Response to Comments
Vapor Intrusion Technical (VIT) Guidance

January 2012

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
1	1	0	0	Re. the **last sentence of 2nd paragraph of Intro**. "Recent research ... biological degradation." is this meant to apply to chlorinated VOCs also? If not, would be good to indicate that. If it is meant to apply to the more recalcitrant, chlorinated VOCs, would be good to provide a reference, or two, re. this statement. Recent research presented by D. Carr in a recent VI Training event (presentation attached to email, note slides 5,6,9,11,14,17,18, & 21 especially) indicates the vadose zone may have significant storage capacity for recalcitrant VOCs. Perhaps could mod. to say (insertions underlined) - "Recent research has shown that substantial attenuation, including biological degradation, occurs in subsurface soils and that for more recalcitrant contaminants, VOC mass temporarily stored in the vadose zone could be significant. " Could add - Thus, when ground water concentrations of chlorinated VOC have recently decreased, or the trend of concentration over time for these contaminants in ground water is unknown, evaluating vapor intrusion risk based solely on ground water sampling may not be appropriate.	Text has been modified.
1	1	0	par 1	The last statement in the second paragraph may belong in the first paragraph. The following edits are suggested (insert last sentence of par. 2 into par 1): Vapor intrusion (VI) has been recognized as a potential exposure pathway for human health risks for over two decades. VI is defined as the migration of volatile chemicals from the subsurface into overlying buildings (USEPA 2002b). The presence of volatile compounds in soil or ground water offers the potential for chemical vapors to migrate through subsurface soils and along preferential pathways, potentially impacting the indoor air quality of affected buildings. Recent research has shown that substantial attenuation of vapors may occur in subsurface soils, including biological degradation. However, the accumulation of volatile vapors in impacted buildings can result in acute health concerns associated with high levels of contaminants, as well as the potential for chronic health effects associated with lower levels of site related contaminants.	Text has been modified.
1	1	1		Section 1.1 Intended Use of Guidance and 1.3 Purpose are repetitive. Combine and eliminate one of them.	Text has been modified.
1	1	0	par 2	The second paragraph seems out of place. If it is to be kept in the introduction, the following edits are suggested: Sampling and analytical methodologies allow the measurement of very low levels of compounds of interest in indoor air. In many cases, these compounds may be present as a result of contributions from sources other than VI, such as storage and use of consumer products, building materials, and building processes, as well as from compounds present in outdoor air. The identified levels of these compounds can be similar to background concentrations of chemicals present in indoor air. from sources such as consumer products, building materials, and outdoor air. As a result, In addition, the results of sampling events may be highly variable and are further affected by changes in ambient air pressure and temperature and the operation of heating, ventilation and air conditioning (HVAC) equipment in buildings.	The second paragraph has been removed.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
1	1	1	par 1	Suggest that the last sentence be deleted and that the second to last be modified, such that the paragragh reads: The Vapor Intrusion Guidance document is designed to help the person responsible for conducting remediation to comply with the requirements of the New Jersey Department of Environmental Protection (NJDEP or Department) established by the Technical Requirements for Site Remediation (Technical Rules), N.J.A.C. 7:26E. Specifically, the guidance is intended for use in the evaluation of the VI pathway at contaminated sites located within the state of New Jersey.	Text has been modified.
2	1	1		The last sentence of the third paragraph (i.e. "*However, the investigator shall provide written technical rationale justifying any deviations from this guidance* .") is redundant and should be removed.	Text has been modified.
2	1	1	--	In Section 1.1, as well as throughout the document, it is stated that "the investigator shall provide written technical rationale justifying any deviations from this guidance." We acknowledge the need to document variances from regulation, however, precisely because this is a guidance document, it should not be a requirement that the LSRP document all deviations. LSRPs are professional experts by definition on the regulations and guidance documents. There should not be a requirement to provide a written technical rationale justifying “any” deviations from the guidance document. Moreover, the expectation that a written justification be prepared for these deviations, including those that may result from using or implementing updated data, techniques and technologies, will materially increase site remediation costs and implementation times for remedies with no appreciable environmental or health benefit, which goes against Executive Order No. 2. For example, at a complex site with more than one groundwater plume, multiple structures, and/or with several preferential pathways, the amount of written justification could feasibly exceed the discussion of the results of an actual vapor intrusion study. In addition, it is not clear how a deviation from guidance is defined. For example, as worded now, an LSRP would have to decide if a justification was warranted for deviating from guidance phrased as "may be appropriate but" and "it would be prudent". We recommend removing "shall provide written technical rationale justifying any deviations from this guidance" and similar statements made elsewhere in the document as noted.	Justification required as per Technical Rules (7:26E-1.7) and SRRA (C.58:10C-14)
2	1	1		Last sentence of paragraph should be expanded to include "any person that uses this guidance to *investigate, evaluate, manage and/or* remediate a contaminated site".	Text has been modified.
2	1	1	par 1	Suggested reword: Individuals involved in using this guidance may include licensed site remediation professionals (LSRP), Non-LSRP environmental consultants, NJDEP personnel, and other environmental professionals. Therefore, the generic term “investigator” will be used to refer to any person that uses this guidance on behalf of a remediating party, including the remediating party itself	Text has been modified.
2	1	1	par 2	Suggested reword: 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. However, the investigator shall provide written technical rationale justifying any deviations from this guidance. The procedures for a person to vary from the Technical Rules in regulation are outlined in the Technical Rules at N.J.A.C. 7:26E-1.7.	Text has been modified.
3	1	3		The final sentence should read "justification for variations from the technical approach established in this guidance…."	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
3	1	3	--	In section 1.3 the following recommendation with regard to evaluation and remediation for the VI pathway is stated; "It is, therefore, recommended that the investigator consult with the Department before implementing methodologies or procedures not included in, or contrary to, this document." and "Justification for variations from the guidance must be included in the relevant submittal that addresses the pathway ..."; LSRPs are professional experts by definition on the regulations and guidance documents and should not have to consult with the Department or justify any variations from the guidance document. Moreover, having to consult with the Department before implementing methodologies or procedures will delay the remediation process and unduly increases costs. Allowing LSRPs the latitude and flexibility to make professional judgments, as they are licensed to do, will speed up the process along with making it more effective and less costly. We recommend removing this statement and allowing for professional judgment in applying technical guidance.	Justification required as per Tech Regs (7:26E-1.7 and SRRA (C.58:10C-14)
3	1	3		3rd sentence regarding consultation with DEP before implementing procedures not included in or contrary to the VIG. The Department should ensure that consultation include a definitive outcome that is provided within the tight timeframes required for a VI investigation.	Text has been modified.
3	1	3	par 1	Suggested reword: The purpose of this document is to provide guidance to site investigators in determining whether VI impacts may be present that require additional actions to mitigate potential human health impacts.	Text has been modified.
3	1	4		It might be helpful to reference the Department's draft Conceptual Site Model Guidance document in this discussion of the use of CSM's	Text has been modified.
3	1	4		Is there a reason the Site Conceptual Model is in the "Introduction" section (before the Guidance Overview)? While it may be totally appropriate, the fact that it is highlited separately in the Introduction and also covered in Section 3.1.1 could confuse readers. Perhaps explain why.	Text has been modified.
3	1	4	--	We recognize that former Chapter 2 (CSM) of the 2005 VIG has been removed, however we recommend that section 1.4 also be omitted because it includes information that is not directly related to vapor intrusion. This section is addressed in another NJDEP guidance document and needs to be deleted. The repetition makes the document cumbersome and when inconsistencies occur the unnecessary redundancies are confusing. We recommended removing section 1.4 and replacing it in section 1 with a reference or references to guidance on developing Conceptual Site Models.	Text has been modified.
3	1	4	par 1	Comment: The 2005 document included important descriptions of VI CSM and VI transport mechanisms. Since some environmental practioners may not have an understanding of these mechanisms and since the relevant mechanisms should be the basis for the selection of types, locations, and depths of samples collected (or not collected), it is suggested that NJDEP not delete this important 2005 text. In the interest of brevity, NJDEP may wish to place the 2005 text in Appendix A with the ITRC checklist.	In order to streamline the document, the CSM chapter from the 2005 VIG has been removed.
4	1	4		"Assessing the potential for VI should involve assembling a comprehensive three-dimensional model of the site – commonly referred to as a conceptual site model (CSM)." This section creates a requirement that a CSM be performed, this is unnecessary on several sites. The VIG is not an appropriate place to create a requirement that a CSM be conducted.	Text has been modified.
6	1	6		If not currently planned, the DEP should make updates to screening levels available for public comment, since they were not a component of the draft VIG.	Beyond the scope of this document.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
6	1	6	par 1	Suggested reword: The Department will update the document as the state of the science for VI pathway evaluation advances. Department will modify the guidance and update the VI Screening Levels, as appropriate, based on new regulations and advances in the recommended methodologies, analytical procedures and associated analytical reporting limits (RL).	Text has been modified.
12	2	3	2	It is stated that all samples collected from a crawlspace should be compared to IASL. However, there should be no comparison to IASLs if a crawlspace is not occupiable (inaccessible). IASLs should only to applicable to indoor air that humans will breathe. SGSL are more applicable for these types of crawlspaces as the potential for human inhalation exists above or outside the crawlspace similar to sub-slab. DEP should discuss in more detail the types of crawlspaces that should be sampled and those that do not need to be sampled.	Text has been modified
12	2	3	2	Suggested reword: The nonresidential IASL are applicable to industrial/commercial facilities where the adult is the receptor of concern. The nonresidential IASL are applicable to industrial/ commercial sites when a discharge to the environment has occurred and the facility is not currently handling or using the subsurface COCs associated with the discharge, including those portions of an industrial/commercial building or facility that do not store, handle or use the VI related COC, such as businesses adjacent to a dry cleaner in a strip mall.. While the collection of indoor air samples is generally not recommended in situations where the facility is currently using the same COC for the VI pathway, indoor air samples collected under these circumstances should include consideration of both the nonresidential screening levels and the applicability of the Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) to the subject building.	Text has been modified
13	2	3	2	There is mention that OSHA PELs are appropriate only when "fully covered by OSHA regulations". OSHA PELs apply to all workers that have received notifications (right-to-know) only and other requirements such as training and medicial monitoring are not necessary for a worker to voluntarily work in an environment with a COC. For instance, worked in an office next to a manufacturing area (their indoor air is shared through common walls and doors) are informed that CoC are used next door. Those office workers' exposures are regulated by OSHA for those CoCs. In addition, training and medicial monitoring are only required for certain levels (thresholds) of certain compounds.	The current wording is sufficient.
13	2	3	2	There should be residential and non-residential RALs due to the different exposure durations of each setting.	RALs are beyond the scope of this document.
13	2	3	2	Suggested reword: The potential for a future change in the use of the building or in the use of the COC within the building must be considered and addressed in situations wherein nonresidential IASL and/or the OSHA PEL are used, including a consideration of whether periodic monitoring and evaluation as part of institutional control requirements are appropriate at the affected building(s) to address potential future changes in site use.	Text has been modified
13	2	3	2	Suggest that this statement be moved from par 5 to par 4, between sentences 1 and 2: An IEC determination is based on an exceedance resulting from the VI pathway and not background or ambient air sources.	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
13	2	3	2.2	First full paragraph. The DEP should clarify whether a VC or IEC condition exists once the occupational standards are exceeded.	VC and IEC determinations are based on the VI pathway being complete. Since it is extremely difficult to assess the contribution of the VI pathway verses operational activities in the building, it is not possible to conclude if the pathway is complete. An exceedance of the occupational standards should be addressed through OSHA.
13	2	3	2.2	Second full paragraph. The DEP should clarify whether a property owner is required to accept institutional controls.	The Department does not require institutional controls for the VI pathway. With the cooperation of the building owner, it is an option to be considered by the investigator.
13	2	3	2.2	Third full paragraph. The DEP should clarify the basis for the RALs, which do not appear to be developed based on subchronic or acute exposure scenarios.	RALs are beyond the scope of this document.
13	2	3	2.2	Third paragraph references institutional controls and monitoring. Will vapor issues eventually have their own Remedial Action Permit, or will they be lumped in with soil and/or ground water permits? What about scenarios where engineering/ institutional controls are not in place (i.e., RI has not been completed)?	These issues are beyond the scope of this document.
13	2	3	2.2	If the use of a building doesn't change, why would monitoring bee required? Reword so text does not imply that sampling is required.	Text has been modified
13	2	3	2.2	In the workplace, OSHA regulations apply to all employees. Accordingly, the statement that employees must be "fully covered" by OSHA regulations is unnecessary and should be deleted. In addition, OSHA PELs apply to all workers in occupational setting covered by the various 29 CFR regulations for both industrial and construction work places. Since NJ is regulated by Federal OSHA, that is the state has not elected to petition for a State-run program, the jurisdiction for worker occupational exposures is under the purview of OSHA without any respect to media, exposure source or route. Therefore, it must be clear in the guidance that work place exposures in industrial and construction settings will apply OSHA criteria and evaluation methods. This guidance does not provide the clarity that is needed by the regulated community and is not accountable in current form.	The current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
13	2	3	2.2	We note that in the fourth paragraph on page 13 of Section 2.3.2.2 Indoor Air Screening Levels it is stated that "an IEC condition exists when contaminant concentrations in indoor air exceed the applicable Rapid Action Level (RAL) found in Table 2 of the NJDEP's VI website. [end of paragraph]" This is incorrect, as screening levels alone do not trigger an IEC, and is inconsistent with Section 2.5.2 Vapor Intrusion Immediate Environmental Concern "When the results from an indoor air sample exceed the NJDEP RALs AND it is reasonable to conclude that the VI pathway is complete, a VI IEC is triggered". We recommend deleting this redundant paragraph that was added to the guidance and referring to appropriate sections of the document.	Text has been modified
14	2	3	2.2	The document states that " On a case by case basis, the health department may also be notified when elevated indoor air levels below the HDNL are present in an occupied school, day care center, health care facility or other building with sensitive receptors." This "may" statement may lead to confusion and be interpreted as a default requirement. We recommend that additional clarification be provided to indicate that the need for additional notification should be based on the professional judgment of the LSRP.	Text has been modified
14	2	3	2.3	Fourth sentence. The DEP should provide greater flexibility to use exterior soil gas samples. In particular, as an alternative to sampling inside buildings, provided there are no apparent preferential pathways, near the outer limit of the 100 foot critical distance criteria.	Text has been modified
14	2	4	0	Deep soil gas or sub-slab soil gas data should be used as a primary factor in evaluating the potential for VI in cases where groundwater concentrations are limited or localized. If groundwater data exceed GWSLs, but soil gas data collected within the delineated groundwater footprint are below SGSLs, we believe that the requirements for "delineation" of impacts and VI investigation are adequately satisfied and no further step out is needed. Please clarify whether additional investigation is necessary when the extent of soil gas concentrations greater than SGSLs is smaller than the extent of groundwater concentrations greater than GWSLs.	This scenario is addressed in Section 2.4.1.
14	2	4		First paragraph, second sentence. The 150 day timeframe provides little opportunity to consider site-specific evaluations, such as clean water lens and soil texture evaluations.	Timeframes are contained in regulation.
14	2	4	par1	Suggested reword: The VI Investigation stage involves the evaluation of the VI pathway through an investigative strategy as required in N.J.A.C. 7:26E-1.18(c-j). The initial round of the VI investigation shall be completed within 150 days [N.J.A.C. 7:26E-1.18(c)] after determining the need to conduct the investigation. Comment: The guidance is iterative and may require winter sampling, or additional rounds of sampling, such that the VI study may not be completed in such a time frame.	Text has been modified
14	2	4	1	Suggested deletion: The ground water table across most of New Jersey is relatively shallow and ground water data are usually available in the vicinity of the receptors. Thus, a ground water investigation is the appropriate first stage for most VI investigations.	Text has been modified
15	2	4	1	First full paragraph. The DEP should allow an investigator to consider site-specific screening levels based on soil concentrations.	Text has been modified
15	2	4	1	Third full paragraph. The DEP should provide greater flexibility to use exterior soil gas samples.	The Department prefers sub-slab soil gas for determinations on the VI pathway.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
15	2	4	1	Last paragraph, third sentence. The VIG should recognize that modeling provides a better method for conservatively estimating the indoor air concentrations over an average exposure period instead of a single point in time.	While modeling is recognized as a line of evidence in assessing the VI pathway, it does not replace indoor air sampling when soil gas sample results exceed the Department's SGSL.
15	2	4	1	Soil contamination represents potential source of VI. What is criteria used to determine soil contamination? States that use of ground water data and GWSL alone are not appropriate if soil contamination in unsaturated represents potential source. So if ground water data and GWSL are clean, still need to investigate VI? We do not support release of this document without extensive clarification of this issue.	VI screening levels for soil have not been developed. If known soil contamination exists in the vadose zone , the investigator is to use professional judgment to determine the need for further VI investigation.
15	2	4	1	For assessing undeveloped parcels using exterior soil gas sampling, will DEP accept NFA if >GWSL but <SGSL?	The guidance suggests that no further investigation is necessary but the decision ultimately rests on the LSRP that evaluates the entire site.
15	2	4	1	For undeveloped parcels where mitigation is required, will Deed Notice/Remedial Action Permit and Financial Assurance will also be required?	Some form of instituiuional control should be implmented to address vapor intrusion a structure is built on the property in the future.
15	2	4	1	Suggest adding the following at the **end of the 2nd paragraph** on this page - <u>If soil contaminated with chlorinated VOC and/or chlorinated product was recently (at least a year ago) removed from the site, the investigator should consider soil gas sampling even if ground water is not contaminated. Some site data and research indicate the vadose zone can have significant storage capacity for recalcitrant VOC vapor even after the original source is gone (Rivett 1995, Carr 2011). The w</u>ord doc. attached to my email provides some info. re. site data that supports this comment.	The current wording is sufficient.
15	2	4	1	Suggest adding the following at the **end of the 3rd paragraph** on this page - <u>If current ground water levels of chlorinated VOC no longer exceed screening levels, but are known, or were likely, to have exceeded them in the last two years, approximately, the investigator should consider some type of soil gas sampling. Some site data and research indicate the vadose zone can have significant storage capacity for recalcitrant VOC (Carr 2011), especially if the mass of VOC originally released from ground water was very large and other factors impede dispersion of the vapors (e.g., relatively impervious ground cover)</u>. See Word doc. referenced above for further back-up for this comment (case data & recent research presentation/paper.).	The investigator is to use professional judgment in these situations. See the mitigation chapter for additional information.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
16	2	4	2	Fourth bullet point. The DEP should clarify what information should be included on the indoor air data summary tables.	Template summary tables will be posted on the Department's Vapor Intrusion website.
16	2	4	2	Regarding receipt of analytical data, what is definition of receipt? Hard copy of report in hand, not electronic? We do not currently receive paper copies of lab data, they are downloaded as required.	The regulations consider receipt of the analytical data as occurring when the investigator receives the data package from the laboratory - eiother hard copy or electronically.
16	2	4	2	When discussing the various timeframes for response actions, there should be a mention of issues that may not permit compliance with timeframes; issues such as delayed or denied access and delay in air and/or building permits.	Text has been modified.
16	2	4	2	Regarding the new first bullet "Notify the NJDEP 7 days prior to conducting the VI investigation", to avoid confusion we recommend referencing regulation 7:26E-1.4(e) (consistent with the fifth bullet) and directing the reader to the NJDEP SRRA Forms website (Potable Well/Vapor Intrusion Sampling Notification Form at http://www.nj.gov/dep/srp/srra/forms/).	Text has been modified.
16	2	4	2	Regarding the fifth bullet "Provide the results to each property owner/tenant and a copy to the NJDEP (within 14 days of receipt of the analytical data) per N.J.A.C. 76E-1.18(d).", to avoid confusion we recommend directing the reader to Section 8.5.	Chapter 8 has been eliminated.
16	2	4	2	In Section 2.4.2 Iterative Nature of VI Investigations, which we note is a newly written section for the guidance, it is stated "Concurrent with the VI investigation, delineation of the ground water contamination shall be completed. If the VI trigger is not ground water contamination (e.g., soil or soil gas contamination, vapor cloud), the source shall be identified and properly delineated." This statement reads like regulation, not guidance, by using the word "shall" and includes information that is not directly related to vapor intrusion. We recommend replacing the “shall” statements with references to appropriate regulatory citations and guidance documents that professional investigators will follow.	Text has been modified
16	2	4	2	The term vapor cloud is used first in the **next to last para**. on this page. I have seen this used in other literature to refer to <u>any</u> vapor plume in the vadose zone, as opposed to how it is used in this guidance. Could include it in the Definitions since it does not seem to have a standard meaning to all those working in this field **or** could refer to how & where EPA describes it in their 2002 VI guidance (pgs. 17 & 18) **or** <u>do as suggested in Comment 22 below</u>.	Text has been modified
16	2	4.2	par 2	Suggested reword: Concurrent with the VI investigation, delineation of the ground water contamination shall be implemented. Comment: The guidance is iterative and additional rounds of sampling, such that the study may not be completed in such a time frame.	Text has been modified.
16	2	4.2	par 3	Suggested reword: The 150 day timeframe to initiate a VI investigation commences again with the discovery of additional buildings or undeveloped land that warrants investigating, often overlapping with the previous round.	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
17	2	4	3	It should be noted in this section that the 100-foot critical distance criterion is not applicable for #2 fuel oil or diesel free product when no VOCs are detected in the groundwater at concentrations above the GWSL.	Text has been modified
17	2	4	3	First paragraph, first sentence. The DEP should provide the basis for the 100 foot critical distance criteria to allow the investigator to determine whether this is appropriate based on site-specific characteristics.	Critical distance criteria established in regulation.
17	2	4	3	Second paragraph, third sentence. The DEP should provide the basis for the 30 foot critical distance criteria to allow the investigator to determine whether this is appropriate based on site-specific characteristics.	Critical distance criteria established in regulation.
17	2	4	3	I think applying the critical distance to soil gas above the SGSL is overly conservative. The critical distance concept was originally developed for groundwater plumes, to allow for the potential for lateral diffusion of soil gas beyond the edge of the plume, which empirically and by theory is generally limited to about 100 feet. If we have actually measured the soil gas concentrations and determined the extent of lateral diffusion, that should preempt the need for applying the critical distance as a buffer. If the precision of such a delineation is the issue, then I would at least use a smaller distance for soil gas, e.g., 30 feet.	Text has been modified
17	2	4	3	With regards to the critical distance criterion for PHC compounds, the second paragraph states a 30foot distance criteria is to be utilized for PHC compounds however, in the next paragraph it states that you should use a 100 foot criterion. Please clarify if it is 100 feet or 30 feet for PHC compounds.	The document states 30 feet for dissolved PHC compounds in groundwater and 100 feet for PHC free product.
17	2	4	3	At the bottom of the page, it is stated "*The application of the diagonal distance is not acceptable.*" This will probably be misinterpreted and it might be good to provide an example.	Text has been modified.
17	2	4	3	Paragraph hard to follow - suggest adding examples	Text has been modified
17	2	4	3	Biodegradation of gasoline, 100 feet criterion too conservative, mentions BTEX, also includes MTBE, TBA? Please provide list of ALL compounds that the 30' criterion and the 0.1 attenuation factor apply to.	These issues are addressed in Chapter 5.
17	2	4	3	4th P: The technical basis for many of the requirements stipulated here is unclear, and these do not appear to represent "guidance". Linear interpolation as opposed to actual measurements does not seem to represent a defensible strategy in many cases, especially when there are limitied groundwater monitoring points . What exactly does "diagonal distance is not acceptable" mean? Aren't the distance criteria "rules of thumb", that already include safety factors?	Linear interpolation is a standard approach employed by consultants. "Diagonal distance" statement is removed. Critical distance criteria are based on diffusion of vapors through the vadose zone and are established by regulation.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
17	2	4	3	Regarding the Critical Distance Criteria, in the first paragraph on page 17, the guidance recommends a VI investigation where buildings are within 100 feet horizontally or vertically of free product or shallow ground water contamination in excess of the GWSL. In the third paragraph, the following new statement has been added; "In addition, the critical distance criteria are applicable to soil gas data in excess of the SGSL." We understand that the guidance has adopted the 100-foot screening criteria from the EPA 2002 VI Guidance. We and others (Alliance for Site Closure: Comments and Recommendations regarding the US EPA's 2002 Draft Vapor Intrusion Guidance, 5-13-2001) find that the 100-foot screening criteria is over conservative, not well supported by data and causes unwarranted economic burdens because of the number of unnecessary screening investigations that it produces. The EPA offers the following explanation of "How did we develop the suggested distance?" on page 17 of the EPA 2002 VI Guidance; "Available information suggests that 100 feet laterally and vertically is a reasonable criterion..."	Critical distance critera are defined by regulations.
				and "The recommended lateral distance is supported by empirical data from Colorado sites where the vapor intrusion pathway has been evaluated. At these sites, no significant indoor air concentrations have been found in residences at a distance greater than one house lot (approximately 100 feet) from the interpolated edge of ground water plumes." In the 2002 Colorado examples, the "one house lot" distance is an indirect and conservative measurement; the actual radius of migration from contaminated water (interpolated in the Colorado examples) was not determined. The Alliance for Site Closure points out in their white paper that finer grained soils (sandy loam and loam) have been demonstrated to have greater attenuation (Hers, 2011 https://iavi.rti.org/attachments/WorkshopsAndConferences/03_Hers_IAVI_3-14-11-v2.pdf) that would eliminate the 100-foot radius as a screening criteria. The 2002 EPA Colorado sites included the Redfield Rifle Scopes site and CDOT MTL site; both sites had very permeable sandy wind and stream deposits as the water table aquifer material. The NJDEP states that the default value for soil texture is sandy loam	
				(NJDEP Basin and Background Document Impact to Ground Water Pathway 2004), therefore we recommend that the critical screening distance be changed to 30 feet for all VOCs, as MassDEP has done in their 2010 VIG.	
18	2	4	4	Please consider alternatives to the only options discussed in this section: 100% acceptance of data or collecting additional data. For example, although a sampling approach may not have been primarily designed to investigate the VI pathway and/or may not be fully compliant with the most current guidance, the data may have some usability in evaluating whether the pathway is potentially complete.	Text has been modified.
18	2	4	4	Please clarify the level of data validation required.	The Department validates all VI analytical data.
18	2	4	4	Is formal third-party data validation required? Please clarify.	The Department validates all VI analytical data.
18	2	4	4	The **third bullet** includes the following "...(some sampling events are left in place…)." Seems awkward to refer to "events" being left in place. Should it be "some equipment is left in place...?"	Text has been modified
18	2	4.4	par 2	Suggested reword: Any negative responses may indicate false positive or false negative bias in the data acquisition that may require the collection of additional data.	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
19	2	4	5	First full paragraph, last sentence. The DEP should provide the basis for the requirement for continuous soil lens at least five feet thick.	Text has been modified
19	2	4	5	Second full paragraph, third sentence. The DEP should provide the basis for a soil boring to determine soil texture within 10 feet of the building.	The current wording is sufficient.
19	2	4	5	Specify that site specific screening levels should not be used if a preferential pathway is identified (see section 3.2.1.5). For site specific options, are we assuming there is no soil source in the vadose zone? Most spills originate at the ground surface or in the vadose zone. Are we also assuming that there is no horizontal travel of a potential vapor cloud along a sloping “continuous lens” that may transport vapors laterally.	The current wording is sufficient.
19	2	4	5	We find the sentence "At least 75% of the soil vertical profile should be as fine as the selected soil texture. " confusing and recommend that it be reworded to "At least 75% of the soil vertical profile should be composed of soils as fine-grained as the soil texture selected for use with Table 3."	Text has been modified
20	2	4	5	Please clarify requirements for sample frequencies for grain size. Discrete for entire length, 1/boring, 1/soil type identified by visual characterizations, etc.	The investigator is to use professional judgement.
20	2	4	5	This section states that "Development of alternative screening levels based on new chemical toxicity information or changes in the risk assessment methodologies, as well as adjustments to the J&E and other models (depth to vapor source and overlying unsaturated zone soil type) must be submitted to the Department for review and approval. " LSRPs are professional experts by definition on the regulations and guidance documents and should not have to consult with the Department on making adjustments to model parameters such as soil type. Moreover, having to consult with the Department before implementing methodologies or procedures will delay the remediation process and unduly increases costs. Allowing LSRPs the latitude and flexibility to make professional judgments, as they are licensed to do, will speed up the process along with making it more effective and less costly. We recommend removing this statement and allowing for professional judgment in applying technical guidance.	Text has been modified.
21	2	5	1	This implies that NJDEP iwill assign a case manager for every VC case. Suggest limiting such activity to sensitive population cases only.	The Department will assign a case manager to VC cases.
21	2	5	1	Suggest revising l**ast two sentences of first paragraph** for clarity (assuming sentence on triggering assigning CM is correct) - The investigator shall notify NJDEP within 14 days of receipt of the data package showing the exceedance, using the VC Response Action Form available at www.etc.. This notification will trigger assigning a NJDEP Case Manager. After this point the investigator should communicate with the Case Manager to ensure that all future actions are mutually acceptable.	Text has been modified.
21	2	5.2	par 2	Suggested reword: The implementation of the plan shall be initiated within 120 days of receipt of the analytical results.	Wording taken directly from regulations.
21	2	5	2	Table 2 for Rapid Action Levels need to be updated with more contaminants of concern widely present.	RALs beyond the scope of this document.
22	2	5	2	60 days to implement an ESRA in a large industrial setting not realistic	Regulatory timeframes beyond the scope of this document.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
22	2	5	2	Is Engineered System Response Action defined? Is it required if Interim Response Action is successful? Please provide definitions for both terms.	Please refer to N.J.A.C. 7:26E-1.14 and the NJDEP IEC Technical Guidance for additional information.
22	2	5.2	par 1	Suggested reword: Notify the building's owner about the contamination in writing;	Text has been modified.
23	2	7	--	In Section 2.7 Termination (Stage 5), we note that the word "final" has been added before "remediation" in the following statement; "Finally, the decision to terminate the proposed mitigation is dependent upon the final remediation of the VI source (Stage 5)." Because there is no VC or IEC without a complete VI pathway, the decision to terminate mitigation should be based on eliminating the pathway. We recommend changing the statement to "The decision to terminate the proposed mitigation is dependent upon the remediation of the VI source to the point where the VI pathway is not complete (Stage 5)." The evaluation of the pathway should be based on professional judgment.	Text has been modified.
22	2	5	3	Provide examples of institutional control to address current/future use.	Please refer to Section 7.4.1.
24	3	1	0	The second sentence of the first paragraph states "*When submitting the results of the sampling event, the investigator shall provide written technical rationale justifying any deviations from this guidance."* This is redundant and not needed since it is already stated in section 1.1 that ...*departure from guidance must be documented and adequately supported with data or other information*.	The current wording is sufficient.
24	3	1	1	"While the CSM can greatly assist in explaining results of an investigation, it is not a required deliverable for documents submited to the NJDEP." **Not even a couple of sketches and a check list?**	CSM is recommended and subject to professional judgement.
25	3	1	2.1	Third paragraph, third sentence. The DEP should clarify which IEC conditions may necessitate the collection of sub-slab soil gas and/or indoor air samples prior to acquisition of sufficient ground water data, since an IEC is defined as "contamination in indoor air at a level greater than any vapor intrusion rapid action level included in or developed consistent with the Department's Vapor Intrusion Guidance", and therefore would require indoor air sampling results.	Text has been modified.
25	3	1	2.1	Section 3.1 is 15 pages, is it an overview of what will be presented later? For example 3.1.2.1 is about soil gas sampling and repeats information presented in section 3.3.	Seven pages concern methane, which is new to the document. Two redundant paragraphs have been deleted.
25	3	1	2.1	"Section 3.2 below should be followed for all ground water investigations." It is not reasonable to require all of section 3.2 be followed for every case. If it should be followed for all groundwater investigations it should be adressed in that guidance docuemnt rather than under VI.	The current wording is sufficient.
25	3	1	2.1	"The presence, quantity and location of non-aqueous phase liquid (NAPL) in the vadose zone **close to buildings** may also indicate that the collection of soil gas and/or indoor air saples should precede collection of ground water analytical data."	Text has been modified.
25	3	1	2.1	**Last paragraph, 1st sentence** could add - and changes in concentrations over time. at the end. Also, to **2nd sentence** could add - and history at the end but before "(as defined in the CSM)."	The current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
26	3	1	2.2	Third paragraph. The DEP should provide greater flexibility for allowing near slab sampling as an alternative to sub-slab sampling. Particularly, as part of the assessment of buildings within the critical search distance but at greater distances from the source. Obtaining access to the interior of buildings to perform sampling is often more difficult and time consuming than gaining access for an exterior sample, which could impact the investigator's ability to meet the stipulated investigation timeframes.	Historical data indicate that sub-slab sampling is most accurate. Near slab sampling can be performed based on professional judgment and technical justification.
26	3	1	2.2	"Sometimes, it is necessary to investigate the subsurface soil gas under buildings with existing sub-slab depressurization system (SSD) systems designed to address either radon or VI. In these cases, the SSD fan (if present) should be turned off and the vent pipe capped a minimum of 24 hours in advance of the sub-slab soil gas sample collection." **A minimum of 24 hours may not be sufficient for concentration beneath the sub-slab to equilibriate. Suggest a minimum of 48 hours or one week.**	Text has been modified.
26	3	1	2.2	In 5th paragraph, 1st sentence: change "buildings with existing sub-slab depressurization system (SSD) systems designed…." to "buildings with existing sub-slab depressurization systems (SSDS) designed….."	Abbreviation has been modified.
26	3	1	2.2	Please add "the presence of a vapor barrier" to the reasons for accepting near-slab soil gas samples, or provide the rationale for requiring that a hole be drilled in the vapor barrier to investigate VI.	Wording added to 3.3.2.1
26	3	1	2.2	Capping vent pipe(s) prior to SSSG sampling in industrial setting is not practicable.	The investigator may deviate from this provision based on proper technical justification
26	3	1	2.2	"Sometimes, it is necessary to investigate the subsurface soil gas under buildings with existing sub-slab depressurization system (SSD) systems designed to address either radon or VI. In these cases, the SSD fan (if present) should be turned off and the vent pipe capped a minimum of 24 hours **(arbitrary)** in advance of the sub-slab soil gas sample collection. The sub-slab sampling point(s) should be located away from existing SSD system suction points, floor drains, sumps, and any other openings in the slab, if possible." **Why not measure flow and concentration in the pipe? F = CxQ --> divide by Q(building) to get C(indoor).**	The current wording is sufficient.
26	3	1	2.2	"Sub-slab soil gas samples may also be more appropriate when obtaining respresentative ground water data is not possible or is impractical." **Or water table is very shallow.**	The current wording is sufficient.
26	3	1	2.2	In the third paragraph of Section 3.1.2.2 Soil Gas Sampling, the document reads: "Near slab soil gas sampling is an acceptable alternative when it is verified that obtaining sub-slab samples is not possible." It is suggested that the word "possible" be changed to "practical."	The current wording is sufficient.
26	3	1	2.2	It is stated in the newly added fifth paragraph that turning off an active sub-slab depressurization system (SSD), which has been installed for purposes other than the investigator's vapor intrusion evaluation, 24 hours prior to sub-slab soil gas sample collection, may potentially expose receptors in that building to carcinogenic or potentially carcinogenic radon and/or VOCs. The requirement to turn off the system prior to sampling and the potential for exposure should based on the professional judgment of the LSRP.	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
27	3	1	2.2	Comment: The UST scenario and the vapor degreaser scenario appear to be very different. If the source is in indoor air at the surface, such as an interior vapor degreaser (or acetone from a nail salon), then VI is not the pathway unless an adjacent structure or building is affected from the subsurface by the vapor cloud.	The current wording is sufficient.
27	3	1	2.2	"Underground storage tank sites or sites where chlorinated solvents are used in buildings or facilities at the surface (e.g. dry cleaners, vapor degreasers) may have contamination in the vadose zone due solely to vapor **releases**."	The current wording is sufficient.
27	3	1	2.2	**4th paragraph, third sentence**, should the ending be "...the sample collection increases" instead of "...the soil collection...?" Also, could **add** the following **to end of para**. - In addition, the vertical distribution of soil gas concentrations may provide a basis for estimating the mass of VOC currently in the vadose zone, which, for recalcitrant VOC could be relevant to analysis of future VI risk.	Text has been modified.
28	3	1	2.2	First paragraph, last sentence. The DEP should clarify whether macadam driveways would also qualify as an exception to the near slab sample depth requirements.	This paragraph has been removed.
28	3	1	2.2	I suggest allowing near building soil gas samples as shallow as 3 feet if a helium shroud is used and demonstrates no significant leakage of ambient air.	See section 3.3.2.2
28	3	1	2.2	I would include JE modeling in the bullet list, simply as another line of evidence	Text has been modified.
28	3	1	2.2	In 3d paragraph, 1st sentence: change "A VI investigation for undeveloped land may not be necessary…." to "A VI investigation for undeveloped land will not be necessary…."	Text has been modified.
28	3	1	2.2	If building does not exist why does testing have to be performed if landowner will accept an institutional control? Could be years before any building constructed. Contamination may decrease below criteria by then.	Text has been modified.
28	3	1	2.2	There is mention of investigating undeveloped parcels. What requires this since Receptor Evaluation regulations only require investigation of buildings? Since the Tech Reqs do not specify undeveloped parcels, how can the VIG lawfully make them a requirement.	Text has been modified.
28	3	1	2.2	The NJDEP SGSL are applied to soil gas results of near slab samples only when near slab samples are collected one foot **(very limited)** above the capillary fringe **(difficult to define)** with a minimum depth of 5 feet below the ground surface. A shallow ground water table may prevent the collection of representative or valid soil gas samples due to high moisture content **in the soil which can reduce gas permeability** and/or dilution due to atmospheric air being drawn down from the surface. One exception to these depth requirements is for near slab samples collected from a central location below a shallow or at ground level **low-permeability** slab, including concrete driveways, building slabs, and garage floors."	This paragragh has been removed. See 3.3.2.2.
28	3	1	2.2	We have noted that the Department has changed the 2005 guidance by deleting "parking lots" and specifically qualifying driveways with "concrete" in the following statement: "One exception to these depth requirements is for near slab samples collected from a central location below a shallow or at ground level impermeable slab, including concrete driveways, building slabs, and garage floors." We have the concern that this will cause confusion because it is inconsistent with page 64, Section 3.3.2.2, which reads; "including garage floors, patios, parking lots, roads and driveways." We suggest revising 3.1.2.2 to read "including building slabs, patios, garage floors, parking lots, roads and driveways."	This paragragh has been removed. See 3.3.2.2.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
28	3	1	2.2	To **last bullet** "Soil stratigraphy" add and/or vertical profiling of soil gas concentrations. To end of **next paragraph** could add - Another potential option for undeveloped land is to include a specific plan for a future VI investigation as part of the plan for monitoring, maintenance and evaluation of the ground water Classification Exception Area (CEA); this plan is currently part of the remedial action workplan (RAW), pursuant to N.J.A.C. 7:26E-6.2(a)18, but the CEA documentation can be submitted prior to preparation of the site-wide RAW.	Text has been modified.
29	3	1	2.2	passive soil gas data is also useful for locating hot-spots or source zones due to vadose zone contamination, not just GW plumes. The passive soil gas COC ratios have proved to be useful lines of evidence at other sites (for distinguishing VI and indoor sources). The difference in the sorption rates must be accounted for, however.	Text has been modified.
29	3	1	2.3	ambient air samples should be collected near representative HVAC intake locations, which may be on the roof (or in one case in Long Island, was in the adjacent parking garage). The current wording requiring sampling at breathing zone height would not allow this.	Text has been modified.
29	3	1	2.2	Suggested reword: Passive soil gas results are not acceptable as the only line of evidence in assessing the VI pathway.	Text has been modified.
29	3	1	2.3	Suggested reword: Indoor air sampling may be necessary to properly assess whether the VI pathway is complete in several situations, such as:	Text has been modified.
29	3	1	2.2	"At this time, passive soil gas results are not acceptable as a line of evidence in assessing the VI pathway." **This warrents further discussion. Recent research conducted for the ESTCP and the Navy shows that quantitative passive soil gas sampilng is possible. THe key here is to demonstrate the correlation using side-by-side active and passive samples, and explicitly address the implications of the undertainty in either measure of concentration.**	Text has been modified.
30	3	1	2.3	Define "close proximity" to building, as referenced for the location of ambient air samples. Ten (10) feet? Five (5) feet?	It is left to the professional judgment of the investigator.
30	3	1	2.3	It is stipulated that ambient air samples should avoid areas near auto traffic and other non-site sources. A true background sample incorporates the effects of all non-site sources rather try to avoid known, non-site sources. Avoiding traffic and other potential sources would potentially bias the background data. We recommend that the sentence be changed to: "Ambient air samples should be taken at breathing zone height (if practicable), and in close proximity to the building.	Text has been modified.
30	3	1	2.3	(first reference of breathing zone height) Document should include reference to changing indoor air sample height if population (child care centers) warrants.	It is left to the professional judgment of the investigator.
30	3	1	2.4	Statement made that even when soil samples results reveal no detectable VOCs VI can still be a concern. How does this aid in discussion? What is to be done regarding soil data?	Text has been modified.
30	3	1	2.4	"In general, soil samples for VOCs have a potential for negative bias due to volatilization losses and generally higher RLs compared to soil gas samples. Thus, VI can be a concern even when soil samples results reveal no detectable VOCs." **Conversely, high soil concentrations may be useful as an indictator of the depth and/or extent of the vadose zone sources (can be useful to screen in, but not out).**	Text has been modified.
31	3	1	2.5	can the LSRP approve use of modeling without seeking DEP approval?	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
31	3	1	2.5	At the bottom of the page, it is stated that *"...modeling results can be used (with the Department's approval) as another line of evidence in assessing the VI pathway."*. One of the concerns is that whenever DEP approval is identified as being required, we should provide the citation that requires it and also have a mechanism in place for actually getting the approval. If the approval process is currently in place, it would be good to identify contact info for it. This comment would apply to other sections of the document where we require DEP approval.	Text has been modified.
31	3	1	2.5	*Other Investigative Tools* **Add citations**	Sources of additional information added.
31	3	1	2.5	"Thus, monitoring barometric and differential pressure, as well as wind speed and precipitation, **can be** recorded to document daily or seasonal trends."	Text has been modified.
31	3	1	2.5	"Finally, modeling results can be used (with the Department's approval) as another line of evidence in assessing the VI pathway." **Building Pressure Cycling, compound specific isotope analysis, floor slab leakage tests, portable mass spectrometer, and infarred cameras are all emerging techniques that have been used with some success in some circumstances. Consistent with the ITRC Guidance, it is good to have a toolbox of technologies at the disposal of the practitioner, and it is not desireable to limit the number of tools to a small number.**	Text has been modified.
32	3	1	3	There is mention that natural features be identified. What does NJDEP expect to take place? A geophysical survey or matrix of soil borings throughout the investigation area? It is unreasonable to require such extensive effort. The VIG should be more specific of the type of investigation intended to identify natural features.	The current wording is sufficient.
32	3	1	3	We find the use of "must" in the following statements to be overly prescriptive and inflexible; "Due to the nature of vapor migration, all VI investigations must assess the presence of preferential pathways, whether natural (e.g., shallow rock or vertically fractured soil) or manmade (e.g., buried utilities) (PA DEP, 2004)." We recommend removing must statements and allowing for professional judgment.	The current wording is sufficient.
32	3	1	3	We find the use of "must" and "shall" in the following statement to be overly prescriptive and inflexible; "As part of the VI receptor evaluation (Stage 1), the investigator shall evaluate the possibility of interconnections between a source and a building through subsurface utilities. Specifically, the use, the depth of the invert, the diameter of the conduit, and the construction specifications of utility lines shall be determined. Natural features that may act as preferential pathways must also be identified." We recommend replacing these statements with recommended practices, appropriately cited regulations and allowing for professional judgment and unique situations.	These provisions are part of the Technical Rules, as cited in the document.
33	3	1	4	Landfill includes an AOC where waste was dumped on ground surface or below ground surface. What about random dumping in woods, debris? Definition too broad. Does this include engineered remediations such as capped soil?	The definition is from the Technical Rules, as cited in the document.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
33	3	1	4	Please clarify whether the person responsible for remediation is responsible for investigating landfills unassociated with contamination at the contaminated site, as defined in the Technical Requirements for Site Remediation (TRSR). The TRSR and Draft Revised Vapor Intrusion Guidance clearly indicate that the person responsible for remediation is not required to investigate compounds that are not site-related (i.e., not compounds of concern [COCs]). If the TRSR and Draft Revised Vapor Intrusion Guidance require that the person responsible for remediation of non-landfill contamination is also required to investigate an adjacent landfill unrelated to the site, please provide the regulatory and technical bases for such requirement.	This provision is from the Technical Rules, as cited in the document.
33	3	1	4	Not clear when and why a variance is applicable for landfills next to buildings	The current wording is sufficient.
33	3	1	4	The draft SI guidance has a good section on Landfills (3.6.9); the IV guidance should reference the SI guidance here	The current wording is sufficient.
33	3	1	4	*Landfills and Methane Gas* **Check for consistency with existing landfill gas guidance and regulations.**	The current wording is sufficient.
34	3	1	4.1	"It is a colorless, odorless hydrocarbon that is combustible at concentration of 5-**15**% by volume in air.	Text has been modified.
34	3	1	4.1	"(N.J.A.C. 7:26-2A7(f))" **Claritfy whether anything in this guidance that is different from that regulation would be applied, or not.**	The current wording is sufficient.
35	3	1	4.3	"Presence of oxygen - Methane will only be produced after oxygen is no longer present in the landfill." **Both anaerobic and aerobic conditions are common and can occur side-by-side in small regions, so methane can be created and quickly destroyed. If anything changes to limit the oxygen supply, the methane distribution can change quickly.**	Text has been modified.
36	3	1	4.3	"Landfill Liners - If the landfill has an impermeable **(nothing is impermeable, prefer to say "low-permeability liner")** liner system, LFG will not migrate into the surrounding subsurface area **by advection**. **It will still migrate by diffusion, methane is a very small molecule and can diffuse through plastics, clay liners, etc.**	Text has been modified.
36	3	1	4.4	It is noted that this section uses "must" statements, which we feel are overly prescriptive and inflexible. We recommend referencing the appropriate regulation and delete the "must" statements from the guidance ("remedial actions for landfills must include mitigation of the VI and gas migration pathways").	Text has been modified.
37	3	1	4.5	Provide examples of instances and indicators that would identify "VI investigations that have the potential for methane to be present".	The current wording is sufficient.
37	3	1	4.5	"When methane may likely be present,…" **Might want to specify certain conditions where it must be assessed.**	See 3.1.4.1
37	3	1	4.5	"Once the investigator determines that an explosive condition does not exist at the building…" **Most buildings that do explode would not have explosive conditions "most of the time". So concluding it doesn't exist is not enough, you need to conclude it will not have explosive conditions in the future.**	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
38	3	1	4.5	What are "other methanogenic environmental conditions"?	See 3.1.4.1
38	3	1	4.5	"While samples can be collected in Summa canisters for laboratory analysis, a field instrument capable of directly measuring methane (landfill gas analyzer, combustible gas meter, **infared dector,** or flame ionization dectector (FID) can be used."	The current wording is sufficient.
39	3	1	4.5	Second paragraph. The DEP should indicate what the target sub-slab pressures should be when methane is the COC.	The current wording is sufficient.
39	3	1	4.5	"EPA Method **TO-**3C…" "Methane Specific IR Gas Analyzer (Landfill Gas Meter)" **- add to previous page**	EPA Method 3C is not part of the Compendium of Methods for the Determination of Toxic Organic (TO) Compounds in Ambient Air.
39	3	1	4.5	"Measurements of the sub-slab pressures should be completed with a manometer capable of reading 0.001 inches of water." **0.001 - not very practical. DeltaP can +/-0.02 inH2O just from wind buffeting.**	Refers to the capability of the instrument, not the measurement.
40	3	2		As described in 7:26E-3.7(e), can ground water averaging be done to determine VI triggering?	Yes
40	3	2	1.1	First paragraph, fourth sentence. The DEP should provide the basis for the required clean water lens thickness requirement. In addition, it does not seem likely that an investigator could complete the investigation of the clean water lens during seasonal low water levels within the required timeframes of a VI investigation.	Professional judgement is the basis for clean water lens thickness. As long as a clean three foot lens is documented the VI investigation is not triggered.
40	3	2	1.1	Define periodic monitoring (e.g., semi-annual, annual, etc.)	The current wording is sufficient.
40	3	2	1.1	"(Rivett 1995)" **- many more citations could be added.** "A clean water lens of three feet or greater may be an appropriate barrier to prevent volatilization into overlying buildings." **- It depends on the range of water table elevation fluctuations. If there are no fluctuations, an even thinner lens is enough, but if the water table fluctuates by 5 feet each year, then a 3 ft lens may not be enough.**	The range was based on typical fluctuations in New Jersey. The investigator can deviate from this provision with proper technical justification.
40	3	2	1.1	The Department's recognition that a clean water lens is can act as a barrier is appropriate but the Guidance is too prescriptive in outlining the acceptable approach to establishing whether a clean water lens is present. The Guidance should be changed to state that changes in water levels should be considered in evaluating the applicability of a clean water lens to the CSM.	The range was based on typical fluctuations in New Jersey. The investigator can deviate from this provision with proper technical justification.
41	3	2	1.1	"Other acceptable methods of sampling groudwater…" **The Waterloo Profiler(R) works well in sandy soils**	The current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
41	3	2	1.1	"A clean water lens immediately above the plume can not be determined without vertical profile data or use of other acceptable multi-depth sampling approaches to document the approximate depth of the vertical transition from clean to contaminated ground water." **Narrow view - If recharge is high and water table fluctuations are minimal, good chance the lens is clean. Without knowledge of recharge and water table fluctuations, I'm not sure I'd rely on vertical profiles alone (there can be cross-flow from different intervals during sample collection)**	The current wording is sufficient.
41	3	2	1.2	We are concerned that the Department's new definition of water table is confusing and inconsistent with other parts of the guidance as well as previous NJDEP definitions; ""The water table can be described as the upper surface of the zone of saturation. " The "the upper surface of the zone of saturation" can describe the top of the capillary zone or capillary fringe, which is saturated but under negative pressure (Freeze & Cherry), not the water table. Because some authors consider the capillary zone part of the zone of saturation (Freeze & Cherry), the definition of water table in this document should be changed to avoid confusion, especially since the Department has prescribed different distances to building slabs from both the water table and the capillary zone or fringe. We recommend revising the definition to: The water table can be described as the surface of the body of unconfined ground water where the hydrostatic pressure is equal to atmospheric pressure. (see http://www.state.nj.us/dep/srp/bust/defs.htm#wat)	Text has been modified.
42	3	2	1.3	This section should provide an online link to the database for supply wells, production wells, etc. impacting groundwater levels.	Beyond the scope of this document
42	3	2	1.3	The last paragraph states "Proper ground water sampling design may overcome this potential limitation but use of ground water samples that represent worst case conditions and/or use of soil gas data is more acceptable for modeling in such situations." This is an additional layer of conservatism that is not necessary. We recommend reworded the sentence: "Proper ground water sampling design may overcome this potential limitation."	Text has been modified.
44	3	2	2	Please clarify if this section is referring to samples collected by volume average sampling.	The current wording is sufficient.
44	3	2	1.5	We note that the Department has used the term "residual DNAPL". We are concerned that this will lead to confusion and recommend that "residual DNAPL" be replaced with "NAPL" (see previous comment regarding the term "residual"). We also feel that DNAPL is too specific and inconsistent with previous sentence and should read "NAPL".	Text has been modified.
44	3	2	2	We are concerned that the Department has changed the guidance to limit pre-existing ground water data to monitoring wells. Many times a VI investigation is triggered during a ground water delineation phase using alternative sampling methods as part of a Triad approach, such as direct-push groundwater grab samples. We feel limiting groundwater data to monitoring wells is inconsistent with Section 3.2.3 and Table 3-1 that clearly indicate that direct-push data is acceptable and "well suited" for VI investigations. We recommend changing "shallow ground water monitoring well data" back to "shallow ground water data" and deleting the added term "well" from "In deciding whether existing well data are sufficient."	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
45	3	2	2.2	Section 3.2.2.2 illustrates another overarching concern – I am left uncertain as to whether VOCs in private potable wells are a VI trigger or not and what criteria could be used to make that professional judgment.	Text has been modified.
46	3	2	3	In 2nd paragraph, last sentence: please explain why volume average purging "...is not well suited to generate new ground water data specifically for VI evaluations."	Text has been modified.
46	3	2	3	Please reconsider the use of 3-5 volume purge groundwater sample collection as being suitable for the assessment of chlorinated VOC impacted groundwater or those compounds more dense than water. Vertical profiling and low flow sampling in discrete intervals for less than 10 feet of submerged screen will add significant costs to ongoing projects.	Text has been modified
46	3	2	3	Section 3.2.3 and Table 3-1– it's going from low flow to zero purge in industry from what I'm seeing – may not want to back ourselves into a low flow corner.	Text has been modified
47	3	2	3.1	Section 2.4.3 vs. 3.2.3.1 – is critical distance criterion 30 feet or 100 feet? Needs to be clarified and better example provided.	Text has been modified
48	3	2	3.2	The discussion aboutr perched zones in paragraph 2 is good. I recommend adding "but may be necessary for plume delineation/complete characterization of the gorund water contamination" to the last sendtence in paragraph 2.	The current wording is sufficient.
49	3	2	3.2	We note that the Department has added the following statement to guidance; "Across the width of a plume, at least one boring per every two or three buildings at risk for VI is a general rule-of-thumb." We find this overly prescriptive, it doesn't allow for site-specific dimensions and other conditions, and is presented without any technical basis. We recommend that this statement be removed from this guidance.	Text has been modified.
50	3	2	3.3	Provide definition/examples of direct push and alternative ground water sampling methods. Will the DEP provide a listing of alternative methods that are currently approved and will not require a variance request?	Beyond the scope of this document
50	3	2	3.4	Define situations where existing water table wells should not be used.	Text has been modified.
50	3	2	3.4	We recognize that groundwater sampling is an important part of evaluating the vapor intrusion pathway, however, we recommend that Section 3.2.3.4 and Table 3-1 be omitted because they include information that is not directly related to vapor intrusion. This section is addressed in another NJDEP guidance document and needs to be deleted. The repetition makes the document cumbersome and when inconsistencies occur the unnecessary redundancies are confusing. We recommended removing Table 3-1 and Section 3.2.3.4 and replacing it in Section 3 with a reference or references to guidance on ground water sampling methods.	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
51	3	2	3.4	Under the section that describes the use of Passive Diffusion Bag Samplers (PDBS), I would suggest using the full name of the sampler in the heading, not the acronym. In addition, the last sentence of this section states "*If profiling should extend to the 6 to 10 foot interval bwt (due to expected decline in water levels), one PDBS deployed in the central portion of that interval will be sufficient*." This sentence is confusing even though I understand how to use PDB samplers. I would suggest revising this sentence to better convey your intentions. I would also use the words "below the water table" rather than bwt. While I realize guidance on the use of PDB samplers are provided in the NJDEP's Field Sampling Procedures Manual, there are other depth discrete passive sampling approaches that are available and guidance is available on their use (ITRC 2007, *Protocol for Use of Five Passive Samplers to Sample for a Variety of Contaminants in Groundwater)*. Have they been considered?	Text has been modified
51	3	2	3.4	In last paragraph of this section: Volume-Averaged Purge and Sample Collection, it states "This method is not recommended when obtaining new data specifically geared for a VI investigation. However, there may be site-specific cases where this method can be used." Again, please explain why it's not recommended, and give an example where it can be used.	Text has been modified
51	3	2	3.4	Comment: Passive diffusion bag samplers not defined.	Text has been modified.
51	3	2	3.4	Regarding "Other discrete interval well sampling devices or methods (such as use of packers between PDBS) may be appropriate but use of methods not included in the FSPM could result in the data being considered invalid; all deviations must be documented pursuant to N.J.A.C. 7:26E-1.7, as discussed in Section 1.1 of this guidance." We feel that LSRPs are experts by definition on the regulations and guidance and should not be required to provide written technical rationale justifying any possible deviations from this guidance document. Because this is a guidance document, deviations should not be required to be supported with data and other information. We recommend deleting "all deviations must be documented pursuant to N.J.A.C. 7:26E-1.7, as discussed in Section 1.1 of this guidance".	Text has been modified
51	3	2	3.4	**Volume-Averaged Purge and Sample Collection** - Recommend replacing last sentence with something like - <u>There may be specific situations where use of this method is appropriate; these include, but may not be limited to: where COC concentrations are expected to be quite high relative to their GWSL; where water table wells have been constructed so that the saturated water column height in the well is very small (about 5 feet); and/or where the resulting ground water data will only be used in conjunction with soil gas data to evaluate vapor intrusion risk.</u>	Text has been modified
52	3	2	3.4	Regarding deviation from well construction for installing well in transition zone between unconsolidated sediments and bedrock. Need to discuss with appropriate NJDEP site remediation staff recommended. What happens if not site remediation case but rather LSRP? How will process for variance for well construction work without case manager?	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
52	3	2	3.5	We note in Section 3.2.3.5 Installation of New Monitoring Wells that the Department has replaced "5 to 10-ft screen" with "a 10-foot screen". This is inconsistent with the NJDEP FSPM, which recommends 5 to 10 feet and only 5 feet for low flow sampling. This is also inconsistent with pg. 51: Low Flow Purging and Sampling (LFPS). The LFPS procedures in the NJDEP FSPM are acceptable for VI investigations. We feel that there is no technical justification given for this change that would essentially require two different well constructions for ground water delineation and monitoring versus vapor intrusion investigations. We recommend changing the screen length back to 5 to 10 ft. and also changing "10 feet " to "10 feet or less" with respect to bedrock open holes to be consistent with FSPM and LFSP.	Text has been modified
52	3	2	3.5	**Last sentence** in section (bottom/top of pages), could add more info. at end - "Discussion with the appropriate Department site remediation staff is recommended prior to requesting such a deviation from the well construction regulations (i.e., contact Case Manager, if assigned; for LSRP cases, a technical consultation is appropriate, see contact information at http://www.nj.gov/dep/srp/srra/technical_consultation/)."	Text has been modified
53	3	2	3.6	Please provide the regulatory requirement, including the TRSR citation, for evaluating the potential for VI when completing CEA certifications, and clarify the procedures and documentation required for completing this evaluation.	Text has been modified
53	3	2	3.6	Define "close to, but not currently within the applicable critical distance criterion" (e.g., an additional 50% increase over the distance crtierion)	The current wording is sufficient.
53	3	2	3.6	**1st paragraph, 2nd sentence, middle of 4th line** - Should the word "potential" be deleted? **Last paragraph, last phrase of 1st sentence** - Since we already know these CEA requirements are gonna be moved to the ARRCS rules, might be good to change - ", specified in N.J.A.C. 7:26E-8.6." to - (currently specified in N.J.A.C. 7:26E-8.6) or just insert currently before that phrase.	Text has been modified
54	3	3	0	Last sentence, first paragraph - the word "impossible" should be changed to "impractical".	Text has been modified.
54	3	3	0	First paragraph, fourth sentence. The DEP should provide greater flexibility for allowing near slab sampling as an alternative to sub-slab sampling. Particularly, as part of the assessment of buildings within the critical search distance but at greater distances from the source. Should talk with Paul Johnson about this. He is pretty down on sub-slub sampling, except for maybe oxygen sensors at hydrocarbon sites. There may be better ways to do this (like passive or high purge volume sampling).	Data indicates that sub-slab sampling is more accurate. The investigator can deviate from this provision with proper technical justification.
54	3	3	1.1	Third paragraph. The DEP should clarify why exterior soil gas sampling is appropriate when sub-slab soil gas results do not imply a VI issue, but is generally otherwise unacceptable in evaluating the VI pathway.	Subsurface vapors may not be originating from the groundwater but instead from impacted soil in the vadose zone. Exterior soil gas sampling may be a way to identify this vadose source.
54	3	3	1.1	air from the building can move down below the slab under reverse pressure gradients, not just density flow	The word "dense" has been removed.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
54	3	3	1.1	If the absence of COCs below screening levels in soil vapor does not mean a VI condition does not exist, does this mean that indoor air must be analyzed for any building with distance criterion? Please clarify which situation it would imply no VI.	Indoor air does not need to be sampled unless soil gas results adjacent to the building exceed the SGSLs. The statement in the Guidance reminds the reader the sources can exist in the vadose zone that might not be reflected in sub-slab soil gas results.
54	3	3	1.1	**2nd bullet** - should we really say, essentially, the VI pathway is complete, only when it is complete? Could word this similar to suggested wording in comment 2 above. **Last full paragraph** on pg. - seems there is too much redundancy between this para. and 1st para. in next section (3.3.1.1) re. horizontally placed source area not detectable thu. sub-slab sg sample. I suggest deleting this para. & replace with - Elevated contaminant vapors in a sub-slab gas sample indicate the pathway could be complete, however, low levels or the absence of VOC in a sub-slab soil gas sample does not automatically imply there is no VI risk (see additional discussion in following section).	Both comments: Text has been modified.
55	3	3	1.1	First partial paragraph. The DEP should clarify how an investigator would determine when conditions conducive to "extrusion" may exist.	Due to numerous variables, the investigator is to use professional judgment.
55	3	3	1.1	"Care should be taken when collecting sub-slab soil gas samples to avoid vapor extrusion." This statement implies that measures beyond methods detailed in field sampling procedures manual and VIG are necessary. This statement should be removed.	It will remain for informational and awareness purposes.
55	3	3	1.1	"This is a condition where ~~**dense**~~ indoor air contaminants move downward ~~**(i.e. sinking vapors)**~~ into the sub-slab area from the indoor air **because of oscillations in the sub-slab to building pressure differential**." **Sinking has nothing to do with it. This is a total misconception. Vapors move from high concentration to low concentration via diffusion. In order to sink, they need to be very highly concentrated and in very high permeability materials (Hughes et al., 1990).**	Text has been modified.
55	3	3	1.1	"By comparing the specific chemicals (and their concentrations) detected in the indoor air sample with the sub-slab soil gas sample, a determintation may be possible on the likely role of background sources." **Elaborate with 2 examples; one that works and one that does not**	Sentence removed. See section 4.7 for an example.
55	3	3	1.1	The last sentence of 3.3.1.1 and the first sentence of 3.3.1.2 are very repetitive in their meanings	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
55	3	3	1.1	**1st two complete sentences at top of pg**. - Should this be worded - When choosing sub-slab soil gas sample locations investigators should consider possible impacts of what has been referred to as a vapor cloud; this is a condition where dense indoor air contaminants move downward (i.e. sinking vapors) into the sub-slab area from indoor or above ground sources. I have not seen the term vapor "extrusion" used anywhere (neither has Paul Sanders). The term vapor cloud, appears to be used to refer to the sinking vapors situation in other parts of this guidance (pg. 27). and also in EPA's 2002 VI guidance **(**pg 17 & 18/in question 3.**)**. Plus may not always want to just "avoid" sampling a vapor cloud, as the current wording seems to indicate, but may need to do more than just sub-slab to determine what is happening. Also should note that recent research (& maybe some limited case data) seem to suggest vapors may sometimes migrate out of buildings but not just due to having a density greater than air (building may "breath" in and out). See reference/link to Paul Johnson presentation in Word doc. attached to email.	1st Comment: Text has been modified. 2nd comment: Investigator can do additional sampling based on professional judgment.
55	3	3	1.2	if no slab is present, you can also collect traditional soil gas samples below the earthen floor (e.g., at a depth of 3-5 feet) - while traditional sub-slab attentuation factors would not apply, the resulting presence or absence of compounds, as well as compound ratios, will provide valuable lines of evidence	Can be done based on professional judgment and site conditions with proper technical justification.
55	3	3	1.2	So is sub-slab and near slab sampling required where utilities enter through a basement wall?	It is left to the professional judgment of the investigator.
55	3	3	1.2	"In these situations, it may be prudent to collect a conbination of sub-slab soil gas samples from the concrete area and indoor air samples from the crawl space overlying the earthen floor." **What about deeper soil gas samples through the dirt floor?**	It is left to the professional judgment of the investigator.
56	3	1	1.2	Subslab soil gas evaluation when the water table is less than two feet below the slab may be desirable as design data for the installation phase. If the slab is opened to install horizontal extraction piping, consideration may be required for both the Health & Safety of the installation personnel and potential release of trapped vapors into the structure during installation.	Statement in guidance document is for determining vapor pathway and not installation.
56	3	3	1.2	**We have experience collecting soil gas samples at a Site in NJ where the water table was less than 2 feet below the building's concrete slab. Instead of not allowing the collection of a sub-slab sample in these conditions, how about asking for a sump water sample in addition to sub-slab samples.**	It is left to the professional judgment of the investigator.
56	3	3	1.2	In an effort to reduce costs and reduce impact to building occupants, will NJDEP approve concurrent SS and IA samples to be collected at the same time? While there may be a slight chance that the installation of a SS sample point may impact the IA, it is more likely that impacts to the IA sample will be from background sources. No other guidance requires such a sequential sampling approach and our extensive experience with simultaneous sampling has neve revealed a cross contamination issue.	The investigator can deviate from this provision with proper technical justification.
56	3	3	1.2	"…high moisture content in the soil gas sample…" **The relative humidity of soil gas is almost always 100% everywhere** "…can "mask" results, particulary polar compounds." **I would double check this with a lab**	Current wording verified with a lab.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
56	3	3	1.2	"Depending on the analytical method, high moisture content in the soil gas sample can "mask" results, particularly polar compounds. Additionally, low permeab**ility**, soils, especially in the capillary fringe area may limit or restrict the flow of soil gas thereby extending the time to collect adequate sample volume to meet data quality objective." **If the capillary fringe is in contact with the slab, sub-slab soil gas samples may not be very representative, and if the gas permeability is so low that you can't get the volume of sample you need, there is a really good chance the sample you do get will be from leakage. Suggest clarifying these concerns.**	Text has been modified.
56	3	3	1.2	"The capillary zone does not reach the building's concrete slab." **How do you measure this?**	See section 2.3.2.1
57	3	3	1.3	"The NJDEP is to be informed of any compounds detected in the sub-slab soil gas that are not COCs. The NJDEP will assess potential off-site contamination independent of the current investigation since the investigator is not required to address contaminants unrelated to the site." **How will the NJDEP assess the potential off-site contamination?**	Assessment to be done through internal processes.
57	3	3	1.3	Is departmental notification of the presence of non-site-related COCs in sub-slab required for all detections or just exceedances? Please clarify	Exceedances of the analytical triggers i.e. SGSL. Language clarified.
57	3	3	1.3	Please confirm that notification to the NJDEP of compounds detected in sub-slab soil gas that are not COCs can be completed via the submittal of the full data deliverable 14 days after receipt of data.	Soil gas exceedances of the SGSL should be reported to the Department's Hotline. The wording has been clarified.
57	3	3	1.3	"All VI decisions on no further action at a building must be made based on data from a certified analytical method." **This will generate a lot of comments. 8260? TO-17? Or only TO-15? What is a mobile lab follows TO-15? Fixed labs will argue there are lots of gaps in TO-15 that allow shortcuts.**	Need to use certified analytical methods through the DEP's Office of Quality Assurance.
56	3	3	1.3	This section should indicate that there is a factor of 10 difference in detection limits reported by lab for 1-liter versus 6-liter samples.	The information has no affect on the sampling protocol.
56	3	3	1.3	Suggested reword: The sample container normally utilized for the collection of sub-slab soil gas samples is the passivated stainless steel canister. The sub-slab soil gas samples can be analyzed using USEPA Method TO-15 (or other appropriate certified methods). Sampling with Automatic Thermal Desorption tubes and analysis by USEPA Method TO-17 is also acceptable.	The current wording is sufficient.
57	3	3	1.3	"Alternatively, **indvidually certified** 60-500 cubic centimeter (cc) glass **and** Teflon syringes can be used." **(don't really need to specify the volume)**	Current wording is sufficient.
57	3	3	1.3	USEPA SW-846 Methd 8260B is the most common method utilized for field screening of air samples **but TO-15 is also acceptable**."	Current wording is sufficient.
57	3	3	1.3	"The initial set of sub-slab soil gas samples from a building **should typically** be analyzed…"	Text has been modified.
57	3	3	1.3	"Given an appropriate technical justification (e.g., large existing building), the investigator **and NJDEP case worker** may consider a variance…"	The current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
57	3	3	1.3	The document states that initial sub-slab soil gas samples shall be analyzed for the full parameter list of the applicable analytical method based on NJDEP policy. We see several disadvantages to analyzing samples for the full parameter list. Analyzing samples for the full parameter list complicates the investigation, is redundant if a full volatile scan was conducted during the groundwater investigation, and increases cost for the responsible party by requiring a determination on what exceedances are related to background or off-site sources of contamination. Because the TO-15 analysis includes different compounds than the groundwater analysis for VOCs (EPA 624 and SW-846 8260), this may lead to additional requirements in the groundwater investigation. The detection of contaminations from off-site sources in vapor samples may also negatively impact property value and create disclosure requirements for a homeowner if contamination is identified that is not due to the actions of the responsible party. Furthermore, there is concern whether there is a legal basis for the responsible party to analyze for contaminants beyond the site contaminants of concern. We recommend that the LSRP should have the ability to use professional judgment to evaluate whether vapor investigation samples can be analyzed for site-specific compounds and their degradation products instead of the full analytical list, such as when site contaminants of concern are well characterized, vapor intrusion pathways are understood, and/or other standards such as OSHA apply. Additionally, information should be provided detailing what the NJDEP policy entails.	The Department's preference is for full parameter analysis with initial soil gas samples. However, this is not a requirement and the wording has been modified to reflect it. As always, the investigator can deviate from this provision with proper technical justification.
58	3	3	1.4	Last sentence in this section on page 58. You also make the same statement in Section 3.3.1.5 on page 59. I don't understand how these are reasons to not take grab samples. Makes no sense. You really don't want these consultants taking 8 to 24 hour soil gas samples. It is simply more parts & procedures they will screw up. It's well documented, even by Wertz, that temporal variations in soil gas concentrations, including sub-slab samples, are minimal. So in trying to get "better data" all you are really going to get is more data with more errors. You know what I'm talking about. So, I suggest you eliminate this.	1st comment: Agree. Duplicate statements will be deleted. 2nd comment: Instantaneous/grab samples not best sampling method for investigating VI.
58	3	3	1.4	"The leak test serves as a quality control measure to evaluate the potential for dilution of a sample from ambient air. If multiple samples are taken during a sampling round or multiple sampling rounds are required, and leak tests performed on the initial probes installed indicate sample integrity the investigator may reduce the number of probes that are tested. In these cases, leak testing 10% of the probes is recommended." **The leak test conducted during the initial round of monitoring will confirm that the annulus of the borehole or the sub-slab probe cement seal does not leak. It will not verify that there are no leaks in the sample train during subsequent sampling events. Therefore, a "shut-in" test should be conducted at each location, during every sample event to verify above ground fittings do not contain any leaks.**	Text has been modified.
58	3	3	1.4	**Helium detectors will indicate a false positive when high level's of methane are present in the soil vapor. If there are conditions in the soil gas that are significantly different than atmospheric (i.e., low O2 and high CO2 and CH4), a shut in test and field screening measurements can be used in place of conducting a tracer test to demonstrate the absence of a leak.**	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
58	3	3	1.4	"A recommended method employs a shroud placed over the soil gas probe and the sample train. An inert tracer gas (such as helium) is released into the shroud with a target concentration of approximately 20%." **Recommend changing to 10 - 20%. Add sentence at end of paragraph "The range of tracer gas concentrations in the shroud during each purge volume should be recorded in the field log (i.e., 10 - 20%)."**	Text has been modified.
58	3	3	1.4	A leak is occurring when the helium concentration is greater than 10% of the **MINIMUM** concentration within the shroud. **Recommend using 5% instead of 10%.**	The current wording is sufficient.
57	3	3	1.4	Leak checking was not a previous requirement for sub-slab sample collection. The State presents a method to be followed for sub-slab sample collection. It is not difficult to obtain a proper seal for collection of sub slab samples. This will increase the time in the field for sample collection making it difficult to collect sub-slab samples following cessation of indoor air samples. Costs to collect samples will also increase significantly. Please provide clarification as to why this is now required.	Leak testing only for the initial probes (# of initial probes based on professional judgment), not all. Initial leak testing is to confirm field technique. Additional leak testing is recommended.
58	3	3	1.4	Text indicates collecting gas sample for leak detection into tedlar bad, is this necessary? Is measurement of leak detection substance directly from sample train acceptable?	Professional judgment to be used with proper technical justification.
58	3	3	1.4	The last three sentences of the last paragraph of 3.3.1.4 are repeated in the first paragraph of 3.3.1.5.	Text has been modified.
58	3	3	1.4	The recommended leak check procedure describes placing a shroud over the sample train, which is assumed to include the Summa canister and associated laboratory-provided flow controller and associated fittings. This will require that the canister sample be analyzed for the tracer compound. When this approach is used, the investigator will not know the results of the leak test until the laboratory analysis is complete. A leak in the canister and flow controller connections is evident by the dramatically decreased sampling duration and does not need to be checked with a tracer gas. We suggest placing the tracer gas shroud over the sample point installation only, which tests the seal between the sample point and slab.	See diagram for suggested field protocol.
58	3	3	1.4	Maintaining a constant helium concentration in the shroud can be problematic for rough floors or any installation where a tight shroud seal is impractical. We recommend pre-sample and post-sample leak checks when recharging the shroud can be accomplish prior to each check.	Text has been modified.
58	3	3	1.4	We have not seen the need for tracer gas tests of sub-slab sampling because a proper seal between probe and slab is easily accomplished by use of Permagum. The seal is evident and we have never had data quality issues.	The Department feels that leak checks are important to overall data quality.
58	3	3	1.4	"In these cases, leak testing 10% of the probes is recommended." **This is risky. Leaks tend to be "hit or miss" and are not systematic enough for this to work.**	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
58	3	3	1.4	"To verify the integrity of the seal, a tracer compound, typically iso-propanol, butane, helium, sulfur hexafluoride, or difluoroethane is used. Helium is the preferred tracer as it is readily available, non-toxic, and easily measured in the field. Sulfur hexafluoride is an effective tracer, but requires a specialized instrument for detection that may not be readily available. It is also of concern as a greenhouse gas." **Isopropanol, butane, and DFE can cause interference with the methods used for sample analysis and are best used only where they can be tested on-site.**	Text has been modified.
58	3	3	1.4	"... (which, based on the set up should not exceed a 200 ml/minute flow rate). ... the flow rate for sample collection should be based on the professional judgment of the investigator, but not in excess of 200 milliliters per minute (to avoid potential short circuiting or drawing in outside air along preferential pathways)." **The logic behind this is weak at best and flawed at worst. Its time to rethink this part. THere is a stronger technical justification to limit vacuum to <100 inH2O instead of limiting flow.**	The current wording is sufficient.
59	3	3	1.5	The statement that the maximum flow rate of 200 ml/min has been established due to short circuiting is not correct. It has been established due to minimizing the desorbing of VOCs off of the soil particles.	Text has been modified.
58	3	3	1.5	The first paragraph under this section is a repeat from the end of the previous section. Is this redundancy intentional?	Language modified. Duplicative language will be deleted.
59	3	3	1.5	Clarification of "It is not necessary to retain residual vacuum in the stainless steel canisters upon completion of the soil gas sample when the sample is collected over a period of 1 hour or less." Does this indicate that the pressure within the summa canister can increase to an equilibrium with the ambient barometric pressure and this still be a valid sample?	Text has been modified.
59	3	3	1.6	What about the volume of the sand pack? Shouldn't it be included in the purge volume?	Text has been modified.
59	3	3	1.7	Provide guidance, in the form of square footage, when one (1) sub-slab sample is sufficient for a building. A minimum of two (2) samples for all buildings less than 1,500 square feet will at times be extraordinarily conservative.	Table 3-2 is a starting point for determining the number of SSSG samples. The minimum number of 2 samples per building is based on the latest scientific research. However, the investigator can deviate from this provision with proper technical justification.
60	3	3	1.7	Rather than recommending number based on area of building footprint, why not recommend number based on portion of building within distance criterion of suspected source?	The Department is comfortable with the technical approach employed in Table 3-2. However, the investigator can deviate from this provision with proper technical justification.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
60	3	3	1.7	Is there a source or reference for the number of SSSG samples/area contained in Table 3-2?	Table 3-2 was developed based on the technical experience of the Department with input from stakeholders and the VI Guidance Committee.
60	3	3	1.7	For larger dwellings (or other unique conditions in the subfloor or construction of the foundation), the table below may be used as guidance for determining the number of samples based on the building-specific features and conditions provided below the table.	Table 3-2 is a starting point. Technical justification required if sample frequency varies based on professional judgment.
60	3	3	1.7	Suggest that ranges be added to allow for professional judgment	The current wording is sufficient.
60	3	3	1.7	Table 3-2 **The sample density here spans more than 2 orders of magnitude with no logic at all. Suggest adding a column for Density of Sub-Slab Soil Gas Samples "1/750 sq ft, 1/1667 sq ft, 1/2500 sq ft, 1/4000 sq ft, 1/8333 sq ft" and the last 3 rows should be combined and changed to ">50,000 / case specific". Having specfic values for the larger areas is not protective and the given values are too low. You could completely miss a substantial hot spot.**	The current wording is sufficient.
60	3	3	1.7	"Features and conditions that may require altering the number of samples or baising a sample location are as follows: Add: p**ast usuage, particularly dry cleaners, vapor degreasers, USTs**"	Text has been modified.
60	3	3	1.7	We note that there is no definition provided for a "larger dwelling"? Does this include multi-family dwellings (e.g. apartments)? The word "dwelling" is only used twice in this draft guidance document, both times in this subsection. The NJDEP SRP defines a dwelling as a residential building: "Residential building means a single or multi-family dwelling, nursing home, trailer, condominium, boarding house, apartment house, or other structure designed and used primarily as a dwelling. " (http://www.state.nj.us/dep/srp/bust/defs.htm#res) We recommend not using the word "dwelling" and instead use the previously defined "residential building".	Text has been modified.
60	3	3	1.7	We have serious concerns about Table 3-2. We find it overly prescriptive, inconsistent with other sections of the VIG and without technical justification. The recommended minimum number of sub-slab samples required based on square footage of floor is not appropriate for many cases and should be left up to professional judgment. Additionally, the recommended minimum number of sub-slab samples may add an additional cost burden without providing a technical advantage. The table seems to be intended to address "larger dwellings", i.e. residential buildings? ("For larger dwellings (or other unique conditions in the subfloor or construction of the foundation), utilize the table below as a minimum number of samples and add additional samples based on the building-specific features and conditions provided below the table. ") However, this table is also referenced by the Department in Section 3.3.2.3 for near-slab sampling of non-residential buildings, which it is also inconsistent with and overly prescriptive for near-slab, and therefore confusing.	The Department is comfortable with the technical approach employed in Table 3-2. However, the investigator can deviate from this provision with proper technical justification.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
				We recommend changing the language back to "Larger residential buildings (or other unique conditions in the subfloor or construction of the foundation), will require additional vapor probes based on site-specific conditions and professional judgment".	
60	3	3	1.7	We recommend deleting the bullet " • Small foundation pockets (<100 ft2) such as loading docks, trash rooms, etc.". We feel there is no justification given for the quantitative area (100 ft2) or explanation for bias sampling with respect to loading docks. This is too prescriptive and will lead to confusion.	Text has been modified.
61	3	3	1.7	The two sentences in this section indicated that data are not averaged but considered discretely, additional explanation of the rationale would be useful beyond "due in part to spatial variability." We recommend that LSRPs be given the latitude and flexibility to consider site-specific conditions and to make professional judgments, as they are licensed to do, on whether to average data or not.	The Department is comfortable with this technical position based on subsurface spatial variability. The investigator may deviate from this provision based on proper technical justification
61	3	3	1.7	Requirement to treat each occupied space as a separate building when determining sample frequency is excessive. What is scientific rationale? Why not allow normal building frequency but with at least 1 per space?	The investigator can deviate from this provision with proper technical justification.
61	3	3	1.8	Seems like it should be worded firmer, perhaps give examples of situations where 2nd round would and would not be required. Already stated above when to resample - consider removing.	Current examples are sufficient. Professional judgment is to be used for other situations.
61	3	3	1.8	In 3.3.1.8 – again, what is a practitioner supposed to base their best professional judgment upon?	Professional judgment is to be based on experience and other avenues of technically justifiable information.
61	3	3	2	**Entire introduction to this section has already been stated earlier in the chapter.**	Text has been modified.
61	3	3	2	The guidance should allow the option for near-slab sampling to take priority over subslab sampling at sites being investigated for petroleum hydrocarbon VI. The third paragraph restricts near-slab sampling to situations where obtaining a subslab sample cannot be obtained. For petroleum VOCs this restriction is unnecessary. Modeling simulations by Abreu 2009 show that exterior shallow soil-gas samples are representative, so long as sufficient oxygen is present and three to five feet of clean soil exist under the receptor. So, near-slab sampling for PHCs should be a viable approach at most sites, unless contaminated soils or low oxygen is suspected under the structure.	The investigator may deviate from this provision provided proper technical justification is given to address the potential for soil contamination below the building or the presence of an oxygen shadow.
61	3	3	2	The guidance should recognize alternate soil gas sampling strategies for petroleum hydrocarbons. Vertical profiles of VOCs and O2 are useful for defining the presence of an aerobic zone when the strategies in Section 6.4 are inconclusive. Other soil gas sampling strategies for petroleum vapor intrusion should be referenced , including American Petroleum Institute (API). 2005. "Collecting and Interpreting Soil Gas Samples from the Vadose Zone: A Practical Strategy for Assessing the Subsurface Vapor-to-Indoor Air Migration Pathway at Petroleum Hydrocarbon Sites." API Publication Number 4741, November 2005, American Petroleum Institute, Washington, DC, USA.	The investigator may deviate from this provision based on proper technical justification

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
62	3	3	2.1	"Near slab soil gas sampling has limited applicability in the evaluation of the VI pathway and is not recommended as a primary investigation tool for assessment of the VI pathway on existing buildings." T**his is too strongly worded, deeper near slab samples are probably OK**	Historical data indicate that sub-slab sampling is most accurate. Near slab sampling can be performed based on professional judgment and technical justification.
63	3	3	2.1	Second paragraph. The DEP should provide greater flexibility for allowing exterior soil gas sampling as an alternative to sub-slab sampling. Particularly, as part of the assessment of buildings within the critical search distance but at greater distances from the source.	The Department stands by the statement. However, the investigator may deviate from this provision based on proper technical justification
63	3	3	2.1	Third paragraph. The DEP should clarify whether no further investigation of the undeveloped parcel would be required once a building is constructed, provided soil gas concentrations are below the SGSL.	The decision on no further investigation is determined by the investigator.
63	3	3	2.1	"Near slab soil gas sampling should be used for comparison to the SGSL when specific technical issues make sub-slab soil gas sampling impossible (e.g., very high water table) or the building owner refuses access." **Better to sample shallow ground water if water table is high**	The assumption is made that GW data has already been collected and the investigator is moving onto soil gas.
63	3	3	2.1	"Exterior soil gas sampling has limited applicability in the evaluation of the VI pathway for existing buildings. This investigation tool is limited because significantly different conditions for the migration of vapors may exist outside of the building as compared to beneath or in proximity to the building slab (as noted above). Thus, exterior soil gas data are more appropriate as a field screening tool or as a supplementary line of evidence in the evaluation of the VI pathway." **I wouldn't say it this way. It's very useful for mapping vapor source areas WHEN DONE RIGHT, especially deeper samples. The key is having good probe construction to prevent leaks by design, slam-bar samples must be discouraged or disallowed.**	The current wording is sufficient.
63	3	3	2.1	"Exterior SG sampling should not be compared to the SGSL to determine regulatory compliance except in conjunction with an undeveloped parcel. Analytical results from an exterior SG sampling may be utilized as part of a multiple lines of evidence approach to determine whether the VI pathway is currently complete for a particular building. **State the positive, not the negative. There is no technical reason not to compare exterior SG samples to the SGSLs, unless the protocols used to collect the samples are untrustworthy (this can be fixed with training and a good protocol) or the samples are too shallow (which can be fixed by specifying a minimum depth requirement).** Exterior SG sampling is more often used to identify/delineate volatiles in the subsurface, update the CSM and assess the magnitude or extent of biodegradation of hydrocarbons. A SG survey is not intended to be a substitute for conventional methodology (e.g., GW sampling), but instead as a screening tool to enable conventional methods to be used more effectively." - also a great way to verify where a clean water lens is acting as a barrier to off gassing from GW	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
63	3	3	2.2	Regarding soil gas sampling depths, the Department changed the last sentence (from the 2005 VIG) to read "be collected in the vadose zone at the depth of one foot above the capillary fringe". We feel this is too prescriptive and inflexible for site-specific conditions and should be changed back to "at least one foot".	Text has been modified.
64	3	3	2.2	You should allow samples to be collected shallower than 5 feet bgs for petroleum hydrocarbon sites since bio could be significant in the upper 5 feet.	Refer to Chapter 6.
64	3	3	2.3	Last paragraph, 2nd sentence, which reads, "Samples should be spaced horizontally at two to three times the depth to ground water." I am not quite sure what this is statement is asking me to do. 2 to 3 times away from the building (what about the near slab requirement of being within 10' of the slab), or equidistant apart and adjacent to the building. Maybe an example could be provided illustrating the sampling strategy. Needs to be clearer.	Text has been modified.
64	3	3	2.3	What is justification for sampling distance of 2-3 times DTW? Distance should be dictated by CSM not arbitrary value.	This provision is contained in the Department's Field Sampling Procedures Manual.
64	3	3	2.3	We feel the following paragraph is inconsistent and confusing; "In general, the number of near slab soil gas sample points should be the same or greater than the number of sub-slab sample points that would be required for that same building (see section 3.3.1.6). " [note 3.3.1.6 is Calculating Purge Volumes - we assume the Department meant 3.3.1.7]. Section 3.3.1.7 contains Table 3-2 - sampling frequency for large dwellings; we feel this is too prescriptive for near-slab sampling and completely inconsistent with 3.3.2.3 for near-slab sampling; "Samples should be spaced horizontally at two to three times the depth to ground water. "	Text has been modified.
65	3	3	2.3	"If two soil gas sample locations have two to three orders of magnitude difference in concentration, the investigator should consider collecting at least one additional sample between the two points. " **What if near-slab probes are on opposite sides of the building? Generally, near-slab probes will be installed on opposite sides of the building. The above would only apply if the building is >10,000 ft2 and more than one sample is collected per side of the building?**	The investigator is to use professional judgment
65	3	3	2.3	Final paragraph totally unclear - either revise or remove.	Text has been modified.
65	3	3	2.3	At **end of section** could add - Use of passive soil gas samplers may be appropriate for biasing the locations of near slab samples.	Text has been modified.
65	3	3	2.4	For evaluating undeveloped parcels and future use, talks about collecting samples but no discussion of sample frequency. Please provide guidance on sampling specifics.	The investigator is to use professional judgment.
65	3	3	2.4	"…analysis of deep soil gas samples (just above the water table)…" **If you are a proponent of soil gas probes in this circumstance, the use of soil gas probes in situations mentioned in previous sections should also be allowed.**	The current wording is sufficient.
65	3	3	2.4	At **end of 1st pargraph** could add - Use of a passive soil gas sampling grid may be appropriate for biasing exterior soil gas sampling locations, especially in situations where ground water contamination of recalcitrant VOC has only recently decreased to below GWSL.	The current wording is sufficient.
66	3	4	0	**Addition to List: "Building pressure / ventilation in large buildings"**	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
66	3	4	1	**Move** *Indoor Air Building Survey and Sampling Form* **list to end of section 3.4, just before start of 3.4.1**	Text has been modified.
67	3	4	1	"When background sources of indoor air contamination are identified and removed from a building, it would be prudent to ventilate the rooms affected in advance of the sampling event. This ventilation should be completed at least 24 hours before commencement of the indoor air sampling event. " **Instructions to occupants form in Appendix says 48 hours"**	The instructions require that the owner/occupant follow the certain procedures 48 hours prior to sampling. Many of the instructions pertain to removing sources. The 24 hours refers to stopping of non-standard ventilation. The section was revised to clarify this.
67	3	4	1	Please elaborate on building ventilation prior to sampling. How should this be performed? When is ventilation "complete"?	The goal of ventilation after source removal is to reduce the influences of background sources. The investigator may determine the appropriate ventilation based upon a number of factors including size of area being ventilated and source(s) removed. The investigator should take into consideration the occupant/owner wishes.
67	3	4	1	"Factors that should be evaluated in selecting a screening instrument for VI investigations include the instrument detection limit for the contaminant of concern (COC), the eV of the lamp, the ionization potential of the COC and the calibration gas used for the instrument." **For sub-ppm readings, on-site calibration using both span gas and zero gas (and not ambient air) is recommended, as well as several calibration checks per day.**	The comment refers to operational details that are beyond the scope of the VITG.
67	3	4	1	"As discussed in Chapter 5, these contaminants can be retained in materials found in the building (i.e., carpeting) and subsequently released over a period of time, **so 24 hours may not be long enough.**"	The investigator, based upon professional judgment, can ventilate for a longer period of time. Return to normal building ventilation typically occurs at least 24 hours before sampling.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
67	3	4	1	It is suggested that a FID be also included as it has the ability to detect methane, BTEX compounds.	The investigator can use other instruments based upon the compounds of interest. The guidance does not preclude the use of other instruments.
68	3	4	2	"The investigator should also examine and note the point at which utility lines enter the building." **Alternatively, one can depressurize the building and photo the potential ingress points with a thermal camera.**	The guidance presents a common practice for evaluating entry points of vapors how/where subsurface utilities enter a building. The guidance does not prevent the investigator from using other methods for evaluating vapor intrusion points in a building. The comment provides one of these methods.
68	3	4	3	"The identification of basement or foundation VI entry points, as outlined above, allows the investigator to target worst case sample locations for sub-slab soil gas and indoor air sampling. In addition, the determination of those portions of a building where occupants spend the greatest amount of time (i.e., residential living room or commercial office space) during the walkthrough allows the investigator to identify areas that represent the greatest period of exposure to the occupants that can then be used in the evaluation of indoor air sample locations. " **Which supercedes, worst case conditions or where occupants spend most time, for example, would you collect indoor air sample in the utility room with the sump or in the bedroom in the basement.**	The guidance allows the investigator to use professional judgment in selecting actual sample locations. In some cases, the investigator could collect samples from both areas - expected worst case and expected greatest exposure time.
68	3	4	3	"For the selection of sub-slab sample locations, the presence of any utilities (e.g., sewer, water, radiant heat) under the slab should also be identified during the building walkthrough so those areas can be avoided **or targeted(?)** when determining potential sample locations."	The guidance has been modified to clarify that locations should be selected to avoid damaging/encountering utilities.
68	3	4	4	"The investigator should inform the property owner during the walkthrough that representatives from the utilities (e.g., electric, gas) will visit their property to mark out the location of area utility lines prior to the sampling event." **Give them information about expected background indoor air concentrations of common VOCs.**	Information provided to owner/tenant is to be determined by Investigator.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
69	3	4	4	"Any deviation from the instructions noted during the sampling event should be documented on the Indoor Air Building Survey and Sampling Form." **Should provide guidance on what next (ie. If occupants don't follow instructions, and elevated concentrations of VOCs are detected, what is next?)**	This comment is covered in Chapter 4.
69	3	5	0	Uninhabitable (less than 2 feet in height) and designed void spaces under buildings with a continuous slab should not be considered as a crawl space. This space should nonetheless be sampled and results compared to and treated as a soil gas sample and not indoor air.	The evaluation of air samples collected in crawlspaces is clarified in Section 2.3.2.2.
69	3	5	0	"In addition, indoor air samples are appropriate for post-mitigation verification purposes." **Or when there are sensitive receptors? What about when there are unusual chemicals that are not complicated by background levels, such as HCBD, BCEE, etc.?**	Current language is sufficient.
69	3	5	1	"A source of vapors related to a discharge is identified **in the subsurface**; and, A pathway exists connecting the **subsurface** source to human receptors inside the building and/or structure**; and** **Concentrations are high enough and the source is close enough to the building to pose a reasonable probability of an unacceptible risk**"	Risk is not a factor in evaluating if pathway is complete.
69	3	5	1	"…when the soil gas results exceed the SGSL at a building." **And if they don't exceed?** **Can't screen out, therefore indoor air sampling whether they exceed or not.**	When soil gas concentrations exceed criteria, indoor air samples should be collected. When soil gas concentrations are below criteria, the investigator, using professional judgment as described in Chapter 4 and mentioned in this comment, may determine whether the collection of indoor air samples is appropriate.
70	3	5	2	What technical and regulatory justification is there to say that conditions listed in option 2 mean IA sampling is "required". Contradicts idea of investigating complete pathway.	Text has been modified.
70	3	5	2	It should be noted that when sub-slab samples are collected in conjunction with indoor air samples, that the samples should be located in close proximity to each other, whenever possible.	Investigator is to use professional judgment in selecting sampling locations. Close proximity is a factor the investigator may consider in this process.
70	3	5	2	Suggest reword to make consistent with previous reference: When a VI investigation is triggered, the investigator may also elect to collect sub-slab soil gas (or near slab soil gas when substituted for sub-slab) and indoor air samples concurrently where sensitive populations, such as schools, child care centers or residential properties are involved.	VITG has been revised based upon this comment.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
71	3	5	2	Not recommended to collect indoor air in buildings where same COCs are used. The investigator may consider other lines of evidence in evaluating VI exposures. Are these situations to be evaluated for VI or not?	These situations are to be evaluated for VI by the investigator. The investigator is to use professional judgment in evaluating other lines of evidence. Collection of IA samples is one component of a VI investigation.
71	3	5	2	Suggested reword: The investigator can use a combination of sampling options in a VI investigation. For either option 2 or 3, it is suggested that the indoor air sample should be collected first at the building undergoing investigation. This provision is designed to minimize influencing indoor air concentrations from sub-slab sampling, especially when new soil gas implants are installed to complete the sampling.	Collection of IA samples prior to breaching of the slab is preferred approach.
71	3	5	2	"Any other information that indicates that human health may be impacted via the VI pathway." **This is too broadly worded.**	Text has been modified.
71	3	5	2	"Twenty-four (24) hours later…" **There are a lot of reasons to consider 72 hours - 7 day samples. Review www.epa.gov/radon**	The typical sampling period currently is 24 hours. The investigator can use longer sampling duration based upon professional judgment.
71	3	5	2	"In general it is not recommended to collect indoor air samples in a portion of a building where operations use, handle or store the same **chemicals that are** investigative COCs (**a common occurrence at** dry cleaners, active gas stations or maintenance facilities and various industrial operations)."	Text has been modified.
72	3	5	2	I don't see a whole lot of value to collecting barometric pressure and temperature data - but I would recommend measuring the sub-slab pressure differential during sub-slab soil gas sampling - this should obviate the need for collecting barometric data, which is less relevant than the pressure differential	Text has been modified.
72	3	5	3	Since the 2005 VIG introduction, I have done hundreds of letters (50+ VI cases) and time after time I see the majority of contaminants that exceed the screening levels are not associated with site, but are background related. These include acetone, 1,4-DCB, 1,3-Butadiene, Chloroform, BTEX, Freon 11, Freon 12, etc. Solution: Change the language so as to allow the following "target for only the contaminants of concern - for all sampling rounds, including the initial round.	The Department's preference is for full parameter analysis with initial soil gas and indoor air samples. As always, the investigator can deviate from this provision with proper technical justification.
72	3	5	2	"The potential for a change in the future use of the building should be considered and addressed…" - How should this be considered/addressed?	Refer to Section 7.4.1

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
72	3	5	2	"The collection of ambient temperature and pressure readings during the collection of indoor air samples ~~**including ambient air samples**~~ is appropriate to do in order to verify data integrity."**- more "representativeness" than "integrity"**	Text has been modified.
72	3	5	2	"Alternatively, the investigator can bring portable meteorological instrumentation on site to obtain the information." **Need to explain what exactly will be done with the information, most people won't know.**	Text has been modified.
72	3	5	2	"Larger commercial buildings may also require the same approach." **Many commercial/industrial buildings economize on energy by changing air exchange rates and temperature settings during evening and overnight periods, which could also influence 24 and 8 hour sample concentrations.**	Text has been modified.
72	3	5	3	"The initial set of indoor air samples should be analyzed for the full parameter list of the applicable New Jersey certified analytical method as listed on the NJDEP website (link should be included here)." **This is still difficult to justify. Why only TO-15 and not all the 114 compounds on the OSWER list? Why not just site-specific COCs? Why not just the risk drivers? The policy to analyze for all TO-15 compounds is not technically justified.**	The Department requires certified laboratories to follow methods like TO-15. The parameters listed in TO-15 are the parameters that the Department has certified for this method. The investigator is expected to use professional judgment in determining if additional compounds are to be analyzed and the appropriate method.
73	3	5	4	When using TO-17 for sampling durations between 8-24 hours, care must be taken not to exceed the safe sampling volume for each VOC related to the sorbent/combination of sorbents used. For example, the EPA TO-17 method Appendix 1 lists a safe sampling volume (SSV) of 26L for benzene for most commonly used sorbents. Sampling at 20 ml/min for 24 hours will result in a 28.8L sample; in this case, sampling volume should be decreased and/or two tubes should be used in series. In addition, sampling in humid environments for long durations may result in an accumulation of moisture on the sorbent tube, which would further accelerate breakthrough. The laboratory should be consulted prior to sampling to determine the most appropriate sorbent and sampling volume.	Text has been modified.
73	3	5	4	the guidance appears to favor 24 hr over 8 hr samples for commercial buildings - yet often HVAC operation is different during off hours, which may bias results for a 24 hour test either high or low. I recommend that the default time period for a commercial building be 8 hours, during the time period the building is commonly occupied.	The recommended indoor air sampling period is 24 hours for all buildings. The investigator may use professional judgment to modify sampling times to accomplish the VI investigation.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
73	3	5	4	Suggested deletion: Sampling times less than eight hours need prior Department concurrence.	Sampling times of less than 8 hours require technical justification.
73	3	5	4	"Alternative sizes or types of sample containers are not acceptable…" **Why not?**	The analytical methods dictate size/type of containers.
73	3	5	4	"For sensitive use buildings indoor air samples are collected over a 24-hour period. A sampling time less than 24 hours may be substituted with proper justification, such as limited access or to reflect hours of operation. However, the minimum sampling duration for sensitive use buildings is 8 hours." "For commercial, retail, office, and industrial settings, indoor air samples are typically collected over a 24 hour period. However the investigator may shorten the sampling period to correspond to the average work day or the timeframe the building or floor of interest is occupied on a daily basis. The minimum sampling time is 8 hours with proper justification." "The minimum sample collection time for the sorbent tubes is eight (8) hours. A twenty-four (24) hour sample collection time is the preferred sampling time, because it provides a longer time weighted average for exposure." **Cover this once, not three times.**	Current language is necessary for the investigator to understand.
74	3	5	4	"Grab sample results are not considered to be representative of indoor air quality with respect to evaluating VI pathway. Grab sample results are not to be compared to IASL or RAL." **They may however be used for identifying background sources.**	The use of grab samples to screen for background sources is left to the professional judgment of the investigator as part of the MLE.
74	3	5	5	Table 3-3; provide reference under table that justifies sample minimums for building size	Table 3-3 was developed based upon the professional experience of the DEP/Stakeholder VI Guidance committee.
74	3	5	5	Under Table 3.3, it is stated that "Indoor air sampling requirements cannot be based on area alone". This infers a requirement, which can only apply if it is in a rule. If so, provide the citation; if not, use the words "...*should not* be based on area alone".	Text has been modified.
74	3	5	5	Requirement to treat each occupied space as a separate building when determining sample frequency is excessive. What is scientific rationale? Why not allow normal building frequency but with at least 1 per space?	The investigator can deviate from this provision with proper technical justification.
74	3	5	5	Suggested reword: The following table provides general information for determining the suggested number of indoor air samples.	The Department is comfortable with the technical approach employed in Table 3-3. However, the investigator can deviate from this provision with proper technical justification.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
74	3	5	5	Suggest that ranges be added to allow for professional judgment	Ranges have been incorporated based upon square footage.
74	3	5	5	"At least one indoor air sample should be obtained from the basement or slab on grade foundation level of a **typical residential size** building."	Sentence applies to all buildings not just residential buildings.
74	3	5	5	"The following table provides general information for determining the minimum number of indoor air samples **for buildings of various sizes**."	Text has been modified.
74	3	5	5	Table 3-3 **Add a column for Density of Indoor Air Samples "1/1500 sq ft, 1/2500 sq ft, 1/3333 sq ft, 1/5000 sq ft, 1/10,000 sq ft" and the last 3 rows should be combined into one: ">50,000 | case specific". The >50,000 values depend very strongly on the number of "air zones" in the building.**	The current language is acceptable.
74	3	5	5	Table 3-3: The recommended minimum number of indoor air samples required based on square footage of floor is to prescriptive and without technical justification. The recommended minimum number of indoor air samples required based on square footage of floor is not appropriate for many cases and should be left up to professional judgment. Additionally, the recommended minimum number of indoor air samples may add an additional cost burden without providing a technical advantage.	Table provides recommended frequency. Based upon professional judgment, sampling frequency can be altered.
75	3	5	5	"Features or conditions that may ~~**alter**~~ **increase** the number of samples or biasing a sample location are as follows:…" **Clarify <u>how</u> these would change things. Maybe provide examples otherwise, every site will end up wasting a lot of time debating what this means.**	The use of "alter" is appropriate. Alterations are based upon the professional judgment of the investigator.
75	3	5	5	"Any sampling approach should take into account the different exposure scenarios (e.g., child care, **residences,** offices, and warehouse) that exist within the building**(s)** and any sensitive populations that may be exposed to the contaminated vapors."	Text has been modified.
75	3	5	5	"For example, a 25,000 ft2 strip mall separated into five individual tenant spaces that are separately ventilated may require 10 samples, where a stand-alone 25,000 ft2 building that is mostly warehouse space with a small office space and a single ventilation system may only need 5 indoor air samples to document indoor air quality." **Separately ventilated spaces with floor to roof walls should be evaluated as separate air zones.**	Comment refers to the use of professional judgment.
76	3	5	5	the first paragraph on this page could be inferred to mean that one indoor air sample should be collected in each room of a basement. We seledom see large concentration differences within a basement, even if divided into more than one room, since the air still circulates between rooms fairly freely. I would indicate that a sample is not required in each and every room, and that a sub-divided basement would typically only double the number of samples on the table.	Professional judgment is to be used in selecting the number and location of IA samples. Ventilation in basement is a factor to be evaluated by the investigator.
76	3	5	5	Provide justification as to why ambient air sample should not be biased towards suspected/potential sources located outside of the building. If such source(s) exist, then the investigator should assess them to determine if source(s) are impacting the indoor air.	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
76	3	5	5	3rd paragraph. For clarity, I believe the second sentence should read, "Each ground level residential living space (duplex, rowhouses) with a basement or on slab should be considered an independent unit for Indoor air sampling., e.g. 4 multi-family residential units will equal 4 indoor air sampling locations.	Text has been modified.
76	3	5	5	"…for multistory buildings, sampling should be conducted from the basement floor upward until there is a floor where no COCs are detected." - As the extent of VI into a building is unknown before sampling, does this mean that it is necessary to collect indoor air samples from each floor above the basement during the initial sampling event? If COCs have been identified in the indoor air samples in the basement and first floor, is it then required for samples to be collected from upper floors if a conduit for COC dispersion (such as an elevator or open stairwell) is not identified? Why is the additional sampling necessary if the occurrance of VI can be identified based on basement and/or first floor samples?	Text has been modified.
76	3	5	5	"sampling should be conducted from the basement floor upward until there is a floor where no COCs are detected. If COCs have not been detected in the basement then analyzing air samples on upper floors would not be necessary." **Disagree; at least one sample should be collected from above the neutral pressure plane.**	Text has been modified.
76	3	5	5	"Each ground level residential living space (i.e. duplex, row houses) with a basement or slab **on grade** should be considered a separate building for indoor air sampling**, because…" (elaborate on the rationale)**	In many cases, each residential space have separate heating/ventilation systems.
76	3	5	5	"In general, **at least** one ambient (outdoor) sample should be collected per sampling event concurrently with indoor air samples to assist in evaluating background **outdoor air** contaminant levels. This ambient air sample should be taken at breathing zone height and located in a reasonably representative area close to the building (e.g., not immediately next to auto traffic or other potential sources)." **Do not hang them from trees (trees respire water which can contain VOCs)**	Text has been modified.
76	3	5	6	NJDEP indicates that if COCs are detected in indoor air 10X below the IASL then a second round of sampling may not be needed. However, for those COCs with an IASL set at the detection limit, it will be highly unlikely that "each COC concentration is an order of magnitude or more below the IASL." For these compounds, it would seem that a second round will always be required, if the initial round is collected between April and October. Please provide clarification as to under what circumstances an initial sampling round from April to October investigating these compounds could result in no further sampling, or provide clarification as to why this initial round should be collected, given that no final conclusions regarding the VI pathway can be made from it.	The Department recognizes that the 10 times rule is only an option for those contaminants whose IASLs are at least 10 times the analytical reporting limit. Contaminants with IASL less than 10 times the reporting limit would not be able to use the rule and would likely require resampling during the recommended sampling time frame between November and March.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
76	3	5	6	Please provide an explanation for November through March sampling requirement.	This time period is considered to represent the " worst case" exposure scenario.
77	3	5	6	The heating season/Nov-Mar) requirements seem to be most applicable to a residential setting. Solution: Include a sentence or two in regards to a building that is sealed all year (such as 401 E. State St.) - where the heating season/Nov-Mar) requirements are probably not applicable.	In most cases the heating season represents the worst case scenario for residential and non-residential buildings. The Investigator can use professional judgment for varying from collecting indoor air during the heating season.
77	3	5	6	In regards to collecting second round of air samples if outside of period from November 1 thru March 31. There is an exception of sampling performed between April 1 - October 31, with data showing levels an order of magnitude or more below IASL. Discussion goes on to say two sets of data, isn't this supposed to be one set? Then goes on to talk about third confirmation sampling. Confusing, needs to be cleared up to indicate that 2nd and 3rd rounds are not always necessary.	Text has been modified.
77	3	5	6	2nd P: Why is averaging not acceptable? The guidance fails to address the fact that time-averaged samples are more representative of exposure than single point samples. Several decades of radon sampling data collection and analysis provide ample justification for this approach.	Samples collected over 8 - 24 hours are time- weighted averages. Each valid sample is to be compared to the applicable criteria.
77	3	5	6	.18), the investigator cannot delay the collection of indoor air samples due simply to the time of year whe	Data collected from April to October will provide timely data with respect to IASL or IEC ensuring public health and safety are protected.
77	3	5	6	(November to march represents worst case conditions) "..for VI framework during this timeframe." **Do you have evidence to support this? The CDOT data shows that seasonal changes are very small, less than the typical magnitude of day-to day variability. If you are going to allow 24 hour samples, and not allow summer-time samples, you are allowing a 5-fold uncertainty and disallowing a 3-fold uncertainty. This needs more thought.**	Sampling during this period is standard protocol for VI. This protocol is consistent with other federal and state agencies.
77	3	5	6	"…the single round of indoor/ambient air samples should be able to determine whether the VI pathway is complete." **What if detectable and only barely below screening level? A single 24hr sample has +/-5x variability and seasonal effects are ballpark +/-3x. Logic flaw.**	The investigator is to use professional judgment in the situation noted including evaluating MLE on whether additional sampling or remedial action is warranted.
77	3	5	6	"…each COC concentration is an order of magnitude or more below the IASL." **3x is probably more appropriate**	Order of magnitude is appropriate. No change.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
77	3	5	6	"If the two sets of results are inconsistent with respect to the appropriate screening level (i.e. one result above and one result below screening level) a third confirmation sample is necessary. The results cannot be averaged for comparison to the appropriate screening level." **Nobody is going to want to end up here. Why can the concentrations not be averaged? The receptor is exposed over 30 years to the average concentration, not the maximum.**	Text has been modified.
77	3	6	0	It is stated that "*The Technical Rules require the submittal of reports when a VI investigation and/or VI sampling has been conducted under the following scenarios*." Provide the citation for the rule. This comment would apply to several sections of the document where reference is made to "the Technical Rule" but no citation is provided.	Text has been modified.
77	3	6	0	"The analytical units of parts per billion by volume are no longer acceptable**, because…" (elaborate to complete the logic trail)**	Text has been modified.
77	3	6	1	For clarity Section 3.6.1 through 3.6.3 could be organized in accordance with the timeline in Appendix C.	Text has been modified.
77	3	6	1	"*Immediate Environmental Concerns*" **"Immediate" is an intimidating word. Perhaps "Short-term" would be better.**	Title is in regulations.
78	3	6	1	For a complicated site, you may not be at a point of complete delineation or RA selection within 1 year.	Requirement is in regulations. Extensions for time frames available.
78	3	6	1	**Is the GIS map an electronic copy?**	Electronic and mailed copy as outlined in the IEC guidance. Link is sufficient
79	3	6	2	The online link provided should directly take the investigator to the specific form requested.	Link is sufficient.
80	3	6	3	"An evaluation of sampling results…" **Elaborate, or all you will get is comparison to screening levels. Cal DTSC is returning reports like that unread.**	Text has been modified.
81	4	0	0	ARCADIS supports the use of a multiple lines of evidence (MLE) approach for vapor intrusion investigations. As currently outlined, however, the conceptual site model (CSM) is not explicitly included in the MLE approach. It is our experience that key components of the CSM including site geology, hydrogeology, source area and chemical use, and building air exchange and HVAC information are critical components of the MLE approach. Such information are critical for interpretation of sampling results. The approach should be revised to clearly indicate that components of the CSM can and should be used when evaluating MLE.	Text has been modified.
81	4	0	0	I would say that the other lines of evidence bulleted "could", not "should" play a role in the evaluation process. In most cases, no one will know what to do with met data, soil pump test data, etc. How do these values influence the interpretation of the results? Hard for even us experts to say. In particular, I see the air permeability of soil misused - in the VI pathway, it's only relevant to the soils around and under the foundations, whereas most people measure it beyond the these foundation materials, where diffusion dominates.	Text has been modified.
81	4	0	0	Last sentence of last paragraph re mitigation should be copied into each section - important to emphasize throughout	Current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
81	4	0	0	4. Chapters 4 and 5 seem repetitive and could be condensed into 1. Section 4.0 leads off with MLE discussion – differs from and doesn't reference Section 5.0, entitled MLE.	Chapters 4 and 5 have been merged.
81	4	0	0	This section should discuss data validation and the Full Laboratory Data Deliverable Form.	Current wording is sufficient.
81	4	1		Suggested reword - combine paragraphs and rephrase: One of the most critical steps during a VI investigation is the evaluation of analytical data, particularly as it relates to source identification. Due to the fact that the health-based standards for indoor air quality are low, the potential for confounding sources of background contamination in buildings can be a significant factor in decision making. An assessment of potential background sources should therefore be included in any data evaluation process. The representative median indoor air concentrations from Table G-4 in Appendix G can be utilized as a line of evidence in evaluating the analytical results. At no time, however, shall the ambient air results or median background values be "subtracted" from the analytical results to determine an exceedance of the screening levels. As a general point, sub-slab mitigation may not be effective if ambient air results are in excess of indoor air results for site contaminants of concern.	Text has been modified.
82	4	1	0	NJDEP correctly allows for the use of ambient background concentrations to screen indoor air results. Table G-4 presents ambient indoor background concentrations that can be used for screening. The major limitation of this table is the lack of information or "representative median concentrations" on a significant number of constituents. NJDEP should clarify that either the range of median values can be used or that additional literature sources can be identified if an appropriate value is not presented in Table G-4.	Text has been modified.
82	4	1	0	Given that the median indoor air background concentration by definition excludes 50 percent of the indoor air background dataset, a comparison of indoor air data to the median does not provide a very good evaluation of whether the indoor air sample results are within the range of indoor air background concentrations. For example, a marginal exceedance of the median concentration could be well within indoor air background levels. The 90th percentile concentrations (also reported in the Vapor Intrusion Guidance) provide a better threshold concentration for evaluating whether indoor air data are within the range of background concentrations.	The Department takes the reasonably conservative approach of using the median value to be protective of human health. The 90 percentile represents an unacceptable risk of erroneously concluding no impact from the VI pathway. However, the investigator may use professional judgment based on the MLEs to reason that levels above the median value are related to background sources.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
82	4	1	0	Regarding the statement: "As a general point, mitigation will not be required when the site-specific ambient air results are in excess of indoor air results. Similarly, the representative median indoor air concentrations from Table G-4 in Appendix G can be utilized as a line of evidence in evaluating the analytical results. At no time, however, shall the ambient air results or median background values be "subtracted" from the analytical results to determine an exceedance of the screening levels." It is not uncommon in urban settings (e.g. near gasoline stations) where the outdoor air exhibits elevated concentrations of benzene that clearly can contribute to indoor concentrations of benzene. With regard to the guidance, it is unclear how background sources may be considered when interpreting indoor air data but at the same time cannot be subtracted from indoor air analytical results.	When properly validated ambient ar results are in excess of the indoor air results, mitigation is not required. However, ambient air results that are less than the IASL can not be subtracted from the IA results. They can only be utilized as a line of evidence.
82	4	2		Paragraphs seem out of order. Suggested reword: The ground water data should be evaluated to determine whether the contaminant plume has been delineated to the extent needed to assess the VI pathway. If it is determined that the plume has not been sufficiently delineated, additional ground water samples will be required to complete the delineation as it pertains to this pathway. Assuming that samples were collected consistent with the procedures and recommendations in Section 3.2 and the NJDEP FSPM, data that are representative of site groundwater conditions should be compared to the applicable NJDEP GWSL. An exceedance of these screening levels for any compound will necessitate further investigation. However, it should not be assumed that elevated ground water concentrations automatically indicate that unacceptable levels of vapors are currently entering the building. All existing buildings that are located within the critical distance criteria of the shallow plume's perimeter should be investigated. If preferential pathways (man-made or natural) or a landfill are nearby, the investigator should consider whether the critical distance criteria are adequately protective. The results of this effort will highlight those buildings that will necessitate further investigation for the VI pathway.	Text has been modified.
82	4	2	0	At **end of 1st pargraph** could add - <u>In addition, for recalcitrant VOC it should not be assumed that ground water concentrations currently below the GWSL prove there is no longer a VI risk if historical ground water data within the distance criteria exceeded the GWSL within recent history (see section 2.4.1.)</u>	Current wording is sufficient.
83	4	3		First full paragraph. The DEP should provide the basis for the six foot lens thickness requirement.	The guidelines provided are based on the professional experience of the NJDEP. The investigator is always permitted to deviate from the guidance with proper technical justification.
83	4	3		Paragraph 3 - reword to make sentence 4 clearer.	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
84	4	4	0	The guidance currently indicates that if chemicals are detected that are not present in groundwater, another source may be present. The guidance should also clarify that background constituents in indoor air can contribute to sub-slab soil gas, thus chemicals identified in sub-slab soil gas can also be from a background source. As pressure differentials change in a house, data have shown that the slab does "breathe" in both directions.	The movement of indoor air contamination into the sub-slab environment is possible. However, many other factors would have to be evaluated (e.g., IA concentration, pressure differential) before that conclusion can be reached.
84	4	4		Second paragraph, second sentence. The DEP should provide the basis for the attenuation factor of 0.02 used in the development of the SGSL.	The Department has been utilizing an attenuation factor of 0.02 since 2005. No new information has been developed that would cause the Department to change that value.
84	4	4		Paragraph 4 "May consider collecting a second round of sub-slab…". If there is scientific evidence to justify the collection of confirmatory sub-slab samples when concentrations in shallow ground water exceed the GWSL by more than 10 times, then require it. If there is no scientific evidence to justify the collection of confirmatory samples, remove this statement.	It is left to the professional judgment of the investigator to determine the need for a second round. Text has been modified.
84	4	4		Move firsrt paragraph to last paragraph and reword: The compounds detected in the sub-slab (or near slab/exterior, when appropriate) soil gas results should also be compared with the site-specific COCs (including degradation products) identified from the contaminated ground water or soil. If additional and/or unrelated compounds are seen in the soil gas results, a secondary VI source may be present. A supplemental investigation of the on-site soils and groundwater may be warranted.	Text has been modified.
84	4	4	4	At **beginning of bullet list**, recommend inserting a new item similar to - • Soil gas concentrations have reached equilibrium with ground water concentrations (See Word doc. attached to email for justification for this insertion.)	Current wording is sufficient.
85	4	5		First paragraph, third sentence. The DEP should provide a mechanism for reviewing alternative screening levels within the timeframe of a VI investigation.	Beyond the scope of this document.
85	4	5		It is stated that all samples collected from a crawlspace should be compared to IASL. However, there should be no comparison to IASLs if a crawlspace is not occupiable (inaccessible). IASLs should only to applicable to indoor air that humans will breathe. SGSL are more applicable for these types of crawlspaces as the potential for human inhalation exists above or outside the crawlspace similar to sub-slab. DEP should discuss in more detail the types of crawlspaces that should be sampled and those that do not need to be sampled.	Text has been modified. See Section 2.3.2.3 for additional information.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
85	4	5		There is mention that alternative screening levels (assuming this refers to IASLs given the subsection topic) using adjustments to the J&E model which are for site-specific conditions. There should be other site specific adjustments allowed including exposure duration. There should also be site-specific SGSLs (using building volumes and air exchange rates for instance).	Text has been modified.
85	4	5		The discussion regarding sampling of multiple floors appears that multiple floor sampling is required. The VIG should clarify that multiple floor sampling is not required and is simply a tool that can be used to ascertain the location of indoor sources.	Text has been modified.
85	4	5		Comment: Some flexibility may be needed here. This section and Technical Rules for VC or IEC conditions (N.J.A.C. 7:26E-1.18 and 1.14, respectively) should recognize an allowance for resampling to confirm conditions. For example, an IASL exceedance for an indoor air sample collected in a unoccupied structure may merit confirmation of indoor air in adjacent, occupied building.	The timelines for IEC and VC conditions are dictated by regulation and can't be modified in guidance.
87	4	7	0	In those cases where a constituent is detected in indoor air but not in sub-slab soil gas, NJDEP directs the investigator to evaluate vadose zone (soil) contamination and preferential pathways. No additional information is provided on the extent of documentation needed to show that neither of these additional pathways is complete. More likely the data indicate that a background source is present. Unless specific evidence indicates that there is soil contamination or preferential pathways, no further evaluation should be needed.	Current wording is sufficient.
87	4	7	0	The Decision Matrix (Stage 3) indicates that if concentrations in sub-slab soil gas are >10X SGSLs and the constituent is not detected in indoor air, that long-term monitoring should be conducted. In these cases, NJDEP should allow for limited monitoring as a way to confirm that vapor intrusion is not occurring. Summary statistics from USEPA (2008) Attenuation Factor Database Report indicates that at least 25% of buildings had attenuation factors of 0.002 or less. Under these circumstances, 10X SGSL would be protective and no further action would be needed.	The presence of soil gas contamination >10X SGSL represents a level above which the Department feels the potential for future exposure is legitimate and should be monitored if mitigation is not implemented.
87	4	7		In the last paragraph, the current wording implies that LTM is required for <u>any</u> sub-slab soil gas sample. Please revise text to indicate that the recommendation for monitoring only applies to exeedances of the SGSL.	Text has been modified.
88	4	7		long term monitoring is recommended when indoor air is below the IASL but soil gas is above the SGSL, up to 10 times the SGSL. This triggers long term monitoring when soil gas levels are only slightly above screening levels, which already represent conservative attenuation assumptions. Empirical data (EPA) indicate that many buildings have attenuation factors less than 1/100, and we know through experience that commercial buildings often have attenuation factors less than 1/1000 - so I'm concerned about LSRPs requiring ongoing monitoring in these situations where the apparent attenuation factor might be fairly low.	The Mitigation Decision Matrix is guidance. The investigator may deviate from this provision based on propoer technical justification.
89	4	7		It would be helpful if the SGSL and IASL criteria were included in Table 4-1 to simplify evaluation of the illustrative example.	The table has been modified.
89	4	8		The second sentence of the first paragraph is a little confusing. Revise sentence to start with "An IEC is present when,…"	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
90	4	9		"If driver chemical at site does not have RAL or HDNL level, NJDEP shall be contacted to identify an applicable level." Where does NJDEP come up with these other values and are they going to provide backup/equations showing how these values were generated? Please add discussion to VIG of how values will be derived.	Beyond the scope of this document.
90	4	9		Paragraph 1 does not make it clear who is responsible for what tasks.	Text has been modified.
90	4	9		Paragraph 3, the text indicates that occupants will be directed to contact the local health department. Who will be directing them to the local health?	Text has been modified.
90	4	9		Reword: In cases where the compounds in excess of IASLs are concluded to be originating from background sources unrelated to VI, the occupants may be directed to consult with the local health department on ways to reduce background contamination.	Text has been modified.
91	5	0	0	NJDEP should include additional lines of inquiry for consideration as part of the MLE approach. These include: (1) using radon testing to develop site-specific attenuation factors; (2) use of constituent ratios in soil gas/indoor air compared to sampling nearer source areas; (3) Johnson and Ettinger or other soil gas transport modeling (i.e., Abreu and Johnson 3D model) calibrated to field observations; (4) air exchange rate information; (5) pressure differential readings, and (6) the influence of on-going remedial activities.	Text has been modified.
93	5	3	0	**Second paragraph, 1st sentence** - This sentence ends with " (a “weighted” average)." The meaning of this ending is unclear. I suggest deleting it.	Text has been modified.
94	5	3	1.1	In the second paragraph of section 5.3.1.1, it is stated "*It should be noted that the Department requires soil gas and indoor air samples collected during the initial round at each building undergoing a VI investigation to be analyzed for the full list of parameters (based on the methodology) and not a reduced list.*" If this is a DEP requirement, it must be included in a rule and the rule should be cited. If it is not in a rule, replace the word "requires" with "recommends".	Text has been modified.
95	5	3	1.3	While an alpha of 0.02 might suggest VI is more likely, it's a good idea to look at relative apparent alphas for all compounds - the compounds with the lowest alphas may indicate the true alpha (essentially another way of looking at COC ratios between sub-slab and indoor air).	current wording is sufficient.
95	5	3	1.3	It would be helpful to provide online link for the Department's ongoing Ambient Air Monitoring data at various areas for reference.	Text has been modified.
96	5	3	1.4	With the Draft 2011 VIG being over 170 pages, it becomes a cumbersome and redundant document to use. This will lead to confusion. As an example of unnecessary redundancy in the document; the following paragraph in Section 5.3.1.4 is repeated on page 82 Section 4.1 and on page 99 Section 5.3.3; "Thus, the median concentrations from the New Jersey study were frequently selected as representative values. These representative median indoor air concentrations (from Table G-4 in Appendix G) can be utilized as a line of evidence in evaluating the analytical results. At no time, however, shall the ambient air results or the representative median indoor air concentrations be “subtracted” from the analytical results to determine an exceedance of the screening levels."	Chapters 4 and 5 have been merged. In general, redundant wording has been deleted.
95	5	3	2	delete word correlate: Do they generally agree with the results from the sub-slab soil gas and indoor air samples? Agreement between these different sets of data may indicate that the VI pathway is complete	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
98	5	3	3	The document needs to address Regional PCE and TCE contamination and provide a map or reference to an online database showing the extent of this contamination in the various areas of the state.	Beyond the scope of this document.
98	5	3	3	delete: It is imperative that data quality be assessed before, during and after the sampling event. Change later sentence to: Collection of additional field the appropriate quality control samples (blanks, duplicates, etc.) may aid data interpretation.	As part of the process of merging Chapters 4 and 5, this Section was deleted.
98	5	3	3	Could insert the following at the **beginning of 2nd paragraph** - Sampling results should be interpreted with the general understanding that biodegradable VOC are less likely to complete the VI pathway than more recalcitrant VOC, especially if at least five feet of unsaturated soil exists between a source and a building (see Section 6.4.1).	As part of the process of merging Chapters 4 and 5, this Section was deleted.
99	5	3	3	change sentence to: False positive bias due to sampling and analytical anomalies, including laboratory contaminants, may sometimes impact sample results.	As part of the process of merging Chapters 4 and 5, this Section was deleted.
99	5	3	3	edit and delete text: In order to collect an indoor air sample that is both representative of indoor conditions and avoids the common sources of background air contamination, the occupants may be provided a copy of *Instructions for Occupants - Indoor Air Sampling Events* ,prior to scheduling sampling (Appendix F). This precautionary step may eliminate potential background sources and avoid the process of distinguishing contaminant causes in indoor air samples, since New Jersey does not factor chemical specific background values into their IASLs.	As part of the process of merging Chapters 4 and 5, this Section was deleted.
99	5	3	3	With the Draft 2011 VIG being over 170 pages, it becomes a cumbersome and redundant document to use. This will lead to confusion. As an example of unnecessary redundancy in the document; the following paragraph in Section 5.3.3 is repeated on page 82 Section 4.1 and on page 96 Section 5.3.1.4; "While the Department does not subtract background air concentrations from the analytical results, site-specific background sources may be considered when interpreting indoor air data. Background contaminant levels, particularly ambient air results and the representative median indoor air concentrations (from Table G-4 in Appendix G), can be utilized as a line of evidence since the Department does not require mitigation to levels below background concentrations."	As part of the process of merging Chapters 4 and 5, this Section was deleted.
102	6	3		Document does not recommend collection of indoor air at active gasoline stations. However, sub-slab sampling should be conducted, why? What about other types of maintenance garages, dry cleaners, etc.? Why is there a requirement to continue monitoring sub-slab if there will not be any remedial action while building use remains the same?	Text has been modified.
102	6	3	--	Paragraph 2 recommends that subslab samples be collected at service station sites. This approach is inappropriate because numerous studies (e.g., McHugh 2006) have shown that vapors move up and down across foundations, meaning that subslab samples are easily affected by indoor air. McHugh, T.E., DeBlanc, P.C., and Pokluda, R.J. 2006. Indoor air as a source of VOC contamination in shallow soils below buildings. Soil & Sediment Contamination 15(1), 103–122.	Although the statement about vapor migration into the subsurface is true, proper sampling techniques and leak detection by the investigator should address this issue.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
102	6	3		**2nd paragraph, starting with the 3rd sentence** must be modified. Need to refer to MME plan (for CEA or Deed Notice) not **O**MM plan (for ESRA), moreover, deed notice MME requirements contain no specific VI provisions & if is a CEA, those MME requirements still apply even if site specific VI requirements are put in a deed notice. Also the wording of 4th sentence suggests periodic monitoring is needed even if VI risk doesn't change, but it is really not needed. Something like the below must be stated - If sub-slab results exceed the SGSL, the monitoring, maintenance and evaluation (MME) plan for the applicable institutional control (e.g., a CEA) should require additional sub-slab sampling if the property use or other conditions change in such a way that increases VI risk. The MME plan should include such a sampling provisions until it is demonstrated that site contaminant concentrations no longer represent a VI risk (e.g., benzene ground water concentrations drop below the applicable GWSL). See Section 7.4.1 for more information regarding institutional controls and the MME plan.	Text has been modified.
102	6	3		The second paragraph should be revised to read "For active gasoline service stations, it is not recommended to collect indoor or sub-slab soil samples…. However, a vapor intrusion investigation is necessary at active gasoline stations with a convenience store when the convenience store employees' only role is to work in the store."	The current wording is sufficient.
102	6	3		The remainder of the paragraph, dealing with potential changes in land use, is not necessary because 1. It is addressed in subsection 7.4.1. All that is necessary is a reference to this subsection, 2. There is no reason to investigate current sub-slab soil gas conditions since any contaminant concentrations are likely to undergo significant changes prior to a change in property use, 3. The CEA biennial certification section of the Tech Regs already requires a VI investigation if land use changes increase the likelihood of vapor intrusion, and 4. Any property transfer will trigger a phase 2/site investigation during which potential VI concerns may be investigated and evaluated.	Text has been modified.
103	6	4	1.1	Scenario (c) requires the collection of oxygen data within 10 feet horizontally of the building slab at a depth 2 feet below the building foundation, midway between the building foundation and the water table and at least 5 feet below ground surface. The guidance needs clarification on recommended methods for collecting these samples, and whether they differ significantly from the methods involved in collecting a near-slab soil gas sample.	Text has been modified. Check the Department's FSPM for additional information on sampling techniques.
103	6	4	1.1	Clarify whether the petroleum VI distance exclusion criteria be applied horizontally to the edge of the plume when the seasonal high groundwater table is less than 5 feet below the building foundation. The guidance indicates that if the seasonal high groundwater table is 5 feet below the building foundation, a groundwater concentration of 100 ug/L benzene beneath the structure is acceptable (i.e., it would not warrant a VI investigation). However, if the seasonal high groundwater table is 4 feet below the building foundation and if the building is 30 feet from a concentration of 16 ug/L benzene, a VI investigation would be warranted. Is there flexibility in the approach that may be used to evaluate buildings on the edges of shallow plumes in these situations - e.g., if the building is side gradient, or if the plume footprint is demonstrated to be stable?	Currently, the Department only applies the gasoline exclusion distance criteria vertically. The Department will consider changes to this provision as more scientific information is developed.
103	6	4	1.1	This is confusing - suggest switching (or combining) with 6.4.1.2	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
103	6	4	1	The gasoline exclusion criteria, while conservative compared to criteria that are suggested from empirical studies conducted by Robin Davis (Utah DEQ), are a positive step and improve over the attenuation factor based approach.	Thanks.
103	6	4	1.1	For clarity, the introductory sentence should be revised to read "When benzene is the only VI contaminant of concern, a VI investigation will not be triggered if one of the following three conditions applies:"	Text has been modified.
103	6	4	1.1	In addition, for accuracy and to maintain consistency with items b. and c, item a. should be revised to read "the vertical separation between the seasonal high water table..."	Text has been modified.
104	6	4	1.1	I found the bullets describing "appropriate location to sample for oxygen" to be confusing. If I'm confused, others will be also.	Text has been modified.
104	6	4	1.1	Add reference to 6.4.1.2 (4 conditions for use of exemption) to opening paragraph of 6.4.1.1 to avoid confusion. Current wording is confusing - makes it seem like scenarios A, B and C are the conditions noted above.	Text has been modified.
104	6	4	1.1	The requirement that the O2 measurements be at least 5 feet below ground surface is overly conservative. EPA studies by Schumacher et al 2007 have shown that reliable samples can be obtained at shallower depths. Meteorological variations had little effect on soil gas concentrations even as shallow as 3 feet bgs in a sandy soil with no surface covering. By not allowing shallower samples, aerobic zones at sites under investigation for petroleum vapor intrusion could be missed (Davis 2010). Schumacher, B. A., B. Hartman, J. H. Zimmerman, D. Springer, J. Elliot, and M. Rigby. Results from EPA Funded Research Programs On The Importance Of Purge Volume, Sample Volume, Sample Flow Rate And Temporal Variations On Soil Gas Concentrations. Presented at Air & Waste Management Association Conference, Vapor Intrusion: Learning from the Challenges, Providence, RI, September 26 - 28, 2007. Robin Davis (2010). API's "Assessing Vapor Intrusion at Petroleum Hydrocarbon Sites" training course.	The current wording is sufficient. However, the Investigator can deviate from this provision based on proper technical justification.
104	6	4	1.2	Why is gasoline exclusion only applicable when small buildings (family home) are present? All 4 conditions must exist to get exclusion? Please clarify that only benzene needs to be considered because it is the remediation driver and that the presence of other compounds does not exclude site from exclusion.	Very large buildings (such as box stores) may inhibit oxygen transport beneath the structure. Yes, all four conditions need to exist. Yes, benzene is used as the exclusive driver.
104	6	4	1.2	What does "extensively paved" mean in bullet 2?	The investigator is to use professional judgment.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
105	6	4	2	In regards to statement regarding No. 2 fuel oil/disesel on water table or within unsaturated zone, VIG indicates that if product is excavated or removed within 6 months after detection, can delay sampling ground water to evaluate VI until after remedial actions are completed. This is good approach, and may eliminate many cases from IEC/VC due to remedial activities. So no ground water sampling will be performed during first 6 months of remediation, for evaluating either ground water conditions or assessing VI?. How does this fit with the NJDEP sheen policy which states that intermittent sheen on water table may not need remediation based on the results of ground water sampling. When does ground water sampling take place? Please make sure VIG, Tech Regs, sheen policy and any other applicable guidance/regulations do not conflict with this section.	This provision is a variance from the Technical Rules that is recommended by this document. It is currently being utilized by the UHOT program.
105	6	4	2	Is the 6 months cut-off from regulation? If not, temper the requirement to provide guidance on how investigator can make judgment	This provision is not contained in regulation. It is an approach currently utilized by the Department that is being recommended in this document.
105	6	4	2	Investigating discharges of No. 2 Fuel Oil and Diesel. Bioattenuation processes will operate at sites where these types of fuels are of concern. Therefore, the exit criteria in 6.4.1 should apply to these types of releases. As mentioned in other comments, alternative soil gas sampling strategies should be allowed prior to advancing to sub-slab sampling. Review this section for clarity	The current wording is sufficient.
106	6	4	2	Investigator told to evaluate ground water results for 2-methyl naphthalene and naphthalene. There are currently no GWSLs for these 2 compounds. Will GWSLs be established for 2-methyl naphthalene and naphthalene? If not, what criteria should they be evaluated against?	VI screening levels for both 2-methyl naphthalene and naphthalene are being developed.
107	7	0	0	First paragraph, second sentence - the phrase "the vapor mitigation system" should be replaced by the words "vapor mitigation", since a system will not always be required to complete vapor mitigation.	Text has been modified
107	7	0	0	Second paragraph - the word system or systems should be removed (three locations); where applicable it can be replaced by the word "techniques"	Text has been modified
107	7	0		reword: Ultimately, the primary goal is to remediate the source of the vapor contamination (ground water and/or subsurface soil) such that the risk of VI is reduced.	Current wording is sufficient
107	7	1	0	IEC Response action of source control is not discussed in this guidance. Response action timeframe of 1 year for IEC source control should be addressed.	Beyond the scope of this guidance. It can be found in the NJDEP Immediate Environmental Concern Technical Guidance.
107	7	1	1	IRA and the ESRA acronym not defined.	Acronyms have been defined.
109	7	1	5.1	This section should make reference to Appendix C for additional information on required forms and deliverables as part of the response action which are not discussed in this section.	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
110	7	1	5.3	Please clarify the term "implement" as it relates to an ESRA. For some Sites the implementation of a ESRA can be lengthy due to the design, permitting, procurement of system components and installation. At what step in the process, awaiting construction permit approval, construction, or system startup, is the ESRA to be considered implement.	Text has been modified
110	7	1	5.3	This section does not address the possibility that IRAs have mitigated the indoor air to acceptable levels. Following the implementation of IRAs, the investigator should have the option of re-sampling to determine whether an ESRA is necessary or whether long-term monitoring would be a reasonable alternative.	By definition, IRAs are "interim" actions and not designed to replace permanent mitigation. However, the investigator may implement a variance from this provision with proper technical justification.
111	7	1	0	Second full paragraph. The DEP should provide its basis for claiming that success using exterior soil gas sampling in VI investigations is suspect.	This paragraph has been deleted. See Section 3.3.2.1 for additional information.
111	7	1	5	reword: For all documents prepared for the VI pathway, including letters sent to building occupants, the results shall be reported in units of µg/m^3 (results reported in parts per billion by volume are no longer acceptable as the only analytical reporting unit).	current wording is sufficient.
111	7	1	5.3	Please provide reference for where the 2011 NJDEP Presumptive and Alternative Remedy Guidance can be found.	Text has been modified.
111	7	1	5.3	NJDEP Presumptive and Alternative Remedy Guidance, 2011 does not differentiate between residential and nonresidential and/or manufacturing versus an office or retail establishment.	Refer to NJDEP Presumptive and Alternate Remedy Technical Guidance, 2011
112	7	2		The Guidance Document does not mention about radon collection in the carbon systems causing radiation hazards. The investigator and occupants should be warned about these hazards, the proximity of the location of the system such as to a daycare center, etc.	A statement will be included in Section 6.3.6
112	7	2		First partial paragraph, fourth sentence. The draft VIG indicates that for existing buildings the type of mitigation system will be determined based on the results of the VI investigation and diagnostic testing. No additional detail is provided and the current version of the Presumptive Remedy Guidance, which is cited in the last sentence of the same paragraph as a source of additional information, does not discuss such diagnostic testing requirements.	Text has been modified
112	7	2		passive mitigation with an active contingency is the presumptive remedy for new schools, child care facilities, and residences - why not commercial buildings?	Presumptive remedy does not include commercial buildings, it is applied to those buildings with high risk persons such as children.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
112	7	2	1	NJDEP has implemented many additional controls and requirements for sub-slab depressurization systems. Currently, the state appears to prefer active mitigation, although passive mitigation may be allowed in some cases. Overall, ARCADIS notes that there is a large disparity in the stated monitoring obligations between passive systems and active systems. The State is allowing passive systems with little or no monitoring criteria, but active systems are required to meet numerous criteria and monitoring requirements. ARCADIS believes that the specific requirements outlined for active systems are too stringent and that greater flexibility should be allowed for responsible parties to implement the best solution for a building.	Text has been modified.
112	7	2	1	3rd Para - ASD systems vertical as well as lateral vacuum fields. Contaminate riser concentrations have indicated an average 70 % depletion rate over one year. There is no evidence that these systems do not address source control.	Current wording is sufficient
113	7	2	1	"It should be noted that in situations where the soil permeability of the building subsurface is high, it may not be feasible or economically reasonable to obtain an acceptable pressure differential across the entire slab." Please clarify what is considered high soil permeability and economically reasonable. Very low permeable soils also have the same effect on system feasibility and economics.	Text has been modified
113	7	2	1.1	5th Para - Sand is a low permeability sub slab fill material that makes soil depressurization difficult. Sand should be removed from this paragraph and AASHTO 57 stone specified throughout.	Text has been modified
113	7	2	1.2	7th Para - HDPE is a difficult material to weld especially in crawlspaces. If vapor membranes are not selected by chemical benefit then EDPM should be the primary material.	Current wording is sufficient
113	7	2	1.2	Multiple liner penetrations are not required because crawlspace floors are irregular. A 4" pipe can easily depressurize 12,000 sq.ft. of sealed liner.	Text has been modified
114	7	2	2	passive systems actually operate by both SSV and SSD - the primary mode depends on the tightness of the surrounding soil and building shell. If tight, then negative pressures develop, if not tight (or if air inlets provided) the mode is SSV. In fact, the mode may change seasonally, with stack effects promoting SSD in the winter, and SSV dominating in the summer). Bottom line, I would title this Passive Subsurface Systems, and indicate that they may operate in both modes depending on site specific conditions. My Battelle paper is attached, which might provide some useful info. We also hope to collect and publish more data on passive system performance over the next couple of years. I would also note that high permeability venting layers are recommended for passive systems in new buildings, such as aerated floors. Otherwise, the radius of influence will be too limited, just like observed in existing buildings.	Text has been modified
115	7	2	2	NJDEP guidance indicates that "passive systems are not recommended in existing buildings." Again there is a large disparity in requirements between active entire-slab remedies and passive remedies. The criteria for whether a system is considered to be effective should be based on the measured concentrations of indoor air, and not the installation of an active system that covers the entire slab area.	Text has been modified
115	7	2	2	reword: Passive systems generally include the following major components:	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
115	7	2	2	I don't see any reason why a high water table will affect the performance of a passive system. I strongly recommend removing this paragraph. A shallow water table might cause the system to work in more of a SSD mode, due to tighter soil conditions, but that doesn't necessarily decrease the efficiency of a passive system. We installed a passive system in Cheyenne with wet soils at subgrade level (just below the aerated floor space) and saw very low sub-slab soil gas levels despite elevated levels in GW, presumably due to passive ventilation. Finally, aerated floors do not require a membrane (item 3), as indicated at the end of section 7.3.4 - just specify a low permeability floor; i.e., floor of good integrity, all cracks and penetrations sealed.	Current wording is sufficient
115	7	2	2.3	EDPM not HDPE	Current wording is sufficient
116	7	2	3	NJDEP indicates that limiting access to affected areas of building could be used as an alternative mitigation technique. Please clarify what types of access limitations would be considered acceptable.	Limiting access to affected areas of the building would be to limit time or prohibit occupants in the area.
116	7	2	3	this section suggests that passive systems are "alternates" requiring approval, whereas the previous section indictated that passive systems (with active contingency) were the presumptive system for new buildings NOT requiring approval. This needs to be clarified.	Text has been modified
116	7	2	3	Sub-slab pressurization is an option for radon not VOC. Pressurizing volatile vapors pushes soil gases up through electrical conduits and hollow block wall openings. This should be removed.	The mitigation technique selected for a site will be based on professional judgement and successful mitigation of VI.
117	7	2	3	Under document list - Add NJAC 5:23-10 Radon Hazard Subcode and Proposed Radon Hazard Subcode for Schools. NAVFAC Naval Facilities Engineering Command Vapor Intrusion Mitigation in Existing Buildings Fact Sheet. NAVFAC Naval Facilities Engineering Command Vapor Intrusion Mitigation in Construction of New Buildings Fact Sheet	Text has been modified
117	7	3	0	This section should remind the reader that there are regulations to follow when disturbing asbestos containing materials.	Text has been included in Section 7.3.3.1
117	7	3	1	1st Para - Mitigation Contractor should be changed to Radon Mitigation Specialist. This is the responsible individual who is required to maintain the license, CEU's and sign off on mitigation designs. Similarly the LSRP and Professional Engineer are also individuals.	Current wording is sufficient
117	7	3	1	Radon Mitigation contractors and home improvement contractors may not have proper training in Health & Safety and have 16,32 or 40 hour OSHA training. I had a dry cleaner case where PCBs were found and Level C were required due to gasoline/fuel oil spills. Recommend that OSHA training be included as requirement.	Text has been modified
119	7	3	0	Installation of a system employing an exhaust stack should incorporate in the design and installation consideration of the effects of condensation on the system. Condensation in the stack should drain properly and not create dangerous icing conditions in winter.	Text has been modified. This information is also included in the Vapor Intrusion Mitigation System Inspection Checklist included in Appendix N.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
119	7	3	3	Add to the bulleted items the integration of available technology such as dynamic building controls to minimize energy consumption of blower motors and HVAC equipment that delivers pressurized conditioned indoor air.	To keep the document shorter, these items would be covered under the "optimize the performance of the selected technology"
119	7	3	3	Integration of alarm systems that notify building occupants or the responsible party of a system malfunction.	Text has been added in Section 6.3.2.7.
119	7	3	3.2	There is no evidence that sealed ASD systems have ever backdrafted a combustion appliance that was functioning properly prior to installation. Backdraft testing should only be a requirement when equipment that alters the interior ventilation rate is installed.	Current wording is sufficient
120	7	3	3.3	"Ensure that a sufficient number of suction points have been installed to achieve the required vacuum levels over the entire slab." There is a large disparity between passive systems and active systems. Although passive systems are not recommended they are allowed. A passive system would not achieve vacuum levels over the entire slab. Why then in an active system is it required that the entire slab be covered by the system. There are cases where a hot spot can be targeted thus preventing vapors from affecting the remainder of the slab. These targeted areas can be at the edge, corner or interior of a slab. For large buildings that require multiple extraction points the design should allow for targeted SSD. If 25% of a slab can be covered by a SSD system effectively treating up to 100% of the sub slab vapors and cutting off vapor transport to the remainder of the slab. Please clarify why a passive system is allowed but an active system that is installed must target the entire slab and have numerous communication test points installed.	Text has been modified
120	7	3	3.3	Diagnostic testing should include predictive vacuum field modeling that insures correct vacuum field extension and energy conservation. Therefore, diagnostic testing "Change SHOULD to SHALL" be conducted. Change "after installation" to "as a part or component of start-up".	Current wording is sufficient
120	7	3	3.3	3rd Para - Eliminate asphaltic/bituminous and silicon. There materials shrink, crack, and asphalt products outgas VOC's.	Text has been modified
121	7	3	3	"Sumps may provide a significant preferential pathway for vapors to migrate into a building. Air tight covers should be installed over sumps that prevent VI but still allow active dewatering and sump pump access (USEPA 2008a)." **Many basements have a perimeter drain around the basement; therefore, they can not be completely sealed.**	These issues must be addressed by the mitigation contractor.
121	7	3	3.5	NJDEP indicates that "For active subsurface depressurization systems, a communication test is a critical step in assessing the viability of the system to extend the sub-slab depressurization field beneath the entire slab and foundation." Although this may be necessary for most buildings, for well-characterized, spatially limited, vapor impacts underlying large buildings, an exception should be provided to allow only the affected portion of the slab to be depressurized.	Text has been modified

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
121	7	3	3.5	The option of suction sump pits should be removed. Vapor mitigation systems should not be permitted to draw soil gas from a sump pit. Sump pits are typically constructed of cylindars with 3/8" holes and present excessive drag and results in excess electrical consumption and limited pressure field extensions. Vapor suction points should be dedicated to the vapor system only. This practice is typically the choice of "cheapest legal" radon contractors. Plumbers who are unaware of the vapor system often remove the sump lids to address water issues rendering the vacuum system dysfunctional. Open suction pipes exhausting air from the basement can actually contribute to combustion appiance backdrafting.	The use of sump pits is an option for VI mitigation and their use is dependent upon the professional judgement of the mitigation contractor.
122	7	3	3.5	As stated in the guidance, "For the OMM phase of the project, the recommended number of permanent points to confirm sub-slab depressurization is (4)-four probes for the first suction point plus (2)-two probes for each additional suction point." ARCADIS recommends that the number of points be based on a system radius of influence (ROI) test. Many large systems with a small ROI will have numerous monitoring points. For example a system with 8 extraction points and a ROI of 20 feet (~2,500 sq ft of coverage) will require 18 monitoring points. At an estimated installed cost of $100+ each, this is cost prohibitive. For finished floors, carpet, tile, linoleum, etc. the currently recommended number of points will significantly impact the cost and acceptance of a system.	As stated, the NJDEP realizes that not all the recommended SSP may be installed due to site conditions, or permission of the building owner. Other monitoring alternatives may be presented based on data generated at the site and best professional judgement The SSP will provide an important line of evidence for slab depressurization and can eliminate the need for periodic indoor air sampling.
122	7	3	4	"It is recommended a minimum 40 mil thickness for all membranes. Alternative materials and thicknesses can be used provided documentation is presented showing equal or superior performance for the intended use." Please clarify the performance criteria to be achieved. There are numerous membranes with a 15 mil thickness on the market that meet various ASTM standards for tensile strength, puncture resistance, and water vapor, radon and methane permeance that meet the intended use. The referenced design guidelines are recommendations only and a system designed by a Professional Engineer should have precedence.	Text has been modified.
122	7	3	4	2nd Para - Change 3 - 6 mil liners to 3 - 6 mil vapor retarders. Also, 6 mil is the minimum residential vapor retarder permitted in NJ.	Text has been modified.
124	7	3	6	First full sentence. "Sampling of the stack to determine if an Air Pollution Control Permit is required should be performed after the system commissioning timeframe…" This statement contradicts the air permitting requirements, which require a permit before a system can be constructed. In addition, if a permit is required for a vapor mitigation system, it is unlikely that mitigation can be performed within the required timeframe. The DEP should include a mechanism for extending the mitigation timeframe in such cases. In addition, there should be a mechanism to expedite Bureau of Air Quality Permitting review and approval of permits for mitigation systems.	Guidelines have been provided by the NJDEP Air Quality Permitting Program.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
124	7	4	1	Further discussion/clarification of details in this section is needed. Please provide specific information about requirements.	Current wording is sufficient
125	7	4	1	In the **3rd line of page** delete "OMM" & insert - monitoring, maintenance, before "evaluation." At **end of same paragraph** delete "all of the above" & insert - both types of monitoring before "requirements." At **end of next paragraph** must add something like - however, this would not substitute for compliance with the CEA requirements applicable to VI risk from ground water contaminants. In **next paragraph, 2nd sentence** could delete "Additional" and at **end of that paragraph** may be helpful to add - Instructions for the applicable Remedial Action Protectiveness / Biennial Certification Form also provide relevant information.	Text has been modified.
126	7	4	1	When using non-residential screening levels, is there a mechanism in place in existing remediation permits to "check off" that previously completed VI evaluation/investigation was sufficient to consider current use (i.e., res vs. non-res) of potentially impacted buildings? If not, need to be more specific about need to submit periodic certifications that previously completed VI evaluation remains valid. A requirement to complete and certify a VI Evaluation Form periodically will solve this issue.	This issue is currently under Department review and guidance will be provided.
127	7	4	2	"The NJDEP has developed a Vapor Intrusion Mitigation System Inspection Checklist which identifies a series of minimum technical design requirements." The Inspection Checklist is an adequate guide to the installation for small radon-like systems. For more complicated SSD designs the Inspection Checklist limits the system design parameters. For systems designed by a Professional Engineer, the engineer should be allowed the freedom to design an effective system without specific constraints. Constraints are more appropriately placed on LSRP and Radon Specialists who are allowed to design these systems, as they may have a limited design background and a more limited technical foundation in fluid mechanics and mass transfer principles.	The checklist is based on radon requrements which have similar design for VI. The Department has developed the checklist as a guide to help with the installation and design of VI mitigation systems. Depending upon the complexity of the mitigation system design, various system specific components may differ, or may be added by the designer.
127	7	4	2	NJDEP recommends follow-up sampling or a Commission Timeframe of 30 - 45 days after system startup. For large buildings, it is our experience that for most systems the proposed 30 - 45 day timeframe is not sufficiently long to lower indoor air concentrations Typical timeframes that we have encountered are 30 to 90 days. Sampling within 45 days increases costs when having to repeat sampling. A timeframe distinction should be made between residential versus non-residential and small versus large buildings.	Timeframes are in the regulations (N.J.A.C 7:26E). A variance is required to vary from the regulations.
127	7	4	2	First paragraph, third sentence. "All applicable items contained in the checklist should be incorporated into the design for any vapor mitigation system unless technical justifications are provided for modifications." The design components of the system should be determined by the PE, certified radon contractor or LSRP that is certifying the system.	The current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
127	7	4	2	Third paragraph, second sentence. The DEP should clarify why the performance requirements for passive systems is less stringent than for active systems, which operate more predictably and consistently. In addition, as with passive systems, chemical smoke testing should be acceptable to demonstrate the presence of vacuum in an active system.	Text has been modified.
127	7	4	2	Needs to be more specific about which conditions require 0.020" water differential and which require a 0.004" differential. Please provide quantitative values.	Text has been modified.
127	7	4	2	Last paragraph p. 128 (re: smoke testing) - This recommendation should be associated with a specific sub-slab pressure value, which should be well in excess of 5 Pascal, the targeted minimum vacuum for sub-slab depressurization per EPA's 2008 document.	The current wording is sufficient.
127	7	4	2	There is no discussion about achieving maximum building depressurization during commissioning of SSD systems, which can easily be greater than the -0.020 in w.c. recommended by the VIG. If commissioning is conducted under low building depressurization, there is no proof that the SSD system can depressurize the slab under worst-case building depressurization. We highly recommend that all commissioning be conducted under worst-case building pressurization (at least in the basement or floor where the system is installed).	Text has been modified.
127	7	4	2	The minimum differential pressure requirement for SSV is contrary to the purpose of a SSV. SSV is useful where depressurization is not achievable but air movement is achievable (sub-slab voids or very high permeable sub-slab soils). Therefore a differential pressure of any kind defines a SSD and the lack of depressurization but the ability to move air out of the subslab defines a SSV. According to EPA (EPA/600/R-08-115), SSV is based on the flow rate of air being removed from the sub-slab and that commissioning is more dependent upon post-mitigation indoor air sampling. We recommend that air movement under the slab be demonstrated by use of smoke tests (pulling air into test holes through the slab), that the flow rate through the suction pipe be measured, and that indoor air sampling be conducted to prove the efffectiveness of the SSV.	Text has been modified.
127	7	4	2	Some form of initial commissioning should be conducted immediately after installation to confirm that all system components were installed and operating as intended. Then baseline pressure differential readings can be established after 30 days. We should not wait for 30 days to check that the system is depressurizing the entire slab.	The current wording is sufficient.
127	7	4	2	2nd Para - Baseline performance mesurements can be collected the same day as system start-up and usually improve as soils dry out over the next fourteen days. Waiting for 30 days is not necessary if a sufficient vacuum field is attained at the time of start-up.	The current wording is sufficient.
128	7	4	2	"Vacuum measurements from permanent sub-slab probes may be in the range of 0.01 to 0.001 inches of water (2.5-0.25 Pascal). Therefore a digital manometer with a resolution of 0.0001 inches of water will be required to obtain vacuum measurements." **I am not aware of a manometer than can reliably measure down to 0.0001 in H2O, I recommend removing this requirement and relying on chemical smoke tubes to determine the presence of a vacuum.**	The current wording is sufficient.
128	7	4	2	"The design of some mitigation systems may not allow for direct measurements of the system to determine if it is operating to eliminate the VI pathway. In these cases, sampling of indoor air may be required to confirm the mitigation of the VI pathway." **This statement seems to contradict first paragraph of section 7.4.3.**	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
128	7	4	2	Last paragraph p. 128 (re: smoke testing) - This recommendation should be associated with the conditions specified in Section 7.3.3.2 (pressure and investigator's concern that backdrafting may occur).	Text has been modified.
128	7	4	2	Last paragraph p. 128 (re: smoke testing) - This recommendation seems counter to the concept of the stack effect. Is there evidence that the low vacuum pressure quoted in Section 7.3.3.2 is capable of overcoming the stack effect, especially considering the exhaust gasses associated with combustion appliances will be warm, and therefore naturally rise through the stack?	There have been cases where this has occurred, especially with faulty combustion appliances. It is a safety concern for the building occupants that must be addressed.
128	7	4	2	reword: Therefore a digital manometer with a resolution of 0.0001 inches of water is recommended to obtain vacuum measurements.	Text has been modified.
129	7	4	2	Table 1 - Add converting pascals to inches of water column. 1 pascal x 0.004 = inches water column This is the most commonly interchanged measurment in mitigation design.	Text has been modified.
130	7	4	3	Not sure of reason for same day verification sampling. Makes more sense to allow indoor air to ventilate via air exchanges, especially in industrial setting	Text has been modified.
130	7	4	3	Regarding the first full paragraph on page 130 of Section 7.4.3 Verification Sampling (VS); "VS analysis is only required for the COCs and their break-down products. The sample(s) should be collected in the basement (or lowest floor) and biased towards worst case locations identified during previous sampling events and/or technical justification. " We recommend that the term "and/or technical justification" be changed to "and/or professional judgment".	Text has been modified.
130	7	4	4	A separate report for each property will be repetitive and onerous in many cases; it should be left to the investigator to determine what is the appropriate number or reports to create.	The current wording is sufficient.
130	7	4	4	In List section - A summary to justify field modifications to a system should not be required as long as the changes are noted in the As-Built. This only adds additional unproductive hours to the installation.	Text has been modified.
131	7	4	5	Last Para - The use of available technology such as dynamic building controls should be integrated into the design or justification provided for not using them.	Dynamic building controls can be a part of any VI mitigation system but, will not be required.
133	7	4	5	Table 7.2. There is a stipulated 60 day time period from implementation of a mitigation system to the required report submission. Given a required system commissioning period of a minimum of 30 days, collection of indoor air verification samples immediately following commissioning and assuming 21 days turnaround time for final lab results, leaves approximately 8 days to complete the report. This is an unreasonable timeframe. The DEP should modify the timeframe or allow the appropriate extension of the timeframe, as needed.	The timeframes have been set by regulation in N.J.A.C. 7:26E.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
133	7	4	5	Although I may have suggested this before, I now think that setting the SGSLs as the performance criteria for sub-slab soil gas samples for passive systems is much too strict. A well designed passive system will have a much higher attenaution factor than the conservative SGSLs indicate, and we will be converting many passive systems to active systems needlessly if we have such a stringent requirement. If a passive system is below IASLs but above the SGSL, I suggest requiring repeat testing the next heating season; if still OK, then as long as the system integrity is maintained according to O&M inspections, then no additional sub-slab testing should be required.	Text has been modified.
133	7	4	5	Table 7-2 - If during an OMM visit, values change by more than 15% however differential pressure field measurements are acceptable - must another VS be collected and the OMM clock reset?	Text has been modified.
133	7	4	5	Table 7-2: The "Vapor Mitigation Verification and OMM Criteria" is too prescriptive, without technical justification and not applicable to all cases. Additionally, the frequency of OMM and vapor sampling does not take into consideration reduced monitoring due to changes in building characteristics, or the vapor source (i.e. ground water is in a steady state and the concentration of soil gas is not likely to increase). The cost associated with monitoring and vapor sampling as discussed in this section, may surpass $3,000 per building per year. The proposed monitoring and sampling frequency will add an additional cost burden without technical justification. The frequency of OMM and vapor sampling should be left to the professional judgment of the LSRP as long as it remains protective of receptors.	Department and Stakeholder experience has shown the level of OMM is adequate for VI systems. Investigator may deviate with technical justification.
133				rename table 7.2 : SUGGESTED VAPOR MITIGATION VERIFICATION AND OMM CRITERIA	The current wording is sufficient.
134	7	4	6	Table 7.3. For sub-slab soil gas concentrations ≥10x NJDEP SGSL, annual inspection and indoor air sampling is required indefinitely. There should be a provision to allow for a reduction in sampling frequency after a certain number of years.	Investigator may deviate with technical justification.
134	7	4	6	Table 7.3 - Change right hand column to indicate that monitoring is only required for exceedances of SGSL that at <10x the SGSL. Revise text above table accordingly	Text has been modified.
134	7	4	6	At **end of 2nd paragraph** should insert - <u>LTM should be incorporated into the MME for the CEA/deed notice</u>.	Text has been modified.
134				rename table 7.3 SUGGESTED LONG TERM MONITORING (LTM) SAMPLING DESIGNS	The current wording is sufficient.
135	7	5	0	3rd Para - 2nd Sentence - The initial 2 week shut down should occur during the heating season.	States this provision in the last paragraph
135	7	5	0	**Last sentence of 1st paragraph** - Should delete "retire" and replace with <u>possibly removal of</u> because in some cases the VI GWSL are greater than the ground water quality criteria so they may be able to cease monitoring/evaluation for VI risk but need to still have the CEA until gw meets standards. **At end of this paragraph or next** could add - <u>For more recalcitrant COC (e.g., chlorinated VOC), significant mass may be temporarily stored in the vadose zone for months or even years after ground water concentrations have decreased significantly and/or contaminated soil is removed. For such COC, it may be prudent to wait longer before initiating system termination sampling than is appropriate for PHC related VOC</u>.	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
135	7	5	0	In **last paragraph, 1st line**, should insert or LTM after "A vapor mitigation system…" At **end of this paragraph** could add - Arrangements should be made with affected property owners to remove any equipment or monitoring devices associated with the system or LTM if appropriate or requested.	1st - Text has been modified. 2nd - Current wording is sufficient.
136	8	0	0	General comment - may want to be more specific on the terms "occupant" and "resident". They seem to be used interchangably.	Chapter 8 has been removed from the document and placed on the Department's VI website.
137	8	2	1	Change "should notify municipal officials" to "may consider notifying…"	Chapter 8 has been removed from the document and placed on the Department's VI website.
137	8	8	1	Understandable that health department may be notified, but why do the mayor, town administrator, etc. need to be notified? This is overreaching and not practical. Completion of the items described in this section are not essential for successful completion of a VI investigation. The presence of this section may lead to confusion. Should the person responsible for remediation get a variance if a public meeting is not held? There is value to the information contained within, but it may be appropriate to soften the language or remove from the VIG and make a stand-alone guidance.	Chapter 8 has been removed from the document and placed on the Department's VI website.
138	8	3	0	In the last sentence after the word "to" Delete "arrange" and Insert "schedule an information meeting or".	Chapter 8 has been removed from the document and placed on the Department's VI website.
139	8	3	1	References to contacting both owners and tenants for rental properties. Tenant information is not readily available through public information sources. Consequently, contact with tenants would likely require either going through the owner to get contact information for the tenants, or attempting to go door-to-door to make contact. Alternately, a 'to whom it may concern' letter could be addressed to the occupant. The VIG should provide additional clarity on what NJDEP expects with respect to attempts to contact tenants.	Chapter 8 has been removed from the document and placed on the Department's VI website.
139	8	3	1	With respect to access agreements - the text provides that in case of tenant-occupied spaces, the access agreement need only be provided to the property owner. The VIG should make it clear that an access agreement with the tenant is necessary. Leases have different requirements for notice for access, etc. and if the landlord doesn't provide adequate notice, that may cause access issues. In addition, it is prudent to get tenant permission prior to entering their premises and conducting the often intrusive activities. It is our company's policy never to conduct VI work in a tenant space without their written approval.	Chapter 8 has been removed from the document and placed on the Department's VI website.
141	8	3	3	Note that there are inconsistencies between the request for access letter described in NJAC 7:26C and the access letter model provided in the VIG (site map, content)	Chapter 8 has been removed from the document and placed on the Department's VI website.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
142	8	5	0	Paragraph 1 - make "owner/occupants' to "owners and tenants"	Chapter 8 has been removed from the document and placed on the Department's VI website.
142	8	5		delete (see below): Very high levels of background contaminants are found in the indoor air. This may allow the occupant/property owner to take immediate measures to reduce their exposure to these contaminants by addressing the source. Building owners/occupants should be referred to their local health department if they have specific health questions about non-site related contaminants.	Chapter 8 has been removed from the document and placed on the Department's VI website.
143	8	5	1	Regarding the verbal contact in the case of RAL exceedances, etc. - what do you do if contact by phone is unsuccessful (since these are results that should be communicated quickly)? If a message is left but not returned, are you required to make a site visit? Send a certified letter within a certain period of time?	Chapter 8 has been removed from the document and placed on the Department's VI website.
143	8	5	2	reword: In the case of rental properties, the findings should be reported in writing to both the applicable tenant and the property owner.	Chapter 8 has been removed from the document and placed on the Department's VI website.
144	8	5	2	move to end of section and reword: In cases where very high levels of background contaminants are found in the indoor air, the investigator is encouraged to provide the information to the occupant/property owner. This may allow the occupant/property owner to take immediate measures to reduce their exposure to these contaminants by addressing the source. Building owners/occupants should be referred to their local health department if they have specific health questions about non-site related contaminants.	Chapter 8 has been removed from the document and placed on the Department's VI website.
144	8	6	0	Paragraph 1 - change end of last sentence to "ensuring that issues or concerns related to remedial action are resolved."	Chapter 8 has been removed from the document and placed on the Department's VI website.
144	8	6	0	After the second sentence add "The investigator should review the design with the building owner/occupant and have them sign-off on the design before installation."	Chapter 8 has been removed from the document and placed on the Department's VI website.
146	8	7	0	Last paragraph - change to "fact sheets, letters and/or phone calls."	Chapter 8 has been removed from the document and placed on the Department's VI website.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
A				We recognize that former Chapter 2 (CSM) of the 2005 VIG has been removed, however we recommend that Appendix A also be omitted because it includes information that is not directly related to vapor intrusion. This section is addressed in another NJDEP guidance document and needs to be deleted. The repetition makes the document cumbersome and when inconsistencies occur the unnecessary redundancies are confusing. We recommended removing Appendix A and providing a reference or references to guidance on developing Conceptual Site Models in Section 1.0.	All discussion of the CSM has been removed and the investigator has been directed to consult the Department's Conceptual Site Model Technical (CSMT) Guidance. However, the CSMT Guidance does not contain the VI CSM Checklist that is contained in Apprendix A. Since the Checklist is from the ITRC's Vapor Intrusion Guidance document that the commenter has already acknowledged is "recognized nationally as a leader in developing vapor intrusion practices," The checklist will remain.
B				On 1st page, may want to clarify that only 1 trigger is necessary to move to Receptor Evaluation.	Text has been modified.
B				On 1st page, specify that identification of structures/utilities is required for 200' of currently known extent of VI trigger.	Text has been modified.
G				The background concentration recommended for MTBE is 3 ug/m3. Table 1 indicates Department's Indoor Air Screening Level for Residential at 2 ug/m3. Please clarify the recommended background concentration for Residential and Non-Residential.	The Recommended Median Indoor Air Concentrations in Table G-4 can be applied to both residential and non-residential buildings.These background values should be utilized as a MLE.
J			Item 6	It is functionally impossible to run combustion appliances such as fireplaces and woodstoves during the cooling season. Backdraft testing should only be a requirement if the mitigation system involves altering air pressures within the building not sealed ASD systems.	Text has been modified.
K	2			The document identifies that a plumber and/or electrician should be consulted to identify the location of utilities inside the building. This requirement should not be needed as they can be readily identified during the building walkthrough by either the property owner or other facility personnel.	Text has been modified.
K	4			The **recommended** materials **for** construction for the sub-slab probe is 316 stainless steel or **brass** fittings. **Add in some wording, "a recommended method is the following….."**	Text has been modified.
K	5	1	9	**Why not just insert the hex plug into the probe while placing the seal instead of using duct tape which has adhesives that will stick to the threads of the probe.**	Left to the professional judgment of the investigator.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
K	5	1	10	A small piece of clay **may** be used… **Definitely not required as the 1/4 inch steel tubing will fit snuggly in the 1/4 inch diameter hole.**	Current wording is sufficient.
K	5	3		"The flow and vacuum check is performed by connecting a pump to the probe and running at a flow rate of 200cc/min for a period of 10 minutes. " **The vacuum should reach steady condtions within a few seconds, suggest changing wording to "The flow and vacuum check is performed by connecting a pump to the probe and running at a flow rate of 200cc/min until the vacuum stabilizes."**	Text has been modified.
K	5	3		"During this test the vacuum should also be monitored. Vacuums at less than 1 inch of water will avoid any partitioning problems. Vacuums over 1-inch of water vacuum must be reported to the person evaluating the data to aid in interpretation of the data." **Applied vacuums over 1 in-H2O are a fairly common occurence, suggest changing notification level to 10 in H2O.**	Text has been modified.
K	5	e		add in "**anchoring cement**"	Current wording is sufficient.
L				Appendices L and M can be combined into one appendix.	Appendices L and M left as is.
L				How do you document that the system does not need a permit? Is an exemption form required? Should any further testing be conducted to confirm the non-permitted status? Can LSRP approve or is NJDEP pre-approval required?	The person designing or performing the mitigation system should establish, based on system flow rate and VOC concentration that the VOC mass emitted is below applicable permit trigger limits.
M				How do you determine if the system has the capacity to emit greater than 0.1 lbs per hour of the TXS? Is a PID reading sufficient, or will analytical samples be required?	The system emissions can be estimated by PID, but should be verified by laboratory results.
M				Air permit required if SSDS has potential to emit Group 1 or 2 TXS at a rate greater than 0.1 pounds per hour. At end of section it says that if SSDS is designed and operated exclusively to remove vapors below slab and no treatment of soils or ground water is occurring, an APC permit would not be required. So even if exceed 0.2 pph rate of contaminants, don't need permit if not doing any other treatment? Please clarify.	The appendix is for informational purposes only. Any questions, please contact the Department's Air Enforcement Regional Office.
N				Should be entitled "Residential" Inspection Checklist. A separate "Commercial" Inspection Checklist should be developed.	Current wording is sufficient.
N			1.1	3" pipe is a NJ code requirement only for **new construction** of residential radon systems. US EPA/625/6-91/029 July 1991 Sub-Slab Depressurization for Low-Permeability Fill Material pages 27 -30 provide guidance on properly sizing pipe. Example - If a suction hole drawing from native soils yields 8 - 12 cfm, 3" pipe should not be a requirement. 2" pipe is sufficient to handle air flow yields from most native soils. Manifolding multiple 2" risers together into a 3" trunk line should be permitted. The main trunk line into the fan can be 3".	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
N			1.2	ASTM D2729 should be permissable as outside vent material on residential buildings. The use of metal pipe is recommended in commercial buildings with forklift traffic. When return air plenums are penetrated, metal pipe or fire-rated plenum wrap is a code requirement.	Text has been modified.
N			1.6-1.8	Piping supports should meet the standards of the 2006 National Plumbing Code.	Text has been modified.
N			1.10	This requirement should be removed. Most smoke sticks are titanium tetrachloride which is a noxious caustic gas that should not be released into homes.	Current wording is sufficient.
N			1.11	What are the required distances from obstructions?	Text has been modified.
N			*1.12	An additional section should be added that requires gate valves on multiple point suction system.	Left to the professional judgment of the investigator.
N			3.5	Lockable switches that are not within the line of sight are permitted under the electric code.	Text has been modified.
N			3.6	Is a matter of preference, irrelevant to most applications, and should be removed	Text has been modified.
N			4.1.1	A 60 mil polyethylene membrane is excessive to residential application. There are other cross laminated reinforced materials that have greater puncture and tear resistance and are far easier to work with in crawlspaces.	Text has been modified.
N			5.1.1	Vapor mitigation systems should not be permitted to draw soil gas from a sump pit. Sump pits are typically constructed of cylindars with 3/8" holes and present excessive drag which results in limited pressure field extensions. Vapor suction points should be dedicated to the vapor system only. This practice is typically the choice of "cheapest legal" radon contractors. Plumbers who are unaware of the vapor system often remove the sump lids to address water issues rendering the vacuum system disfunctional.	Current wording is sufficient.
N	5	1	4	**Many sump covers are not see through. I don't think it is necessary to have a see through port.**	Current wording is sufficient.
N	5	1	6	"5.1.6 Are sample ports located on the vent pipe and at the required distances from obstructions based on the sampling method? " **Not sure why this point is here on the sump pit recommendations.**	Text has been modified.
N	7	1		"7.10 Was an audible alarm installed at the homeowners request?" **Not sure why this is relevant. Guidance recommends an audible alarm, therefore why does it matter if home owner requested?**	Text has been modified.
N			7.1	Every suction point does not need a vacuum measurement device. That is the function of the sampling port. Installing vacuum devices on every commercial high vacuum system wih multiple risers is unnecessary and prohibitively expensive.	The investigator can deviate from this provision with proper technical justification (commercial buildings would fall under this provision).
N			7.10	Has no relevance to commercial systems. Commercial systems should receive alarm systems as standard equipment.	Text has been modified.
N			7.30	High and low vacuum fans need to be defined. A suggestion is blowers capable of generating more than 5" WC should be designated high vacuum blowers.	Text has been modified.
N			7.30	High and low vacuum variations of 15% are common seasonal variations. This should be recorded as a function of percentage and only be a cause for concern when the variation is 25 % or greater.	Text has been modified.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
N	7	3		"7.3 Is the current vacuum reading within 0.25"water of the initial reading for low vacuum fans and within 5% of the commissioned vacuum for high vacuum fans?" **We have seen much more variability in suction point vacuums than 0.25 in H2O for low vacuum systems and 5% for high vacuum. Suggest changing to within 0.5 in-H2O for low vacuum and within 25% for high vacuum. The fluctuations we have observed have primarily been attributed to moisture content in the sub-slab vs operation of the system.**	Text has been modified.
N			7.60	Mitigation systems in and of themselves can not prevent backdrafting of combustion appliances. Most combustion appliance backdrafting is a result of poor designed or flue obstructions.	Text has been modified.
N	7	7		"7.7 Were indoor air measurements taken using a DRI with a CO detector?" **Not sure why this is required**	Appropriate for backdraft testing.
N			8.6 - 8.7	Gable end penetrations should be prohibited as an option. The 90 degree elbow that points up at the gable end causes irregular air flow and excess condensation. This is a practice exercised by "cheapest legal" radon contractors whose employees are not skilled in installing roof vents.	Current wording is sufficient.
N			8.10	RadonAway HS Series blowers have a 2" discharge and a 3" intake. The internal fan intake is only 1 5/8" making 8.10 irrelevant and should be removed.	Text has been modified.
N			8.10	8.10 should read, " The discharge diameter of a blower shall not add back pressure to the exhaust side of the blower.	Text has been modified.
N			8.11	This statement is based on a distortion of a 1980's Radon Pre-construction Code and should be removed. If the total system discharge is only 35 cfm, which is representative of most residential homes, then 4" pipe should never be a requirement for multiple suction point systems. Homes constructed over sand in Florida have up to 12 suction points with the largest pipe diameter being 2". See EPA Document EPA/625/6-91/029 July 1991 Sub-Slab Depressurization for Low-Permeability Fill Material.	Text has been modified.
N		The first 8.12		ASTM D2729 should be permissable as outside vent material on residential buildings. Aluminum downspout material is noisy, creates excess condensation, restricts airflow, is easily distorted by freezing, easily crushed, and should be removed as an option.	Current wording is sufficient.
N		The second 8.12		Remove existing language. Pipe connections shall be sealed using the ASTM method specific for the material. See 2006 National Plumbing Code.	Text has been modified.
N			8.14	State what the required distances are. Roof and attic blowers should not require positive pressure sampling ports.	Wording has been deleted.
N	8	14		"8.14 Are sample ports located before and after the fan and at the required distances from obstructions based on the sampling method?" **Why are sampling reports required? Why are they required before and after the fan?**	Text has been modified.
N			8.30	Unless the Committee can provide documentation of soil gas entrainment through a chimney, references to chimney flues should be removed from this section. Chimney flues are positive pressure vent devices, many of which are power ventilated at the combustion appliance.	Current wording is sufficient.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
N			9.1	Roof and attic blowers should never have condensate bypass systems. A 3/8" condensate bypass as supplies by the manufacturer reduces the air flow potential of the blower by 12 cfm. Condensate is formed on the positive pressure side of the fan when the soil gas is compressed into the exhaust tube and outside air temperatures are less than 55 degrees F. Condensate drains on attic mounted blowers are not recommended by the manufacturer and only increase the potential for leaks and interior water damage. Blowers on commercial systems that exhaust greater than 80 cfm have not demonstrated condensation problems.	Current wording is sufficient.
N			10.8	Setting 60 - 100 mil as a membrane standard is excessive when lighter weight reinforced materials can have greater punction and tear resistance. The vapor barrier material should be matched with the compound of concern.	Text has been modified.
N			10.10	Room references to "house" in commercial applications.	Text has been modified.
N			12	Add "Were technological advancements such as dynamic building controls designed to minimize long term energy consumption incorporated.	Current wording is sufficient.
N			10.60	Add "sub-slab" before venting layer.	Text has been modified.
O	System Compone		Item 4	Magnehelics or digital manometers should be used to monitor commercial systems - not U-tubes.	Appendix has been removed from this document.
O		Picture 1 and 2		Is an example of restrictive air flow on the positive pressure side of the fan by reducing the diameter of the discharge area and aluminum which creates excess condensation. A better example should be selected for a guidance document.	Appendix has been removed from this document.
O		Picture 3		Illustrates unnecessary drag by the use of excess and tight turn pipe fittings. A better example of a gate valve should be selected for a guidance document.	Appendix has been removed from this document.
O		Picture 4		A label explaining how to read a U-tube manometer should be located to the right or the left of the manometer with the reference arrow pointed to 0.0	Appendix has been removed from this document.
O		Picture 5		Illustrates a low point in the alarm switch tubing that can easily fill with condensation triggering a false alarm. A better example of an alarm switch should be selected for a guidance document.	Appendix has been removed from this document.
P	Q			On the monitoring forms, require VOCs, methane, O2, etc. I am assuming these are not all required for monitoring each SSD system.	Text has been modified.
Q		Data Points		Table should be noted by dates not current and previous.	Text has been modified.
R				Is for Residential Only and should have an example of how to calculate electrical costs of 3 phase power consumption.	The appendix is designed to assist the investigator. Modifications can be made by the investigator for commercial buildings.
General				Does the department still intend to simplify the TRSR and refer to guidance? If so, may need to make VIG more stand alone with less references to TRSR.	The current wording is sufficient.
General				In total, this is a 250+ page document and there is no way an LSRP will be able to document all the things done that are not in accordance with the guidance.	An LSRP is a professional who should have knowledge of the entire document. Otherwise, they should hire someone who does.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
General				The document is highly prescriptive in nature, providing minimal flexibility for the exercise of professional judgement	The document provides a generic approach for investigating and mitigating the VI pathway using typical scenarios. The investigator may deviate from this approach based on site-specific issues and proper technical justification.
General				The mitigation section is very prescriptive; especially with regards to O&M calling for significant VI monitoring when elevated contaminant levels are identified in the sub-slab. Long-term VI monitoring is required until the source is gone, regardless of proven effectiveness of the mitigation measure.	The document provides a generic approach for mitigating and monitoring the VI pathway using typical scenarios. The investigator may deviate from this approach based on site-specific issues and proper technical justification.
General				There is a lack of integration with the IEC and other guidance documents, and regulatory basis for same. For example, in Section 3.6.1, a discussion of IEC and receptor Evaluations for VI. You also have to go all the way to Section 7.1.1 to have the first reference for these issues.	Text has been modified.
General				Since screening levels will no longer be included in the document, where will thy be located in the future?	http://www.nj.gov/dep/srp/guidance/vaporintrusion/
General				The early section on data usability needs work, especially given the level of confusion on this topic overall. References and an overview would help. Also Section 4.0 is called Data Usability, but doesn't address QA/QC issues at all. No references. These are the kind of disjointed, "huh?" moments that happen in many points in this draft.	Text has been modified.
General				Looking at references no other guidance documents are included, or regulations. Mismatch between refs cited vs. what's on list. Do we need refs reviewed not cited, to start? There's a lot more out there I would probably consider including then what's here.	Text has been modified.
General				Section 1.4 vs. 3.1.1 both address CSM – in very different ways – and there is no cross-reference between them. Is a CSM required? Document indicates that decision will be based upon one.	Text has been modified.
General				Can the NJDEP provide a VI evaluation form or checklist to make it easier to verify that all requirements of VIG have been considered?	Beyond the scope of this guidance.
General				The document discusses breakdown constituents. A list of breakdown constituents and/or a reference for where this information can be found would help standardize investigations.	The investigator should be able to find this information without expanding this guidance.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
General				The DEP's distribution method for stakeholder review drafts of guidance documents does not reach all stakeholders, namely the public. Please provide a clear description of the guidance development and review process, including timelines for each document on the DEP website. Please also send out a notice with a link to the review draft of each guidance document via the SRRA listserver, to reach additional stakeholders."	This comment has been passed on to the appropriate Departmental managers.
General				Mention is made of an Indoor air sampling form but its location, references and a discussion of its contents is not included.	The Indoor Aor Building Survey and Sampling Form is found in the Appendices and is discussed in Section 3.4.1.
General				**A method is not proposed for sump water sampling.** Suggest something similar *"Sampling of the sump water (if present) will be conducted at each building with an active sump. Active sumps will be those sumps that are equipped with operating pumps and where groundwater enters after standing water is removed at a rate sufficient to yield a sample for analysis within about 10 minutes. A grab sample will be collected in a new clean vial from the sump and will be transferred to three volatile organic analysis (VOA) vials preserved with hydrochloric acid."*	The current wording is sufficient.
General				Are there still going to be the NJDEP TO-15 forms? If so, I would like to proposes some changes.	Beyond the scope of this guidance.
General				It would be helpful to provide online links to the various citations, EPA references, etc. in the main body of the document.	The links are contained in the document where appropriate.
General				Can the DEP provide a definition or regulatory citation for "Professional Judgement"? Does this mean LSRP only or will a PE/PG be sufficient?	The current wording is sufficient.
General				In cases where soil contamination in the unsaturated zone represents a potential source of VI, the use of ground water data and the GWSL alone are not appropriate. The investigator should employ soil gas and/or indoor air samples to assess whether soil contamination is a source of VI. Comment: This paragraph may need additional recommendations or guidance. Diffusion from sources in unsaturated and vadose zone soil is one of the identified VI transport mechanisms in the 2005 VI document. It is assumed that this text addresses the soil diffusion mechanism, but it is not clear under what conditions NJDEP would recommend additional assessment.	At this time, the Department has not developed VI screening levels for soil. Thus, it is left to the professional judgment of the investigator to determine if the presence of soil contamination represents a VI concern.
General				With the document being over 170 pages, it becomes cumbersome to use and the built-in redundancies lead to inconsistencies and confusion. The size of the text and appendices are twice the size of any NJDEP guidance document. The guidance document is also more than twice the size as that of any state, including nearby states NY, PA, ME and MA. It is also more prescriptive than the ITRC guidance document, which is recognized nationally as a leader in developing vapor intrusion practices.	The document has been modified to address this issue.

Response to Comments
Vapor Intrusion Technical (VIT) Guidance

Page	Chap	Sect	Subsec	COMMENTS	Response to Comments
General				The document includes information that is not directly related to vapor intrusion, specifically the Conceptual Site Model, Community Outreach, Receptor Evaluations, and Immediate Environmental Concerns. These sections are addressed in other NJDEP guidance documents and need to be deleted to prevent inconsistencies between guidance documents. The level of detail, language and overall length of the guidance document prevents the LSRP to apply professional judgment consistent with the Site Remediation Reform Act. It also complicates the LSRP's ability to, in a timely manner, remediate the site because it requires the LSRP to implement activities that go beyond what the regulations require. Ultimately, this will increase the cost and timeframes for remediating sites.	The document has been modified to address this issue.
General				Several technical issues within the guidance document are of a concern, including the critical distance criteria which does not have a technical basis, the extremely low vapor screening levels which are not consistent with EPA or other states, the slim distinctions between a vapor concern (VC) and an immediate environmental concern (IEC), and that the screening levels are being used as default remediation standards, which is inconsistent with the process for development of remediation standards, which requires public input. Comments on these items with additional details and references are provided below.	Several of these issues are dictated by technical Rules (VC and IEC). Also, the screening levels are beyond the scope of this document. Finally, the critical distance criteria are in fact consistent with the EPA, ASTM and most state guidance documents.
General				It would be helpful to provide a List of Figures in the document in the Table of Contents area for better access.	The document has been modified to address this issue.
General				It would also be helpful to provide a List of Tables in the document in the Table of Contents area for better access.	The document has been modified to address this issue.