NJDEP Technical Guidance - Response to Comments

DOCUMENT: Ground Water Investigation: SI/RI/RA

START of Comment Period: **Monday, July 8, 2011**
END of Comment Period: **Wednesday, August 29, 2011**

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
1	General			The guidance document includes information that is not directly related to the investigation and remediation of groundwater. Specifically, the Site Conceptual Model, Vapor Intrusion Guidance Document and LNAPL Guidance are addressed in other NJDEP guidance documents and need to be deleted to avoid the potential for conflicts should the guidance documents change over time.	The information will not be removed. These subjects are covered in the this document specifically as they relate to a ground water remediation.
1	General			Although "Remedial Action" is included in the title of this guidance document, there is very little guidance on remedial actions. In fact, the remedial action section is limited only to a discussion of performance monitoring associated with groundwater remediation. The title should be changed to "Site Investigation, Remedial Investigation and Remedial Action Performance Monitoring Guidance for Ground Water".	The title of the document has been changed to "Ground Water Technical Guidance: • Site Investigation • Remedial Investigation • Remedial Action Performance Monitoring"
1	General			A primary goal of a remedial investigation is to achieve horizontal and vertical delineation of groundwater to the degree necessary to: (1) identify and evaluate potential risk to receptors and (2) evaluate and select a remedial action. The draft document should clearly recognize that the achievement of delineation (whether by concentration gradients, modeling or empirical data) should be determined by the LSRP based upon the application of professional judgment and scientific principles.	In accordance with the Technical Requirements and the Remediation Standards, ground water must be delineated and cleaned up to the Ground Water Remediation Standard.

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1	NA	NA	NA	While the techniques and methods described in the document are reasonable, they do not all apply at all sites in all cases. For example, in Section 3.1 (1st "open hole" bullet) the guidance indicates that the ground water RI shall "identify ground water recharge and discharge zones". This is not always warranted particularly for small sites and could be very costly. Therefore, a global statement should be added to clarify that use of the methods and techniques described in the document are not always warranted at all sites; there use and applicability is to be determined on a site-specific basis and at the discretion of the investigator.	The Ground Water Technical Guidance Committee disagrees with the example given. However, the committee agrees that the methods and techniques described in the document are not always warranted at all sites. A good example of this is an investigation of bedrock is not necessary where contamination is limited to the overburden. Therefore, the following statement is made in the opening statement of the document: *"In applying technical guidance, the Department recognizes that professional judgment may result in a range of interpretations on the application of the guidance to site conditions".*
1	NA	NA	NA	Some of the ground water SI and RI requirements and triggers key off of soil data. However, the soil SI/RI/RA guidance is not yet available. Therefore, the ground water guidance document should not be issued as final until the companion soil guidance document is available for review. Also, due to the nexus of soil and ground in remedial decisions, the NJDEP should allow for additional comments to this ground water guidance in the future concurrent with the pending soil guidance document and proposed Technical Regulations (NJAC 7:26E).	The soil guidance document comment period closed in May 2011. The document was available for reiew. An additional comment period will not be held.

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1	3	3.2	General	Delineation - if strict requirements to delineate are not given some alternatives many sites are going to languish as a result of exorbitant costs for delineation without env benefits. Suggest language something like "A variance from delineation requirements may be justified by an evaluation of concentration gradients, temporal analysis of concentrations trends and demonstration of no risk to potential receptors." Suggested language needed throughout the document ... "Put simply, if contamination is determined to be present at the site during the site investigation above the applicable emediation standard, the person responsible for conducting the remediation is required to conduct additional remediation or present a well-founded and supported scientific and technical rationale demonstrating protection of human health and the environment.	This issue is beyond the scope of the Ground Water Technical Guidance Committee. The "Attainment Committee" is writing guidance concerning attaining the Ground Water Remediation Standards for delineation and cleanup.
1			General	The draft guidance document contains much information that could be useful from a reference standpoint. However, the main text of this draft guidance document presents somewhat random components of various levels of ground water investigations. It offers excessive detail in some areas (e.g. investigation of microstructures in bedrock outcrops), little or no information in other areas (e.g. ground water remedial actions) and seemingly irrelevant information (e.g. discussion of a bedrock study in New Hampshire).	The guidance was crafted to give flexiblity to the investigator. The guidance references peer reviewed documents concerning New Jersey where possible. When New Jersey data is lacking, information from other states is used. The NH document reference in Section 3.4.1.4. is referenced to give the investigator an idea of what may be encountered in a crystalline bedrock environment. Few documents for this type of environment are were readily available for New Jersey.
1			General	The discussions of each technology should address the limitations as well as the applications. As currently written, the draft guidance document focuses almost entirely on the applications and gives little or no information regarding limitations of the various technologies. The guidance should identify common problems and pitfalls. The bulk of the information should be put into appendices as references that may be used to help in specific situations.	It is left to the professional judgement of the investigator to recognize the limitations of a technique or tool before applying it to a site.

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1	General			As a guidance document, use of the words "shall" or "must" should be replaced with "can", "may", or "could". The document includes requirements rather than recommendations. There should be more flexibility for the LSPR to utilize professional judgment.	Shall is used in reference to the technical requirements rule and is appropriate.
1	General			All references to the Conceptual Hydrostratigraphic Model should be changed to Conceptual Site Model to correspond with the wording in all other guidance documents.	The conceptual hydrostratigraphic model is distinct portion of the Conceptual Site Model its inclusion in this guidance is appropriate.
1	General			There are multiple references to completion of vertical delineation within this document. Based on site-specific conditions, vertical delineation is not always required.	Vertical delineation is required in accordance with the Technical Requirements for Site Remediation.
1	General			There are multiple discussion for different studies included within this document. Rather than be detailed here, they should just be included as a reference.	The Ground Water Technical Guidance Committee decided to include discussion of New Jersey specific hydrogeologic information in the guidance.
5	1	1.1		First Bullet; "performing and achieving compliance with the requirements of the Department's Technical Rules" should be modified to specify "with regard to the investigation and remediation of groundwater"	The guidance has been edited to address this comment.
5	1	1.1		Last sentence. "These publications should be referenced…" should be changed to "These publications may be referenced…"	The document has been edited as recommended
5	1	1.1	last para	Include the word and number "Appendix 1" in bracket after the words "attached bibliography".	The document has been edited as recommended
5	1	1.1	last para, 1st sentence	The word "from" is repeated in the same sentence.	The document has been edited as recommended

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5	2	4	1	A continuous soil core meeting these criteria may entail a very deep drilling depth and of course, the boring may not even encounter free or residual product. This should not be attempted until multiple locations and various depth monitor wells indicate the presence and potential location(s) of residual DNAPL. Referring to Section 3.2.5 as the technique to utilize would be more appropriate than random continuous coring that may spread contamination.	This section contains the recommendations for completing a Site Investigation of Ground Water. The intent of this sampling is to determine if ground water has been impacted by the AOC. During the site investigation multiple wells are not available for evaluation. Concerning the potential to spread contamination, in no case should the investigator drill or push through a low permeability layer that has an indication of contamination the early stages of an investigation. As soon as contamination is detected in ground water above an applicable standard, the case should procede to the RI. During that time, an outside in approach should be used to assure that investgation induced vertical cross contamination is limited. The suggested method indicates that the ground water sample should be collected at the depth of the greatest reading on field instrumentation, the top of the first low permeability zone encountered or the top of bedrock. Therefore, the investigator should not be pushing or drilling through these zones. Furthermore, since the sample would most likely be collected using a direct push method, the hole would remain open for less than an hour and would be properly sealed upon completion.
				2.0 Site Investigation of Ground Water	
5		2.3		This section should be augmented with a bullet discussing the ‘de minimus’ concept. Something like: **“**Magnitude of Discharge – Where contaminant discharge is of an unknown volume and remediation cannot be quantified that remediation can take place by addressing only the unsaturated zone.	The guidance has been edited to account for a one-time discharge of known volume where an immediate remediation has taken place.

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3	2	1		General Comment - Is this document; or the Field Sampling Procedures Manual, or The Technical Requirements (7:26E, Section 2), to be the primary guidance for "• the general requirements of ground water sampling including biasing of ground water sample locations, soil logging and field screening; • the methods and analyses to use for ground water sampling."?	It is intended that the Technical Requirements for Site Remediation contain the regulatory requirements for remediation of contaminated sites, the Field Sampling Procedures Manual contains procedures used for sampling ground water, the Ground Water Guidance contains methods for performing remediation at contaminated sites as required by the Technical Requirements.
6	2	2.1		"above any of the applicable remediation standards or any criterion." Any criteron? What is intended by the inclusion of "any criterion" and why is anything beyond "applicable remediation standards" needed? "Any criterion" should be removed.	The purpose of a site investigation is to determine if contaminants are present above any standards or criterion. For example, the criteria applicable to ecological evaluations.
6	2	2.1	3rd bullet	Analyses of ground water samples is not something that is covered in this guidance document to any degree-a very extensive topic that might best be left for another guidance document	Refer to the FSPM and the Technical Requirements to Site Remediation.
6	2	2.3	Heading	Recommend this be: Considerations for when a Ground Water Investigation May be Necessary. Each of the bulleted items which follow cannot be applied universally across all sites so the heading cannot imply necessity	The heading has been changed to "Considerations for when a Ground Water Investigation is Necessary"
	2	3		By "proximate" to the Site; does this mean adjacent, a specified distance, or a calculated travel time?	If there is a potential that contamination emanating from the site may impact an area, that area is proximate to the site.

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	2	3		1. Are site specific soil impact to groundwater exceedances a reason to complete a groundwater study? 2. An additional bullet should be added after the introduction paragraph to note another factor in determining when a Site Investigation for groundwater is necessary. The bullet should indicate that soil concentrations detected in exceedance of an Impact to Groundwater Soil Screening Level or a Site-Specific Impact to Groundwater Soil Remediation Standard (developed in accordance with NJAC 7:26D) requires investigation of groundwater quality. 3. First and foremost a Ground Water investigation is necessary when the site specific 'impact to groundwater' soil standard is developed for the site in accordance with NJAC 7:26D and the soil remediation standards guidance. Section 2.2 speaks to the Table of default values, but does not reference thte voluminous volume of guidance on developing IGW criterion 4. First and foremost a Ground Water investigation is necessary when the site specific 'impact to groundwater' soil standard is developed for the site in accordance with NJAC 7:26D and the soil remediation standards guidance. Section 2.2 speaks to the Table of default values, but does not reference thte voluminous volume of guidance on developing IGW criterion	The site specific impact to ground water soil remediation standard is developed as a remediation standard. It is not developed to determine if a ground water investigation is warranted at a site. The following two examples explain this further: 1. Where a chemical that is not very mobile exceeds the impact to ground water soil remediation standard and there is a clean zone between the chemical and the water table a ground water investigation would not be necessary. 2. Where there is the potential that a mobile or volatile chemical was discharged, but does not exceed the site specific impact to ground water soil remediation standard, a ground water investigation may be warranted. In this case, the chemical may have previously migrated through the unsaturated zone to the water table and may no longer be present in the unsaturated zone.

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6	2	2.3	First sentence	1. Groundwater investigation required at "all potentially contaminated AOCs". This implies that a groundwater investigation would be required even before contamination has been confirmed at an AOC, and would be premature, unecessary and overly budensome. Recommend deleting this and all similar language (several occurrences in Section 2.3) in favor of specific investigation triggers that are based in science and the conceptual site model. 2. Reference to N.J.A.C. 7:26E-XX , followed by the language " all potentially contaminated AOCs shall" seems to be taken out of context. Proposed NJAC 7:26E 3.5 (a) states:" The person responsible for conducting the remediation who is subject to N.J.A.C. 7:26E-3.3(b) shall evaluate all potentially contaminated areas of concern to determine if ground water may have been or may be contaminated above any ground water remediation standard. If there is a potential that ground water has been or is contaminated by the area of concern,..." This does not state that groundwater shall be investigated; it states at potential AOCs identified in a PA, or an UST site which has an SI requirement the need to evaluate the potential of groundwater impact is required. Certainly the first step is to affirm contamination at the 'potentially contaminated AOC' then evaluate if groundwater may have been impacted, before a groundwater SI is required.	The guidance has been edited to clarify that each AOC needs to be evaluated to determine if there is a potential for ground water contamination. Where there is no potential for ground water contamination, a ground water SI is not necessary.
6	2	2.3	1st paragraph	The 1st paragraph states, "...all potentially contaminated AOCs shall be evaluated to determine if ground water has been impacted above the [GWQS]." This section should reference the soil impact to ground water requirements so that it is clear that collection of ground water samples is not necessarily required.	The impact to ground water soil remediation standards are soil remediation standards. They were not developed to determine if a ground water investigation is necessary.
6	2	2.3	1st paragraph	The first paragraph should be re-worded as follows: "Pursuant to N.J.A.C. 7:26E-XX, all known contaminated AOCs with the reasonable potential to impact groundwater require a site assessment. The LSRP should consider the following when determining if it is necessary to perform a groundwater investigation: " The introductory sentence appears to indicate that a groundwater investigation is required at all AOCs, which is not consistent with regulation or the remainder of the section.	The guidance has been edited to state " "Pursuant to N.J.A.C. 7:26E-XX, a site investigation is required at all AOCs where there is the potential that ground water has been contaminated. The LSRP should consider the following when determining if it is necessary to perform a site investigation of ground water".

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6	2	2.3		The factors should be listed should be pointed as some of the factors to be considered to perform a GW SI. Remove "necessary" wording as first part of each bulleted item.	The guidance has been edited to indicate that the factors listed should be considered to determine if a GW SI should be performed. The "necessary" wording as first part of each bulleted item has been removed.
6	2	2.3	1st bullet	Potential Receptors: Occupied structures that may have been impacted by contaminants are identified as one form of potential receptors that may trigger a site investigation of groundwater. This appears to overlap with the Vapor Intrusion Guidance (VIG). The definition of "occupied structures" needs to be consistent with the VIG, and the Department should note the requirements for a groundwater investigation in the VIG.	The term occupied structures, as used in this guidance document, is consistent with the definition in the VIG.
6	2	3	1st bullet	Potential Receptors - The requirement to perform a groundwater investigation based on proximity of receptors is not supported by regulation. Since any site or AOC may have a future receptor (occupied structures),a groundwater investigation would be required at all AOCs if this guidance was followed.	The guidance indicates that a ground water investigation is necessary where a receptor may have been impacted by the AOC, not "would be impacted in the future". For example, where a potable well is known to be impacted by chemicals used at an AOC and there is a potential that the contaminant migrated from the AOC to the potable well, a ground water investigation at the AOC would be warranted.
6	2	3	2nd bullet	Presence of free or residual product - Does this requirement also pertain to residual product encountered in soil, regardelss of depth to groundwater or the other conditions outlined in this section?	The opening paragraph in 2.3 has been edited to clarify that the LSRP may apply a combination of ground water triggers outlined in the guidance. In this case, the ground water investigation would depend on the mobility of the residual product encountered. Where the residual product was not very mobile and there is a defined clean zone within the unsaturated zone, a ground water investigation may not be warranted.

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6	2	2.3	2nd bullet	Presence of free or residual product: There is no definition of "free or residual product." The section should be consistent with the NJDEP LNAPL Guidance. The trigger for a groundwater investigation should be consistent with the LNAPL guidance.	Both free product and residual product are defined in the Technical Requirements. The LNAPL guidance discusses measuareable floating product only. This guidance deals with residual LNAPL as well as free and residual DNAPL.
6	2	2.3	2nd bullet	2nd bullet: The guidance indicates the conducting a ground water SI where free or residual product is detected. Consider revising to make ground water sampling optional, contingent on evidence of migration to ground water (e.g., using soil data). For example, a ground water investigation is not necessarily warranted when free/residual product is detected in the surface soils (0 to 2 feet) and soil concentrations are delineated vertically in the unsaturated zone (>2feet above the water table).	As responded to in a previous comment, multiple factors may be applied.
7	2	2.3	3rd bullet	Type of AOC: States that "ground water investigation is warranted where the potential discharge is close to ….the water table". "Close to the water table" is subjective and ambiguous, leading to uncertainty.	The term "close" was used to indicate that the contamination is close to the water table and therefore has the potential to impact ground water. If there is uncertainty concerning the potential that ground water is impacted, ground water samples should be collected to confirm whether the AOC has contaminated ground water.
7	2	2.3	3rd bullet	Type of AOC: States that "ground water investigation is warranted where the potential discharge is close to ….the water table". "Close to the water table" is subjective and ambiguous, leading to uncertainty. Additionly, a GW investigation is not warranted until the AOC is confirmed	See response above.
7	2	2.3	3rd bullet	Type of AOC: States that "ground water investigation is warranted where the potential discharge is close to ….the water table". "Close to the water table" is subjective and ambiguous, leading to uncertainty. Recommend modifying to read, "A groundwater investigation is warranted where the potential discharge is at or below the water table . ."	See response above.

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7	2	2.3	4th bullet	Contaminant Mobility - "a groundwater investigation is warranted unless the depth to the water table is great and the discharge was minimal." The phrase "depth to the water table is great" and "discharge is minimal" are ambiguous and subjective. If there is a *de minimis discharge quantity, it should be specified in the Tech Regs with consistent citations here.*	The guidance has been edited to allow for a one time discharge of known volume where that discharge has been remediated to applicable standards and ground water has not been impacted.
7	2	2.3	5th Bullet	Bullet #5 "Contaminant Mobility and Depth to Water Table" is repetitive of bullet # 4 "Contaminat Mobility". Combine both bullet #4 and #5.	The guidance has been edited. Bullet four has been renamed to "high mobility contaminants and bullet five has been renamed "low mobility contaminants".
7	2	2.3	5th bullet	The trigger for groundwater investigations "where contaminant is detected in soil within two feet of the seasonal high water table or bedrock" - this specific distance trigger is inconsistent with the 4th bullet item (not needed when "depth to water table is great").	It doesn't conflict. One is for less mobile contaminants the other is for mobile contaminants where the volume of discharge is known.
7	2	2.3	5th bullet	Contaminant Mobility and Depth to Water Table. Covers the same topic as the 4th bullet but is inconsistent with the fourth bullet. The trigger for groundwater investigations "where contaminant is detected in soil within two feet of the seasonal high water table or bedrock" - this specific distance trigger is inconsistent with the 4th bullet item (not needed when "depth to water table is great"). Prescriptive one size fits all with no basis given. Seasonal high water table determination during SI is very subjective, yet forms the basis for a prescriptive requirement.	This document provides guidelines for determining when it may be necessary to investigate ground water. The investiagtor should evaluate site specific data to determine if a ground water investigation is warranted.
7	2	2.3	6th bullet	This section states that "a ground water investigation is warranted where soil is permeable, or has little sorptive capacity." The term "highly" should be inserted between "is" and "permeable."	The document has been edited to state "where soil has a relatively high permeablility, or has little sorptive capacity".

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7	2	2.3	7th bullet	Age of Discharge: A groundwater investigation is triggered when contamination has been in place for an "extended period of time". Ambiguous and subjective. Age of Discharge: A groundwater investigation is triggered when contamination has been in place for an "extended period of time". Ambiguous and subjective. Based on the incorrect assumption that all contamination will eventually migrate to the water table, regardless of contaminant physiochemical properities, degradability, and source mass and concentration. Recommend removing this trigger.	The exact date of a discharge is not often known, however conservative date of discharge, conservative soil and chemical properties may be used to estimate if a contaminant has had time to migrate to the water table. Generally, the investigator should be conservative and investigate ground water if there is uncertainty concerning a potential that the AOC has had an impact.
7	2	2.3		"Technical Justification for exclusions" wording is more related to variances from technical regulations. This guidance is not a rule, and the wording should be edited to reflect this. E.g. "the technical justification for such conclusions would be included within the SI or Ri report."	The guidance has been modified to "Where ground water is not sampled during the investigation of a potentially contaminated AOC, and a ground water investigation is warranted based on the above factors. The technical justification for not collecting a ground water sample should be provided in the site investigation or remedial investigation report".
7	2	2.3	last paragraph	1. ". . . techical justification for [not investigating groundwater in a potentially contaminated AOC] should be provided . . ." It would be excessive and overly burdensome to require technical justification for not peforming a groundwater in an AOC where contamination has not been confirmed.	In some instances, the only way to determine if contamination is present at an AOC is by collecting a ground water sample. For example, where mobile and volatile contaminants were potentially discharged from an AOC in the past, and the AOC is no longer active, soil sampling may not indicate the presence of contamination. In this case the contaminants may have migrated through and volatilized from the unsaturated zone. Therefore, a ground water sample would be warranted.

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6	2	2.3		Last paragraph: the NJDEP is asking for technical justification for not collecting ground water at all potentially contaminated AOCs. Since virtually all AOCs are "potentially contaminated", this request will be very burdensome and costly for sites with moderate to significant amounts of AOCs. Revise to read: "Where ground water is not sampled during the investigation of a potentially contaminated AOC, where a ground water investigation would be warranted based on the above factors, the technical justification for this exclusion should be provided in the site investigation or remedial investigation report. Last sentence states "Where ground water is not sampled during the investigation of a potentially contaminated AOC, the technical justification for this exclusion should be provided in the site investigation or remedial investigation report." If results of a soil impact to ground water evaluation indicate no need for ground water sampling then that would seem to serve as technical justification but should not be identified as an "exclusion" as the approach is consistent with current guidance. The term "exclusion" should be deleted from this sentence.	The guidance has been modified to "Where ground water is not sampled during the investigation of a potentially contaminated AOC, and a ground water investigation is warranted based on the above factors. The technical justification for not collecting a ground water sample should be provided in the site investigation or remedial investigation report".
7	2	2.4	3rd paragraph	Delete all sentences beginning with the one beginning "During the early.." and cite references to the FSPM and LNAPL Guidance for considerations to mitigate potential cross contamination.	The guidance has not been modified. The paragraph inidicates the importance of limiting the potential for cross contamination a very important aspect of all phases of remediation.
7	2	2.4		Overly descriptive 3rd paragraph which is just re-wording of Aug 2005 FSMP manual. The guidance document should simply refer the the FSPM as the reference for the investigator to review and get the full details of preventing cross-contamination. Including this additional wording here in this document does not add anything significant and just makes the document that little bit longer.	

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7	2	2.4	2.4.1	Consideration of access limitations. This section of the guidance contains very prescriptive requirements for well placement. The guidance should acknowledge that access limitations (e.g. underground utilities, critical structures, property access, etc.) often play a signficant role in the placement of monitoring wells, and should allow more flexibility to account for situations where access limitations make it impratical to install a well a the prescribed location.	2.4.1 indicates that ground water samples should be as close to the aoc as practical considering access utiliies etc. In addition, this section discusses biassing collection of ground water samples. Ground water samples may be collected without the installation of a monitoring wells.
7	2	2.4		Guidance document should not establish new regulatory requirements. In the 2nd sentence, the term shall should be replaced with "should".	Shall is used in reference to the technical requirements for site remediation. This guidance is not establishing new regulation.
8	2	2.4	2.4.1	In the second paragraph, second line, a word appears to be missing at the end of the sentence: “Ground water flow direction may also be predicted based on data from adjacent.” Should this be adjacent sites?	The guidance has been modified to read "Ground water flow direction may also be predicted based on data from adjacent sites".
8	3	2.4.1	2nd paragraph	In the 1st sentence of the 2nd paragraph, insert "often" between "Ground water flow direction can" and "be predicted based on topographic relief..."	The sentence has been modified to read "Ground water flow direction can often be predicted based on topographic relief…"
8	3	2.4.1	2nd paragraph	The last sentence of the 2nd paragraph states: "If ground water flow direction cannot be determined as stated above, it shall be determined by collecting site specific potentiometric surface data from surveyed temporary wells, piezometers or monitoring wells prior to collecting ground water samples." There may be cases where it is appropriate to collect ground water samples immediately and therefore before ground water flow direction has been established. While it may be prudent to do so, establishing flow direction before sampling should not be a requirement.	In cases where ground water flow direction can not be estimated and it is not desirable to determine it by collecting site specific elevation data, multiple ground water samples should be collected surrounding the AOC or within the AOC. The guidance has been edited to reflect this option.
8	2	2.4	2.4.1, 2nd paragraph	Sentence "Ground water flow direction may also be predicted based on data from adjacent" is incomplete, and is assumed to be "data from adjacent properties." Strongly recommend using temporary wells, but the NJ Well Code should be relaxed. DEP should commit to adding flexibility to the well code to allow for expanded use of temporary wells.	The sentence has been modified to read "Ground water flow direction may also be predicted based on data from adjacent sites."

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8	2	2.4	2.4.1, 3rd paragraph	"Where contaminants are less dense than water… continuous soil cores should be collected to a depth of 10 feet below the observed water table." This is overly prescriptive, and may not meet all field conditions (i.e. if there is significant distance between the soil impacts and depth to water, or if soil impacts are delineated above the water table). The requirements for continuous soil cores should be addressed in the FSPM or soil guidance document. The depth should be established based upon the professional judgment of the LSRP based upon an understanding of site conditions and likely variations in water table elevations.	The sentence has been modified to read "Where the contaminants are less dense than water, such as petroleum products, continuous soil core(s) should be collected through the water table to account for water table fluctuation and the possibility of contamination trapped beneath the water table"
8	3	2.4.1	3rd paragraph	The guidance document specifies cores to 10 feet below the water table for contaminants less dense than water. The depth of the core should be based on field conditions, not an arbitrary number. This requirement should be deleted.	The committee agrees, the depth of the core should be based on field conditions. However, if the soil core is not extended some depth below the water table, contamination could be missed even where the "field condition" at the water table indicates that no contamination is present. The core should extend below the water table to ensure that contamination is detected. Many studies have been performed concerning the distribution of LNAPL. These studied have shown the LNAPL is not soley found at the water table but may be found below it. Therefore, initial ground water sampling should consider this potential.
8	3	2.4.1	4th paragraph	The guidance document specifies sampling at the interval that exhibits the highest PID/FID readings. Organic vapor readings are one indicator of contamination. However, other field observations should be considered as well when selecting sample intervals. The text should be revised to indicate sampling at the interval that exhibits the greatest evidence of contamination in the field.	The document has been modified to read "Ground water samples should be biased based on contaminant type, AOC history, field instrument readings, visual observation or other field indicators".

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8	2	2.4	2.4.1	This section discusses the depth of ground water samples. In the fifth paragraph, the first line lists USTs, leach fields, seepage pits, and UIC systems, but provides not other information. Is there something missing here, such as where the samples should be biased for these AOCs?	The paragraph has been corrected to read "Where the discharge originates at an underground storage tank, leach field, seepage pit or Underground Injection Control (UIC) unit, and is located below the water table, the ground water sample should be collected beneath the water table at the depth of the discharge or the depth of greatest contamination as determined by field screening".
8	2	2.4	2.4.1, 5th paragraph	" Where the discharge originates at an underground storage tank, leach field, seepage pit or where the AOC is classified as an Underground Injection Control (UIC) unit" is an incomplete sentence.	
8	3	2.4.1	5th paragraph	The 1st sentence in the 5th paragraph appears to be incomplete.	
8	3	2.4.1	5th paragraph	The 2nd sentence in the 5th paragraph states "Where the potential discharge is located below the water table, the ground water sample should be collected beneath the water table at the depth of the discharge." This is not necessarily an appropriate approach for light contaminants. For example, gasoline leaking from the bottom of a UST below the water table often migrates upward before spreading outward. In that case, the ground water sample would be collected at the water table, not the depth of discharge.	The guidance has been modified to read"Where the discharge originates at an underground storage tank, leach field, seepage pit or Underground Injection Control (UIC) unit, and is located below the water table, the ground water sample should be collected beneath the water table at the depth of the discharge or the depth of greatest contamination as determined by field screening".

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8	2	4	1, 2	The document appears to indicate that groundwater samples should be collected adjacent to all AOCs, not within the AOC as is currently required. The document should clearly state that groundwater samples should be collected within the AOC at the area of highest potential contamination, and that sampling adjacently downgradient of the AOC would be an acceptable alternative if direct access to the AOC is not possible. We suggest that the figures be updated to depict the sampling locations within the limit of the AOC.	The document has been edited to read: "All initial ground water samples should be located within the area of the greatest suspected contamination. Where ground water samples cannot be collected in the area of greatest suspected contamination they should be collected as close to the AOC as practical and in a location that is hydraulically downgradient".
8	2	4	1	Fourth paragraph. The outlined sampling protocol for contaminants with a density greater than water may be appropriate for contaminants discharged as a pure product, but the approach would likely miss contaminants discharged as a mixture or dilution with a density close to water. This concept should be addressed. For example, PCE has a density greater than water but is commonly discharged in a diluted form (e.g., dry cleaning condensate or runoff from dumpsters containing disposed dry cleaning filters). If following the outlined protocol resulted in sampling groundwater above a low permeability zone that is 30 feet below the water table at a dry cleaning site, there is a good possibility that shallow water table contamination could be missed.	The document has been edited to read:' Where there is no indication of free or residual product, ground water samples should be collected along a vertical profile so that dissolved contamination may be detected".
8	2	2.4	2.4.1, 5th paragraph	" Where the discharge originates at an underground storage tank, leach field, seepage pit or where the AOC is classified as an Underground Injection Control (UIC) unit" is an incomplete sentence.	The sentence has been edited to read "Where the discharge originates at an underground storage tank, leach field, seepage pit or Underground Injection Control (UIC) unit, and is located below the water table, the ground water sample should be collected beneath the water table at the depth of the discharge or the depth of greatest contamination as
8	2	2.4	2.4.1	Complete the sentence in the 2nd paragraph: Ground water flow direction may also be predicted based on data from adjacent sites.	The sentence has been edited as suggested.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
8	2	2.4	2.4.1	This section should be revised to include a statement and examples of SI ground water samples within the AOC(biased to worst-case location); down-gradient samples should be an option for the SI when access within the AOC is infeasible or potentially required for an RI where necessary based on the SI data. Also, a note should be added to indicate that well placement decisions are field determined based on the professional judgment of the investigator.	The document has been edited to read: "All initial ground water samples should be located within the area of the greatest suspected contamination. Where ground water samples cannot be collected in the area of greatest suspected contamination they should be collected as close to the AOC as practical and in a location that is hydraulically downgradient".
8	2	2.4	2.4.1	Third paragraph - collection of ground water samples from discreet intervals based on seasonal water table and potential smear zones is not appropriate for the SI phase and should be removed from this section of the document. Also note, the technique for obtaining such samples is not compatible with standard well construction (i.e., 10-foot well screen) and purge methods.	Collection of ground water samples from discreet intervals based on seasonal water table has been removed from the document. Initial "SI" ground water samples should be collected from discreet intervals utilizing temporary well points or other ground water grab sample method. It is intended that ground water samples collected during the SI portion of the investigation will be collected as a grab sample using a temporary drive point or well screen. Therefore, installation of a monitoring well will not be required.
8	2	2.4	2.4.1	"Continuous soil core should be collected to the depth of the first low permeability soil layer, or the top of bedrock, whichever is encountered first. " This should not be required for all sites. Soil sampling should be conducted using techniquies that allow for characterization of all encounrtered stratagraphic units present at the site.	The guidance only suggests this type of sampling where DNAPL chemicals were suspected to be released. This type of sampling is not suggested for sites with LNAPL chemicals.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
8	2	2.4	2.4.1	Paragraph 3 - this is a GW guidance document, why is this document dictating how a section of a soil SI should be done to the extent that it is listing how deep soil samples should be collected. This is for the Soil SI guidance document. The 1st line of this paragraph is unnecessaary and not fully appropriate for GW guidance document and suggest the sentence be removed.	This section outlines requirements for selecting the location of ground water samples based on soil coring and the location of contamination and low permeability strata… it is intended that the ground water samples will be collected as a grab sample using a direct push method. The section does not discuss the collection of soil samples for analysis. The results of soil sampling and screening are mearly used to identify the location at which to bias the location of the ground water sample.
9	2	2.4	2.4.2	1) Too prescriptive. No technical justification for sampling every 30 linear feet. This requirement fails to acknowledge that the soil type and hydrogeologic regime should be considered in establishing sampling locations. 2) In the previous sections of the Guidance (Sec. 2.4, 1st paragraph), it was stated that ground water samples should be biased to the location of the greatest contamination. To be consistent with previous requirements this section should be revised to include "biased to the greatest contamination" location.	The document has been edited to read: "All initial ground water samples should be located within the area of the greatest suspected contamination. Where ground water samples cannot be collected in the area of greatest suspected contamination they should be collected as close to the AOC as practical and in a location that is hydraulically downgradient". and "Where mobile and volatile contaminants were used at an AOC and there is no indication of soil contamination, but contamination may have migrated to the water table due to soil type, contaminant type or solubility, AOC size and history, collecting a ground water sample every 30 feet of width or diameter in the direction of assumed ground water flow may be considered. For AOCs where point source discharges may have occurred (i.e., below grade piping or floor drains) or where preferential contaminant migration pathways exist (i.e. utility trenches), installing monitoring points closer together in the direction of assumed ground water flow may be warranted".

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
9	2	4	2	This section is too prescriptive and the dimensions of the AOC should not dictate the well location. The LSRP should be able to utilize professional judgment when determining appropriate well locations to evaluate an AOC.	These are not necessarily wells. These are ground water samples collected using a direct push method.
10	2	4	3	This section recommends GW sampling for tank fields containing 3 USTs even if there is no indication of a release. This is not a requirement and not really a concept that should be applied carte blanche.	This section has been removed.
11	2	4	3	1) Collecting at least one ground water sample with leaking USTs is too prescriptive; no clarification for cases when no ground water observed in the excavation and/or post-excavation soil results are clean. In addition, the guidance should define the term "leaking UST." We anticipate that the definition will be consistent with NJAC 7:14B. 2) It appears that ground water sampling is required for tank fields containing up to three tanks with a maximum capacity of 10,000 gallons per tank, even if no evidence of discharge was documented. Should specify that groundwater sampling is not required for UST cases where no discharge was documented. Regarding requirement for variance from well code to meet this guidance, DEP should commit to adding flexiiblity to well code so that this work does not require a site-specific variance each time it is deemed needed and consistent with DEP guidance.	This section has been removed.
11	2	4	3	Sampling groundwater within the backfill of a former excavation may yield inaccurate data particularly if the investigator did not have direct control over the practices and material used to fill the excavation. Former excavations can act as dry wells and collect runoff.	This section has been removed.
11	2	4	3	Guidance document should not establish new regulatory requirements. In the 1st paragraph, 2nd sentence, the term “shall” should be replaced with "should".	The word "shall" is used in this document when referencing a requirement pursuant to regulation.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
11	2	4	3	It is unclear why regulated USTs are dealt with as a separate AOC. The methods outlined in the prior sections would appear to also pertain to USTs, so this section does not seem warranted. The discussion of locating the groundwater sampling point within the UST excavation should also be stressed in the prior sections (i.e., a preference for sampling within a AOC, and sampling downgradient of the AOC when not practical).	This section has been removed. The Department will issue separate guidance concerning the investigation of regulated underground strage tanks.
11	2	4	3	1) Collecting at least one ground water sample with leaking USTs is too prescriptive; no clarification for cases when no ground water observed in the excavation and/or post-excavation soil results are clean. 2) It appears that ground water sampling is required for tank fields containing up to three tanks with a maximum capacity of 10,000 gallons per tank, even if no evidence of discharge was documented. Should specify that groundwater sampling is not required for UST cases where no discharge was documented.	This section has been removed. The Department will issue separate guidance concerning the investigation of regulated underground strage tanks.
11	2	4	3	1st sentence: "The NJDEP recommends that at least one ground water sample be collected for sites with leaking USTs and tank fields containing up to three tanks with a maximum capacity of 10,000 gallons per tank." Consider revising to make ground water sampling optional (e.g., gw samples in lieu of soil samples for soluble contaminants), and/or contingent on evidence of a discharge (e.g., soil data). Also clarify "tank field" (i.e., "up to" vs. "at least" three tanks) and whether the intent is to recommend additional ground water samples for larger tank fields and/or larger tanks.	This section has been removed. The Department will issue separate guidance concerning the investigation of regulated underground strage tanks.
11	2	4	3	In reference to 2.4.2 above this 1st paragraph is written more inline with guidance. 2.4.2 should be written more like this subsection. Why just "regulated" USTs? Since this a guidance document trying to cover as many issues as possible, this should refer to any USTs not just regulated.	This section has been removed. The Department will issue separate guidance concerning the investigation of regulated underground strage tanks.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
11	2	4	3	1) Collecting at least one ground water sample with leaking USTs is too prescriptive; no clarification for cases when no ground water observed in the excavation and/or post-excavation soil results are clean. 2) It appears that ground water sampling is required for tank fields containing up to three tanks with a maximum capacity of 10,000 gallons per tank, even if no evidence of discharge was documented. Should specify that groundwater sampling is not required for UST cases where no discharge was documented.	This section has been removed. The Department will issue separate guidance concerning the investigation of regulated underground strage tanks.
11	2	4	3	FMA Recommends this section be entirely removed from the guidance. NJAC 7:14 B specifies a site investigation be conducted in accordance with NJAC 7:26E when regulated tanks are closed. NJAC 7:26E, Table 2.1 sets forth the required analytical parameters for the petroleum storage sites.	The UST requirements are being removed from the Department's Technical Requirements for Site Remediation. Therefore, guidance is being issued concerning the investigation of regulated underground storage tanks.
	2	4	3	NJAC 7:26D sets forth the default impact to ground water criterion and provides for the development of a 'site specific' impact to ground water criterion. If the impact to ground water trigger is exceeded, or soils impacted with petroleum at concentrations greater than the criterion, are removed from within two feet of bedrock or ground water (for less permeable soils, greater distances could be applicable based on percent sand) the ground water investigation is triggered.	NJAC 7:26D establishes impact to ground water soil remediation standards. These standards are cleanup standards and were not developed to determine if a ground water investigation is necessary. Contaminant concentrations in soil may not be indicative of contaminant presence in ground water. For example, at a site where a release occurred in the past and the contaminants are mobile and volatile, such as gasoline, there may be no indication of contamination in soil since the contaminants have migrated to ground water and volatilized from soil.
12	2	4	4	In GW guidance why a subsection on soil logging, classification and screening as a stand-alone? This should be referred to Soil SI guidance document or if used in here should be presented as an introduction paragraph to a GW related item … such as the next subsection 2.4.5 Monitoring well construction.	The document has been edited to read "The logging requirements are necessary to bias initial ground water samples and to assist in developing a conceptual hydrostratigraphic model".

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
11	2	4	4	Soil Logging and Field Screening – Perhaps this is a pet peeve but this document is supposed to be technical guidance and lacks a very important point here and in many other sections. It should be specified that field work must be performed by qualified individuals trained in the required field methodologies and supplied with appropriate tools to promote consistent data collection. I have a parochial preference for geologists to perform stratigraphic logging but if supplied with the appropriate field tools (texture and color cards for example) consistent data can be collected by others. This concept is particularly cogent for this document. In later sections (3.3 et seq) the development of Conceptual Site Models is discussed and we all know the trials of preparing large cross-sections with soil logs prepared by several different individuals. Even when they are all well qualified the data translation is tedious at best and at worst can result in costly errors.	It is the LSRPs responsibility to ensure individuals working on technical issues at a site are qualified by education, training, and experience. Pursuant to N.J.S.A. C.58:10C-16c. "A licensed site remediation professional shall not provide professional services outside the areas of professional competency, unless the licensed site remediation professional has relied upon the technical assistance of another professional whom the licensed site remediation professional has reasonably determined to be qualified by education, training, and experience".
12	2	4	5	Use of "should" rather than "shall" implies flexibility. Is that the case? If not, then why was "should" used? How about adding a section on temporary wells? This guidance is quite supportive of their use, but the well code is not.	The term "should" is used when regulation is not cited. The well code is supportive of Category 5 geotechnical borings as defined in N.J.A.C. 7:9D-2.1(a)5 "test borings, probe holes, uncased holes drilled or otherwise constructed for the purpose of obtaining data for engineering and/or geophysical, hydrological or geological purposes and borings involving the use of directpush technologies", provided that they are decomissioned within 48 hours. In addition, section 6.9.2.1 of the FSPM is supportive of the use of temporary wells.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
12	2	5	1st paragraph	This paragraph does not allow for the use of new or emerging sampling technologies; peer-reviewed techniques should be allowed.	When there is no specific requirement provided by the technical requirements for site remediation and guidance issued by the department are not appropriate or necessary in the professional judgement of the lsrp relevant epa, other states and other relevant and applicable methods may be used.
12	2	5	General	No real guidance here on sampling or analyses – just refers readers elsewhere. Why claim to offer it? Or perhaps retitle it to be “for gas stations”	This section directs the reader to other applicable guidance concerning ground water sampling and analysis.
12	2	5	2.5.1	1) Requirements for Initial Ground Water sampling parameters are addressed in Table 2-1 of the Technical Requirements for Site Remediation (TRSR); the requirement included in the Guidance should be consistent with the Tech Regs. Specifically, the requirement to analyze ethylene dibromide is inconsistent with the TRSR, which specifically excludes ethylene dimbromide from the target analyte list for petroleum discharges. Any requirement to for addtional analytical parameters should not be retroactive to any site where groundwater investigation is complete and/or remediation is in progress.	This section of the document has been deleted. Refer to the NJAC 7:26E, Table 2-1.
12	3	2.5	1st paragraph	The last sentence states: "Ground water monitoring wells should be sampled in order, from least to most contaminated, to minimize cross contamination." Insert the phrase "as practicable" after "least to most contaminated."	The document has been edited as recommended
12	2	5	1	Third paragraph. First bullet is unclear since the preceding paragraph outlines storage history.	This section of the document has been deleted.
12	2	2.5	2.5.1	The more detailed analytical requirements should be contingent on initial detection or exceedances of more conventional VOCs such as BTEX that may be used as indicators. In this case, the described analyses should be moved to the RI section of the guidance.	This section of the document has been deleted. Refer to the NJAC 7:26E, Table 2-1.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
10	2	5	1	Target Compound List (TCL) should be included for identifying the apporpriate VO+10 analysis.	This section of the document has been deleted. Refer to the NJAC 7:26E, Table 2-1.
12	2	2.5.1		The discussion in 2.5.1 is inconsistent with Table 2.1 of the Tech Regs.	This section of the document has been deleted. Refer to the NJAC 7:26E, Table 2-1.
12	2	2.5	2.5.1	2.5.1: FMA Recommends this section be deleted entirely. Proposed NJAC 7:26E Table 2-1 specifies the sampling parameters required when investigating petroleum storage sites. For sites where leaded gasoline was stored, the compounds 1,2-dibromoethane and 1,2-dichloroethane have been added to the analytical parameters for sampling ground water. It is not the place of guidance to add additional sampling parameters. If the section is not to be deleted, FMA suggest the following edits: Underground storage tanks (USTs) which stored gasoline prior to 1986 would be expected to have been closed or to have conducted a site investigation prior to having been retrofitted to be compliant with the NJAC 7:14B. These sites were required to conduct a site investigation and submit the results of the site investigation to the Department. If the Department issued an NFA for the site, the required investigation for closure of tanks currently in use should be limited to analysis as specified for the products currently stored. Pursuant to N.J.A.C. 7:26EXXX and Table 2-1 in the Technical Rules, the following sampling is required: VO+TICs, including ethylene dibromide (1, 2-dibromoethane), 1,2-dichloroethane. FMA does not see where 1,2- dichloropropane has been added to the recently proposed Table 2.1 and this guidance should not infer the analysis for this compound is required. At sites where leaded gasoline has been stored in the existing tanks after 1986 (off-road racing fuel, aviation gasoline) sample and analyze for VO+TICs, ethylene dibromide, (1,2-dichloroethane), and 1,2-dicloroethane in accordance with Table 2-1 of the TRSR. In addition to our very serious concern that this guidance recommends currently sampling for	This section of the document has been deleted. Refer to the NJAC 7:26E, Table 2-1.
13	3	2.5.1	Last paragraph	The last sentence states: "In order to reach the GWQS practical quantitation limit (PQL) for ethylene dibromide, USEPA method 8011 must be used (USEPA, 2010)." This requirement should be replaced with a caution that reminds the user that conventional analytical methods may not achieve the necessary reporting limits and provide a reference to another method such as 8011. Many commercial laboratories are constantly improving their detection limits. It is possible that another method, such as SIM, could eventually achieve the required reporting limit.	This requirement has been removed from the guidance. The Technical Reqirements contain the analytical requirements for petroleum discharges.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
13	3	2.5.2		This section states: "The Department's current policy recommends sampling for ethanol if a new discharge is suspected." There is no current GWQS for ethanol and the guidance does not offer any suggestion as to how to address the results. This requirement should be eliminated from the guidance.	This requirement has been removed from the guidance. The Technical Reqirements contain the analytical requirements for petroleum discharges.
				background	
13	2	2.6	1st paragraph	The Guidance requires a determination of background conditions in SI phase. Background investigations are typically not considered until extents of groundwater impacts and site hydrogeology are known.	A background investigation is only required if the person conducting the investigation is claiming all or part of the ground water contamination originates from an off-site source. A background investigation may be performed at any phase of the remediation.
13	2	2.6	1st paragraph	The requirement to install a "sufficient number of background wells" to "evaluate all offsite sources" should be removed. The demonstration of offsite sources can be through methods beyond wells, and it should not be the responsibility of the remediating party to evaluate other releases beyond what is necessary to establish remedial requirements for the target site.	The section has been modified to allow for other investigative techniques including temporary well points.
13	2	2.6		Naturally occurring background. The guidance should provide a framework for establishing, where applicable, that contamination is related to naturally occurring background conditions (e.g., for inorganics).	The document has been edited to include a paragraph concerning natural background.
13	2	2.6		This section should note that onsite concentrations that are marginally higher than background, off-site concentrations may be statistically insignificant, and may be a function of common variability in environmental data. In these cases and where sufficient data exist or can be collected, statistical analysis of the data may be warranted to determine whether such minor differences are significant.	The guidance indicates that it may be prudent to collect more than one round of ground water samples to identify seasonal and long term water quality trends. The LSRP may use statics to evaluate the seasonal or long term trends.
14	2	2.6	last paragraph	The Department should provide technical justification for requirement to re-evaluate an established background GW contamination on annual basis or this requirement should be eliminated.	Background ground water quality may change over time therefore, it should be re-evaluated at some regular interval, annually was provided as an example

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
14	3	2.6		2nd to last paragraph notes that when background contamination is confirmed, "the extent of remediation necessary is only to address the higher of the ground water quality standard for the contaminant constituent or the background concentration." This requirement does not address situations where the upgradient concentrations may be lower than on site concentrations when the only source is upgradient, such as a contaminant slug.	If the site never used the contaminant, as documented by a signed affidavit, and the contaminant was never detected in on-site soils would provide evidence to a slug theory. Additionally, the LSRP may provide the rationale for the occurrence of contamination in the next key document submission to the Department.
14	2	6		Fourth paragraph: This discussion should be expanded to include the scenario where a parent product discharged upgradient to a site breaks down after it enters the site and results in daughter products that may be present in site wells but not in background wells.	The intent of the guidance concerning background is clear. If there is contamination originating up-gradient along a flowpath of concern the person responsible for conducting the remediation does not have to address it. This includes dissolved constituents and daughter products from sources located off-site.
14	2	6		Fifth paragraph: Would the no further action requirement hold true if it were shown that the upgradient plume was not contributing to the on-site plume, say in the case of a large site where the could be a separation between the plumes?	No, background conditions must be established for the AOC in question. Background ground water quality must be established along the same ground water flowpath as the AOC.
14		2.6		This section makes it seem as the RP must investigate background conditions. It is only required when GWQ is exceeded and to support a claim of contamination from background source – this should more clearly specify investigation of only contamination exceeding GWCS and reporting of lower impact to NJDEP as per requirements)	Pursuant to the technical requirements, a background investigation is only required if the person conducting the investigation is claiming all or part of the ground water contamination originates from an off-site source. If the person conducting the remediation assumes that all of the contamination detected originates on-site, no off-site investigation is necessary.
				3. Remedial Investigation of Ground Water	

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
15	3			The establishment of a conceptual hydrostratigraphic model should refer to Site Conceptual Model Guidance. Remove from this document.	The text has been edited to refer the reader the the CSM guidance document. However, reference to the conceptual hydrostratigraphic model will remain in this document as it is a distinct portion of the Conceptual Site Model.
15	3			"Rapid delineation and elimination of a continuing source of groundwater contamination" is not cited in the TRSR (N.J.A.C. 7:26E). This sentence should be eliminated. NJAC 7:26E-1.12 states that "As a first priority, the person responsible for conducting the remediation shall identify the need for any interim remedial measures necessary to remove, contain, or stabilize a source of contamination to prevent contaminant migration and exposure to receptors".	The text has been modified to state "Pursuant to NJAC 7:26E-1.12, the person responsible for conducting the remediation shall identify the need for any interim remedial measures necessary to remove, contain, or stabilize a source of ground water contamination to prevent contaminant migraton and exposure to receptors".
15	3			Reliance on a dynamic workplan, real time screening analytical data and field decisions is not practical for all sites. It further is too prescriptive and does not allow investigators to use professional judgment. The guidance should be revised to indicate that investigators should consider use of Triad-type techniques, as appropriate.	This is a guidance document. It precsents options for ways of doing investigations. A triad approach is recommended and not required.
15	3			Establishment of a CEA upon completion of delineation is not consistent with the TRSR (NJAC 7:26E). NJAC 7:26E-8.3(a) indicates that the Department will establish a groundwater classification exception area as part of a remedial action for groundwater.	The August 11 proposed Technical Requirements include the establishment of a CEA as part of the Remdial Investiation Report.
15	3	3.1		The sentence and entire list describing the methods to conduct a remedial investigation for groundwater should be eliminated (i.e., the sentence that concludes "shall be conducted by:"). As written, this is a prescriptive series of requirements that are not appropriate in guidance. The purpose of the remedial investigation outlined in the prior paragraph is sufficient.	The requirements are listed in reference to the proposed Technical Requirements.
15	3	3.1	2nd bullet	The receptor evaluation citation is incorrect. It should be cited as NJAC 7:26E-1.15-19.	The requirements are listed in reference to the proposed Technical Requirements.
15	3	3.1	2nd bullet	Bullet #2 indicates that a receptor evaluation must be updated if an immediate environmental concern or vapor concern exists. The source of these definitions (NJDEP VI Guidance) should be cited.	The source of the bullet is the proposed Technical Requirements.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
15	3	3		The 5th sentence states, "Delineation of ground water contamination should proceed in a rapid fashion relying on a dynamic workplan, real time screening analytical data and decisions made in the field." The requirements for "rapid fashion" and "dynamic workplan" are undefined and unclear. Timeframes should be in accordance with those established in the regulations. It is difficult or impossible to demonstrate compliance with non-specific "rapid" timeframes. This requirement should be deleted from the guidance document.	The guidance document indicates that the investigation "should" proceed in a rapid fashion. The LSRP may use professional judgement in determining a schedule for delineating ground water contamination provided that it meets the mandatory and regulatory timeframe.
15	3	3.1		This section states that, "a remedial investigation of ground water shall be conducted by: Characterizing the hydrogeology of the site," and then identifies a variety of data requirements. This section and the entire guidance document should note that the goal of the investigation should be to obtain sufficient data to select and design the appropriate remediation technologies for a given site. Not all of the data needs identified in the guidance apply to all sites universally. The extent of site characterization should be based on professional judgment rather than a list of items that "should" be determined.	The guidance document is written to capture the data needs for most sites. The practitioner should use professional judgement to determine the scope of the remedial investigation as it pertains to their particular site.
15	3	3.1		2nd to last bullet on page 15 requires the investigator to identify ground water recharge and discharge zones. This requirement is not necessarily applicable at all contaminated ground water sites. For example, if a zone of contaminated ground water has been fully delineated, identifying the recharge and discharge zones may not be necessary in order to select and implement a successful remedial action. Additionally, in bedrock systems, identifying the recharge and discharge areas can be very difficult and costly and may not be relevant to every situation. This discussion should be clarified to indicate that the information should be collected as necessary and appropriate based on the needs of the case and professional judgment. This comment also applies to the next bullet which requires determination of the seasonal high water table and the subsequent bullet which requires determining hydraulic properties of aquitards.	It is important that the investigator develop an understanding of ground water flow and contaminant migration for the site. Part of this investigation should include identifying regional recharge and discharge areas as a means of assisting in understanding ground water flow direction and developing a conceptual hydrostratigraphic model. However, it is understood that data collection will be taylored to meet the investigation needs at a particular site.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
15	3	3.1	1st bullet	Delineation of the vertical extent of groundwater contamination should be completed as appropriate. Vertical delineation is not always required. Additionally, "Ground Water Remediation Standard" is an incorrect citation. These two issues occur in multiple sections of this document.	Vertical and horizontal delineation to the ground water remediation standard is required by the Technical Requirements for Site Remediation. "Ground Water Remediation Standard" is not an incorrect citation. The Remediation Standard Rules at N.J.A.C. 7:26D establish the Department's Ground Water Quality Standards as the Ground Water Remediation Standards.
16	3	3.1		The LNAPL Guidance should be cited or referenced for determining and characterizing the contaminant source zone(s) and its extent above and below the water table.	The LNAPL guidance only addresses measureable free phase LNAPL and does not address the entire ground water source area.
16	3	3.1		The receptor evaluation citation is incorrect. It should be cited as NJAC 7:26E-1.15-19. In addition, there is no guidance for performing a receptor evaluation under the link provided.	The citation is from the proposed Technical Requirements. The link connects to instructions for filling out the receptor evaluation form.
16	3	3.1	6th bullet	Second sub-bullet: unsaturated zone should be changed to vadose zone (this occurs in later sections of the document as well). Vadose zone should be defined. Third sub-bullet should be revised to "Delineating the extent of soils in the saturated zone to the applicable Direct Contact Soil Remediation Standard".	The term vadose zone is correct, however, the guidance document uses the term unsaturated zone since this term is used in other Department Guidance and Regulations.
				Third sub-bullet should be revised to "Delineating the extent of soils in the saturated zone to the applicable Direct Contact Soil Remediation Standard".	While all other pathways must be addressed, including the requirement to delineate to the appropriate direct contact standard, this document deals with the delineation of sources of ground water contamination only.
17	3	3.1	3.1.3	Modify the fourth sentence to state: Data for the initial conceptual hydrostratigraphic model "can be obtained from various sources, including" instead of should be gathered by"	The text has been edited as suggested.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
17	3	3.1	3.1.3	The initial conceptual hydrostratigraphic model details are too prescriptive and imply a one-size fits all approach. The summary should be modified to indicate the model "may consist of"…	The committee disagrees. The guidance document is written to apply to most sites. The practitioner should use professional judgement to determine the scope of the data necessary for their particular site.
17	3	3.1.2		The 1st sentence states, "To minimize costs and the time necessary to conduct a remedial investigation, the Department recommends implementing the Triad approach." The Triad approach may not be applicable or cost-effective in every case. It is reasonable to identify the Triad approach as a method that may be employed. However, by recommending this approach for all sites, the guidance document puts the investigator in the unreasonable position of explaining why this approach was not used in a case where it may not be considered optimal. The "recommendation" to use the Triad approach without conditions should be removed from this guidance document.	The document has bee edited to read "the LSRP may implement the Triad approach".
17	3	3.1.3		This section includes surface geophysics among the data that should be gathered for a conceptual hydrostratigraphic model. While surface geophysical data may prove useful in developing an understanding of site hydrogeology, there are many limitations that need to be considered, none of which are discussed in this document. The use of surface geophysics should be considered as one possible tool in assessing a site. But, this technology may or may not be applicable given site-specific conditions and therefore should not be required for all sites.	The guidance recommends different techniques. The investigator may adjust the scope of the investigation based on site specific needs.
17	3	3.1	3.1.3	I am concerned that the GW document does not refer to the CSM Guidance coming out. While there are many references to hydrostragraphic models the CSM is approach is broader and incorporates both technical information as well as information to develop a complete understanding of the contamination event (i.e. sources, pathways and receptors). This is necessary to demonstrate a complete understanding of site conditions and associated risks.	The document has been edited to include a link to the CSM guidance document.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
17	3	3.1	3.1.3	This draft guidance document appears to lose sight of the ultimate goal of ground water investigation and remediation at a given site; that is protection of the resource. The extent of investigation needs to be commensurate with the extent and complexity of the problem. The guidelines presented in the draft guidance go well beyond what is often necessary. For example, much of the information presented for developing hydrostratigraphic conceptual models would be used in developing complex numerical flow models and is beyond what would typically be included in a basic remedial investigation.	The guidance recommends different techniques. The investigator may adjust the scope of the investigation based on site specific needs.
18	3	3.1	3.1.3	Second paragraph. Recommend modifying to read "Following are some of the available resources that may [not "should"] be used to develop an initial conceptual hydrostratigraphic model." The list of avaialble resources is appreciated, but it may not be necessary to consult all of these resources for every site. The LSRP is a professional and should have the flexibility to decide which resources are most appropriate to use on a case-by-case basis (including resources that may not be listed). Some may percieve that the listed resources, particularly to hydraulic conductivity and effective porosity values (3rd and 4th bullets), are the only ones that can be used.	The document has been edited as recommended.
19	3	3.1	3.1.3	Describe how an investigator should "thoroughly" characterize a production well if encountered at a site. The BWA requires these wells to be closed right away after going out of use. Another example of conflict between well code and Tech Reg priorities. Well code should aligned with this guidance, be changed to add provisions for this.	Where the well is not being used it should be properly abandoned. However, it may be worthwhile to investigate alternative approaches to abandonment. Where the well is useful in the investigation it may be modified to a Catagory 3 well. The document has been edited to indicate that the investigator should obtain information concerning the production well’s pumping history, water quality, depth, boring log and construction details If the well was sealed, it would not be subject to characterization. However, boring log information may be available and useful during the initial stages of an investigation.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
19	3	1	3	Effective porosity values are also provided in the Department's SESOIL guidance documents. It is suggested that this reference replace the existing references to maintain consistency within the Department.	The effective porosity values provided in the NJDEP SESOIL guidance document are model specific and are not appropriate for the saturated zone. As defined by the SESOIL documentation (Bonazountas and Wagner, 1984), effective porosity is "total porosity minus the moisture left after drainange". This term may be appropriate for modeling soil moisture movement through the unsaturated zone, however, is is not appropriate for determining the rate of ground water flow through the saturated zone. Here effective porosity is defined as "The volume of the void spaces through which water or other fluids can travel in a rock or sediment divided by the total volume of the rock or sediment" (Fetter 1988).
19	3	1	3	The reference to Sanborn maps is out of place in this section, which deals with remedial investigation. These maps would typically be obtained and consulted at a much earlier stage, i.e. during the preliminary assessment.	The reference to Sanborn Maps has been removed from the document.
20	3	3.1	3.1.3	Use of surface geophysics to confirm the presence of buried drums should be completed in the Site Investigation phase as per NJAC 7:26E-3.6.	The statement "and the presence of buried materials, such as steel drums or tanks" has been removed from the guidance document. The objective here is using geophysics to gain a better understanding of subsurface conditions as they relate to site geology and contaminant migration pathways.
20	3	3.1.3	Perform field reconnaissance of the site and surrounding area	The 2nd paragraph in this section requires the investigator to document numerous detailed conditions regardless of impact contaminant delineation and remedial action selection. This approach appears to be veering away from practical evaluations in favor of data collection for the sake of data collection. For example, will an RAO be considered incomplete if the investigation did not address microbreccias and paleosols in local bedrock outcrops? The need to identify and address such features should be up to the professional judgment of the investigator.	The guidance provides references that may be helpful in gaining an understanding of a site prior to any intrusive investigation. The committee believes that this type of up front background information will assist the LSRP in better understanding hydrogeology and, in the end, help to focus the intrusive portion of an environmental investigation.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
20	3	3.1	3.1.3	Perform surface geophysics to ascertain buried structures and subsurface topography. The need to perform surface geophysics should be based on the site history, size, complexity and known infrastructure at the site. Surface geophysics may not provide useful data at many sites and therefore should not be required at all sites.	The guidance document is written to apply to most sites. The practitioner should use professional judgement to determine the scope of the data necessary for their particular site.
20	3	3.1	3.1.3	The draft guidance document identifies and directs the investigator to use a wide variety of technologies and techniques in every case, regardless as to whether or not they are applicable. But, ***because of the requirement in ARRCs this guidance puts the onus on the investigator to explain why he or she did not use a specific technique or technology*** that was identified in the draft guidance document. For example, the draft guidance document identifies surface geophysics as a component of an initial hydrostratigraphic conceptual model as well as a tool for investigating free product. While surface geophysical surveys can provide information that is useful in many cases, there are also many cases for which surface geophysical surveys may be irrelevant or impractical. Because, the draft guidance document identifies this technology as basic to several aspects of investigations, the decision to forgo a surface geophysical survey now becomes a variance or deviation that has to be defended by the investigator. Extending this example to the dozens of other technologies and techniques in the draft guidance document will result in reports that are unwieldy, containing dozens of variances and deviations for items that were not applicable in the first place. Furthermore, many of the techniques identified in the draft guidance document (e.g. geophysics, MIP, LIF)	The LSRP is required to document what they did and why. The guidance RECOMMENDS different techniques. If the investigator sees fit to use something else as per their professional judgement, they simply must document it in their report (what they used and why).
21	3	3.1	3.1.3	The details required in an updated conceptual hydrostratigraphic model are too prescriptive and imply a one-size fits all approach. The summary should be modified to indicate the model "may consist of"…	The Department recognizes that professional judgement may result in a range of interpretations on the application of the guidance to site conditions.
				3.2 Delineation of NAPL and Sources of Ground Water Contamination	

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
22	3	2	1	This section references a 1992 USEPA guidance document entitled "Estimating Potential for Occurrence of DNAPL at Superfund Sites." It would be helpful to also reference USEPA's 2004 "Site Characterization Technologies for DNAPL Investigations."	The reference has been added as suggested.
22		3.2		Guidance should not carry the prescriptive weight of regulation that is inferred throughout the subject document. Throughout the draft document there is selective endorsement of various methodologies (laser induced fluorescence, MIPs, etc) and the danger becomes regulators that expect to see these at every site. I would specifically recommend the insertion of an additional paragraph at the introduction to section 3.2 on the order of:" The methods presented below are guidance recommended to ensure proper delineation of sources of groundwater impact. The purpose of this section is to provide an understanding of the detail and considerations required to complete appropriate delineation. The field and laboratory methods will be appropriate for various sites but not all. The investigator should review the techniques available and select the most appropriate for a specific site. "	The opening page of document indicates "In applying technical guidance, the Department recognizes that professional judgement may result in a range of interpretations on the application of the guidance to site conditions".
22	3	2		The term "rapidly" should be eliminated from Section 3.2 - Delineation of NAPL and Sources of Groundwater Contamination as it is subjective.	The term "rapidly" has been removed from the guidance.
22	3	2	3	The last sentence of this section should be eliminated from the remedial investigation portion of the guidance as it relates to selection of remedial actions.	The committee disagrees. The committee believes that the evaluation and selection of a remedial action for sources of ground water contamination should occur as soon as practicable.
22	3	2	2	The first sentence should be revised to add: "Potential s"ources of ground water contamination within the unsaturated zone include any soil contamination that exceeds the site specific IGWSRS.	The document has been edited as suggested.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
22	3	2	3	It should be mentioned that the IGWSRS do not apply to the saturated zone. Additional guidance should be provided on the methods used to determine if saturated soils remain a source of groundwater contamination.	Section 3.2.2 of the document outlines considerations for the unsaturated zone soils. At this time the Department has not developed methods to determine impact to ground water soil remediation standards for the saturated zone.
23	3	3.2	3.2.4	Indicating that investigators should use an outside-in approach to investigate free and residual product is too prescriptive and does not allow for professional judgment. The approach should be provided as an option to consider to minimize cross contamination.	The section has been updated to indicate that the outside in approach is an option. However, it is emphazised that the investigative approach must limit the potential for cross contamination to the extent practicable.
23	3	3.2.4	1st paragraph	The 2nd sentence states: "Hydrogeology, as well as the type of contaminants present should be understood before the source area investigation is undertaken." Developing an understanding of site hydrogeology is an iterative process. In some cases it may be necessary to investigate the source area to understand the hydrogeology and contaminant types. This sentence should be deleted.	The guidance was written to apply to most instances and to emphasis the importance of limiting the potential for cross contamination. Therefore, the sentence has not been modified.
23	3	3.2	3.2.4	LNAPL/Free-Product etc. components/definitions within this whole subsection should be consistent with DEP LNAPL guidance document.	The LNAPL guidance document is applicable to free phase LNAPL. This guidance applies to residual LNAPL. The definition of free product is consistent with the Technical Requirements for Site Remediation.
23	3	3.2	3.2.5	The guidance leaves the strong impression that field screening using cone penetrometer testing (CPT) equipped with laser induced fluorescence (LIF) and/or membrane interface probe (MIP) must be used for field screening and confirming the presence of free and residual product. It should be clear that these are options to be used based on site-specific conditions.	The document is providing guidance. The LIF is a tool that may be used to delineate separate phase material that is fluorescent.
21	3	2	5	Field Testing - Soil Agitation testing has not been considered valid by the NJDEP for the last several years. Again, there should be a reference to an appropriate document for conducting these tests (ie. The FSPM or revise the 1994 Field Analysis Manual).	The reference to soil agitation test has been removed from the guidance. A reference is included. The Mercer and Cohen paper entitled "Evaluation of Visual Methods to Detect NAPL in Soil and Water",

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
23	3	2	5	The LNAPL guidance document should be referenced as it provides several methods for delineating LNAPL.	The LNAPL guidance document has been referenced.
23	3	3.2	3.2.5	The guidance leaves the strong impression that field screening using cone penetrometer testing (CPT) equipped with laser induced fluorescence (LIF) and/or membrane interface probe (MIP) must be used for field screening and confirming the presence of free and residual product. It should be clear that these are options to be used based on site-specific conditions.	In all cases, it is up to the LSRP to select appropriate tools for delineating contamination based on site specific considerations.
24	3	3.2	3.2.5	The "safe vertical limit of penetration" concept is good but no real guidance is offered regarding its discovery, or not. if you do not find DNAPL after the “safe” limit of penetration, are you to conclude it does not exist? This is the Pandora’s box DNAPL problem.	As stated in the guidance, the "safe vertical limit of penetration" is found by evaluating data collected from borings outside of the source zone. The data are used to form a conceptual model of site hydrogeology, stratigraphy, and potential DNAPL pathways. The data would likely include the locations of low permeability strata on which DNAPL may be discovered. Upon intitiating the investigation within the source area, if the investigator does not find concentrations of DNAPL chemicals that could be indicative of seperate phase material to the depth of low permeability strata, then the investigator may conclude that DNAPL is not present at the site.
24	3	3.2	3.2.5	The Griffin and Watson method for delineating free and residual DNAPL is described as "the most effective strategy for identifying and delineating DNAPL" and may imply that it's process must be followed. The guidance needs to clearly indicate that the process is a consideration for investigators and that other delineation approaches may also be followed.	The document has been edited to read "Their strategy...". As stated in the opening of the document, "The Department recognizes that professional judgement may result in a range of interpretations on the application of the guidance to site conditions".
24	3	3.2	3.2.5	The Griffin and Watson delineation method bullet list should be numbered to indicate a sequence. Bullet # 3 is not clear and may be a partial sentence.	In order to make it more clear, the document has been edited to read "• Collect soil core samples from high the concentration areas identified during the MIP survey and evaluate the soil data with respect to phase equilibrium partitioning algorithms."

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
24	3	3.2	3.2.5	The field screening techniques section should be re-titled "soil field screening techniques" as it deals with screening soil cores.	The document has been edited as suggested.
24	3	3.2.5	4th paragraph	The guidance document states that a membrane interface probe (MIP) is the most effective strategy for identifying DNAPL in unconsolidated formations. In recommending the use of this technology the guidance document should also identify the limitations and potential problems that may be encountered. As with other investigation technologies, MIP is not perfectly suited for all cases. It should be identified as a possible tool, not as "the most effective strategy." Decisions regarding appropriate investigation technologies should be up to the professional judgment of the investigator.	As noted above, the document has been edited to remove the words "most effective strategy". The guidance lists several methods for identifying NAPL, not just the MIP. A reference to two papers that list the performance and costs of certain characterization technologies has been added to the document (Kram et al).
24	3	3.2.5	4nd paragraph	The last sentence of the fourth paragraph and all four associated bullets should be removed. This should be replaced with "This document could be reviewed if applicable to your site."	The guidance provides helpful insight in the delineation of DNAPL by summarizing the papers conclusions and directing the reader to the paper.
25	3	3.2	3.2.5	No introduction is provided to both the hydrosparge methods and fluorescence techniques summaries. Therefore, understanding how these methods and techniques fit into this section is not clear.	The paragraph has been edited for clarity. Reference to the methods has been removed. The reader is directed to the paper by Kram et al.
25	3	3.2.5	Vertical Profiling Techniques	This section appears to advocate the use of a variety of innovative, experimental and in some cases extremely expensive technologies without offering any discussion of the potential limitations of those technologies. This is information may be useful for a reference but is not appropriate as guidance as it puts the investigator in the position of having to justify why these technologies were not employed.	The investigator need not justify why he or she didn't do something, he or she needs to indicate what they did and why.
25	3	3.2.5	Soil Gas Surveys	This section states: "Soil gas surveys can be used to screen for LNAPL source accumulations." The guidance should note that this is only true under certain conditions. There are many subsurface conditions and sampling limitations that can affect the results of a soil gas survey and the accuracy in identifying LNAPL or other contaminant sources.	The document has been edited to indicate that soil gas surveys cannot be easily conducted in very low permeability or saturated soils.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
26	3	3.2	3.2.5	The use of the term "will be determined" to describe the choice of technology is too prescriptive. The statement should be revised to state "may be determined based on review of the following factors". Regarding soil gas surveys, Why limit this to LNAPL? The prior sections went into extensive use of DNAPL techniques that are limited to unconsolidated deposits. If a DNAPL can be characterized above the bedrock, why not use this technique?	the document has been edited to read "The investigator should choose an appropriate technology based on lithology, degree of consolidation…" The document has been edited to indicate that soil gas surveys may be useful in determining the location of DNAPL entry point.
26	3	3.2	3.2.6	The title of the first technique to infer the presence of free and/or residual product should be modified because it only indicates residual product assessment.	The document has been edited as suggested.
26	3	3.2.6	3rd paragraph	The 3rd paragraph states "…for DNAPL chemicals, free and/or residual product shall be considered to be present if the contaminant is detected in ground water at concentrations equal to or greater than 1% of its effective water solubility." Such concentrations may be considered evidence that a DNAPL is present but it is not the only line of evidence. There may be other evidence that indicates no DNAPL is present. It is unreasonable to mandate that concentrations of 1% of the effective solubility must be treated as separate phase product.	this is a requirement cited from the Department's Technical Requirments for Site Remediation.
26	3	3.2	3.2.6	The residual product assessment section should indicate that site-specific Kd values can be developed and are more reliable than estimated Kd literature values. Also note that estimating Kd from foc may significantly underestimate Kd since it ignores the sorptive capacity of inorganic silt and clay minerals, in contrast to the reference to sorption processes of these soil fractions in Section 3.2.3 above.	A reference to "Guidance for the use of the Synthetic Precipitation Leaching Procedure to Develop Site-Specific Impact to Ground Water Remediation Standards" has been added to the guidance. This document includes a method for determining a site specific Kd value.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
27		3.2.6		Residual Product Presence Inferred from Laboratory Analytical Data – Within this section the 1% rule for inference of DNAPL from TechRegs section 7:26E-2.1(a)14 is applied to LNAPL. The application of the 1% rule for LNAPL here is a huge step further than the Tech Regs and the current LNAPL Guidance Document. The TechRegs are specific in the application of the 1% rule to DNAPL (though it is not appropriate there either). The application of the 1% rule to to LNAPL should be stricken from this SI/Ri/RA guidance. The better reference would be to eliminate any mention of the 1% in relation to LNAPL and direct the reader to the Draft LNAPL Guidance that specifically states ”This guidance addresses the following activities when responding to the presence of measurable LNAPL (measured, or otherwise observed, to be a thickness of 0.01 feet or more)”	The guidance indicates that residual LNAPL may be inferred to be present within the 1% effective solubility isoconcentation contour. It's presence should be confirmed using the iterative approach outlined by Griffin and Watson. The document has been edited to indicate this. The LNAPL guidance does not address residual LNAPL. Residual LNAPL is a source of ground water contamination and must be remediated pursuant to the Department's Technical Requirements. However, the reference to 1% effective solubility has been removed for LNAPL. Other methods outlined in the guidance document should be used to delineate the extent of residual LNAPL (LIF, field screening, etc.)
27		3.2.6		This section introduction should clearly state that unless LNAPL is detected as per the TechRegs or LNAPL Guidance Document it does not activate the reporting requirements and response timeframes.	The reporting requirements for Free Phase light non-aqueous phase liquid are outlined in the tech regs. These requirements do not apply to residual LNAPL. The LNAPL guidance document covers this subject in more detail.
26	3	3.2.6, 3.2.7		The 2nd topic in 3.2.6 and all of 3.2.7 is regarding soil sampling. This is not pertinent to a groundwater guidance document and should be removed.	The committee disagrees. This section of the guidance document covers the characterization of sources of ground water contamination. A very pertinent subject when determining ground water source removal options at a contaminated site.
28	3	3.2	3.2.7	The soil saturation limit summary should be under section 3.2.6 as one of the three techniques to infer the presence of free and/or residual product, not provided as section 3.2.7.	The document has been edited as suggested.
28	3	3.2	3.2.7	An option should be added to develop site-specific Kd values. Literature values for Kd may be useful for screening level or a default starting point for evaluation, but are inferior to site-specific Kd values developed from site data.	The guidance indicates that the soil saturation limit should be calculated on a site-specific basis. A site specific Kd is certainly appropriate if developed.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
29	3	3.2	3.2.7	The soil saturation limit is not noted in the TRSR as a guide to indicate when residual product is present. Therefore, the TRSR citation 7:26E-5, should be removed.	The Technical Requirements indicate that "Residual product means a separate phase material present in concentrations below a contaminant's residual saturation point, retained in soil or geologic matrix pore spaces or fractures by capillary forces. This definition applies to solids, liquids, and semi-solids". The Csat equation indicates the concentration at which the contaminant will exist in a seperate phase within the soil matrix. Therefore, the reference will not be removed.
29	3	3.2	3.2.7	The generic soil bulk density and water filled porosity values utilized to determine the soil saturation limits in table should be provided.	the document has been edited as suggested.
29	3	3.2	3.2.7	Provide reference(s) to support the 1 to 10 percent soil saturation limit equals residual product rule of thumb.	The 1 to 10 percent reference has been removed.
29	3	3.2.7	3rd paragraph	This section states, "The soil saturation limit may be used as a guide to indicate when residual product is present in soil and treatment or removal of the material is required [emphasis added] in accordance with N.J.A.C. 7:26E-5.???." This is an unreasonable requirement. The guidance specifies using theoretical equations to determine whether a NAPL is present that must then be delineated. If calculations are necessary to determine the presence of the NAPL what techniques can be used to delineate the NAPL? The requirement to delineate and remediate conditions based on theoretical calculations should be deleted.	The Technical Requirements require treatment or removal of free and residual product. Where free and residual product is indicated by Csat, this material should be treated or removed.
31	3	3.2	3.2.8	The "term" rapidly should be eliminated from Section 3.2.8 as it is subjective.	The document has been edited as suggested.
31	3	3.2	3.2.8	In cases where free and/or residual product is present at a site but is not impacting ground water (i.e. is not a source of ground water contamination) and immobile which is common for heavy oils such as No. 6 heating oil or highly weathered crude oil, the requirement for treatment or removal where practicable or containment where treatment or removal are not practicable should be modified to allow the product to remain under these circumstances along with a monitoring program to confirm no mobility or impact to ground water.	While some separate phase materials may not act as a source of ground water contamination, the removal or treatment of this material is still required in accordance with the Technical Requirements and the Spill Act.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
31	3	3.2	3.2.8	There is no reference to DEP LNAPL guidance document? I would expect that this should be 1st reference the NJDEP would expect an investigator to look at for LNAPl related contamination?	A reference to the LNAPL guidance has been added.
31	3	3.2.8	first paragraph	The title of this Section should be changed to IRM. The first sentence should be revised to be "An IRM should be implemented to remove, contain, or stabilize NAPL in accordance with the Technical Requirements for Site Remediation". The second sentence should be removed.	The document has been edited as suggested.
				3.3 Characterization of Unconsolidated Aquifers	
32	3	3.3	3.30	The term "aquifer" should be changed to "saturated materials" because there are many instances, especially in northern New Jersey, where characterization of groundwater is required within historically placed fill materials, or other low permeability deposits that are by no means an aquifer.	The term aquifer is used in a generic sense to include all water bearing units. This includes perched water bearing zones and historic fill.
32	3	3.3	3.3.2	This overview is overly detailed on specialized topics. Suggest reducing level of detail from "textbook" like repitions to 1 or 2 paragraph summaries of general concepts. If an investogator needs additional detail, they should be referred to the specific reference. The guidance should be more focused on "how" to investigate these areas i.e. well types, water table depths, casings, presence of known consolidated aquifers, aquicludes or possible hinderances, drilling methodology types that have been shown to work best in these areas, and not so much on detailed geological descriptions?	The committee disagrees, the guidance is meant to encourage the investigator to use a thoughtful approach in remediating a site. The overview is two and one-half pages long and provides a bibliography of useful references.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
33	3	3	2	The first paragraph (or another paragraph) which describes "diving" plumes for dissolved constituents should also have language recoginizing that light dissolved contaminants (not free product) will only "rise" in accordance with groundwater flow pressures, not their individual specifc gravities.	The following sentence has been added to the guidance "Likewise as a contaminant plume approaches an area where there is an upward hydraulic gradient, such as a surface water body, it will rise".
35	3	3.3	3.3.3	The last sentence in this section should end with the word "model". The remainder of the sentence should be deleted.	The guidance is encouraging the investigator to use the model as a tool to identify areas where additional investigation is warranted.
35	3	3.3	3.3.3.1	Tidal influence on water levels in unconsolidated aquifers is typically very localized (within a 100 feet of the tidal water body) and does not have an over-reaching impact on groundwater flow or contaminant migration. Therefore, continuous monitoring of water levels for 24 hours offers little value. Therefore the need to monitor for 24 hours should be eliminated. Surface water – ground water interactions get little attention in this guidance and this important topic should be expanded.	There are many sites in tidally influenced areas. The guidance states that the monitoring should be conducted if the "site is located in an area that is tidally influenced".
35	3	3.3.3.1	4th paragraph	This section states, "If the site is located in an area that is tidally influenced, synoptic ground water and surface water levels should be collected using a pressure transducer recording hourly for a minimum of 24 hours." The use of pressure transducers to obtain synoptic data may not be applicable at all sites. In some cases it may be preferable to obtain water level data manually over a reasonably short time period. While not synoptic (i.e. simultaneous over a large area) such data may be sufficient for a given project. The use of pressure transducers for water level recording should be identified as one possible approach only.	The intent of the guidance document is not to prevent the investigator from collecting the data manually. Where it is technically appropriate, the investigator may use professional judgement and collect hydraulic data manually.
35	3	3.3	3.3.3.1	Corrected depth to water equation - what is the source reference? In the guidance, should note that is more than equation for this that is used in industry, and maybe reference different sources / equations, rather than just presenting a single equation without any caveats.	The source of the discussion if the Department's Field Sampling Procedures Manual at section 6.9.8.4.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
35	3	3.3	3.3.3.1	What is the source - technical reference or rationale for the e.g. hourly for 7-days.?	There is not a source for this recommendation. Where ground water flow may be influenced by pumping wells, it is important to collect data during the week and on weekends to account for different pumping schedules. For example, industrial supply wells may not operate during the weekend.
35	3	3.3.3.1	first paragraph	The last sentence of the first paragraph should be removed.	The committee disagrees, triangulation is important when determining ground water flow direction. However the last two sentences have been edited to read "When constructing the ground water contour map, ensure that wells are screened within the same hydrostratigraphic unit and, where possible, are placed equidistant from each other to provide optimal triangulation".
36	3	3.3	3.3.3.1	The last sentence should be modified by eliminating the word "Additionally" and replacing it with "As applicable,". There are instance when water level measurements are taken, but the wells do not need to be sampled.	The edit has been made as suggested.
36	3	3.3	3.3.3.2	While direct push technologies are recognized as an effective approach to delineate, "ways and means" to achieve delineation should not be dictated in the guidance. Northern NJ has many sites where this cannot work; shallow depth to Bedrock and limited saturated thickness. No quick and temporary way to vertically profile in bedrock	Section 3.3 of the guidance applies only to unconsolidated formations. Guidance on delineating contaminant plumes in bedrock is provided in section 3.4. Where it is not possible to use direct push techologies, the investigator should use other investigative methods.
36	3	3.3	3.3.3.2	Transects of well points is an approach to delineate a plume, but "ways and means" to delineate a plume should not be dictated (recommended) in guidance because there are other effective approaches that one may use.	The committee disagrees. The committee believes that the use of transects can effectively delineate the extent of a contaminant plume and source area in a rapid and efficient manner.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
36	3	3.3	3.3.3.2	The term "source area" should be defined.	An outline and explanation of potential sources of ground water contamination is provided in section 3.2 of the guidance.
36	3	3.3	3.3.3.2	The spacing between the direct push locations of "one half of the source width" is overly prescriptive and should be eliminated.	The sentence has been edited to read "A sufficient number of direct push locations should be completed to adequately characterize the plume centerline and the side gradient and downgradient edges of the plume".
36	3	3.3.3.2	2nd paragraph	This section states: "To delineate the contaminant plume and to characterize the hydrogeology at the site, NJDEP recommends the installation of transects of temporary well points." This is one approach although it may not be practicable at developed sites or other areas where access is limited. If the investigator can develop a good understanding of horizontal and vertical gradients, it is often possible to select monitoring well locations without first installing numerous temporary wells. Further, drilling and installing numerous well points has inherent dangers including contact with subsurface obstructions and increased potential for cross-contamination. It can be difficult to properly abandon deep temporary wellpoints. The advantages and limitations of well point transects at a given site should be considered carefully before this approach is implemented. Again, the investigator should employ professional judgment in determining how best to investigate and delineate site conditions.	The investigator is not required to perform transects for every investigation. At many sites transects may not be necessary, at other sites a modified transect approach may be used to fit conditions, at sites with large plumes and open areas, a large detailed transect investigation may be warranted.
37	3	3.3	3.3.3.2	The requirement to conduct vertical profiling at every boring is overly prescriptive and should be eliminated.	The committee disagrees, it is important when initially characterizing the extent of the contaminant plume to determine both its horizontal and vertical extent so that potential receptors are protected and an effective remediation may be designed.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
37	3	3.3	3.3.3.4	The need to perform slug tests at each monitoring well is overly prescriptive and should be eliminated. Slug tests are not effective in permeable materials and would be of little value. The manner in which site-specific hydraulic conductivity is derived, should not be dictated in guidance.	The guidance has been edited to indicate that slug tests may be performed to determine hydraulic conductivity. The guidance indicates that longer term pumping tests may be necessary in some instances.
37	3	3.3	3.3.3.4	Define "long" as used in "long duration pumping tests".	The guidance has been edited to indicate that "Pumping tests need to be long enough to estimate hydraulic properties based on well and aquifer characteristics. The bibliography provides several guidance documents and references concerning the performance of pumping tests".
37	3	3.3.3.2	Last paragraph	The last paragraph in this section states, ".If the horizontal and vertical extent of the plume does not fit with the model, the investigator shall evaluate if there are flaws in the assumptions within the methods to acquire site specific data or if there are flaws within the model." Verification of a model should not be a mandated part of a remedial investigation. If the contaminant plume has been delineated horizontally and vertically, then the regulatory requirements have been met for the remedial investigation. This paragraph should be deleted.	The section is in reference to a conceptual model and is not indicating that rigorous verification of a mathmatical model is required. The basis for all phases of the ground water investigation should be a conceptual site model that is updated as data become available.
37	3	3.3.3.2	Last paragraph	This section states: "If the horizontal and vertical extent of the plume does not fit with the model, the investigator shall evaluate if there are flaws in the assumptions within the methods to acquire site specific data or if there are flaws within the model. Additional investigation may be needed to reconcile the hydrostratigraphic model with field data." The term "shall" is inappropriate in this context. The conceptual model should be considered as a tool in addressing a contaminated site. It may not be the only tool and may prove unnecessary to achieve the final remedial goals.	The text has been edited. The word "shall" has been replaced with "should".

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
37	3	3.3.3.4	1st paragraph	This section states: "Slug tests should be conducted at each monitoring well to determine site specific hydraulic conductivity values. Slug test values are not necessarily representative of the aquifer as a whole." Slug test results can also be affected by well construction and testing conditions. There are other techniques for assessing hydraulic conductivity. Selection of the appropriate method for characterizing ground water conditions should be left to the professional judgment of the investigator. The requirement to conduct slug tests should be deleted.	The guidance has been edited to indicate that slug tests, pumping tests or tracer tests may be performed to determine aquifer hydraulic properties.
37	3	3.3.3.4	first paragraph	The word "each" should be replaced by "select" and "monitoring well" should be changed to "monitoring wells".	The document has been edited. The word each has been removed.
38	3	3.3	3.3.3.5	A groundwater contour map need not be generated for each groundwater sampling event. Often groundwater sampling events are performed a month apart and as long as water levels do not change relative to each other at a site, multiple contour maps offer no value. Contour maps should be generated when the water levels at a site fluctuate causing a potential change in groundwater flow potential.	The guidance states that a contour map should be constructed for each sampling event since these data are easily obtained during ground water sampling events.
				3.4 Characterization of Bedrock Aquifers	
39	3	3.4	3.4.1	The guidance should be more focused on "how" to investigate these areas i.e. well types, water table depths, casings, presence of known consolidated aquifers, aquicludes or possible hinderances, drilling methodology types that have been shown to work best in these areas, and not so much on detailed geological descriptions?	The guidance focuses on the "how to" invetigate fractured bedrock aquifers. The guidance details how to target bedrock fractures for investigation. Drilling methods are discussed in Appendix 6.1of the Departments Field Sampling Procedures Manual.
43	3	3.4	3.4.2.1	The type and duration of aquifer tests is overly prescriptive and should be eliminated.	The practitioner should use their professional judgement. Testing should be taylored to the needs of the investigation. The detail is provided strictly as guidance.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
43	3	3.4.2	2nd bullet	This section states that investigation goals for bedrock should include locating "conductive fractures that control ground water flow at the site." It should be noted that this goal may be difficult and extremely costly to achieve, particularly in a contaminated environment. The investigative goal should be consistent with the TRSR (i.e. horizontal and vertical delineation). The requirement identified in this bullet should be revised to indicate that it may be appropriate to investigate ground water and contaminant pathways including conductive fractures.	The guidance describes how to identify conductive fractures. Since such fractures control the contaminant migration one can not properly delineate the horizontal extent of contamination without identification of such fractures first.
43	3	4	2	The sentence "If there are no other indicators to suggest the borehole depth, advance the two strike-parallel boreholes to 150 feet." Why 150 feet?	150 ft is a typical (median) depth of bedrock domestic supply wells. At many older contaminated sites, 150 ft monitoring wells were constructed as "deep-aquifer wells." The 150 ft depth of TTHs is not a requirement; the investigator may choose a different depth if there is justification.
43	3	4	2	The sentence "If the temporary test boreholes will be left open for an extended period of time (7 to 10 days generally)," Isn't 48 hours the maximum time limit for tempoary points according to NJAC 7:9D?	The 48 hrs decomissioning requirements refers to Category 5 geotechnical borings (7:9D-3.4) not to bedrock test holes subsequently converted to monitoring wells. TALK TO WELL PERMITTING PEOPLE ABOUT 48 HOUR ISSUE
44	3	3.4	3.4.2.1	Fifth paragraph. The requirement to thoroughly test, characterize and sample any production well is ambiguous and overly burdensome. The need to test production wells should be determined based on the conceptual site model.	very presence of such well(s) can alter the bedrock flow regime and contaminant migration, even if the wells are not currently being pumped. Testing existing wells is less expensive, as the holes are already in place. Upon completion of the testing program, the production wells can be converted to monitoring wells.
45	3	3.4.2.1	field reconnaissance of bedrock available	This section includes a discussion similar to that on page 20, Section 3.1.3, identified above. The same comment applies here regarding the need to identify esoteric geological features in outcrops. This discussion should be eliminated in terms of required investigation activities.	High porosity intervals have been found to occur in association with these structures. Therefore it is important to note them since they may have relevance for fracture flow at the contaminated site.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
45	3	3.4.2.1	Perform surface geophysics	As noted above in the comment on page 17, section 3.1.3 the use of surface geophysical techniques may or may not be appropriate at a given site. Many contaminated sites are located in areas with numerous cultural interferences that reduce or eliminate the effectiveness of surface geophysical techniques. Use of surface geophysical techniques should not be a universal requirement. On a given project investigation techniques should be left to the professional judgment of the investigator based on site conditions and specific remedial goals.	The language has been modified to make surface geophysics optional, based on site conditions.
46	3	3.4.2.1	Implement initial test drilling program	The 3rd paragraph in this section specifies: "Install a minimum of three deep open-hole temporary test boreholes that will be converted to monitoring wells upon completion of their testing." If one ground water sample is obtained near the source area and indicates no impact then there may be no need for three wells. It may not be practicable to convert a test boring into a ground water monitoring wells. These requirements should be deleted.	The bedrock investigation is part of the remedial investigation phase. The SI has been completed and it is known that ground water is contaminated. Also, the recommended strategy is an outside-in approach installing wells in the source area only after the bedrock aquifer has been characterized.
46	3	3.4.2.1	Implement initial test drilling program	The 4th paragraph in this section states, "If there are no other indicators to suggest the borehole depth, advance the two strike-parallel boreholes to 150 feet. The third (downdip) borehole should be deeper to terminate at the same stratigraphic depth as the other two holes." No scientific basis is offered for these depth requirements. The depth of boreholes used to investigate bedrock contamination should be based on the professional judgment of the investigator. The depth requirements should be deleted from the guidance.	150 ft is a typical (median) depth of bedrock domestic supply wells. At many older contaminated sites, 150 ft monitoring wells were constructed as "deep-aquifer wells." The 150 ft depth of TTHs is not a requirement; the investigator may choose a different depth if there is justification. See response to #312. The third, downdip hole needs to be deeper and terminate at the same *stratigraphic depth a*s the other hole because of the documented prevalence of bedding-parallel flow in sedimentary bedrock. The latter provides the scientific basis for the target depths of the

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
46	3	3.4.2.1	Implement initial test drilling program	The 4th paragraph in this section states, "Six-inch diameter of the open-holes in the test boreholes is preferred, as it permits conversion of the open-holes to two-inch diameter short-screen wells at the completion of the test boring program." This approach is not preferred by many investigators as it is extremely costly and introduces numerous complexities into the investigation. For example, if the final well construction depth is considerably shallower than the test boring depth, it can be difficult to seal just the lower portion of the borehole effectively in order to construct the monitoring well. The cost and amount of waste generated in a 6-inch diameter test boring is significantly higher than a 2-inch test boring.	the diameter of the borehole. However, It may not be possible to utilaize some geophysical equipment in a two inch diameter bore hole. The grouting of a lower portion of the bedrock test hole to install a 2-ich well above the grouted has successfully been accomplished numerous times, with a two-stage grouting approach. This approach is cost effective. Two-inch borings are advance in unconsolidated formations but not in bedrock settings where 6-inch hole drilling is the standard.
46	3	3.4.2.1	Implement initial test drilling program	The 5th paragraph in this section states, "If the temporary test boreholes will be left open for an extended period of time (7 to 10 days generally), the risk of cross contamination through vertical cross-flows needs to be considered and mitigated." Leaving a deep test boring open for more than 48 hours conflicts with N.J.A.C. 7:9D-3.4(a).	See response to #313. TALK TO WELL PERMITING PEOPLE
46	3	3.4	3.4.2.1	In order to complete the suggested steps of a bedrock investigation for three deep boreholes, the holes would need to remain open for a longer period of time than 7 to 10 days. Consider revising the text to account for the additional time needed for simultaneous, multiple well evaluation.	The intent of the discussion is to convey to the pratitioner that they should minimize the amount of time that the borehole is left open since it is a potential conduit for cross contamination.
46	3	3.4	3.4.2.1	"The initial test bore hole drilling program must use an outside-in approach." This should not be a requirement as for many small sites, one would want to start the investigation close to the source.	The investigator may cause mobilization and migration of contamination by drilling in bedrock close to the source without prior understaning of the hydrostatigraphy and fracture migration pathways at the site.
46	3	3.4	3.4.2.1	"two of them to be sited along strike of bedding (or foliation) on either side of the suspected source and the third located down-dip of bedding from the source area. " This is too prescriptive – these should be considerations but not requirments.	The guidance document presents guidelines that are appropriate when performing an investigation in a bedrock aquifer. The practitioner should use their professional judgement when investigating a site.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
47	3	3.4.2.1	Conduct borehole geophysical logging and other downhole characterization tests	The 1st paragraph in this section states, "Geophysical logging of the test boreholes should be completed to characterize the lithology and fracturing, including identification of potentially conductive fractures." The need for downhole geophysical logging should be determined by the investigator based on professional judgment and the site-specific conditions. This item should be removed as a universal requirement.	The Department recognizes that at some bedrock sites the scope of geophysical logging can be reduced to methods aimed at identification of conductive fractures. Specifically to electrical conductivity and temperature logging and flow meter or salt tracing once the geology and hydrostratigraphy of the site are adequately understood.
47	3.4.2	3.4.2.1		Conduct borehole geophysical logging and other downhole characterization tests: The following sentence should be striken: "Note that the practical resolution of the currently available commercial heat-pulse flowmeters is approximately 0.4 gpm (Herman 2006b) which is significantly above the ambient vertical flow range in many open holes." This is no longer a true statement as heat-pulse flowmeters are routinely used for measureing low-rate flows in open boreholes (reportedly down to a minimum threshold of about 0.03 gpm)	REPLACE THE QUOTED SENTENCE WITH THE FOLLOWING:Whereas the USGS high-resolution heat-pulse flowmeter with a divertor can reportedly measure flow as low as 0.01 gpm in 6-inch diameter hole, the practical resolution of some commercial heat-pulse flowmeters flowmeters is only approximately 0.4 gpm (Herman 2006), which is significantly above the ambient vertical flow in most open holes. The investigator needs to ensure that a flowmeter used is appropriate for the tested holes.
48	3	3.4.2.1	Conduct packer tests	The 1st paragraph in this section states, "In addition to sampling of ground water inflow fractures/zones, straddle packer testing should be utilized to measure the hydraulic head and transmissivity values where inflow or outflow fractures were identified." These techniques and many others described in this section may be useful, but may not be warranted or practicable given site-specific conditions as well as budget and schedule constraints. The investigator should use professional judgment to define conditions sufficiently to demonstrate and select appropriate remediation technologies. Many of the techniques listed here may or may not prove necessary in achieving this goal. The requirement for packer testing and other specific investigation tools should be removed. These technologies should be identified as potential tools for use during site characterization.	This document provides guidelines for completing a bedrock investigation. The practitioner should use professional judgement to expand or contract the scope of the investigation to meet their investigative goals.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
50	3	3.4.2.1	Update Conceptual Hydrostratigraphic Model and Complete Plume Delineation	The 4th paragraph in this section states, "Short-duration tests lasting less than an hour should be used to determine aquifer hydraulic properties (hydraulic conductivity and transmissivity)." It is not clear what is meant by "short-duration tests lasting less than an hour." Single well pumping tests as well as slug tests can often take longer than an hour to complete. The type and duration of aquifer testing should be left to the professional judgment of the investigator. This condition should be deleted from the guidance document.	Bedrock fractures transmit hydraulic stess very quickly so shot term pumping tests are appropriate for determining transmissivity and storage. Standard 1-3 day pumping tests may provide additional information such as recharge and aquifer boundaries.
51	3	3.4	3.4.2.2	The recommendation for "shorter screen lengths" contradicts regulations that allows for 25 foot screen lengths. Therefore, shorter screen lengths should be "considered", but not "recommended".	The document has been modified to indicate that the purpose of short open hole intervals in bedrock is to monitor the specific transmissive fracture identified during the
52	3	3.4.3	first paragraph	The second sentence should be removed.	The text has been edited to read "In many instances, hydraulic containment may be necessary in addition to in-situ treatment technologies. Many technologies are available to remediate ground water." Where in situ treatment options are used in a bedrock aquifer, it may be necessary to hydraulically contain source areas since the delivery of the in situ treatment is difficult in this environment.
			4.0 Performance Monitoring of Active Ground Water Remedial Actions		
53	4			Delete the fourth bullet - "optimization of groundwater remediation systems". The document actually does not provide any technical guidance on this topic, nor should it given that (1) there are a variety of existing external guidance documents that deal with this topic and (2) remedy optimization is highly site-specific, complex, and significantly beyond the scope of this draft guidance.	The fourth bullet has been edited to read "technology re-evaluation".

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
53	4	4.0	4.1	Remainder of section 4.1. For programmatic consistency, replace with language similar to that found in the Department's Draft MNA Guidance Document as follows: "The number and type of wells to be included in the performance monitoring program will be dependent on the Conceptual Site Model (CSM) including consideration of the size and stability of the plume, relative levels of contamination, and presence of potential receptors. Performance monitoring wells will typically include source area wells, plume fringe area wells, and sentinel wells. Performance monitoring may also include wells perpendicular to the groundwater flow direction to monitor lateral components of the plume. Performance monitoring wells should be positioned to evaluate the long-term performance of the remedy and ensure protection of receptors." This more generic language is appropriate given the variety and combinations of plume conditions, remedial strategies/objectives, and remedial technologies that will exist in the universe of New Jersey groundwater remediation sites. Furthermore, there is no need to provide detailed, prescriptive guidance on groundwater performance monitoring networks given that the Department will have an opportunity to review all performance monitoring plans as submitted with Remedial Action Permits for Groundwater. If the Department is compelled to provide more detail in this section, they	The language in this section has been modifed as recommended. However, some the more specific considerations have been maintained to offer additional detail.
53	4	4.1	Sentinel Wells	This 5th paragraph in this section states, "Sentinel wells should be positioned at the water table above the contaminant plume to evaluate potential for vapor intrusion where receptors are present." It is not clear how sentinel wells would be used in this regard. If there is a concern regarding vapor intrusion then the investigator should implement a vapor intrusion investigation in accordance with applicable guidance. The requirement for installing sentinel wells to assess potential vapor intrusion should be deleted from this guidance document.	Where applicable, sentinel wells should be placed above the contaminant plume to determine if the contamination will migrate into the shallow aquifer in the future potentially triggering a VI.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
54	4	4.0	4.1	Sentinel wells. Sentinel wells should be defined as unimpacted monitoring wells located between the delineated plume and the nearest unimpacted receptors. This clarification is needed to account for sites there are impacted receptors that are being appropriately mitigated and/or where there is a potential for VI that has been investigated and is being monitored (if appropriate) via. soil gas and/or indoor air sampling. Otherwise, based on the current language, there would be no such thing as an effective groundwater remedy for a site with an impacted receptor or VI investigation trigger. Note that this clarification is also needed in the TRSR.	The document has been edited as suggested.
55	4	4.0	4.2	Second paragraph. Replace with the following: "To provide the most valid and reliable data for evaluation of trends using trend analysis and statistical methods, monitoring should be conducted at evenly spaced time intervals using consistent sampling and analytical methods. Specific frequencies and monitoring parameters should be established on a site-specific basis. Guidance on the frequency of performance monitoring can be found in the TRSR and the Department's Remedial Action Permits for Groundwater Guidance. Less frequent monitoring may be appropriate when and if it has been demonstrated that the remedial objectives are being met. Additional guidance on groundwater monitoring methods can be found in the Department's Field Sampling Procedures Manual."	The document has been edited as suggested.
56	4	4.3		Statistical tests - The Mann-Whitney U test is noticeably absent from this list of recommended statistical tests. As this has been a staple in the Tech Regs, it should be included in the list.	The document was written to be consistent with the USSEPA guidance that is referenced, i]n which the Mann Whitney is referred to as "WILCOXON RANK SUM". The document has been edited to include this in parentheses.
57	4	4.3		Sentinel wells. Modify data evaluation guidance for sentinel wells to read "Data should show that sentinel wells remain consistently below the Groundwater Remediation Standards for site-related contaminants of concern (i.e. sentinel wells should not exceed the GWRS for multiple consecutive monitoring events)". This modification will provide appropriate flexibility in situations where sentinel(s) well may exhibit an anomalous, time-limited exceedance of the GWRS that do not represent an increased receptor risk.	The document has not been edited as suggested. Sentinel wells should remain below the Ground Water Remediation Standard.

Page	Chapter	Section	Sub-section	COMMENTS	Suggested wording for Document or Suggested Response to Comment
57	4	4.4		First sentence. This sentence implies that the TRSR require the person responsible for remediation to periodically re-evaluate the remedial technology and "submit a revised remedial action workplan or remedial action workplan addendum when a remedial action does not perform as designed." There is currently no such requirement in the TRSR related to active groundwater remedies. Such prescriptive language is unnecessary and inappropriate given that a more holistic re-evaluation of the groundwater remedy and its protectiveness is already required as a component of the CEA biennial certification process (N.J.A.C. 7:26E-8.6).	The guidance was written this way to be consistent with the propsed NJAC 7:26E.
57	4	4.5		There are many sites were contaminant plumE mass and/or area is monitored to document that the plume is stable and not mobile. However, the discussion only notes reduction of contaminants. Some discussion should be added to indicate monitoring to confirm the plume is not mobile (e.g., stable and not migrating to a receptor, concentrations /mass is stable and not increasing, etc.).	The Water Pollution Contraol Act, ground water must improve in quality where it has been degraded.
REFERENCES & APPENDICIES					
63	Appx 2, 3, 4			The inclusion of these three appendices is not appropriate. The inclusion of these technologies implies that these techniques/technologies are preferred or required by NJDEP. These appendices should either be eliminated or clearly identified as examples of investigative techniques.	The document is guidance and offers a way to characterize bedrock aquifers, not the only way.