The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

October 8, 2010

Michele V. Leone
National Grid
40 Sylvan Road
Waltham, MA 02451-1120

Subject: **Gilford** – Lower Liberty Hill Road, DES Site #**200411113**, Project RSN #14262

Remedial Action Plan Addendum No. 2 and Groundwater Modeling Report, prepared by GEI Consultants, Inc., dated August 14, 2009

Dear Ms. Leone:

The New Hampshire Department of Environmental Services (Department) has reviewed the report entitled *Remedial Action Plan Addendum No. 2 and Groundwater Modeling Report* (RAP Addendum No. 2) prepared by GEI Consultants, Inc. (GEI) on behalf of EnergyNorth Natural Gas, Inc. d/b/a National Grid (National Grid). A Remedial Action Plan (RAP) was previously submitted to the Department in February 2007 followed by a Remedial Action Plan Addendum (RAP Addendum) in November 2007. In the RAP Addendum, National Grid/GEI proposed the implementation of remedial action alternative 5 (RAA5) which consisted of excavating tar-impacted soil to 3 feet, excavating tar-saturated soil below 3 feet, containing remaining tar-impacted soil below 3 feet using a slurry wall and cap system, and treating excavated soil off-site with thermal desorption. In February 2008, the Department issued a preliminary determination that RAA5 met the criteria for RAP approval found in Env-Or 606.13 of New Hampshire Administrative Rule Env-Or 600, *Contaminated Site Management*. In March 2008, the Department held a public information meeting to present its findings and to solicit comments from the public. In response to comments from the public and Town of Gilford, the Department deferred its final decision pending the outcome of additional site investigation work and groundwater modeling to demonstrate the effectiveness of the proposed remedy (i.e., RAA5).

In an effort to garner input from the various interested parties, an ad hoc working group was established to review and work on technical comments. The work group consisted of representatives from the Department, National Grid, GEI, Attorney Jeffrey Meyers and MacDonald Morrissey Associates representing the Town of Gilford, and an abutter to the site. During these meetings, the work group reviewed comments received and National Grid presented the status and findings of their work. At the last of four technical review committee meetings that was held in May 2009, National Grid and GEI reported that they had concluded that the proposed passive slurry wall system would not meet Department standards for containment. They also presented conceptually an alternative where an active groundwater pumping system was added to the slurry wall system. This alternative, RAA5a, was detailed in RAP Addendum No. 2 and compared to RAA1, the alternative that includes complete removal of all coal tar impacted soil.

The Department has reviewed both alternatives included in RAP Addendum No. 2 and specifically evaluated the recommended alternative, RAA5a, for conformance with the criteria for RAP approval (i.e., Env-Or 606.13). The following identifies each criterion for approval and provides a summary of our evaluation:

Env-Or 606.13 Remedial Action Plan Approval. The Department shall approve the remedial action plan upon determining that:

(a) Human health and the environment will be protected - Human health and the environment are protected when it can be demonstrated that there are no complete exposure pathways to contaminants of concern originating from the site. Exposure pathways are the various mechanisms by which humans or ecological receptors may be exposed to contaminants originating from a site. Exposure pathways can include: 1) direct contact with contaminated soil; 2) use of and contact with contaminated groundwater; 3) human or ecological receptor exposure to contaminated surface water and/or sediments; and 4) inhalation of vapors or particulates.

1. Soil Exposure Pathway. An estimated 80% of the contaminant mass, including the tar-saturated soils and tar impacted soil in the upper three feet, will be removed from the site. Exposure to the remaining tar-impacted soils will be controlled by the construction of a cap in conjunction with the establishment of activity and use restrictions (AUR). Thus removal combined with the cap and AUR will control future direct contact to the contaminated soil.

2. Groundwater Exposure Pathway. Contaminants attributable to coal tar have not been detected in any drinking water wells. In addition, contaminants have not been detected in any bedrock monitoring wells. The characteristics of the site hydrogeology (i.e., deep glacial till deposits and a groundwater flow regime beneath the site which has strong upward gradients and discharges to Jewett Brook) act to limit the migration of contaminated groundwater and provide protection to nearby drinking water supplies. There are no water supply wells located within the plume of contaminated groundwater and no contamination has been detected in the bedrock which is the primary source of drinking water for nearby residences. Groundwater modeling indicated that the slurry wall, cap and pumping system included in the proposed remedial alternative are predicted to prevent contaminated groundwater from migrating from the source area. As a result, groundwater quality outside of the slurry wall is expected to improve and over time be restored to achieve groundwater standards, although it is expected to take a long time given the low hydraulic conductivity of the glacial till and time required for natural attenuation of the existing plume. A groundwater management permit (GMP) is required which will control of the use of groundwater within the Groundwater Management Zone (GMZ) and address any potential exposure pathways in the future

3. Surface Water Exposure Pathway. in November 2008 a small seep adjacent to Jewett Brook where groundwater discharged to surface water was remediated by the placement of fill, resulting in the elimination of the potential exposure pathways (e.g., oral, inhalation, direct contact) for the contaminated groundwater. All water samples collected from Jewett Brook meet drinking water and surface water quality standards which were developed to be protective of human health and aquatic organisms. There will be continued sampling of Jewett Brook under a GMP. Additionally, the quality of the groundwater discharging to Jewett Brook is expected to improve, albeit slowly, over time.

4. Inhalation Exposure Pathway. The recommended remedial alternative restricts residential use of the properties and includes a cap over the source area. This will eliminate exposure to contaminant vapors. Also, previous sampling collected during the site investigation and when the residences were occupied did not identify any unacceptable risks due to vapor inhalation. Particulates will be controlled during the removal of contaminated soil and construction at the site, thereby addressing this potential exposure pathway.

Preliminary Determination: The proposed remedial action alternative appears to address all potential exposure pathways and is protective of human health and the environment.

(b) The groundwater quality criteria specified in Env-Or 603.01 will be met – Env-Or 603.01 Groundwater Quality Criteria requires that: a) groundwater be suitable for use as drinking water; b) groundwater shall not contain any regulated contaminant at a concentration greater the ambient groundwater quality standards (AGQS); and 3) groundwater shall not contain any regulated contaminant at a concentration such that the natural discharge of that groundwater to surface water will cause a violation of surface water quality standards as established in Env-Wq 1700. The water supply wells outside the proposed GMZ have been sampled and meet drinking water standards for the chemicals of concern. For both of the remedial action alternatives evaluated, the existing plume is predicted to attenuate and meet AGQS within 140 years (Note: the benzene plume is expected to be substantially attenuated within 30 years and naphthalene is estimated to meet AGQS within approximately 140 years). AGQS are based on drinking water standards and have been established to be protective of human health. The slurry wall and cap in combination with a pump and treat system is to be designed to contain contaminated groundwater and prevent the migration of contaminated groundwater from the source area that remains (after the tar-saturated and shallow soils are removed). As a result of preventing the migration of additional contamination from within the slurry wall area, groundwater quality outside the slurry wall is expected to improve over time and ultimately meet AGQS. Groundwater within the slurry wall will continue to exceed AGQS and be managed under a GMP. Samples of the surface water in Jewett Brook have met the surface water standards of Env-Wq 1700 for the contaminants of concern. Jewett Brook will continue to be sampled under a GMP.

Preliminary Determination: The proposed remedial action alternative appears to result in the groundwater quality standards of Env-Or 603.01 being met.

(c) Sources of contamination will be controlled to reduce or eliminate further discharges – Pursuant to RAA5a, all tar-impacted soil to 3-feet and all tar-saturated soil below 3-feet, representing an estimated 80 percent of the contaminant mass, is to be excavated and treated off-site. The cap, slurry wall and groundwater pumping system is to be designed, constructed and operated to prevent additional contaminants from the impacted soil that remains after removal of the tar-saturated and shallow soils from migrating in groundwater at concentrations exceeding AGQS beyond slurry wall. To meet this criterion the effectiveness of the cap, slurry wall and groundwater pumping system must be demonstrated and the system must be operated for a long period of time to ensure that control is maintained.

Preliminary Determination: The proposed remedial action alternative appears to control the source of contamination and reduce further discharges.

(d) Contaminated soil will be removed, treated, or contained to reduce the human health risk associated with direct exposure via dermal contact, ingestion, and inhalation – As indicated above, all tar-impacted soil to 3-feet and all tar-saturated soil below 3-feet is to be excavated and treated off-site pursuant to RAA5a. Three feet of clean fill will be placed over the area. This remedial alternative will result in the removal of approximately 80 percent of the contaminant mass. All remaining tar-impacted soil is to be contained within a slurry wall and impermeable cap with three feet of clean fill placed over the area. The removal of contaminated soil, construction of the slurry wall and cap, and placement of three feet of clean fill in conjunction with the implementation of an AUR will eliminate direct exposure via dermal contact, ingestion, and inhalation with the remaining contaminated soil.

Preliminary Determination: The proposed remedial action alternative appears to address the direct contact risks associated with contaminated soil.

(e) The risk to human health and the environment will be reduced to the greatest extent practicable, balancing costs and benefits by evaluating the risk to human health and the environment by the methods described in the ASTM E2081-00 (2004)$^{\epsilon 1}$ entitled "Standard Guide for Risk Based Corrective Action" (ASTM E2081) - RAA5a, as proposed, will result in the removal of approximately 80 percent of the contaminant mass and contain the remaining 20 percent of the mass within a slurry wall and impermeable cap system in combination with a groundwater pumping system for hydraulic control. While it is proposed that residual contamination will remain onsite under RAA5, there would be no potential exposure pathways and therefore no risk to human health. In order to evaluate costs and benefits, the Department compared RAA5a to RAA1 which consists of excavating *all* tar-impacted soil and treating it off site with thermal desorption. The cost for implementation of RAA1, which would result in 100 percent removal of the contaminant mass, is estimated to be $16.8 million compared to an estimated $10.9 million for 80 percent mass removal and containment of the remaining contamination on site under RAA5a.

In the Department's February 2008 preliminary determination, we concluded that the substantial increase in cost associated with RAA1, when compared to RAA5, would result in little or no appreciable reduction in risk to human health and the environment. While it can still be said that there is little or no appreciable difference in risk reduction, there is much less certainty with respect to the cost differential; therefore cost no longer weighs as a significant factor. GEI estimates a cost differential of $5.9 million; however, the Department believes there are several areas of cost sensitivity (e.g., securing the reinforced concrete containment wall, encountering obstructions during construction of the slurry wall, the installation, operation and maintenance of the groundwater pump and treat system) as well as uncertainty due to the long term nature of the remedy that could affect the comparison of costs. The following elaborates on the Departments concerns.

- *Pre-Construction*. The Department would expect the cost of engineering design and the preparation of construction plans and specifications to be considerably greater for RAA5a simply due to the complexity of this remedial action alternative.
- *Slurry wall* (as it relates to groundwater pump and treat system). GEI has proposed a soil/bentonite slurry wall comprised of dense glacial till and bentonite backfill material. Variable silt content within the till may result in variable permeability of the backfill material.

Potential variation in wall permeability may result in continued exceedences of groundwater quality criteria outside the wall necessitating the need to increase required pumping rates which in turn would result in increased operational costs. Alternatively, a cement/bentonite slurry could be used which typically results in a more consistent low-permeability backfill material. This, however, would increase the construction costs. Either scenario may result in the increased cost for implementation of RAA5a.

- *Pump and Treat System*. A cost breakdown for the pump and treat system was not provided so it was not possible to evaluate whether specific portions of the installation and maintenance costs are reasonable.
- *Long Term Groundwater Monitoring*. The costs shown in Appendix I are the same for both remedies. The Department expects that there would be a more rigorous monitoring program for RAA5a because of the active groundwater pump and treat system, which would operate indefinitely, and the need to monitor water quality and the hydraulics associated with the slurry wall and pump and treatment system. The Department anticipates that those costs would be significantly higher compared to the expected requirements for RAA1 where the source is to be removed and the monitoring would only be for natural attenuation of the groundwater plume. An active pump and treat system will need sampling of water quality and the measurement of groundwater elevations to verify that the active groundwater treatment system operating in conjunction with the slurry wall and cap does in fact "contain" the remaining source of contaminants and continues to do so over a long period of time. There would be periodic sampling of the treatment system influent and effluent, each production well (18 proposed), wells inside and outside the slurry wall constructed at different depths for water quality and groundwater elevations to evaluate that containment is effective and to evaluate the source over time. And that monitoring would be in addition to the baseline monitoring of groundwater quality and elevations within the extended groundwater plume that would required for RAA1.
- *Financial Assurance*. The cost estimate for RAA5a did not include the cost of obtaining financial assurance for a rolling 30 year time period to address the ongoing requirement for the active groundwater remediation system.

Preliminary Determination: The proposed remedial action alternative appears to reduce the risk to human health and the environment to the greatest extent practicable. However, the balancing of costs and benefits was not a significant factor as the estimated costs of RAA5a would be expected to increase and narrow the cost differential between RAA5a and RAA1.

Please note that at this time the Department is not requesting that the cost estimate be revised to address the comments above. However, we reserve the right to request a formal response should it become pertinent to making a final decision.

(f) Long-term management, including operation and maintenance [O&M] of the remediation equipment and site monitoring requirements, will be minimized - In order to evaluate whether or not long-term management will be minimized, the Department believes it is necessary to compare RAA5a to another feasible alternative, namely RAA1. The following is a summary of anticipated long-term O&M and site monitoring requirements for the respective remedial alternatives:

Table 2: Comparison of Long-Term Management Requirements

Remedial Alternative	Operation and Maintenance	Site Monitoring
RAA5a	• Inspection and maintenance (if necessary) of cap system • Routine maintenance and periodic replacement of pumps used for hydraulic control • Routine maintenance and periodic replacement of treatment system components and media • Replacement of leach field • Adjustment of pump flow rates to preclude advection under the slurry wall or flux through the wall.	• Sampling of monitoring wells downgradient of containment system • Monitoring of wells inside and outside of slurry wall for assessing the performance of the containment and groundwater pumping systems • Monitoring of groundwater treatment system effluent • Surface water sampling (Jewett Brook) • Sampling of residential water supply wells on adjacent properties • Compliance monitoring with respect to Activity and Use Restrictions (AUR)
RAA1	• Inspection and maintenance (if necessary) of cap system	• Sampling of monitoring wells downgradient of the former source area • Surface water sampling (Jewett Brook) • Sampling of residential water supply wells on adjacent properties

For both of the remedial action alternatives evaluated, the existing plume is predicted to attenuate and meet AGQS within 140 years. However, for RAA5a, operation of the pump and treat system and associated monitoring would have to continue beyond 140 years for as long as groundwater within the slurry wall exceeds AGQS.

Preliminary Determination: In consideration of the comparison above and the O&M requirements for RAA5a well beyond 140 years, the proposed remedial alternative does not minimize long-term management requirements.

(g) The potential need for modification of the remedy will be minimized – Cap systems, slurry walls and groundwater pump and treat systems are demonstrated remediation technologies. However, there is less experience with the long term operation and performance of these systems. Remedial alternative RAA5a is expected to require operation for substantially longer than 140 years; therefore, there is a potential that the remedy may need to be modified in the future but is difficult to predict what the specific modifications may be.

Furthermore, the effectiveness and actual performance of these remedial technologies is not assured and can depend on site specific conditions. For example, it is noted in the report that hydraulic conductivity measurements collected on-site had a relatively large range (0.012 to 12 ft/day). For the groundwater flow model, a global hydraulic conductivity value of 0.5 ft/day was assigned to the overburden layer. The model predicted that a pumping rate of 5 gallons per minute (gpm) would be required to contain contaminated groundwater within the slurry wall. Based on the sensitivity analysis included in the RAP, increasing or decreasing the hydraulic conductivity by 50 percent would result in the need to increase the flow rate by 50 to 500 percent in order to prevent breakthrough beneath or through the slurry wall.

In this case, due to the heterogeneity of the till and the sensitivity of the pump and treatment system to hydraulic conductivity, the potential for modification of the remedy is substantial.

Preliminary Determination: The Department cannot conclude with confidence that the potential for modification of the remedy as proposed will be minimized over the 140+ years of its implementation.

(h) Resource value of groundwater impacted by the contamination will be protected to the greatest extent practicable taking into account current and anticipated future land use – Groundwater impacted by site contaminants has been limited to groundwater in the overburden (i.e. soil above bedrock) on six properties. Groundwater in the overburden is not expected to be used as a source of drinking water for any of the six properties. The drinking water wells used to supply the former residences on the properties now owned by National Grid are bedrock wells. Adjacent properties also use groundwater as the supply for their drinking water and most of the individual drinking water wells adjacent to the site are also bedrock wells. Site investigation work performed to date indicates that bedrock water quality at and adjacent to the site has not been impacted by coal tar related contaminants and the site hydrogeology and expected flow of groundwater (i.e., toward Jewett Brook) should act to protect the drinking water supplies from the contaminant plume. The Department believes that it is very unlikely that nearby drinking water wells will be impacted by the Lower Liberty Hill Road site in the future. Regardless of the remedial action alternative ultimately approved by the Department, use of groundwater within the GMZ will be managed and controlled and routine monitoring of drinking water wells adjacent to the site will be required pursuant to a GMP. In summary, while the groundwater in the Lower Liberty Hill Road neighborhood is used as a source of drinking water for individual lots, the recommended remedy will provide for protection of the groundwater and wells used to provide drinking water to residents in the area.

Preliminary Determination: The proposed remedial action alternative appears to protect the resource value of groundwater to the extent practicable, taking account current future land use.

(i) Long-term institutional and engineering controls will be reliable – Institutional controls are the legal or administrative restriction on the use of or access to the site to eliminate or minimize potential exposure to contaminants. As provided for in Env-Or 607, the groundwater management permit (GMP) and the groundwater management zone (GMZ) established under the permit will serve to control and manage contaminated groundwater and ensure that drinking water supply wells are protected. Monitoring of the groundwater contaminant plume will be required under the permit to ensure compliance with the GMZ boundary and to ensure that groundwater quality is being restored over time as a result of remedy implementation. In addition to the GMP, an activity and use restriction (AUR) is required pursuant to Env-Or 608.01(a) since the proposed remedial action relies on the restriction of site activities and uses to achieve or maintain protection of human health and the environment. RAA5a includes a containment system (i.e., slurry wall and impermeable cap) to preclude direct contact with contaminated soils that would remain on-site. Accordingly, an AUR would be required in order to protect the containment system and control exposure to the contaminants in the source area. The AUR will include periodic inspections with accompanying certification that the requirements of the AUR continue to be met. Notice of the GMP and a copy of the AUR are required to be recorded at the Belknap County Registry of Deeds in the chain of title for each effected property.

Engineering controls are the physical modifications to the site to eliminate the potential exposure to contaminants. For the proposed remedy, the engineering controls include an impermeable cap, slurry wall, and groundwater pump and treat system. While slurry wall and pump and treat systems have proven to be effective in controlling the migration of groundwater contaminants, the Department has no experience with the long term (i.e., greater than 140 years) operation and performance of these systems. As a consequence, we cannot speak to the long term reliability of the proposed engineering controls.

Preliminary Determination: Proposed remedial action alternative RAA5a appears to have reliable institutional controls and short term engineering controls. Based on existing experience, it was not possible to evaluate the long term reliability of the proposed engineering controls over the time frame that they are expected to be required.

(j) Financial assurance pursuant to Env-Or 606.20 and Env-Or 606.21 will be available – RAA5a includes active containment that will be ongoing for more than 10 years and therefore pursuant to Env-Or 606.20 and Env-Or 606.21 National Grid is required to provide financial assurance. The report indicated that cost of financial assurance was not included because the cost could not be accurately estimated. Providing sufficient financial assurance is critical for any remedial alternative that includes an ongoing commitment to operate and maintain an active system such as a pump and treat system.

Preliminary Determination: At this time National Grid has not proposed a plan provide the required financial assurance in compliance with this criterion, but would be required to do so if RAA5a were to be implemented.

In addition to looking at the criteria for RAP approval, the Department also reviewed the remedy evaluation performed by GEI in accordance with Env-Or 606.12(c). A discussion of this evaluation was provided in Section 5 of the RAP with detailed justifications and rankings provided in Table 8. Table 8 compares RAA5a and RAA1 and assigns a value of 1 or 2 for each criterion with 1 being awarded to the remedy determined to perform the best for each criterion, and the cumulative low score being selected as the best remedy overall. Table 8 shows RAA5a received a total score of 10 and RAA1 receiving a total score of 14. Based in part on this qualitative ranking, RAA5a was the recommended remedial alternative. There are several criteria where a different ranking could reasonably be selected which would change the total scores. The Department does not require a numeric score when comparing remedial alternatives but to the extent it guided the selection of the remedy the Department does not agree with several of the rankings selected in the table.

1. *Effectiveness*. RAA5a was selected as the best or most effective remedy because it would be: a) more effective at restoring groundwater quality in the down gradient plume; and b) pumping eliminates the uncertainty associated with seams of contamination which you may not be removed by remedial alternative RAA1. The Department believes there is also uncertainty associated with RAA5a and cumulatively the uncertainty may exceed the uncertainty associated with RAA1. There is uncertainty associated with the construction of the slurry wall: a) site is underlain by glacial till containing large boulders; and b) achieving the design hydraulic conductivity throughout the entire slurry wall may be difficult.

Additionally, the Department's experience with groundwater pump and treat systems is that they can behave differently than originally predicted and have the potential to require modification over time as a result of not meeting performance standards - in this situation, containing contaminated groundwater within the slurry wall. Pumping rates may vary, additional wells may need to be added, additional treatment may be necessary (e.g., for treatment of iron, manganese or arsenic) and pumps and leach fields may need to be replaced to maintain the effectiveness over the expected period of operation.

GEI indicates that the effectiveness of RAA1 is a function of the ability to identify and remove thin, discontinuous seams of tar-affected soil that are located at depth during a large-scale excavation project. The Department recognizes this issue as a practical matter that has been discussed and dealt with at many sites. However, the Department expects given the level of characterization performed at the site and the substantial removal planned in the area of the release, the unexcavated lenses would be less frequent at the outer extent of the planned excavation given the increased distances from the release area. The total mass that may remain unexcavated would likely be a small portion of the total contaminant mass, much less than the estimated 20% that would remain and be contained by the slurry wall proposed for RAA5a. Additionally, the expected remaining contaminant mass in these seams/lenses would also be expected to undergo natural attenuation, thus decreasing contaminant concentrations over time.

2. *Reliability*. GEI concluded that RAA1 is less reliable over the long-term in completely restoring groundwater quality due to the uncertainty of achieving complete source removal. The Department recognizes that groundwater pump and treat systems have an extensive track record but experience indicates that they can pose challenges if their full scale operation does not correlate well with original modeled predictions. These systems are often complicated and need to be carefully operated and monitored to ensure their effectiveness in the short and long term. In addition, while slurry walls have been used in many applications, it is difficult to ensure that they can be constructed to the design depth given this geologic setting of glacial till with significant boulders, be constructed to achieve the design hydraulic conductivity and meet performance standards over the life of the project. While these issues can be minimized with engineering design, quality control and construction oversight, there remains complexity and uncertainty. In addition to the technical aspects of the remedy, RAA5a would require significant financial resources for operation and maintenance to ensure long term reliability. The Department believes a reasonable argument can be made that RAA5a is less reliable because of some of the uncertainties discussed above and the need to operate and maintain an active system for a period of time substantially greater than 140 years.

3. *Feasibility and Ease of Implementation*. The evaluation focuses on the implementation associated with RAA1, namely the excavation of contaminated soil at depth, and concluded that RAA1 would be more difficult to implement. It does not seem to reflect the challenges of constructing a slurry wall in glacial till or installing and operating a groundwater pump and treat system to maintain its effectiveness for a long period of time (i.e., greater than 140 years).

   These construction and long-term operational challenges are significantly more complicated and thus affect the ease of implementing RAA5a, as compared to RAA1

4. *Timeliness*. GEI ranked both remedies similarly for long term timeliness and RAA5a higher because it would take less time to construct. The Department believes that a reasonable argument can be made that RAA1 is the better long-term remedy because under RAA5a the groundwater plume within the slurry wall is expected to remain indefinitely. The Department does acknowledge that if cap, slurry wall, and groundwater pump and treat system are effective, the estimated remedial timeframes for the plume downgradient of the slurry wall is expected to be approximately the same as for RAA1. However, if RAA1 is effective, groundwater would meet AGQS throughout the site.

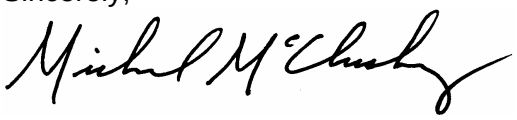
In addition to the Department's preliminary evaluation of RAA5a provided above, the Department has also prepared initial technical comments with respect to the groundwater model (see Attachment).

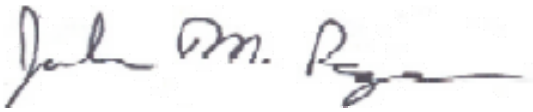
Based on our review, the Department believes that RAA5a, as proposed by National Grid/GEI, does not meet the criteria for approval identified above. Specifically, the Department finds that the proposed remedy: 1) will not minimize long-term management requirements; and 2) will not minimize the potential need to modify the remedy over the long term. As a result of this preliminary determination the Department would recommend implementation of RAA1.

Prior to issuing a final decision, the Department has committed to holding another Public Information Meeting to present the findings of our review and to seek additional public comment. The Department is currently working with the Town of Gilford and National Grid on scheduling a date for this meeting for sometime in mid-November. The Department will allow for a 30 day public comment period subsequent to the meeting.

Should you have any questions, please contact us at the Department's Waste Management Division.

Sincerely,





Michael McCluskey, P.E.
Hazardous Waste Remediation Bureau
Tel: (603) 271-2183
Fax: (603) 271-2181
E-mail: michael.mccluskey@des.nh.gov

John Regan, P.G., Supervisor
Hazardous Waste Remediation Bureau
Tel.: (603) 271-3744
Fax: (603) 271-2181
E-mail: john.regan@des.nh.gov

ec: Scott Dunn, Administrator, Town of Gilford
Town of Gilford Health Officer
Katherine Dormody, Gilford Public Library (repository)
Tupper Kinder, Esq., Nelson, Kinder, Mosseau & Saturley, PC
Daniel Morrissey, McDonald Morrissey Associates, Inc.
Charles Spalding, McDonald Morrissey Associates, Inc.
Art Niskala
James Ash, P.E., GEI Consultants, Inc.
Saskia Oosting, GEI Consultants, Inc.
Andrew Adinolfi, GEI Consultants, Inc.
Michael Quinn, Esq., McLane, Graf, Raulerson & Middleton, PA
John Regan, P.G., Supervisor, DES-HWRB
Ralph Wickson, P.G., DES-HWRB
Brandon Kernen, P.G., DES
Brian Hilliard, P.E., DES
Sherry Godlewski, DES
Evan Mulholland, Esq., DOJ – Environmental Protection Bureau

ATTACHMENT

Lower Liberty Hill Road, Gilford, NH
DES Site #200411113

Groundwater Modeling Report Comments

The groundwater modeling performed was invaluable with respect to the assessment of the previously recommended passive slurry wall remedial alternative, RAA5, and the subsequent development of RAA5a. The Department has reviewed the pertinent sections of RAP Addendum No. 2 and, as a result, prepared the following technical comments. Response to the technical comments may not be required given the Department's preliminary determination. Therefore, at this time, the Department is not requesting a response to these comments. However, we reserve the right to request a formal response and may also provide additional comments with respect to how the model was calibrated and what assumptions have been made.

1. It is difficult to provide detailed comments because the actual calibrated model inputs are not provided. Rather, GEI states in a narrative form what they originally/generally used for model inputs and then let the model adjust these inputs in order to match hydraulic head and contaminant concentrations. With the information presented the Department can not determine if the final adjusted model inputs reasonably match measured components of the environment. At a minimum, National Grid should provide a complete list of inputs and outputs for the calibrated models. At this point in time, the Department is not requesting an electronic copy of the model data files but the electronic copy should be made available if there was a request from the Department or other interested parties.

2. Based on the data contained in the report, it is not clear to what extent hydraulic conductivity, total porosity, effective porosity, precipitation recharge, river cell inputs, and fate and transport inputs were modified during the calibration process to create a good match of modeled versus hydraulic heads. The Department recommends that tables and superimposed contour maps be developed to show the difference from the input values and the final calibrated values.

3. RAA5a relies heavily on the predictions of the groundwater model. As an active (pumping) alternative, determining precise cleanup timeframes or the actual number and spacing of wells is very difficult because: a) limited field data; b) the model calibration is based only on 48 hours of pumping that influenced a limited area of the site; and c) aquifer heterogeneity. Should RAA5a be implemented, the groundwater model would need to be further calibrated to hydraulic conditions ***after*** slurry wall construction and the establishment of the groundwater extraction system with the well spacing being refined in the field as necessary.

4. Superimposed contour maps should be used to compliment Figure E-1 to demonstrate the area distribution of under- or over-estimated hydraulic head values for each model layer and to show where no data existed to calibrate the model.