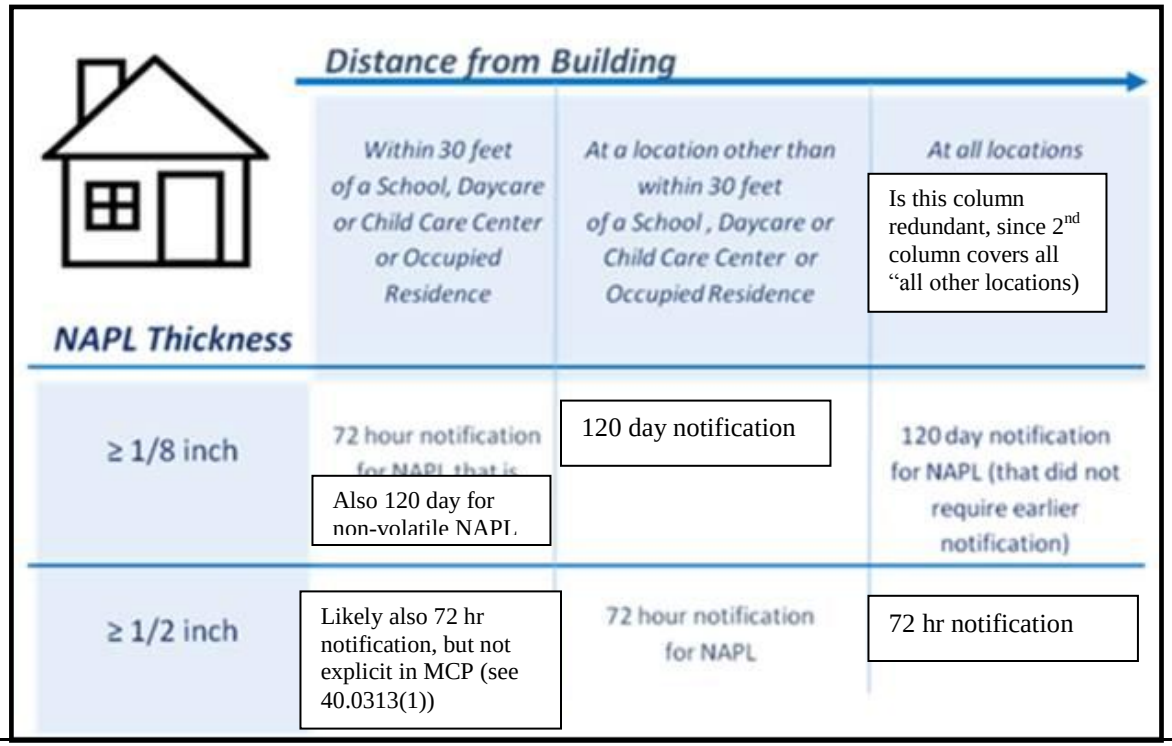
Attachment to LSPA Cover Letter: Compilation of Comments from the LSPA

Public Review Draft, July 1, 2014
LIGHT NONAQUEOUS PHASE LIQUIDS (LNAPL) AND THE MCP:
GUIDANCE for SITE ASSESSMENT AND CLOSURE
Policy #WSC-14-450

The following are collective comments from the LSPA. Page numbers refer to the Public Review Draft made available electronically in pdf. Every effort has been made to state the issue of concern, provide a specific example wherever possible and propose suggested language changes where appropriate.

LNAPL Draft Guidance		
Page No.	**Section**	**Comment**
1	**1.0**	To demonstrate the way in which this guidance presents "a simplified approach" it may be helpful to explain the analogy to MCP risk characterization methods 1, 2 and 3. The intent is analogous; to provide: 1) a simple but very conservative method that involves little or no specialized sampling, 2) a modification of #1 that includes some specialized sampling and site specific characteristics, and 3) a full site-specific characterization using transmissivity determination.
	General Comment	Use of LNAPL thickness measurements is not supported by ITRC or ASTM. LNAPL thickness is considered a poor metric that does not meaningfully correlate to any significant engineering, hydrogeologic or risk parameter. This guidance should reflect the actual state-of-the-art in LNAPL understanding. The presence of LNAPL in a monitoring well should be the appropriate notification guideline, and MassDEP should consider eliminating thickness based reporting requirements.
	General Comment	The guidance focuses strictly on technical feasibility with no discussion of cost/benefit of recovery of LNPL Micro-scale mobility. Is it MassDEP's intent to require attempts at LNAPL recovery in <u>all</u> cases other than LNAPL Transmissivity <0.8 ft2/day? That is the only off-ramp in Table 7 other than asymptotic or <1 gallon/ 3 month recovery rates.

		The guidance does not mention or seem to consider cost/benefit, except indirectly as it may relate to the level of technical investigation/evaluation. There is concern that the concept of cost versus benefit, especially incremental cost versus incremental benefit, is not addressed in the guidance, which could lead to significant problems as LSPs try to implement the guidance and as MassDEP staff try to evaluate response actions at LNAPL sites.
	General Comment	Guidance is needed as to what is required to demonstrate "control" of LNAPL with micro-scale mobility for purposes of a Temporary Solution as it seems micro-scale "control" is inherent in its definition, i.e. only macro-scale in LNAPL that is uncontrolled. Could the guidance so state that micro-scale LNAPL is controlled, absent some listed examples?
	General Comment	The guidance should recognize that potentially recoverable LNAPL at most sites is typically low (1% to 20%). Conversely, even good recovery systems may "leave behind" 80% to 99% of all LNAPL mass. The point of the guidance is to help identify when recovery should be used, and when it is not practicable. This clearly depends on the total volume of recoverable NAPL, and, a de minimus fraction and total volume would be helpful, particularly because most LNAPL sites are smaller sites (heating oil or gasoline/diesel releases).
1	**2.0**	The guidance is limited to LNAPL in porous media. Guidance on LNAPL in bedrock and DNAPL is also needed.
4	**3.0 – Figure 1**	Recommend revising the figure for clarity and to fill in empty cells. For example, see below:

		
4	**3.0- Figure 1**	If LNAPL thickness is a poor metric, why bother having different thickness reporting conditions? Just simplify this to distances from sensitive receptors at any measureable thickness. This begs the question what "any measureable thickness" means. Current interface probes used for measuring LNAPL thickness all appear to have a precision of 0.01 foot or 0.125 (1/8) inch. Using a variable term such as "any measurable thickness" is unwise as someone might develop an interface probe capable of a precision of 0.002 ft, for instance, and then it would depend on which probe was used.
6	**4.0 – Figure 2**	Add a "No" box under "Does LNAPL with Micro-scale mobility remain at the site? If LNAPL is no longer present in wells after removal (or is less than ½ inch after removal), then the site qualifies for Permanent

		Solution without Conditions (i.e., no AUL).
7	**5.0**	This discussion of "pushing LNAPL" is unclear. Literature suggests that Cres is affected by maximum past LNAPL pressure. This is mostly a laboratory phenomenon. This is a concern about laboratory tests that use high back-pressure to saturate first with LNAPL before attempting to drive LNAPL out of the pore space. It is not clear that this is a significant concern for soil samples tested at field saturation values.
8	**5.0 – Figure 4**	Perhaps additional language should be added to clarify that this is an abstract simplification, and actual distribution will be highly site specific.
9	**6.1**	The discussion of Csat is not in line with the intended use in the LSPA White Paper. C_{sat} cannot be used as a mobility metric. Its value is limited to assessing LNAPL presence and extent. This is important in the context of establishing the extent of contamination (i.e. that LNAPL may be present as a source even if not measured in a groundwater monitoring well). In this regard Csat is valuable in delineating the extent of source zones. Rather than putting one number (i.e. 100 mg/kg) in the guidance, the table in the LSPA White Paper is valuable in showing the impact of solubility on Csat. Recommendation to not make TPH greater than or equal to 100 mg/kg in soil an indicator of the "likely presence of LNAPL". Absent other lines of evidence (site and release history, visual observations of LNAPL), this metric has the potential to make many sites "LNAPL sites" when the low level TPH can be attributable to many other sources, particularly in urban settings. TPH at 100 mg/kg is also well below NSR levels for unrestricted residential use. Guidance is requested as to a scenario in cases where soil concentrations are below S-1 standards, there is no observation of measurable LNAPL. LSPs want to know if the standard of practice has changed for such cases that would have been a simple A-2, Method 1 under the old regulation.
10-11	**6.3**	The guidance does not recognize the importance of confined aquifers and their impacts on LNAPL assessment and T_n measurements. As described by ANSR, confined LNAPL conditions can exist even when classically confined aquifers are not present (i.e. small permeability contrasts can create locally confined LNAPL conditions. This typically results in much higher LNAPL thicknesses than in similarly impacted unconfined aquifers).
10-11	**6.3**	Suggest that the guidance reference the context for the development of 0.8 ft2/day. From http://www.itrcweb.org/Guidance/GetDocument?documentID=48 , section 3.2.1.8 LNAPL Transmissivity,

		page 14.
11 - 12	**7.1**	The draft guidance presents many of the same approaches to characterizing and recovering LNAPL as ITRC has been recently promoting. However, Section 7.1 of the Guidance misconstrues the benefits of identifying LNAPL physical properties from monitoring wells. In their 2012 Conference Handbook, ITRC specifically stated that LNAPL thickness in monitoring wells "correlates unfavorably with LNAPL recoverability" and that monitoring well LNAPL data "does not account for soil and LNAPL properties, soil heterogeneity and LNAPL occurrence conditions" (pg. 228 of the 2012 Conference Handbook). It is not accurate for the guidance document to state that monitoring wells help characterize "LNAPL physical properties used in applying FFPM/LCSM principles" or that they are "representative of a much greater area/volume of a formation than discrete cores or soil samples obtained from within the same zone." (pg. 12 of the Guidance Document).
12	**7.1**	In the "Limitations" section, MassDEP should consider stressing the impact of seasonality and well diameter. 1" wells typically have 4 times the thickness of LNAPL compared to 2" wells, and similarly with 4-inch wells. While 2" wells used to be the "standard" well diameter, 1" Geoprobe wells are now common, as are 4" wells installed for conversion to recovery wells. LNAPL thickness references in graphs, charts and references should be annotated to reflect this significant impact on measured thickness. "Uncertainties continue to exist on the affects [*should be "effects"]* of well diameter and installation techniques on representativeness and data comparability." This statement might be expanded to indicate that while there appears to be an inverse relationship between LNAPL thickness and well diameter, there appears to be no reliable quantitative correlation.
12	**7.1**	Under last bullet of "Benefits" section, suggest removing "In the last several years" from intro, this will quickly become dated. Use actual dates.
13	**7.2**	MassDEP might consider allowing Integrated Sampling Methodology as an alternative, to try to more representatively characterize soils. No discussion of compositing and sub-sampling is included.
13	**7.2**	MassDEP might consider including a further discussion of screening tools in this section. Ex-situ and in-situ UVF/LIF are now very common tools for providing quality, inexpensive soil data. LIF has the capability of providing very fine vertical resolution, semi-qualitative forensic information, and clear vertical limits to contamination migration.
16	**8.3 –**	Cres is strongly influenced by soil type and product type, and there is no generally agreed upon method for

	Table 1	determining C_{res}, therefore it may not be a good idea to suggest using published C_{res} values. However, use of centrifugal tests to measure C_{res} for undisturbed soil samples is very conservative, and can be safely used for comparison to field saturation provided adequate site characterization has been performed. Assuming MassDEP agrees that published Cres values can't be typical of all soil types, then it is safe to assume that MassDEP is trying to provide a spectrum of options, analogous to MCP Methods 1, 2 and 3, to allow LSPs to evaluate their sites. The published Cres values are presented as *conservative* estimates of Cres, analogous to MCP Method 1. If the LSP can "screen out" their site using these published values, then that may be all they need to do, and this will be particularly helpful on smaller sites. But, if the LSP cannot "screen out" their site using published values, alternatives exist (analogous to Method 2 and Method 3), which they may still be able to use to demonstrate no non-stable NAPL.
18	**10.0**	MassDEP describes excavation as an effective corrective action for removal of LNAPL "hot spots". If feasible, excavation is a possibility for "removal of all LNAPL affected soil" (pg. 279 of the 2012 ITRC Conference Handbook). (Although it is recognized that if NAPL removal were feasible, the LSP would just do it and not need the guidance).
19	**11.0**	Provide clarification on when an AUL is not needed (such as any LNAPL below 15 feet/stable LNAPL below 15 feet/no micro-scale mobility below 15 feet). This is especially important now that MassDEP has decided that AUL conditions specific to LNAPL will reside in the LNAPL guidance and not the AUL guidance.
20	**12.2**	This section should clarify that bailing performed solely to investigate LNAPL mobility should be explicitly defined as not being remediation or a remedial activity.
20 and 25	**12**	The draft guidance states (p.20): "Following a gauging event, at least one well volume of any LNAPL must be evacuated from the well and properly disposed or recycled." Assuming MassDEP's intent is that, following gauging, all recoverable LNAPL should be removed from the well, so as not to be "maintaining a source of pollution" then perhaps better wording might be: "Following a gauging event, all recoverable LNAPL must be evacuated from the well, along with at least one well volume of groundwater, and properly disposed or recycled, in order to comply with the two MCP requirements listed at Section 9.0 (310 CMR 40.1003(7)(a)(2.), and 310 CMR 40.1003(7)(b)."

		This section should also clarify that removal of one well volume of LNAPL is not advisable after gauging, if prior to planned transmissivity testing. Suggest that this be changed to bail LNAPL as a "suggested assessment or maintenance practice" rather than a mandate, in order to facilitate LNAPL transmissivity testing.
21	**12.2 – Figure 7**	Consider replacing the term "mobile LNAPL" with "LNAPL?" What is the basis for the TPH >10K in soil indicating the presence of "Mobile LNAPL?" Consider replacing "LNAPL is Likely Present" and "Mobile LNAPL is Likely Present" with "The potential for LNAPL to be present must be evaluated." The terms used in Figure 7 should be the explicit terms of the regulation or refer to specific Tables in the guidance. This will assist with unifying the overall draft document.
22	**12.2**	The guidance states: "Baring unavoidable site constraints, the spacing of a monitoring well network must be in the range of 15 to 30 feet within the core and at the perimeter of the LNAPL plume." Recommend that text be changed to "Taking into account unavoidable site constraints and considering site-specific conditions, the spacing of a monitoring well network in the range of 15 to 30 feet, within the core and at the perimeter of the LNAPL plume, would seem appropriate for most smaller (<1-2 acre) sites such as service stations or residential fuel oil releases."
22	**12.2**	The draft guidance states: "At sites where Non-Stable LNAPL is present or potentially present, wells within and just downgradient of an identified LNAPL plume must be gauged on at least a monthly basis for a minimum of two years." This requirement conflicts with a statement on page 24 that requires quarterly gauging if thicknesses exceed "action levels" that are indicative of potentially non-stable LNAPL. Perhaps, it should be noted that this requirement is for new releases. Older sites with many years of quarterly or semi-annual gauging data demonstrating LNAPL stability should not be required to collect a new set of data on a monthly basis. Suggest changing to: "At sites where Non-Stable LNAPL is present or potentially present, wells within and

		just downgradient of an identified LNAPL plume must be gauged on at least a monthly basis for a minimum of two years, or until Non-Stable LNAPL has been determined not to be present."
23	**12.4**	The draft guidance states: "A spill of a total of 10 or more gallons of oil/waste occurred or likely occurred at the site in the previous 10 years which was not promptly and adequately remediated via removal of the LNAPL, applied sorbents, and/or impacted soils;" would indicate the likely presence of mobile NAPL and necessitate an evaluation of its mobility and recoverability. This is a very low threshold and seems unreasonable to assume a 10 gallon release would generate a mobile LNAPL plume that would persist for 10 years. Suggest changing to: "For the purposes of this approach, an evaluation for the presence of mobile LNAPL shall be conducted if:" We are assuming that this is to be used as a "rule out" approach, ie analogous to the EPA's "rule of thumb" that investigators evaluate for the presence of DNAPL if dissolved concentrations of compounds that could form DNAPL are detected at or above 1% of aqueous solubility. i. e., the proposed criterion is really a cutoff below which the LSP can rule out the presence of LNAPL, not an indication that LNAPL is actually present.
23	**12.5**	The guidance states: "…LNAPL present in the subsurface shall be deemed Non-Stable if:…" It is understand that the designation may be made to disallow sites with the first three conditions (periodic discharges to surface water, buildings, and utility structures), from achieving a permanent solution, but to call these conditions nonstable is technically inaccurate. In these three cases, the surface water, building sump, or utility is no different than a monitoring well that may accumulate micromobile NAPL, but the fact that these discharges occur at a receptor makes the condition unacceptable. Consider revising the language to indicate that these conditions are not acceptable to a permanent closure and require additional evaluation. Further, the presence of LNAPL in bedrock or pervious backfill of utility conduits is a different condition than the previous three bullets. Although this condition creates a more complex NAPL distribution, it does

		not demonstrate "LNAPL non-stability" and should not preclude a site from closure under the MCP. Suggest revising to indicate that the simplified approach in this guidance document may not be appropriate for LNAPL in bedrock "The scope of the guidance offered in this document is limited to the direct impacts related to the occurrence and bulk movement of LNAPL in and through porous media." As bedrock fractures are not porous media, this guidance is not applicable to LNAPL in bedrock fractures or pervious backfill of utility conduits; however alternative evaluations can be conducted to demonstrate that LNAPL is not migrating and has been recovered to the extent feasible.
23	**12.5**	Mobile NAPL includes both micro scale and macro scale ("Non-Stable") NAPL. What is being described here is LNAPL with macro-scale mobility i.e. "Non-Stable" LNAPL.
24	**12.5**	Most researchers believe that LNAPL at "most" sites is macro-stable, unless it is found to be discharging to a surface water body, provided the release is more than one or two years old. It is unclear how well data can be used to establish stability. Similarly, the basis behind Table 2 is suspect given the poor correlation of LNAPL thickness to engineering metrics.
26	**12.6 – Figure 8**	Figure 8: Is this figure specific to 2-inch wells? Does this matter? Our understanding of the purpose of Figure 8 is to provide LSPs a way to "screen out" their sites, not to imply that, if the conditions at their site indicate that LNAPL may be recoverable that it must be recovered. If Figure 8 allows an LSP to screen out their sites, good. If not, they have additional options to evaluate recoverability, including a transmissivity evaluation.
26	**12.7**	One gallon in a three month period is extremely conservative and would only be valuable for sites with *de minimus* quantities of recoverable LNAPL. This bullet should be removed as it is dependent on many factors unrelated to LNAPL recoverability.
27	**12.8**	A Permanent Solution should be achievable if it can be shown that recovery/removal is infeasible. Second bullet should be edited or a new bullet should be added to address economic infeasibility.
27	**12.8**	"In accordance with the provisions of 40.1012(2)(d), an Activity and Use Limitation (AUL) is required for sites where a Permanent Solution has been achieved and LNAPL with Micro-Scale Mobility is present. The presence of LNAPL with Micro-scale Mobility shall be assumed if the maximum observed thickness in any groundwater monitoring well was equal to or greater than ½ inch, at any time in the 12 months previous to

		the filing of the Permanent Solution, including during times of a low or falling water table." MassDEP should allow the flexibility to not require an AUL for a Permanent Solution for LNAPL that is isolated. While an AUL may be required on many smaller sites, on larger sites, such as existing oil terminals and larger industrial sites, it seems as though "Conditions" may be suitably informative to potential future owners. It seems reasonable to require AULs on residential and commercial properties, but the risk of micro-scale mobile LNAPL to receptors, especially where petroleum product use is continuing on a large scale (capacity >10,000 gallons?), the AUL is of little benefit.
32-33	**Appendix 1**	Providing the Lines of Evidence matrix is helpful, but there is concern that MassDEP audit staff will rely too heavily on this and the weighting, and not consider alternative or site specific information; this could result in contested Permanent Solution findings without cause. Additional clarity and training should be provided on the use of the Lines of Evidence checklist and matrix.