NJDEP Technical Guidance Document Review Form

Document: *"Monitored Natural Attenuation Technical Guidance Document Version 2.0 "*

Comment Period: *July 1, 2021 to July 30, 2021*

Committee Co-Chairpersons: Matthew Turner and Alexander Shelkonovzeff

Comment #	Page	Section	Subsection	COMMENTS	RESPONSE
1	1	-	-	Shouldn't you hold off on a date until the comment process has been completed? There could be edits due to the process that need to be made.	The date of the document has been revised.
2	4	1		This technical guidance is designed to help the person responsible for conducting the remediation to comply with the ~~State of~~ New Jersey Department of Environmental Protection (NJDEP or Department) requirements established by the Technical Requirements for Site Remediation (Technical Rules), N.J.A.C. 7:26E.	Noted, change made.
3	4	1		Last ¶ - The ~~Web~~ links provided ~~and Web addresses~~ for third party documents referenced in the Technical Guidance are to websites ~~sites~~ not maintained by the NJDEP or the State of New Jersey. The NJDEP makes no special endorsement for the content of these links, the~~ir~~ websites, or the views expressed by the websites' publishers. Comment: Most writing style guides (e.g. AP Style) no longer capitalize the web or internet.	Noted, change made.
4	5	2		The 1st sentence of this section is no longer correct. I suggest either: 1) change it to past tense, e.g. This guidance was developed due to the enactment of SRRA (or something like that) or 2) change it to explain the reason for this revision and either delete the original sentence or correct it consistent with #1.	Noted, change made.
5	5	2	0	The term "enhanced MNA" is used, yet not defined. A definition or clarification of this term should be included.	Changed "enhanced MNA" to "enhanced attenuation" and clarified the meaning of this term.
6	5	2	2	The "Purpose" section does not fully explain the basis/drivers for the draft revisions. In particular, this section does not describe any specific shortcomings that became evident in the March 2012 guidance, any concerns DEP might have identified in its ongoing review of MNA proposals (as part of RAP applications) and/or concerns about the performance of MNA remedies overall, any or all of which might be concerns that the guidance revisions were intended to address. Providing such context would be an important addition to better inform users how to most effectively understand and use the revised guidance.	A summary of major changes was added to "Section 2. Purpose".
7	6	3	-	Extra "a" here - "… evaluation of **a** decreasing concentration trends over time…"	Noted, change made.

8	6	3		¶1 - The use of "(e.g. Wisconsin 2014)" is confusing. I think this is meant to refer to this report (https://dnr.wi.gov/files/PDF/pubs/rr/RR614.pdf) however this report is not included in the References Section, only WI DNR reports from 2003 and 2009 are. In addition, the first time this document is cited, the citation should be (Wisconsin Department of Natural Resources (WIDNR), 2014). All other uses should be (WIDNR, 2014). Also review the rest of the document to ensure that when a document authored by an organization is used, that the first usage uses the full organization name and all other occurrence uses the abbreviation.	Noted, the first refence to this document includes the entire name of the organization, and all following references have been changed to "WIDNR 2014".
9	6	3		¶1 - "The secondary line of evidence evaluates geochemical conditions to ensure they are supportive of natural attenuation. The tertiary line of evidence involves microbiological and isotopic studies that can be used as additional lines of evidence to confirm natural attenuation. The tertiary line of evidence involves microbiological and isotopic studies that can be used as additional lines of evidence to confirm natural attenuation." Comment: I am struggling a bit with how line of evidence (LOE) is being used here and throughout the document (especially Section 6). To me the line of evidence is the data resulting from the study/sampling and not the study/sampling itself. So I don't think saying the LOE evaluates or involves is correct. I recommend editing these sentences along the lines of: To develop the secondary LOE, the investigator should assess the changes in a site's geochemical environment. Developing the tertiary LOE includes conducting additional assessments such as microbiological and isotopic studies. This comment is pretty in the weeds, so if it's too complicated to fix or if it's not consistent with common usage, I understand,	The Department agrees that the LOE is the data collected, not the process by which this data is collected. Changing the wording in the document to better reflect this was discussed with the stakeholder group and deemed not necessary. Section 6 of the guidance document defines secondary and tertiary lines of evidence. This section outlines the study and sampling that must be collected to further justify that monitored natural attenuation is the appropriate remedy for the site.
10	6	3		¶2 - "If, during the long term monitoring program, MNA is determined to no longer represent a protective remedy, the investigator should evaluate an alternative remedy and submit a revised remedial action workplan (N.J.A.C. 7:26E-5.5(c)) and/or a remedial action report (N.J.A.C. 7:26E-5.7). The MNA remedy involves the issuance of a ~~Department~~ Remedial Action Permit for Ground Water (RAP-GW); (N.J.A.C. 7:26C-7). ~~Ideally,~~ A Classification Exception Area (CEA) should be established prior to obtaining the permit (N.J.A.C. 7:9C-7.3).	Noted, change made.
11	6	3	0	"Decreasing contaminant concentration and (or) mass with time in conjunction with a stable or receding contaminant plume represent primary evidence that natural attenuation processes are effective. In general, both of these conditions should be documented." Evidence from retail gas station sites indicates that both of these conditions do not have to be achieved for MNA to be a viable remediation strategy. "In general, both of these conditions should be documented" is not supported by ITRC or portfolio-wide remediation experience. If there is a lack of groundwater receptors, more emphasis should placed on secondary and tertiary lines of evidence to document that MNA is occurring in a long-term groundwater monitoring program.	The primary line of evidence, which includes decreasing contaminant concentrations and (or) mass in conjunction with a stable or receding contaminant plume, should always be evaluated regardless of receptors. This was a requirement in the initial document and has been further emphasized in the updated MNA guidance document. This comment was discussed with stakeholders, and the primary line of evidence is still viewed as the most important in showing contaminant degradation. The secondary and tertiary lines of evidence may be used to further evaluate MNA if the primary line of evidence does not conclusively support MNA. The secondary and tertiary line of evidence can also be used to further support the primary line of evidence when the primary line of evidence shows that MNA is occurring.

12	6	3	0	"Decreasing contaminant concentration and (or) mass with time in conjunction with a stable or receding contaminant plume represent primary evidence that natural attenuation processes are effective. In general, both of these conditions should be documented." Throughout their portfolio, CCNJ/SRIN members have found that both of these conditions do not have to be achieved for MNA to be a viable remediation strategy. "In general, both of these conditions should be documented" is not supported by ITRC or portfolio-wide remediation experience. If there is a lack of potable groundwater receptors, we ask that DEP put more emphasis on secondary and tertiary lines of evidence providing evidence of potential MNA occurring in a long-term groundwater monitoring program. The PRCR is not forgoing their remediation responsibilities and protection of human health if no receptor pathways are completed and delineation is still determined to be completed by an LSRP.	See response to comment #11
13	6	3	0	A stable concentration trend in the groundwater plume wells should also be acceptable as a primary line of evidence. Particularly, if the plume extent is stable or receding (and the plume has not reached the downgradient receptor). This is also consistent with the rationale in Section 6.1.2.4 'Non-Decreasing Levels of Ground Water Contamination'.	See response to comment #11
14	7	4.1		¶3 - Because lingering sources may unacceptably extend timeframes for all remediation strategies, including MNA, it is appropriate to target source areas during initial remediation stages, and subsequently collect additional data to design the most effective long term ground water remedy. Comment: I suggest rewording this sentence so that "timeframes" is not used, as is could mistaken to be a reference to the remediation timeframes, which I don't believe it is. Instead, i would use something like: To minimize how long the remediation will take, source areas should be targeted in the initial stages of the remediation. Once the sources are controlled, then additional data can be collected to design the most effective long term ground water remedy.	The word "timeframe" has been replaced with "the duration".
15	7	4	1	¶4 - Since some natural attenuation processes may create degradation products that are more mobile and/or more toxic than the parent contaminants, the presence of such degradation products must be assessed. N.J.A.C. 7:9C and N.J.A.C. 7:26E require the remediation of all contaminants, ~~which would be~~ inclusive of degradation products, that exceed the Ground Water ~~Quality Standards (GWQS)~~.Remediation Standards. Comment: While the GWRS are basically the GWQS, the PRCR has to remediate any contamination about the GWRS.	Noted, change made.
16	7	4	1	¶5 - If land use changes would influence the effectiveness of MNA, the MNA evaluation must address this issue, not only in the remedy selection process, but also within the context of the RAP-GW ~~Ground Water Remedial Action Permit~~ (N.J.A.C. 7:26C-7.7). Comment: Since RAP-GW was defined earlier, you should use the acronym not the full name.	Noted, change made.

17	8	4	1	"Residual contamination in soil could continue to leach into ground water and might exceed the rate at which natural processes can attenuate the ground water contamination. Contamination in the saturated zone that is not addressed by source control measures could result in contaminant releases exceeding the natural attenuation capacity of the system to control the contaminants. Equally important, uncontrolled and lingering sources pose a potential threat to downgradient receptors. Thus, compliance with the Soil Remediation Standards Impact to Ground Water pathway should be demonstrated prior to implementation of a MNA remedy." It is recommended that the above language be further qualified to include the actual ground water conditions/data be used in the holistic evaluation regarding MNA at all site. If source control and decreasing dissolved phase concentrations are achieved/documented, then the adsorbed saturated soil concentrations of the constituents of concern should not prohibit MNA being a selected remedy for the site if the ground water data/lines of evidence support this position. There are many processes in the saturated zone that can promote anerobic and aerobic degradation of the constituents that will allow natural attenuation of the adsorbed and dissolved phase constituents. This is also true for unsaturated soil. The MGWSRS are based on the soil-water partition equation, which does not account for biodegradation processes such as microbiology and aerobic degradation through the soil column. This is critical to understanding the CSM for any site. There are many cases where MGWSRS will either not impact dissolved phase concentrations or will not adversely impact the use of MNA from being an appropriate remedy. This section should be reworded to add flexibility for LSRP professional judgement to support MNA as the appropriate remedy / issuance of a GW RAP when saturated and unsaturated soil exceedances exist provided the MLEs are documented and the long-term monitoring program for groundwater is protective of receptors.	No technical changes were made to this section of the guidance. Therefore, the Department did not request technical comments to this section of the guidance. If technically justified, the LSRP may use professional judgement to support a deviation from Department guidance on a site specific basis.
18	8	4	1.1	Thus, compliance with the soil remediation standards for the migration to ground water exposure pathway ~~Soil Remediation Standards Impact to Ground Water pathway~~ should be demonstrated prior to implementation of a MNA remedy. Comment: The impact to ground water screening levels have been replaced with the soil remediation standards for the migration to ground water exposure pathway, see the recently adopted NJAC 7:26D. As a result this above sentence should reference the SRS-MGW not the IGW. Also, since the Appendices weren't provided please review the Appendices and the rest of this document to ensure that the terminology and acronyms are consistent with the updated NJAC 7:26D. Also most of the Tech Guidance docs related to the RS have also been updated, so double check that any references/links to such Tech Guidance docs are current.	All references to the impact to ground water pathway and screening levels have been updated.
				"Residual contamination in soil could continue to leach into ground water and might exceed the rate at which natural processes can attenuate the ground water contamination. Contamination in the saturated zone that is not addressed by source control measures could result in contaminant releases exceeding the natural attenuation capacity of the system to control the contaminants. Equally important, uncontrolled and lingering sources pose a potential threat to downgradient receptors. Thus, compliance with the Soil Remediation Standards Impact to Ground Water pathway should be demonstrated prior to implementation of a MNA remedy."	

19	8	4	1.1	This section takes too harsh of a stance against residual adsorbed concentrations in saturated soil. If source control and decreasing dissolved phase concentrations are achieved then the adsorbed saturated soil concentrations of the constituents of concern should not prohibit MNA from being a selected remedy for the site. There are many processes in the saturated zone that can promote anerobic and aerobic degradation of the constituents that will allow natural attenuation of the adsorbed and dissolved phase constituents. This is also true for unsaturated soil. The MGW SRS are based on the soil-water partition equation, which does not account for biodegradation processes such as microbiology and aerobic degradation through the soil column. This is critical to understanding the CSM and should be supported by the LSRP and PRCR. There are many cases where MGW SRS will either not impact dissolved phase concentrations or will not affect it enough to preclude MNA from being an appropriate remedy as long as source control is demonstrated. This section should be reworded to add flexibility for LSRP professional judgement to support an MNA permit with a limited restricted RAO for sites with saturated and unsaturated soil concentrations. It is important to remember that the selected remedy of MNA requires a long-term monitoring program for groundwater. If soil concentrations adversely affect the protectiveness of the remedy, the LSRP would have to re-evaluate the site conditions and modify the permit accordingly.	See response to comment #17
20	8	4	2	"Effective Monitoring Limitations: Complex hydrogeologic systems such as fractured bedrock or karst formations present difficulties for the monitoring of contaminant migration and natural attenuation processes. Such conditions potentially constrain the adequate monitoring of a natural attenuation remedy to ensure, with a high degree of confidence, that potential receptors will not be impacted. In addition, the effectiveness of natural attenuation processes in bedrock (particularly crystalline rock) has not been established sufficiently. As noted by the Wisconsin Department of Natural Resources guidance on natural attenuation (Wisconsin, 2014), attenuation processes such as sorption, cation exchange, biodegradation and hydrolysis are not as effective in fractured bedrock environments." It is recommended that this topic be moved to a new section - "Section 5.2.1 Complex Hydrogeologic Systems". A site with complex hydrogeology should not be excluded from selecting MNA as a remediation strategy. The NJDEP should elaborate of the expectations that it has for an LSRP to develop the appropriate lines of evidence to support the MNA remedy in these scenarios. MNA is possible in fractured bedrock, although it may be more difficult to occur/document.	The Department notes that MNA in bedrock formations can be challenging but can occur and has been accepted by the Department. MNA in bedrock formations is appropriate when adequate site characterizations is completed and adequate monitoring is proposed. Based on this, the Department has removed this paragraph from the guidance document.

21	8	4	2	"Effective Monitoring Limitations: Complex hydrogeologic systems such as fractured bedrock or karst formations present difficulties for the monitoring of contaminant migration and natural attenuation processes. Such conditions potentially constrain the adequate monitoring of a natural attenuation remedy to ensure, with a high degree of confidence, that potential receptors will not be impacted. In addition, the effectiveness of natural attenuation processes in bedrock (particularly crystalline rock) has not been established sufficiently. As noted by the Wisconsin Department of Natural Resources guidance on natural attenuation (Wisconsin, 2014), attenuation processes such as sorption, cation exchange, biodegradation and hydrolysis are not as effective in fractured bedrock environments." This section should be moved to its own section as "Section 5.2.1 Complex Hydrogeologic Systems" or removed from this document. A site with complex hydrogeology should not be excluded from selecting MNA as a remediation strategy. DEP should elaborate on the expectations that it has for an LSRP to develop the appropriate lines of evidence to support the MNA remedy. MNA is possible in fractured bedrock, although it may be more difficult to occur. This position is not scientifically defensible and should be removed from the guidance document.	See previous response
22	9	4	2	"Free and/or Residual Product: Monitored Natural Attenuation of free and/or residual product is prohibited (N.J.A.C. 7:26E-5.1(e)). The person responsible for conducting the remediation shall treat or remove free product and residual product to the extent practicable or contain free product and residual product when treatment or removal is not practicable. Evaluation of the presence of free and residual product should consider section 4.1.2 of this document, section 4.2.1 of the Department's In Situ Remediation: Design Considerations and Performance Monitoring Technical Guidance, Appendix A of the Department's Groundwater Technical Guidance, Appendix 2 of the Department's Evaluation of Extractable Petroleum Hydrocarbons in Soil Technical Guidance, and other current and relevant technical guidance (e.g., Kueper, et al., 2014). " While it is recognized that the provisions of Tech Regs specify obligations regarding free and /or residual product, it is possible that MLEs could be provided in certain situations where MNA is still appropriate - provided that a variance is submitted and the MLEs to support such a position are well established. Importantly, other industry organizations such as ITRC have written extensively about Natural Source Zone Depletion (NSZD) being an effective remediation remedy in certain site settings.	The Site Remediation Program has made it clear on several occasions that Natural Source Zone Depletion (NSZD) does not meet the criteria outlined in the Technical Regulation for Site Remediation, the LNAPL Guidance, or the MNA Guidance documents.
23	9	4	2	Section references need to be capitalized	Noted, change made.
24	9	4	2	¶4 - Evaluation of the presence of free and residual product should consider section 4.1.2 of this document, section 4.2.1 of the Department's In Situ Remediation. Comment: This same problem recurs throughout the document. The standard convention is to capitalize Section/Appendix/etc. when used as part of a reference to other parts of the document. Review and update the document to ensure formatting is consistent throughout the document.	Noted, this has been updated.

25	9	4	2	“Free and/or Residual Product: Monitored Natural Attenuation of free and/or residual product is prohibited (N.J.A.C. 7:26E-5.1(e)). The person responsible for conducting the remediation shall treat or remove free product and residual product to the extent practicable or contain free product and residual product when treatment or removal is not practicable. Evaluation of the presence of free and residual product should consider section 4.1.2 of this document, section 4.2.1 of the Department’s In Situ Remediation: Design Considerations and Performance Monitoring Technical Guidance, Appendix A of the Department’s Groundwater Technical Guidance, Appendix 2 of the Department’s Evaluation of Extractable Petroleum Hydrocarbons in Soil Technical Guidance, and other current and relevant technical guidance (e.g., Kueper, et al., 2014). “ This section should include a discussion on Natural Source Zone Depletion (NSZD) being an effective remediation remedy to address free and residual product. ITRC has written extensively on the effectiveness of NSZD.	See response to comment # 22
26	9	4	2	Free and/or Residual Product: Presence of measurable free product in wells should preclude using MNA as a sole groundwater remedy. However, assessment of sites with residual product (without measurable product in wells) for MNA should be appropriate on a site-specific basis (and should not be considered a precluding factor). This is also consistent with the rationale in section 6.1.2.4 'Non-Decreasing Levels of Ground Water Contamination'.	MNA is not an acceptable final remedy when un-remediated residual product remains at a site. Section 6.1.2.4. specifically states that residual product should be addressed when utilizing this section of the guidance document under sub bullet ii. Monitored Natural Attenuation of free and/or residual product is prohibited per N.J.A.C. 7:26E-5.1(e). Per N.J.A.C. 7:26E-2.1(a)14., concentrations equal to or greater than one percent of the effective water solubility in groundwater indicate the presence of free or residual product. It is understood that there are exceptions, but at a minimum these levels should trigger a more in-depth investigation including an investigation for free and residual product (especially when contaminant density is greater than water density). These exceptions would be considered a variance and should be supported as such.
27	9	4	2	The paragraph headed "Free and/or Residual Product" references Section 4.1.2. However, that section addresses Technical Impracticability considerations and does not appear relevant to the free/residual product concerns. Perhaps Section 4.1.1 ("Source Control") was the intended reference in Section 4.2.	Noted. The reference was changed to 4.1 to be more general.
28	9	5	1	Headers should be changed to "Organic contaminants" and "inorganic contaminants"	Noted, change made.
29	10	5	1	Several of the bulleted lines include (e.g. Appendix ##). Since e.g. means for example, I'm not sure if the e.g. is necessary in these situations as it appears to me that these are more straightforward references to the Appendix and not an example. I have the same concern about the use of e.g. before many of the reference documents.	The use of e.g. was removed when listed before a reference document. The use of e.g. was sometimes left when referencing appendices where examples can be found.
30	10	5	2	The sentence "detailed characterization of aquifer characteristics" should be "detailed analysis of aquifer characteristics"	Noted, change made.
31	11	5	3	It is recommend that something be added to introduce the concept of seasonality as it pertains to "temporal distribution", as a lead in to the next paragraph	This was discussed with the stakeholder group and deemed unnecessary. Section 5.3 mentions seasonality, and it is discussed in detail in section 5.3.1.

32	11	5	3	"Ground water monitoring for MNA should not include ground water data collected before or during an active remedy. Consistent with the In Situ Design and Performance Monitoring technical guidance, if an in situ treatment was conducted, the first round of data to be used to document MNA should be obtained after the in situ remedy is complete and data demonstrate that any active remediation reagents (exclusive of catalysts, carriers, etc.) have been depleted" This section should also consider the evaluation of groundwater conditions prior to an active remedy to as a secondary or tertiary line of evidence. Groundwater conditions prior to remediation is when the aquifer is in it's most natural state from a aerobic, anerobic, and biological stand point. It would make sense to use this data to support MNA when we are discussing legacy cases with more than 8 rounds of quarterly groundwater data prior to remediation (in many instances, there many years of pre-remedial ground water data that document MNA conditions are present). Remediation is often used in an instance were the RP is attempting to further enhance the groundwater quality and lower the current dissolved phase concentrations to support permit requirements/shorten the permit timeframe. Additionally, this requirement will make meeting mandatory deadlines more difficult. It should be appropriate with LSRP professional judgement to use less rounds groundwater data post remediation when significant/meaning prior groundwater data exists.	The recommended eight rounds of ground water data to support MNA do not need to be the most recent eight rounds of data collected. If it is shown that MNA was occurring before an active remediation, an MNA RAP may still be appropriate. However, if the active remediation selected introduced new compounds into ground water above GWQS (such as injections which may change the geo-chemical conditions of the groundwater), additional monitoring for these new compounds will be needed, and these contaminants would need to be included in the CEA. In this situation the Department would recommend eight rounds of data be collected to support MNA. If additional active remediation is proposed/performed after a RAP has already been approved, the In Situ Design and Performance Monitoring technical guidance document should be referenced. If required sampling will make meeting a timeframe difficult, applying for a timeframe extension is recommended.
33	11	5	3	Regarding the statement "Ground water monitoring for MNA should not include ground water data collected before or during an active remedy," Based on experience that in this introductory context, DEP's use of "active remedy" may not be appropriate if this is meant to include excavation or other soil remedy such as SVE, or any groundwater remedy including one-time injection or continued in-situ treatment. If so, use of "active remedy" is vague as it is most commonly used these days to refer to ongoing longer term groundwater remedy. LSRPA does not agree that "any remedial action on the site" or "any remedial action within the plume boundary" should necessarily invalidate all MNA samples (see following comments regarding soil remedies and then regarding groundwater remedies), the starting point should be clear one way or the other, including providing some flexibility on who to assess this issue.	The Department recommends eight rounds of data be collected to support MNA after any active remedial remedy. There will be some limited situations when less than eight rounds of data can be used to support MNA. In these situations, the ground water monitoring performed after an aggressive remedial action should indicate a significant reduction in ground water contaminant concentrations to support less than eight rounds. This may include a very aggressive remedial action such as soil removal action of the entire source area. It would not apply to remedial actions associated with contaminant rebound such as injections. All these situations will require a deviation from guidance documented in the RAR. This should be supported with technical justification and multiple lines of evidence.
34	11	5	3	Regarding "Ground water monitoring for MNA should not include ground water data collected before or during an active remedy," The concept makes sense but there are numerous situations where MNA monitoring of a downgradient/off-site plume may be appropriate during and not directly affected by some site activities (particularly soil remedies), where professional judgment should be allowed. A few examples: 1) if there is a long-term decreasing trend in the overall plume (more than 8 quarters) and then a source area excavation is done (to speed things up and/or address the source), do we need another 8 quarters? or 2) several gasoline USTs are removed and then monitoring starts and then 6 quarters later another UST/minimal petroleum impact is found and excavated and does not affect the trajectory of the trend, do we start over? or 3) A major source remedy (ERH and excavation) is performed, then MNA monitoring starts and the plume responds very favorably in all wells in multiple depth intervals but one shallow well rebounds - a focused investigation/very small targeted excavation is done and the one well quickly responds - the monitoring program should be allowed to be truncated provided the well in question responds favorably for less then 8 events.	Professional judgement by an LSRP is allowed, but needs to be technically justified and supported with multiple lines of evidence. The examples provided where less than 8 rounds of sampling is proposed would need a deviation from guidance documented in the RAR. See response to comment #33.

35	11	5	3	Also regarding the statement "Ground water monitoring for MNA should not include ground water data collected before or during an active remedy," This comment relates to actual groundwater remedies and how "before or during an active remedy" is defined. The next sentence states "Consistent with the In Situ Design and Performance Monitoring technical guidance, if an in situ treatment was conducted, the first round of data to be used to document MNA should be obtained after the in situ remedy is complete and data demonstrate that any active remediation reagents (exclusive of catalysts, carriers, etc.) have been depleted." For some remedies (perhaps an uncomplicated ISCO program), this definition may suffice. However, the following should also be considered: 1) The criteria should be more consistent with ITRC which states that geochemical conditions should be sustainable throughout the period of MNA - so for example, if ZVI is used (a one-time injection) and will remain effective for 5-10 years and the trend line shows standards will be met in 4 years, MNA should be allowed and a MNA GW RAP should be issued. If DEP disagrees, the guidance should clearly state that in the case of a long-duration reagent remedy program, an active GW RAP should be sought after one to two years of performance monitoring. 2) The NJDEP In-Situ guidance does a better job of describing what is performance monitoring vs MNA monitoring, and when an active vs passive/MNA RAP is appropriate (In Situ - Section 7.3); that document also provides more clarity on the difference between a short-term and long-term treatment and the concept of sustainable conditions, and should be referenced for more than just when to start the "first sample" for MNA. However, it still does not answer the "One-time ZVI question" where the last (or only) injection may have been years ago and geochemistry is stable but iron is still above background. This document should clarify if this situation would warrant an MNA vs active GW RAP. 3) The demonstration that any active remediation reagents has been depleted may be elusive in practice (or inconsistent in permitting). What if microbes are added and populations sustain? What about pH? Is activated carbon a reagent or a catalyst? - this should be clarified	1. ZVI injections would be considered a reactive barrier wall per the Department's September 2, 2020 listserv titled, "Active System Ground Water Remedial Action Permits". Therefore, when utilizing this active remedial method an active RAP should be applied for after a minimum of one year of quarterly sampling is conducted. 2. The Department does not currently have a Passive RAP. See the above response to comment "1" for more information on what RAP is appropriate after a ZVI injection. This guidance document only addresses MNA of ground water and therefore the stakeholder group does not believe it is necessary to discuss ZVI and active ground water RAPs in this guidance document. 3. Regardless of what remedial method was implemented, aquifer conditions should return to baseline conditions. Compounds that have a GWQS and pH which are altered due to injections should always return to baseline conditions. However, any changes to biological conditions from baseline conditions should be discussed in the RAR and supported with professional judgement.
36	11	5	3	"Ground water monitoring for MNA should not include ground water data collected before or during an active remedy. Consistent with the In Situ Design and Performance Monitoring technical guidance, if an in situ treatment was conducted, the first round of data to be used to document MNA should be obtained after the in situ remedy is complete and data demonstrate that any active remediation reagents (exclusive of catalysts, carriers, etc.) have been depleted" This section should consider the evaluation of groundwater conditions prior to an active remedy as a secondary or tertiary line of evidence. Groundwater conditions prior to remediation is when the aquifer is in its most natural state from a aerobic, anerobic, and biological stand point. It would make sense to use this data to support MNA for legacy cases with more than 8 rounds of quarterly groundwater data prior to remediation. Remediation may be used in an instance were the PRCR is attempting to further enhance the groundwater quality and lower the current dissolved phase concentrations to support permit requirements. This will make meeting mandatory deadlines more difficult. It does not make sense to discard previously collected site-specific data as moot. This could cause a quandary for the PRCR to make a decision regarding performing remediation or restarting the dataset to support MNA. It should be appropriate with LSRP professional judgement to use less rounds of groundwater data post remediation when prior groundwater data exists.	See above responses to comments for Section 5.3

37	11	5	3	"Ground water monitoring for MNA should not include ground water data collected before or during an active remedy." There are numerous situations where MNA monitoring of a downgradient/off-site plume may be appropriate during and not directly affected by some site activities (particularly soil remedies), therefore, the LSRP's professional judgment should be allowed. Examples include the following: 1) If there is a long-term decreasing trend in the overall plume (i.e. more than 8 quarters) and then a source area is excavated to reduce the concentrations and/or shorten the overall MNA duration, is the PRCR required to wait a period of time and conduct another 8 quarters? 2) Several gasoline USTs are removed, monitoring starts, and then, 6 quarters later, another UST/minimal petroleum impact is found and excavated on the site and does not affect the trajectory of the trend. Do the 8 rounds of groundwater monitoring need to be re-started? 3) A major source remedy (ERH and excavation) is performed, then MNA monitoring starts and the plume responds very favorably in all wells in multiple depth intervals, but one shallow well rebounds. A focused investigation/very small targeted excavation is done and the one well quickly responds. Do the 8 rounds of groundwater monitoring need to be re-started? DEP's In Situ and Performance Monitoring technical guidance, Section 7.3.2 "After the Ground Water RAP is Issued" discusses between short-term and long-term treatment and the concept of sustainable conditions. Also, it clearly states the required regulatory steps to address both for the PRCR and LSRP. CCNJ/SRIN strongly encourage DEP to incorporate this section into the MNA guidance document.	1) If there is a long-term decreasing trend which supports MNA prior to a soil removal action, collecting less than eight rounds of data following soil removal may be appropriate. 2) This is a site-specific question and contaminant concentrations would be needed to answer this. 3) This example of contaminant rebound highlights one of the reasons that multiple rounds of post-remedial monitoring are typically completed, it is a way to measure the performance of a remedy. Multiple rounds of sampling would be recommended in this situation, after the second remediation is completed. The number of additional rounds would need to be determined based on site-specific conditions. The LSRP should technically justify their deviation (if less than 8 post-remediation rounds are collected) with multiple lines of evidence. The guidance does not preclude the use of professional judgement. Most active remedies will influence groundwater conditions and contaminant concentrations. The challenge with evaluating data collected before and after an active remedy is distinguishing whether the downward contaminant trends are due to the active remedy or natural attenuation. The LSRP should provide multiple lines of evidence and technical justification supporting that the active remedy did not impact their ability to demonstrate the appropriateness of the MNA remedy. Finally, Section 7.3.2 of the Department's "In Situ Remediation: Design Considerations and Performance Technical Guidance Document" will not be added to this document. However, reference to this section of the In Situ guidance has been added to Section 7.2.3 of the Department's MNA Guidance document. Please note, items discussed in Section 7.3.2 of the In Situ Remediation: Design Considerations and Performance Technical Guidance Document are being incorporated into an updated version of the GW-RAP Guidance Document, and this document is also reference in section 7.2.3 of the MNA Guidance.
38	12	5	3.1	Third paragraph, last sentence - should be "seasonal Mann-Kendall trend test", as this is how it is described in the USEPA guidance	While the USEPA guidance document referenced does refer to a "seasonal Mann-Kendall trend test", the original 1984 document refenced in the USEPA guidance document, and in the Department's MNA Guidance in sections 5.3.1 & 6.1.2.3 refers to a "Seasonal Kendall test". For this reason, no change was made.
39	13	5	3.2	Parentheses at the end of first paragraph	We believe by "parentheses" the commentor meant "quotation mark". The un-needed quotation mark has been deleted.
40	13	5	3.2	In general, there is an inconsistent use of terminology throughout this document. In this case, first paragraph, last sentence states "vertical and lateral distribution". Suggest changing "lateral" to "horizontal" to be consistent with earlier terminology use	The Department discussed this with the stakeholder group and deemed this change unnecessary.
41	14	5	3.2	Paragraph 4, there is a discussion of "core of the plume", which is not explained anywhere previously. Suggest adding something on Figure 1 which states where generally the core of the plume would be.	A label has been added to Figure 1 to identify the core of the plume. Additionally, see EPA's "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water" document for more information on cores of plumes.
42	14	5	3.2	Figure 1 - suggest adding disclaimer stating that the figure is a conceptual presentation, and that all wells shown are not necessary for every GW plume condition	Figure 1 is a "Generalized" Monitoring Well Network. This comment was discussed with the stakeholders, and no change was made.

43	15	6	0	"In general, both of these conditions should be documented. If data trends cannot be assessed, or are inconclusive, secondary and tertiary lines of evidence can be used to support the assertion that natural attenuation processes have a potential to remediate the groundwater (Wisconsin 2014)." The statement "In general, both of these conditions should be documented" should be removed or modified. Demonstrating a shrinking plume (decreasing spatial extent of plume) and a reduction of constituent mass in a plume without increasing concentrations in the aquifer should provide evidence that MNA is occurring. This is because the decreasing mass of the plume means a decrease of total constituents in the observed plume. This statement undercuts the next sentence about secondary and tertiary lines of evidence. Both primary lines of evidence should not be required for observing MNA if site specific conditions support this position.	This sentence was added to re-enforce an existing concept described in the original MNA guidance document. The addition of this language was discussed at length with the stakeholder group and agreed upon.
44	15	6	0	"In general, both of these conditions should be documented. If data trends cannot be assessed, or are inconclusive, secondary and tertiary lines of evidence can be used to support the assertion that natural attenuation processes have a potential to remediate the groundwater (Wisconsin 2014)." This statement "In general, both of these conditions should be documented" should be removed. Demonstrating a shrinking plume (decreasing spatial extent of plume) and a reduction of constituent mass in a plume without increasing concentrations in the aquifer should provide evidence that MNA is occurring. This is because the decreasing mass of the plume means a decrease of total constituents in the observed plume. This statement undercuts the next sentence about secondary and tertiary lines of evidence. Both primary lines of evidence should not be required for observing MNA.	See the above comment.
45	17	6	1	"Historic SI or RI data may be used to comprise the total of eight rounds, where these data do not reflect pre-remediation conditions. Of these eight rounds, four consecutive quarterly ground water monitoring events are necessary to evaluate spatial and temporal distribute See prior Comments above about using data pre-remediation.	It is unclear what the concern is with this language, but see the Department's response to the previous comments concerning Section 5.3.
46	17	6	1	Similar to prior comment - Section 6.1 provides more detail and says "It is important to note that if an active remedy is used at the site, ground water monitoring for MNA should begin after the active remedy has ended and the aquifer had time to reach an equilibrium. Ground water monitoring data from before or during the active remedy should not be included in the MNA evaluation. Sufficient sampling should occur following the active groundwater remedy phase to demonstrate that the active remedy is no longer enhancing natural attenuation." Per the comment above, if the remedy is still enhancing and will continue to do so through the projected MNA duration, that should also be acceptable (consistent with ITRC).	As discussed in the response to comment #35, all examples provided of injections which enhance attenuation over time would be addressed under an Active GW-RAP. Enhanced attenuation is not discussed in detail in the MNA Guidance Document since it is outside the scope of this document.
47	17	6	1	"Historic SI or RI data may be used to comprise the total of eight rounds, where these data do not reflect pre-remediation conditions. Of these eight rounds, four consecutive quarterly ground water monitoring events are necessary to evaluate spatial and temporal distribution." See Comment 36 above regarding the use of data pre-remediation.	It is unclear what the concern is with this language, but see the Department's response to the previous comments concerning Section 5.3.

48	17	6	1	"It is important to note that if an active remedy is used at the site, ground water monitoring for MNA should begin after the active remedy has ended and the aquifer had time to reach an equilibrium." It is too subjective to say "aquifer had time to reach equilibrium". It is difficult to make determinations about when a site has returned to equilibrium when the objective of the remediation was to change the site conditions and plume characteristics to enhance groundwater quality. This entire paragraph should be removed and changed to "Groundwater data collected during active remediation should not be used for trend analysis. Data collected after remediation is completed is preferred for MNA evaluation. Care should be taken when evaluating sites that have applied an agent to the aquifer to enhance remediation."	The LSRP should provide professional judgement to support that the aquifer has reached an equilibrium. This will not always necessarily mean that pre remedial conditions will return considering that ground water chemistry has been altered, but a new equilibrium should be supported. It should also be confirmed that enhanced attenuation is not ongoing as this would be addressed under an Active RAP as discussed in response to comment #35.
49	17	6	1.1	Same comment as previous - Figure 1 - suggest adding disclaimer stating that the figure is a conceptual presentation, and that all wells shown are not necessary for every GW plume condition	See response to comment #42.
50	18	6	6.1.1	There is a discussion here regarding plume behaviors. However, no description or citations are provided for plumes containing inorganic and/or radionuclide containing plumes, which often behave differently.	For sites with contaminants other than VOCs such as inorganic contaminants, metals, and/or radionuclides, the secondary line of evidence may be more applicable in evaluating MNA than the primary line of evidence. The primary line of evidence may not thoroughly evaluate MNA at these sites considering many of these contaminants are immobile. Metals and radionuclides are discussed in more detail in Section 6.2.2 of the guidance document.
51	20	6	1.2.1	Need a space between SESOIL and vadose	Noted, change made.
52	20	6	1.1.2	The footnote needs to be updated to refer to the SRS-MGW and/or SLRS-MGW not the site-specific IGW standards as the RS for MGW have replaced the IGW standards. Consider adding a reference to the relevant technical guidance doc, if appropriate.	Noted, change made.
53	20	6	1.2.1 (Footnote 1)	The reference to "site-specific Impact to Ground Water (IGW) standards" should be updated to "alternative Migration to Ground Water soil remediation standards."	Noted, change made.
54	21	Fig 4		Consider using "vs." in the title instead of "Versus" as it I think it's actually clearer to use the abbreviation in this situation.	Noted, change made.
55	25	6	1.2.3	Terminology should be "seasonal Mann-Kendall trend test", as this is how it is described in the USEPA guidance; additionally, the statement "situations where seasonal fluctuations are significant" is vague and somewhat downplays the importance of looking at seasonal trends. Suggest referring the reader back to Section 5.3.1 of the document.	While the USEPA guidance document referenced does refer to a "seasonal Mann-Kendall trend test", the 1984 document refenced in Section 6.1.2.3 refers to a "Seasonal Kendall test". For this reason, no change was made. Citing Section 5.3.1 was discussed with the stakeholder group and deemed unnecessary. Citing Section 5.3.1 would make sense if this was a section found later in the guidance document following Section 6.1.2.3.
56	27	6	1.2.4	There's something weird with the font in the title, I think "Non-" might be in a larger font size than the rest of the title.	Noted, change made.

57	27	6	1.2.4	iii. the site is a candidate for a monitored natural attenuation as outlined, including sentinel well placement and delineation to the Ground Water Remediation Standards (N.J.A.C. 7:26D); Comment: Is delineation the correct word? Don't you delineate the extent of the contamination and remediate to the GWRS? Also, consider rewording or updating the punctuation as this sentence is a little confusing.	The word delineate is correct in this instance and will remain in the document. However, the sentence was reworded to make it more clear.
58	27	6	1.2.4	"ii. all sources of ground water contamination have been identified and remediated, including free product, residual product, and the impact to groundwater pathway for soils has been addressed. This must include an evaluation of soils above and below the water table to ensure that no source of ground water contamination remains including, if applicable, evaluating and ruling out any ground water contaminant concentration correlation with ground water elevation changes;" See prior comment regarding residual soil concentrations and the use of MNA where MLE's support this condition.	Noted, change made.
59	27	6	1.2.4	"v. the person responsible for conducting the remediation has collected a minimum of eight rounds of ground water data from key monitoring wells following source removal and has attempted to demonstrate a decreasing concentration of contaminants in the ground water." See prior comments on this issue - If the remediation is successful enough to create a stable plume within an order of magnitude of the GWQS then less rounds of groundwater data should be appropriate at legacy sites where the groundwater and aquifer conditions are well documented. This should be completed with the LSRPs professional judgement.	See response to LSRPA comment #33.
60	27	6	1.2.4	"ii. all sources of ground water contamination have been identified and remediated, including free product, residual product, and the impact to groundwater pathway for soils has been addressed. This must include an evaluation of soils above and below the water table to ensure that no source of ground water contamination remains including, if applicable, evaluating and ruling out any ground water contaminant concentration correlation with ground water elevation changes;" See Comment 5 above regarding soil concentrations. MNA is likely remediating soil in unsaturated and saturated soil. This can be observed in the long-term monitoring program of the MNA permit. Permits can be modified if necessary. Additionally, ruling out any seasonal variability seems irrelevant if the plume is stable and the concentrations remain within an order of the GWQS. These statements should be removed from this section and document.	The purpose of the MNA guidance document as discussed in Section 2 of the document, is to "provide detailed technical information on the use of monitored natural attenuation (MNA) as a remedial action for a contaminated ground water site in New Jersey". MNA of soil contamination is not part of the intended use of this guidance document. Additionally, the last sentence of Section "ii" was updated to be more clear.

61	27	6	1.2.4	With respect to non-decreasing levels of groundwater contamination, this section provides one example (i.e. back diffusion) as "a plausible case for this situation". Providing only a single example creates confusion, implying that there are no other reasons for non-decreasing concentrations. Rather, as part of the overall lines of evidence supporting the MNA remedy, the completeness of remedial investigations and other remedial actions would have been documented, including in the CSM. For these reasons, it would be more appropriate to replace the current second and third sentences of this subsection with the following text: "There are numerous potential mechanisms for non-decreasing concentrations at sites but MNA may still be warranted in those cases as an acceptable remedy when contamination poses no risk to human receptors and the environment." If DEP feels compelled to provide examples, the list should be expanded to include a range of possible explanations, while also clearly indicating that the list is not all-inclusive. Other possible explanations could include but are not limited to: (1) slow MNA processes that are not necessarily evident per the data obtained to date; (2) minimal mass loading (from soils below MGW SRS) that results in slower attenuation; and (3) contaminants present in essentially a perched zone above a confining unit with limited infiltration such that natural attenuation processes are reduced.	A change was made to the wording of this section to make it more clear that back diffusion is only one example of a situation in which this section of the guidance can be used. While the Department agrees that there are other situations besides back diffusion which can cause non decreasing trends, the Department does not believe it necessary to list all of them in this document.
62	28	6	1.2.4	vi. - This may need to be updated to reference the SRS-MGW not the GWQS	This section of the document is not intended to address the MGW exposure pathway, so no change was made.
63	28	6	1.2.4	"1. When contaminant concentrations are in the part per million (PPM) range for volatile organics, and an evaluation of effective solubility (N.J.A.C 7:26E-1.8) demonstrates that product may remain. As an example, ethylbenzene and toluene can reach product levels in a BTEX plume when applying the 10X values and evaluation using effective solubility calculations. 2. When dealing with contaminants expected to degrade quickly, which have a short half-life, but continue to be present at multi PPM concentrations. This includes some volatile organic compounds such as Ethylbenzene, Toluene, and Xylenes." Reference to 1 ppm (i.e. 1,000 ppb) range for BTEX compounds should be removed from this document. There is no scientific justification for the effective solubility position provided by the NJDEP to assert this requirement for MNA.	This language regarding effective solubility was discussed at length with the stakeholder group. In the Department's experience remaining source material and/or product are often responsible for stable plumes which include contaminants in the multi PPM level. There are also many exceptions to this; however, part of the technical justification to support these exceptions should include an evaluation of effective solubility. One of the tools investigators can use for an evaluation of effective solubility is EPA's Effective Solubility Calculator found at https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/es.html. However, it should be noted that this calculator does not account for weathering of product which can lower effective solubility. In addition to EPA's calculator, the Department is aware of multiple references which include scientific justification to support BTEX compounds in the multiple PPM range can be indicative of residual product. EPA. 2013. Evaluation of Empirical Data to Support Soil Vapor Intrusion Screening Criteria for Petroleum Hydrocarbon Compounds gives benzene greater than 5 ppm as an indirect indicator of potential LNAPL. Lahvis, et, al., 2013, “Vapor Intrusion Screening at Petroleum UST Sites”, Ground Water Monitoring and Remediation, 33(2) gives benzene > 3 ppm and BTEX >20 ppm as initiators of residual product. It also notes “Concentrations lower than the reference values can also be indicative of LNAPL sources”. Zemo, Dawn A., “Sampling in the Smear Zone: Evaluation of Nondissolved Bias and Associated BTEX, MTBE, and TPH Concentrations in Ground Water Samples”, Ground Water Monitoring and Remediation, 26(3) provides a good discussion on effective solubility, and acknowledges effective solubilities “decline relatively rapidly with weathering of the petroleum source”. Finally, Table 3-2 of ITRC's "LNAPL-3 Site Management: LCSM Evolution, Decision process, and Remedial Technologies" indicates that residual product can be present at benzene concentrations between 1 - 5PPM.

					None of this is to say that BTEX in the PPM range will always be indicative of remaining product and/or LNAPL sources. However, the Department disagrees that there is no scientific justification to support the effective solubility position provided in the guidance document, or that the reference to the multiple PPM range should be removed from this document. The Department understands that determining the presence of remaining product is highly site specific. This is why the an evaluation of effective solubility is recommended when proposing MNA as the final remedy for stable VOC plumes in the multi PPM contaminant concentration range. This evaluation should be combined with a demonstration that all source areas have been adequately investigated/remediated to confirm product or LNAPL sources do not remain at the site.
64	28	6	1.2.4	"1. When contaminant concentrations are in the part per million (PPM) range for volatile organics, and an evaluation of effective solubility (N.J.A.C 7:26E-1.8) demonstrates that product may remain. As an example, ethylbenzene and toluene can reach product levels in a BTEX plume when applying the 10X values and evaluation using effective solubility calculations. 2. When dealing with contaminants expected to degrade quickly, which have a short half-life, but continue to be present at multi PPM concentrations. This includes some volatile organic compounds such as Ethylbenzene, Toluene, and Xylenes." The reference to 1 ppm (i.e. 1,000 ppb) range for BTEX compounds should be removed from this document. There is no scientific justification for the effective solubility position provided by DEP to assert this requirement for MNA.	See response to comment # 63.
65	28	6	1.2.4	For non-decreasing contaminant trends, this section cites six factors under which natural attenuation can still be demonstrated, including that the asymptotic constituent concentrations are within one order of magnitude of their respective GWQS or comparable interim specific values. The use of an order of magnitude limit as one of these six factors appears to be arbitrary rather than a line of evidence based on scientific principles (other than the atypical circumstances regarding elevated ethylbenzene, toluene and/or xylenes concentrations described later in this section). In particular, an MNA remedy is warranted after a thorough investigation of contaminant sources and completion of necessary and practicable active soil and/or groundwater remediation. After all such reasonable remedial actions, the demonstration is made that the primary, secondary and/or tertiary lines of evidence supporting MNA have been satisfied. Under those circumstances, it would be not justifiable also to apply a 10X factor to the GWQS as a gating criterion for use of MNA for non-decreasing concentration trends. In fact, the other five listed criteria abundantly resolve concerns justifying an MNA remedy at sites with the presence of such contamination, including lack of receptor impacts and remediation of sources of ongoing groundwater contamination. For these reasons, any requirement related to a fixed ceiling concentration factor should be removed.	The concept in this section of the MNA Guidance document indicating groundwater contaminant levels should be within an order of magnitude of the respective NJDEP GWQS was adapted from a previous version of the "Guidance for the Issuance of RAO" (versions 1.0-1.4). Once removed, this section of guidance was frequently requested to be brought back by LSRPs. The Department determined that an expanded version of this guidance would best fit in the MNA Technical Guidance document. The MNA Technical Guidance stakeholder group had many discussions concerning the 10x factor recommended to use this section of guidance, and language presented in the document was agreed upon. It should be noted, the commentor has suggested that the 10x factor noted in this section of guidance will act as a "gating criterion for use of MNA". The Department does not agree with this statement. It is understood that there may be circumstances where MNA is appropriate as a final remedy with asymptotic constituent concentrations higher than 10x the Departments GWQS. These situations should be documented as a deviation from guidance in the RAR, and supported with technical justification and multiple lines of evidence. Further, the Department does not agree that the commentor's suggested language needs to

				Second, there are multiple site conditions under which constituents might be present at asymptotic concentrations greater than a factor of 10 above the GWQS but where MNA is a solidly protective remedy (those site conditions being the subject of the preceding comment). It would therefore be more appropriate, as well as more consistent with the overall basis for establishing an MNA remedy, to include the following text after the five criteria: "For sites at which constituent concentrations exhibit a non-decreasing trend and where concentrations remain relatively elevated (e.g. more than an order of magnitude above the GWQS), additional technical justification for MNA may be warranted." Last, use of a 10X factor as one deciding line of evidence for non-decreasing plumes could considerably and unnecessarily expand administrative requirements as well as potentially even compel further active remediation resulting in substantial additional remediation expenditures without any enhancement to overall protectiveness. For example, even with such concentrations, a site at which there are no receptor concerns or sources of ongoing groundwater contamination, there are no direct risks that would compel any additional active remediation.	be added to the guidance document. It should be understood by investigators using this document that it is guidance, and deviations from Department guidance are appropriate if properly documented and justified in the site RAR. Finally, the Department does not agree that language in the MNA guidance document recommending asymptotic groundwater contaminant levels be within an order of magnitude of the respective Department GWQS will unnecessarily expand administrative requirements as the commentor suggests. Previous to the addition of this section of guidance all stable plumes proposed to utilize MNA as a final remedial remedy required a deviation from guidance be documented in the RAR. With the addition section 6.1.2.4, a large number of cases proposing MNA for stable plumes can simply refer to this section of guidance instead of documenting and supporting a deviation from guidance in the RAR. This should reduce administrative requirements for many cases. There should be no change to the approach for cases where asymptotic groundwater contaminant levels are greater than an order of magnitude above the GWQS contrary to what the commentor suggests.
66	28	6	6.2.1.4	Please provide the regulatory and technical basis for the criteria set forth in bullet "vi" (i.e., the requirement that the asymptotic ground water contaminant levels be within an order of magnitude of the GWQS for MNA to be an appropriate remedy). This will impact many sites that have already undergone extensive remediation, have documented a significant decline in contaminant concentrations, and have further demonstrated that the capacity of the aquifer to further reduce contaminant concentrations is adequate to retain the migration of low-level contamination that has stabilized at an asymptotic level. The order of magnitude requirement does not reflect the reality of the conditions at many sites, such as those where matrix diffusion is occurring. Given the stringency of the GWQS for many parameters (many at 1 part per billion [ppb] or lower), even with significant mass reduction due to active remediation and/or natural attenuation processes, contaminant concentrations often persist at stable concentrations ranging from 10 to 30 ppb. If the asymptotic levels do not render MNA with institutional controls (i.e., Classification Exception Area) any less protective of human health and the environment, why should the conditions preclude issuance of a Remedial Action Permit?	The section referencing 10x factors for GWQS was adapted from a previous version of the RAO guidance and expanded upon to fit the MNA guidance document. This new section of the guidance is not intended to add administrative requirements, rather this section of the guidance is intended to streamline processing of low level stable plumes when these criteria outlined in the section are met. The guidance already states, "It should be noted that these situations will not always preclude MNA as a final remedial remedy; however, further technical justification may be warranted".
67	29	6	2.1	"Organics" should be "Organic Contaminants" or "Organic Compounds"	The section title was changed to "Organic Compounds"
68	30	6	2.1.1	"Aerobic" header, should be "Aerobic Conditions" or "Aerobic Degradation" or "Aerobic Pathway". Same with "Anaerobic"	These headers were changed as requested.
69	38	7		"the investigator shall propose a Classification Exception Area (CEA) if not already established (N.J.A.C. 7:9C-1.6, N.J.A.C. 7:26C-7.3), and apply for a Remedial Action Permit for Ground Water (RAP-GW) (N.J.A.C. 7:26C-7.5)." Comment: The sentence might read cleaner if you used "pursuant to" the citation instead of putting the cite in (). I'd recommend actually not using () for citations throughout the entire document as it is not a standard approach for citing regs. However that would be a major undertaking and it might not make sense to do so at this time.	No change will be made at this time, but this will be considered going forward.

70	38	7	0	Paragraph 4…."assessed through periodic performance evaluations". Suggest adding something additional to this "at a minimum, during the preparation of the biennial certification submission"	The wording of this section was changed, but not using the suggested language from this comment. This is because results from the long term monitoring program need to be evaluated continuously, and not only at the time a protectiveness certification is submitted. For example, a long term monitoring program may include monitoring events that are more frequent than biennial sampling. MNA effectiveness should be evaluated based on each sampling event, and not only prior to protectiveness certification submission.
71	38	7	0	The LTM section Table 4 presents monitoring well sampling frequencies based on contaminant degradation. However, there should also be discussion of monitoring related to Technical Impracticability determinations and other conditions. For example, the current RAP Application requires a monitoring schedule. On one TI matter, a CCNJ/SRIN member received DEP comments on a RAP application initially requiring that the monitoring program mirror Table 4 in Section 7.1. It would therefore be beneficial to clarify in the new guidance that the recommended monitoring well sampling frequencies in Table 4 do not apply to TI determinations. The revision to address monitoring for asymptotic conditions could be expanded to encompass TI as well.	The recommended sampling schedule in Section 7.1 of this guidance is a general recommendation for MNA. The goals of LTM for TI is different than the goals for LTM associated with MNA. LTM for TI is beyond the scope of this document.
72	41	7	2	"The performance evaluation described below is in addition to the Remedial Action Protectiveness/Biennial Certification – Ground Water requirements." Comment: The form is entitled "Ground Water Remedial Action Protectiveness/Biennial Certification" if this sentence is referring that that form, the actual title should be used. If the sentence is referring the sampling requirements, then something like this should be used: The performance evaluation described below is in addition to the remedial action protectiveness/biennial certification requirements in NJAC ____". Also review the use of this phrase on pages 40, 42, 44 and edit as appropriate.	The form name was corrected as requested, and wording of this paragraph was updated.
73	42	7	2	"If, during the LTM program, it is determined that MNA is no longer a protective remedy, the person responsible for conducting the remediation must evaluate and implement a revised remedial action workplan or remedial action workplan addendum (N.J.A.C. 7:26E-5.5(c))." A RAW or RAWA should not be required. This language appears to be from the old MNA document and should not be included in this version. There is no statutory mechanism for a site that has an RAO and RA permit to submit a RAW or RAWA. Additionally, the case is closed via the RAO but the permit exists in perpetuity. A more appropriate response would be to submit a permit modification with the additional information and detail regarding any modifications to the monitoring program and/or use of additional focused remedial actions.	The reference to submitting a RAW at this stage of the case was removed from the document. The original language from a previous version of the tech regs was added back to the document (however, the citation was removed). Additionally, a reference to the GW RAP Guidance document was added to this section since an updated version of this guidance is being released soon which will discuss the contingency remedy process' effect on GW-RAPs in more detail.
74	42	7	2	In the section "modify the LTM program", there is a sentence which says "then modification of the RA permit". This is inconsistent with the rest of this document, should say "GW RAP". Similarly, in the same paragraph, "RAP-GW", is used. Please make these abbreviations consistent throughout the document as "GW RAP"	Both references to permits in this section were changed to "GW RAP" to be consistent with the rest of the document.

75	42	7	2	"If, during the LTM program, it is determined that MNA is no longer a protective remedy, the person responsible for conducting the remediation must evaluate and implement a revised remedial action workplan or remedial action workplan addendum (N.J.A.C. 7:26E-5.5(c))." Draft July 2021 "If, during the LTM program, it is determined that MNA is no longer a protective remedy, the person responsible for conducting the remediation must evaluate and implement an alternative remedial action (N.J.A.C. 7:26E-6.3(e)3ii)." Version 1.0 March 2012 A RAW or RAW Addendum should not be required. The March 2012 version states the steps to evaluate and implement an alternative remedial action per the regulatory citation, not the required remediation report to be submitted. Also, the Ground Water RAP Guidance dated October 19, 2017, Section IV clearly states the regulatory requirement for groundwater remedy is modified as a RAP modification. This directly corresponds to the RAP modification in N.J.A.C. 7:26C-7.12(b) requirements. There is no statutory mechanism for a site that has an RAO and Ground Water RAP permit to re-submit a RAW or RAWA as a remedial action change. Additionally, the case is closed via the RAO but the Ground Water RAP exists in perpetuity. Again, you cannot submit a RAW or RAWA for a closed case. In conclusion, DEP's regulatory requirement is a permit modification to include additional monitoring.	See response to comment #73.
76	43	7	2	#4 - To lift the CEA and terminate the RAP-GW, the person responsible for the remediation must demonstrate that ~~GWQS~~ GWRS are not exceeded by sampling groundwater pursuant to N.J.A.C. 7:26C-7.9(f). Comment: The PRCR has to remediate to the GWRS not the GWQS. Also consider rewording this sentence as it's a little awkward.	Noted, change made.
77	43	7	2	"Situations that may trigger implementation of the alternative remedial action could include the following: - Reoccurrence of free product in monitoring wells." This statement should be removed or the term "alternative remedial action" should be modified to include increased sampling frequency and/or inclusions of additional wells to the monitoring program. Reoccurrence of aged product in small measurements (i.e. less than 0.1 feet of product) and where dissolved phase concentrations within the plume do not increase by more than an order of magnitude may require no action to for site conditions to return to equilibrium. Additional sampling or characterization may be warranted by the LSRP if they determine through their professional judgement that a new condition that was not previously characterized may change the remediation strategy.	The Department does not agree that this statement should be removed. Additionally, the sentence before this says, "it may be appropriate to perform verification sampling prior to implementing an alternative remedial action", so it is understood that a one time occurrence of a small amount of product/sheen may not immediately trigger a Contingency Remedy.

78	43	7	2	Regarding criteria to determine that MNA is no longer effective, there should be a distinction between "MNA is no longer effective" and "a minor modification is needed." One of the listed criteria is "Reoccurrence of free product in monitoring wells." The preceding paragraph states "Unless imminent or verified impacts to receptors have been identified, it may be appropriate to perform verification sampling prior to implementing an alternative remedial action." DEP has stated in the context of RA Permit training as well as In Situ Design and Performance Monitoring technical guidance that limited product showing up on a single/sporadic occasion, or even the need for an additional one-time in-situ treatment, is not a declaration of remedy failure or reason to switch to an active permit. Additional flexibility in the language used here should be incorporated - see above comments.	See response to comment #77.
79	43	7	2	"Situations that may trigger implementation of the alternative remedial action could include the following: - Contaminant concentrations are not decreasing consistent with predicted rates. Milestones should be established in the LTM program (e.g., approximately 50% reduction in 5 years)." This statement should be removed or the term "alternative remedial action" should be modified to include increased sampling frequency and/or inclusions of additional wells to the monitoring program. If a plume is stable, not increasing, and no receptor impacts then the site should still remain in a LTM. Not all constituent attenuation is linear or will decrease in a predictable pattern. Situations such as this should be a reason to modify the duration of a CEA and permit not complete a new remedial action.	This sentence was not a new addition to the Technical Guidance. The stakeholder group discussed following this comment and saw no reason to remove this sentence.
80	43	7	2	"Situations that may trigger implementation of the alternative remedial action could include the following: - Reoccurrence of free product in monitoring wells." This statement should be removed. Reoccurrence of aged product in small measurements (i.e. less than 0.1 feet of product) and where dissolved phase concentrations do not increase by more than an order of magnitude may require no action for site conditions to return to equilibrium. Additional sampling or characterization may be warranted by the LSRP if they determine through their professional judgement that a new condition that was not previously characterized may change the remediation strategy.	See response to Comment #77.
81	43	7	2	"Situations that may trigger implementation of the alternative remedial action could include the following: - Contaminant concentrations are not decreasing consistent with predicted rates. Milestones should be established in the LTM program (e.g., approximately 50% reduction in 5 years)." This statement should be removed. If a plume is stable, not increasing, and there are no receptor impacts then the site should still remain in a LTM. Not all constituent attenuation is linear or will decrease in a predictable pattern. Situations such as this should be a reason to modify the duration of a CEA and permit, not complete a new remedial action.	See response to comment #79.

82	43	8		"The following general reporting outline describes the process flow for MNA cases. Please consult N.J.A.C. 7:26C, N.J.A.C. 7:26E, and other Department technical guidance documents ~~regarding~~ for additional information on specific reporting requirements. ~~The "Reporting" section (~~For example, Section 8 of the Department's In Situ Design and Performance Monitoring Technical Guidance contains a useful discussion of data evaluation, interpretation and reporting in support of remedial action data submissions to the Department." Comment: This paragraph is confusing and unclear. I made some edits but I'm still not clear on what exactly this section covers. The first sentence really confuses me as I'm not sure what is meant by "process flow". I think you are trying to explain how/when the investigator will submit the data from the multiple LOE in order to support MNA. If that's the case, consider rewriting this along the lines of: In order to support MNA, the investigator will need to provide certain info to the Department at various stages throughout the remediation. Listed below are the specific reports/submittals that will require information supporting MNA	Some of these edits were made, and the paragraph was slightly reworded to be more clear. The word "technical" was excluded since some administrative guidance documents also discuss reporting requirements.
83	44	8		Termination of the RAP-GW Comment: Update this subsection to reference the Remediation Standards generally (especially if the RAP-GW might include remediation to the GWRS, SRS-MGW, and/or SLRS-MGW) or the appropriate media specific RS, e.g. GWRS, SRS-MGW, and/or SLRS-MGW	Noted, change made.
84	51-52	Ref.		The reference at the bottom of page 51 continues onto page 52, however only a single line of text appears on page 52. As a result, it is not readily clear whether or not the link is for the reference on page 51 or if it's a new reference. Generally speaking when paragraphs (or lists) are split between two pages, the second page should never contain just a single line of text (item). Update the formatting for the References section to fix this issue.	Noted, this will be noted when finalizing the document formatting.