productive zones within the aquifer is generally very limited. Aquifer material is predominately fine grained (silt and sand with lesser amounts of clay and gravel). Thus, the capability to transmit groundwater is small. Hydraulic conductivity tests just northwest of Stage I suggest a transmissivity value of about 1100 ft²/day. In contrast, and as stated above, major aquifers have transmissivity values of about 2000 ft²/day. It is noted that the U.S. Geological Survey assigned a saturated thickness of less than 20 feet (limited storage) and a transmissivity of less than 1000 ft²/day to the rest of the aquifer.

Groundwater flow from the NCES site contributes water in a northerly direction toward the Ammonoosuc River. Springs, including the so-called main seep, along the steep valley wall above the river have generally been interpreted to be at the contact between the bottom of the stratified-drift aquifer and underlying till. Thus, the stratified-drift aquifer is not connected directly to the river at the location of these seeps or springs. Downstream, where the southern riverbank topography changes from the steep valley wall to flatter terrain, the stratified-drift aquifer is in contact with the river. Based on the test well drilled in 1954, it was estimated that the potentially most productive area within the stratified-drift aquifer in this part of the Ammonoosuc Valley is near the intersection of Route 302 and Trudeau Road. This area is over 0.8 mile north of the NCES facility.

Legality of Siting a Landfill over the Aquifer

The NH Groundwater Protection Act, RSA 485-C, establishes 4 classifications for groundwater: GAA, GA1, GA2 and GB. GAA is the most protective classification, followed by GA1 and GA2. All other groundwater is classified GB by default. Pursuant to the statute, all groundwater within the state was initially classified by DES in 1991 as either GB or GA2. The statute and administrative rules adopted in Env-Dw 900 to implement the statute include criteria and procedures whereby municipalities, other specified local entities, and DES may seek reclassification of specific aquifers.

RSA 485-C:12 prohibits the siting of a new landfill over an aquifer that is classified GAA. There are no such siting prohibitions over aquifers having any other classification. For groundwater to be classified GAA, it must be within a wellhead protection area for wells currently being used or well sites that have been identified for future use.

Because the aquifer under the NCES Landfill is classified as GB and GA2, the statute does not prohibit siting a landfill in this location.



(35) There are potentially other contaminants that we don't know about and don't test for.

Under a Groundwater Release Detection Permit (GRDP), a facility is required to monitor groundwater for a comprehensive list of analytes. This expansive list includes contaminants typically associated with landfill leachate, and indicator parameters and chemicals that migrate quickly with groundwater flow and therefore provide for early detection of releases from the facility. DES periodically updates this list when there is information on new or emerging contaminants that warrant concern. Even if the list is not complete, the release detection monitoring is designed to detect leaks early, and thus provide for timely response.

(36) One commenter raised several specific questions about well sampling and its implications about compliance with NCES' groundwater permit. Specific concerns expressed by the commenter included the propriety of well purging and sampling methods, use of symbols like "~" and "+" in reporting data, and the accuracy of groundwater quality data.

These questions and concerns have been specifically addressed at length in separate correspondence with the commenter, and can be viewed on DES's One-Stop database at the following link: <http://www2.des.state.nh.us/IISProxy/IISProxy.dll?ContentId=4506393>

In summary, NCES' groundwater monitoring procedures (including well purging and sampling) and reporting are in compliance with the facility's Groundwater Release Detection Permit, and are subject to thorough and regular review by DES' professional staff. Based upon this review, DES believes that the groundwater quality data that is provided by the facility meets applicable data quality standards.

VII. Ammonoosuc River

(37) The seep is coming from the landfill and impacting the river.

The seep along the bank of the Ammonoosuc River down-gradient of the NCES Landfill contains residual contamination primarily in the form of precipitate associated with contaminated groundwater from an unlined landfill that was constructed and operated by others, and was removed by NCES in 1993. NCES remediated the seep in 2010. NCES continues to do surface water sampling under the Groundwater Release Detection Permit to monitor the long term effectiveness of the remediation.

(38) The landfill must be sited 100 feet from the 500-year floodplain. How do we know where that is?



NCES has delineated the 500-year floodplain adjacent to the landfill, showing that it is well below the top of the bank of the Ammonoosuc River. The landfill meets the required setback.

(39) Expanding the landfill is not in keeping with the need to protect the designated river. It is a major threat to the entire river system in New England and beyond NE borders.

The Ammonoosuc River is a designated rural river in this area. The siting of the NCES Landfill complies with the provisions of RSA 483 relative to rivers protection. Please also see DES responses to comments and questions about landfill stability and groundwater protection, above.

(40) NCES should pay for further testing of the river. They should test for metals, VOCs and pharmaceuticals.

The landfill has a comprehensive sampling and testing program required by its Groundwater Release Detection Permit, including sampling and testing of the river. There are no data to indicate that the lined landfill is impacting the river.

VIII. Out-of-state Waste

(41) Casella brings in out-of-state waste into the landfill; there is no need for additional capacity.

The NCES Landfill currently provides disposal service for waste generated in 156 New Hampshire communities. The additional capacity to be provided in Stage V will allow NCES to continue serving those communities until the facility closes in 2021. All of the commercial landfills in New Hampshire receive waste that is generated out-of-state. As noted below, importation of waste is protected by federal laws and constitutional provisions relating to interstate commerce.

(42) Permits should prohibit out-of-state waste. Laws that promote free trade promote economic development, but do not promote environmental protection.

During the past ten years, a majority of waste disposed at this facility was generated in NH and did not come from out-of-state. Since 2004, 22.3% of the total waste disposed at the facility, on average, has been imported from outside of NH. DES often hears concerns about importation of solid waste; however, provisions in the United States Constitution and interstate commerce law prohibit states from preventing out-of-state generators from having access to disposal services. The applicable DES standards for landfill design and operations conform to federal rules and are protective of human health and the environment regardless of the source of the waste.