

Response to Comments

Light Nonaqueous Phase Liquid (LNAPL) Initial Recovery and Interim Remedial Measures Guidance 6-6-11

The above referenced Guidance document was distributed for comment on Tuesday December 21, 2010. The end of the comment period was Tuesday, February 1, 2011. During the comment period a total of 13 sets of comments were received. Those who commented included:

David Barsky, NJDEP, Site Remediation Program
David Bausmith, Environmental Liability Management
Tessie Fields, NJDEP – Site Remediation Program
Mark Fisher and Steve Ueland, Licensed Site Remediation Professional Association
Barry Frasco, NJDEP – Site Remediation Program
Sarah Kinsel, NJDEP – Site Remediation Program
Joseph Krulik, Brilliant Lewis Environmental Services
George Nicholas, NJDEP – Site Remediation Program
Tony Russo, Site Remediation Industry Network and Chemistry Industry Council
George Schlosser, Division of Law – Dept. of Law and Public Safety
Sue Shannon, NJDEP – Site Remediation Program
Dennis Toft, Wolf, Samson
Mark Walters, NJDEP – Site Remediation Program

The Department appreciates the time and effort taken by those who provided comments. While all comments are important to the success and preparation of this document, comments that were primarily editorial in nature are not referenced below. Many, but not all, editorial changes were made to the document as a result of those comments. The comments below are those received that involve technical issues. If multiple comments were raised on a specific topic, all comments on that topic were not restated below, but were addressed in a combined response.

Please note the final document sections have been renumbered. The section numbers identified below reflect the numbering in the final document even though the comment may reference a different section number.

Page 4. Section III

Comment 1: One commenter made reference that the document does not require the remediation of a sheen. It would be helpful either to include a definition of a "sheen" or to refer to the Department's sheen policy.

Response: The scope of this document is to provide guidance for complying with the LNAPL regulatory and mandatory timeframes. The Technical Requirements for Site Remediation at N.J.A.C 7:26E-1.12 and this Guidance are focused on responding to measurable LNAPL 0.01 feet or greater in thickness. While a sheen must be remediated, the commenter correctly identified that the Department does have a sheen policy that provides an endpoint for cases involving discontinuous sheens among other criteria. The Department's sheen policy is available at http://www.state.nj.us/dep/srp/guidance/sheen/sheen_memo0602.pdf

Page 4. Sections II and III

Comment 2: One commenter noted that the document states that “until LNAPL is **measured** (emphasis added), no action is necessary.” The commenter added that collection points are not defined and questioned whether LNAPL needs to be measured in collection points before any action is taken? The document should include a discussion or definitions of acceptable collection points especially if certain collection points such as temporary wells may or may not allow for accurate measurements of LNAPL within 72 hours. The commenter identified that determining “free product” pursuant to N.J.A.C. 7:26E-2.1 (a) 14 may not result in a thickness measurement for some of the listed techniques for mobile LNAPL but rather just the identification of the presence of mobile or immobile LNAPL and as a result this citation should be deleted from the guidance document. The commenter also mentioned that the portion of the definition of “free product” that references N.J.A.C. 7:26E-2.1 (a) 14. should be removed and any measurements for residual phase product should conform with the guidance.

Response: The identification of 0.01 feet or more of LNAPL triggers the application of the regulatory and mandatory timeframes. Language in the guidance document has been modified to reflect that these timeframes are triggered based on measured LNAPL “or otherwise observed” to be a thickness of 0.01 feet or more. The terms “measurable thickness” and “visual identification” are used in N.J.A.C. 7:26E-2.1(a) 14 and are clearly consistent with the intent of this guidance document to identify 0.01 feet or more of LNAPL. Conversely, there are methods specified at N.J.A.C. 7:26E-2.1(a) 14 that are not used for measuring LNAPL thickness, but rather can be useful tools for identifying the presence of, and delineating LNAPL and/or residual phase product. The Department is not looking to prescribe the exact methods by which LNAPL is measured, observed or delineated. It is up to the investigator to use methods to best accomplish the defined objective.

Use of the terms “mobile” and “immobile” LNAPL requires some clarification as the commenter implied that immobile LNAPL may not trigger this guidance. While LNAPL on a plume scale may not be mobile (i.e. LNAPL body is not migrating), it can be mobile within the plume body and can migrate (or become redistributed) into collection points within the LNAPL body where it can be observed and/or measured; hence triggering the LNAPL regulatory and mandatory timeframes.

It is important to note that this Guidance does not require thickness measurements related to residual product. The definition of “free product” is included to reflect that term as defined in N.J.A.C. 7:26E. The investigator may choose to address residual product concurrently with the LNAPL investigation. That decision, which may compliment the overall investigation/remediation, is outside the scope of this guidance.

The commenter also implies that no action is necessary when less than 0.01 feet of LNAPL is identified. While the LNAPL regulatory and mandatory timeframes are not triggered, LNAPL less than 0.01 feet still must be investigated and remediated in accordance with the Technical Requirements for Site Remediation (N.J.A.C. 7:26E).

The term collection point in which LNAPL collects is to be interpreted broadly. Collection points include any location where LNAPL can be measured or otherwise observed on the water surface. Collection points include, but are not limited to, test pits, excavations, piezometers, monitoring wells, surface water, test pits, trenches, sumps, utility vaults, etc. Definition of “collection points” and “measurable LNAPL” have been added to the guidance document.

Page 11. Section VI

Comment 3: One commenter mentioned that this document looks good in the context of "initial recovery" and "interim remedial measures" for LNAPL. However, the document focuses almost exclusively on active removal, and provides limited discussion on natural source depletion (NSZD). As noted in the referenced ITRC (2009) documents, NSZD is an acceptable remediation mechanism for residual NAPL. As stated a couple of times in the document, NSZD is not acceptable pursuant to the Technical Requirements as a standalone approach, but given the problematic aspect of attempting to recover/treat residual NAPL, it would be helpful to discuss or at least reference accepted methods for quantifying mass reduction and attainment of remedial action objectives via NSZD once any recoverable mobile/free product is removed.

Under section VII (Initial LNAPL Recovery), the last sentence in the first paragraph should clarify that NSZD alone does not meet the Tech Reg/Guidance requirements for “Free Product” or “mobile LNAPL”, rather than the general reference to “LNAPL”. As stated earlier, and per ITRC (2009), NSZD may be appropriate for immobile, residual LNAPL.

Response: The LNAPL Committee discussed the concept of NSZD as a sole remedy. The Department representatives emphasized that the resulting guidance document could not develop any definitions that are inconsistent with the Technical Requirements for Site Remediation or provide direction that was inconsistent with legislative or Department policy. The Water Pollution Control Act, N.J.S.A. 58:10A-2 states that “it is the policy of the State to restore, enhance, and maintain the chemical, physical and biological integrity of its waters....” Leaving LNAPL to naturally attenuate, when there are other means of recovering or remediating LNAPL (whether free or residual), does not meet the intent of this policy. As a result, natural source zone depletion of free and residual

product as a sole remedy, and in the absence of an impracticability determination, is not acceptable pursuant to N.J.A.C. 7:26E-6.1(d).

This particular comment goes beyond the scope of this document. This guidance document is focused on responding to measurable LNAPL at or greater than 0.01 feet. As a result, there is a focus on insuring that the LNAPL body is not migrating and, if practicable, reducing LNAPL contaminant mass. In most instances, achieving these objectives may involve some active product recovery to be defined by the LSRP\consultant. As a result, the LNAPL Committee is not intending to make any additional modifications to this document at this time to address the concept of mass reduction for residual product using natural source zone depletion.

Absent a determination that it is not practicable to recover measurable LNAPL or conditions as described on pages 16-18 of the guidance, natural source zone depletion is not acceptable as an initial recovery method or IRM.

In instances where it is not practicable to recover free or residual product, the Department does not dismiss the concept that natural attenuation processes may continue to act upon any remaining LNAPL and that these concepts should be incorporated into the final remedy.

Pages 4 and 17. Section III and X

Comment 4: One commenter believes the guidance document contradicts itself on the need for active LNAPL remediation. Specifically, the requirement for active LNAPL remediation during the Interim Remedial Measure (IRM) as indicated in the 2nd paragraph of Section IX. This contradicts the statement beginning at the bottom of pg. 4:

“If the investigator determines that it is more effective to address the LNAPL as part of a comprehensive remedial approach that addresses multiple contaminant phases simultaneously, this guidance provides flexibility for the implementation of a comprehensive remedial strategy.”

and Section XI. C.1.c:

“if LNAPL remains in monitoring wells and continued removal or treatment is not practicable, the LNAPL IRM Report should clearly document the technical rationale supporting this conclusion, and at a minimum provide a maintenance and monitoring plan to demonstrate continued control and no LNAPL migration until a final remedy is implemented.”

LNAPL mass removal may be appropriate during the initial LNAPL recovery phase to reduce the potential for LNAPL spreading. However, if the LNAPL body is shown to be not migrating, further LNAPL mass recovery, in many cases, may not result in a

significant risk reduction during the IRM phase. Therefore, the language in the 2nd paragraph of Section IX should be changed to allow the option for natural LNAPL depletion alone as an option during the IRM.

Response: The second paragraph of Section IX merely reiterates the requirements of the Technical Requirements for Site Remediation (N.J.A.C. 7:26E-6.1(d)) while acknowledging a level of LNAPL mass reduction may be realized from natural processes. This guidance should not be construed to change provisions of N.J.A.C. 7:26E-6.1(d) but rather is intended to assist the regulated community with complying with the LNAPL regulatory and mandatory time frames. As stated several times throughout the document, and immediately below the second paragraph of Section IX:

The IRM should be selected, designed and implemented to meet the following remedial objectives:

- prevent the migration and any further spreading of the LNAPL body;
- reduce LNAPL contaminant mass, when practicable; and
- consider and address any known receptor risks associated with the LNAPL.

The two comments identified as supporting a contradiction have been taken out of context. The first comment being taken from Section III, Overview and Limitations, which effectively allows the responsible party to achieve compliance with the LNAPL regulatory and mandatory timeframes by..... “If the investigator determines that it is more effective to address the LNAPL as part of a comprehensive remedial approach that addresses multiple contaminant phases simultaneously this guidance provides flexibility for the implementation of a comprehensive remedial strategy.” This statement neither states, nor supports, natural LNAPL depletion alone as an acceptable IRM. Rather, this statement is intended to acknowledge that an investigator may decide that it is in the best interest of their client, for example, to address measurable LNAPL, residual LNAPL and even high levels of dissolved phase contamination simultaneously with the IRM. Taking this comprehensive approach could be a valid reason to request an extension to the LNAPL timeframes.

The second comment was provided from Section X C.1.c which identifies components of a complete LNAPL report. The language at C.1.c specifically acknowledges that LNAPL may remain when continued removal or treatment is not practicable. Actions taken to address the LNAPL recovery may have performed sufficiently such that additional recovery is not practicable and can be discontinued while LNAPL remains present in the monitoring wells. The language at Section XI C.1.c. does not mention natural LNAPL depletion alone as an acceptable IRM. If the reader implies that allowing a “monitoring plan only” is accepting natural LNAPL depletion alone as an IRM, the reader must also acknowledge that this example is based in the context of determination that LNAPL recovery\ treatment is not practicable or considered complete for the IRM. The “LNAPL Free Product Interim Measures Report” should provide the technical rationale supporting this conclusion. (Also see response to Comment 3 above.)

Based on the above comments, the LNAPL Committee has made some editorial changes to Section X. C.1.c.

Pages 13 and 17. Sections VIII, IX and X

Comment 5: The guidance document should cite where examples of remediation endpoints can be found.

Response: The LNAPL document does include the entirety of the documents suggested in the current appendixes and more specific citations are not needed. Remediation endpoints are very complex and very site specific. The workgroup felt competent investigators should be sufficiently versed in the current publications to select appropriate endpoints for site specific conditions. The LNAPL Committee felt that citing additional technical extracts may be more limiting than helpful. Since natural source zone depletion (NSZD) alone does contradict State policy, the Guidance document does include a cautionary statement about using NSZD alone as an IRM. Please note that if any reference document\software\model contradicts the hierarchy of items specified at N.J.S.A.58:10C-14 (and again referenced at N.J.A.C. 7:26C-6.2(c)), the investigator shall base his or her decisions on this hierarchy as listed in the cited legislation and regulation.

Page 11. Section VI

Comment 6: The following additional document is recommended to be added as additional reference for use: “ITRC April 2009: Evaluating Natural Source Zone Depletion at Sites with LNAPL”.

Response: Since Natural Source Zone Depletion alone is an approach inconsistent with the Technical Requirements for Site Remediation and a measure which is not subject of this document, inclusion of the reference is unnecessary.

Page 6. Section IV

Comment 7: Section V of the document is generally accurate in describing the LNAPL science but has one notable gap. A discussion on LNAPL thickness as a poor indicator of recoverability is important and should be discussed.

Response: The document generally infers that LNAPL thickness is a poor indicator of recoverability by encouraging the investigator to construct a Conceptual Site Model (CSM), evaluate and select an IRM and then determine endpoints. An additional cautionary statement has been added to the document that LNAPL thickness can be a poor indicator of recoverability.

Pages 5,12,13,17 and 18. Sections III, VIII, IX and X

Comment 8: Example IRM goals and performance metrics should be provided in Section IX. The document talks about practicability at several places (Section III, IX,

XI), but does not provide guidance on metrics for practicability. With no alternatives provided, it is easy to default to in-well LNAPL thickness as an indicator of practicability, especially when there is so much emphasis on in-well thickness in the document. The ITRC document and the CA LUFT manual both provide some examples of performance metrics for hydraulic recovery of LNAPL (e.g., LNAPL transmissivity, o/w ratio, etc).

Response: While the LNAPL Committee understands that some investigators may consider in-well thickness as an endpoint indicator, the document is clear that an in-well (i.e. collection point) thickness of 0.01' triggers the need to comply with the timeframes. The document, however, at no time speaks to in-well thickness as the sole indicator of completeness. The LNAPL Committee believes it was best to encourage a thorough investigation of site specific conditions in order to build the CSM and then provide flexibility to the investigator to establish the appropriate, site specific performance metrics based on the selected IRM (which could be revised as site conditions change overtime). Example endpoints/performance metrics are provided in some of the references.

With respect to practicability, the investigator should be evaluating all IRM options. This may include LNAPL treatment (chemical, phase change, etc.) in addition to hydraulic recovery. A Technical Impracticability (TI) Technical Guidance Team has been established with the specific focus on providing the regulated community guidance on how to define and support a TI determination.

Page 18. Section XI

Comment 9: It was suggested by a number of those who commented that additional references be added. In particular it was suggested that ASTM Publication E2531-06 and API 2004 Interactive LNAPL Guide Version 2.0.3. be added.

Response: The two additional references noted above have been added to the reference section of the Guidance.

Page 11. Section VII

Comment 10: There is very limited discussion of LNAPL strategies and what constitutes adequate delineation. Is the intent to use the concept of mobile LNAPL delineation as the basis for delineation?

Response: No, it is not the intent of the Guidance to limit delineation to mobile LNAPL. Appendix A does include some of the more common methods used for LNAPL delineation. In most instances permanent monitoring wells will be a method of choice since ongoing monitoring well gauging is needed to determine if the LNAPL is adequately delineated and is not migrating over a range of water table elevation changes. While delineation to 0.01 feet of LNAPL is acceptable for complying with the LNAPL regulatory and mandatory timeframes, it may be difficult to determine if the LNAPL

body is or is not migrating if LNAPL fringe wells are not installed and monitored. This concept is referenced in the Section V “Summary of LNAPL Behavior in the Subsurface “. Professional judgment is a component of determining if delineation is adequate and whether the LNAPL body on a plume scale is or is not migrating.

Page 12. Section VIII

Comment 11: One commenter remarked that the Guide takes into consideration that, given certain site-specific conditions, recovery efforts may or may not be practicable as an IRM . "Practicability" needs to be defined as it relates to whether or not a particular recovery strategy should/can be implemented. My suggestion is that the guidance document should link practicability with "recoverability" and discuss the need for LNAPL recoverability to be quantitatively defined given site-specific conditions, receptor risk, and available extraction methods. Without quantitatively defining recoverability, practicability becomes subjective and therefore, so could compliance with regulatory and mandatory timeframes.

The LNAPL Technical Guidance Document references existing documents that should be utilized in support of an RP's efforts to meet the intent of the LNAPL Technical Guidance Document and the timeframes. I recommend that the LNAPL guidance document add to that list the "American Petroleum Institute Interactive LNAPL Guide" (API LNAPL Guide). The API LNAPL Guide makes available to the user electronically, much of the technical and modeling information referenced by the LNAPL Technical Guidance Document and it may provide the means for quantitatively defining recoverability (practicability).

Response: The LNAPL Committee recognizes that "practicability" is linked to "recoverability". However, the LNAPL Committee did not want to prescribe either the recovery method(s) or the quantitative criteria or performance metrics\endpoints for LNAPL recovery for the IRM. The LNAPL regulatory and mandatory timeframes are about protecting receptors, conducting initial recovery efforts, defining the extent of the LNAPL and initiating an IRM (i.e. understanding\remediating LNAPL early-on before it becomes more difficult to remediate). Given the variability of site conditions, it is the responsibility of the investigator to select and implement the IRM and define the performance metrics\endpoints for the IRM. The investigator's role is to insure that the IRM is focused on meeting the defined objectives of preventing LNAPL migration, and performing mass recovery, when practicable. Further, the Guidance document reminds the investigator that while the LNAPL regulatory and mandatory timeframes are not intended to drive a final LNAPL remedy, the Technical Requirements for Site Remediation (N.J.A.C. 7:26E-6.1(d)) do require treatment or removal to the extent practicable and containment when not practicable. As a result, the investigator should keep this ultimate endpoint in mind when selecting an IRM. The LNAPL Committee did incorporate some additional language cautioning investigators about in-well thickness being an indicator of recoverability and added reference to the suggested API LNAPL Guide as a screening tool. In addition, the underlined language was added under the Section X. C 1.c. (LNAPL IRM Report) requesting the investigator provide; “if LNAPL

remains in monitoring wells and continued removal or treatment is not practicable, the LNAPL IRM Report should clearly document the technical rationale supporting this conclusion, and include a summary of all work done to assess LNAPL recoverability and demonstrate that LNAPL has been recovered to the maximum extent practicable.....”

General Comments

Comment 12: If there is no practicably recoverable LNAPL and there are no known receptor risks, then is the IRM complete?

Response: Yes. The investigator would document the site and LNAPL characteristics in the LNAPL IRM Report along with the technical justification to support the impracticability determination. Appendix C of the document is a suggested reporting format that can be used to capture the information to support the impracticability determination. The receptor evaluation would document the absence of receptor concerns related to the LNAPL. The IRM report would be submitted within the established time frame.

Comment 13: The term LNAPL is used with varying meanings throughout the document. At places it is meant to mean residual and mobile LNAPL and others only mobile (in-well) LNAPL. Suggest adding the adjective ‘mobile’ where appropriate.

Response: The Committee reviewed the document and believes that the sentence structures where the term LNAPL is used provides for adequate meaning of the intended use of this term. In some instances adding either “residual”, “mobile” or “mobile (in-well)” would be too limiting to meet the intended objectives of this Guidance. The Committee did not find any uses of the term “LNAPL” that needed further modification with the adjective “mobile”.

Comment 14: This Guidance document does not specifically address the response to an ongoing LNAPL discharge. There is one brief reference to this concern on the LNAPL Reporting Form.

Response: As a first priority, any source of an ongoing LNAPL discharge should be stopped. The LNAPL Committee assumed that an investigator or responsible party would be taking this step immediately. This comment is well taken and a statement about ceasing any ongoing discharge as an immediate first step has been added to the document.