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Section 1 – Introduction				
1		Guidance contains many very specific recommendations, all of which the Department describes as presumptively appropriate. New substantive requirements can only be adopted through regulation.	17	MassDEP has eliminated reference to the guidance as providing "presumptive certainty" of meeting the regulations. Additional text and emphasis has been placed on the guidance as providing recommendations, not requirements. Recommendations that does not correspond to specific regulatory provisions are strictly guidance and not enforceable as regulation.
2	1.3	Figure 1-1: For the question "Is LNAPL/DNAPL present?"—does depth to groundwater matter? Can it be deeper than 15 feet?	5	The criteria described under the 3rd bullet in Section 1.3.3 has been changed to indicate that it can apply to LNAPL at any depth/greater than 15 feet. In addition it has been modified to include LNAPL only. DNAPL may have clean groundwater above it; a better indicator of the potential for vapor intrusion in DNAPL cases is dissolved phase groundwater concentrations.
3	1.3, Figure 1-1	The 10 times GW-2 screening criterion for groundwater within 100 feet of an occupied building seems to be a de facto standard.	8	The Figure is intended as guidance on situations that pose the potential for vapor intrusion and therefore MassDEP would advise parties conducting assessments to take that potential into consideration. Criteria in the Figure that do not correspond with specific regulatory provisions are provided as strictly guidance.
4	1.3	It appears impossible to answer "no" to the question about preferential pathways - all geologic materials have preferential pathways	8	This item is intended to draw attention to large-scale preferential pathways that may allow contaminant to migrate away from impacted areas to receptors, such as utility corridors; it is not intended to include small scale variations in the geologic fabric. There are some large-scale geologic structures/anisotropies (such as bedrock fractures and channel deposits) that may also have to be considered.
5	1.3 and 1.3.3	Figure 1-1 should be modified to acknowledge that this flow diagram only applies to sites with VOCs in the subsurface and discuss types of VOCs… building type…	10, 15, 22	The first paragraph in Section 1 indicates that this guidance is for sites where VOCs have been released to soil and groundwater. The flow diagram and Section 1.3 have been modified to make this clearer.
6	1.3	The following statement in the Draft Guidance should be modified to make it clear that Method 1 Soil Standards were not developed with a consideration of soil as a source of VOCs for the vapor intrusion pathway: "However, Method 1 Soil Standards were not developed with a consideration for the potential vapor intrusion pathway and cannot be used to draw	10	This has been clarified in Section 1.3.2.

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		any conclusions about the potential for indoor air impacts."		
7	1.3	Figure 1-1; The flow chart eliminates the option of a Method 2 Risk Characterization	17	Figure 1-1 is intended to address when the potential for vapor intrusion pathway should be evaluated; it is not intended to preclude subsequent risk characterization. Section 2 outlines HOW the vapor intrusion pathway should be evaluated and includes a discussion regarding Method 2 risk characterization. The title of Figure 1-1 has been changed to "Evaluation of Vapor Intrusion Potential" to clarify that the scope of the flow chart is limited/does not cover subsequent site assessment/risk characterization work.
8	1.3	Figure 1-1: Soil vapor measurements, sub-slab and/or deep (directly above the water table), are oftentimes a much better indicator of the potential for vapor intrusion into a current or future building, versus groundwater concentrations. Both sub-slab soil gas and indoor air data have been collected to demonstrate the validity of modeling if used appropriately with a representative data set. Additional "outs" should be presented in this flowchart to provide the option that if adequate soil vapor data is available to characterize site conditions, then further evaluation of VI may not be required, despite exceedance of GW-2. Indoor air sampling is given the greatest weight of evidence in determining that there is a completed vapor intrusion pathway. Although multiple lines of evidence are to be used, it is not clear how many additional lines of evidence would be required to counter indoor air results, or whether anything can overcome indoor air sampling results.	15	Figure 1-1 is used to determine when to conduct a VI evaluation to determine if there is a pathway of concern, not "how". Typically, when you are first assessing a site you don't have sub-slab soil gas data. The collection of sub-slab soil gas data, and other lines of evidence, is outlined in Section 2 and that Section includes guidance of weighing that evidence against indoor air data and other additional "outs". MassDEP has researched the deep soil gas issue for future buildings in the literature and by following up with commenters that recommended its use and has not been able to find data to support its use at this time. MassDEP is concerned that deep soil gas samples taken at the water table would be subject to the same dilution/soil moisture issues that affect soil gas samples taken adjacent to building foundations.
9	1.3	Figure 1-1: Foundation type: Step 2 implies that a bare dirt floor is a "worst-case" scenario for vapor intrusion. Again, while this may be the case for chlorinated hydrocarbons that are relatively recalcitrant to biodegradation, it is not the case for petroleum hydrocarbons, which are readily degradable under oxygen-rich conditions.	22	MassDEP recognizes that petroleum compounds readily biodegrade as they migrate upwards through the vadose zone, and this has been taken into consideration when developing the GW-2 Standards. The GW-2 standards for petroleum compounds are typically 2 to 3 orders of magnitude greater than the GW-2 Standards for chlorinated solvents. Concrete slabs in basements will retard the migration of both petroleum and chlorinated

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				solvent derived vapors and without a slab the subsurface vapors can discharge directly into the basement.
10	1.3.1 and 4.7.2	Page 7: MassDEP has not provided the concentrations of VOCs in soil that are "categorically" considered to be a significant source of vapors to indoor air. Does not discuss contaminated soil with respect to Future Buildings (Is MassDEP not concerned about impacted soil?).	2, 15	MassDEP looked at incorporating the potential for vapor intrusion into the setting of its Method 1 soil standards and found that it would have resulted in impractically low standards below the current S-1 concentrations. Therefore, these values were not calculated. This is stated in the guidance document. The potential concern for VOCs in soil with respect to future buildings has been added to the discussion in Section 4 and the related Future Building appendix.
11	1.3.1	“If soil contamination is present within 30 feet of an occupied structure, MassDEP recommends using additional lines of evidence including sampling of groundwater and soil gas to evaluate the potential for the vapor intrusion pathway”. Is the “soil contamination” referred to in this sentence equivalent to the VOC contamination discussed in the previous paragraph (i.e., any detected compound in a USEPA Method 8260B), or is it “Contaminated Soil” as defined in the MCP (i.e., soil containing a Reportable Concentration of one or more oils and/or hazardous materials)?	8	It is not based on Reporting Concentrations. The regulations cite "…if one or more Volatile Organic Compounds is present…"
12	1.3.1	In the 3rd paragraph the last sentence reads “….MassDEP recommends using additional lines of evidence including sampling of groundwater and soil gas to evaluate the potential for a vapor intrusion pathway.” Does this refer to any type of soil gas or specifically sub-slab soil gas? Would active soil gas sampling outside the building footprint be sufficient if the sample was collected within the defined parameters set forth in 310 CMR 40.0942(1)(d) (six feet horizontal and 10 feet vertical from a building)?	9	As discussed in Section 2, MassDEP does not consider soil gas outside the footprint of the building to be a valid Line of Evidence for vapor intrusion potential. It may be useful in defining nature and extent of soil contamination. In this case soil gas sampling is being used to determine if the soil is impacted.

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13	1.3.1	MassDEP's recommendation to sample groundwater and soil gas to evaluate the potential for vapor intrusion when soil contamination is present within 30 feet of an occupied structure is inconsistent with the regulatory requirement of the MCP (310 CMR 40.0942(1)(d)), which considers VOC impacts to soil when such impacts are located within six feet horizontally or 10 feet vertically of an occupied structure. The Guidance should be modified to be consistent with the MCP or at a minimum should be revised to allow room for LSPs to use professional judgment in evaluating VOC impacts to soil. Does this mean ANY detected VOC concentration? What is the scientific basis for this requirement? As stated in the guidance, any detections of VOCs within close proximity to a building, regardless of concentration, require assessment of multiple lines of evidence to evaluate the vapor intrusion pathway. The multiple lines of evidence evaluation, in turn, necessitates sub-slab soil gas sampling. As written, the guidance implies that a Site with a soil sample that is within 6 feet of a building that has as little as a few micrograms per kilogram of a relatively non-toxic substance such as methyl ethyl ketone would trigger the need for sub-slab soil gas sampling. We think it is critical for MassDEP to put some bounds on this and to develop soil screening levels.	10, 14, 15	This section (now 1.3.2) states that the regulatory distances identified in 310 CMR 40.0942(1)(d) represent the minimum requirements for the evaluation of the vapor intrusion pathway. The presence of contaminated soil or soil gas at distances beyond the 40.0942(1)(d) criteria may indicate the need for additional characterization, depending on concentrations found, and gradients of concern, and the possible presence of preferential migration pathways. The guidance *recommends* considering the potential for vapor intrusion if soil contamination is present within 30 feet of an occupied structure, using additional lines of evidence including sampling of groundwater and soil gas to evaluate the potential for a vapor intrusion pathway." This recommendation is based on MassDEP's experience with soil contamination vapor intrusion sites and guidance from other national guidances. Further, in any case when you are investigating the presence of VOC contamination in soil, you are required to delineate the nature and extent of the contamination. Professional judgment should be used and supported in all cases.
14	1.3.2	Pages 7-8: With respect to the Method 1 GW-2 standards, the Guidance states that "they apply when groundwater is the only source of contamination to indoor air." This is inconsistent with the MCP since the MCP does not make this statement. The Guidance makes reference to (310 CMR 40.0942(1)(b)); however, this is an overly broad and improper interpretation since this section of the MCP refers to impacts to other environmental media in addition to soil or groundwater such that a Method 1 evaluation alone cannot be used.	2	If the soil within the distance cited in 310 CMR 40.0942(1)(d) is impacted with VOCs and the concentration of VOCs in the groundwater near the building is less than the GW-2 Standards, the vapor intrusion pathway would still have to be evaluated.
15	1.3.2	Page 7: The GW-2 Standards now embodied in the MCP do not consistently reflect the Department's current knowledge regarding OHM with GW-2 Standards. PCE is a good example.	19	MassDEP does not anticipate changing the GW-2 Standards in the foreseeable future. The application of the GW-2 standards, and adequate assessment and mitigation of the vapor intrusion

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		While the current 50 ug/l GW-2 PCE Standard is based on a background air concentration of 11 ug/m3, the Department's most recent publication on background concentrations suggest that a value between 2 and 3 ug/m3 is actually more accurate. Does this mean that there is a reasonable likelihood that the GW-2 Standards for PCE may be reduced at some point in the not too distant future? If so, how might that change impact the RAOs that are now considered acceptable? Will there be another round of audits targeting PCE sites whose closures are not consistent with the future GW-2 Standards?		pathway in a manner consistent with the MCP and up- to-date best practice will result in protective cleanups. MassDEP's guidance is directed at supporting the achievement of such cleanups.
16	1.3.2	The guidance should be clear on what constitutes a VOC source in groundwater so that residual and "dissolved-phase only" sources are well differentiated. The potential for vapor intrusion is very different depending on the VOC source type. Further, there is only a need to focus on benzene at "dissolved-phase only" sources (i.e., it is the primary risk driver of the soluble petroleum fraction … if other TPH is observed, then it is not a "dissolved-phase only" source).	22	The text has been modified to clarify this issue.
17	1.3.2	The most representative time period can be selected for comparison to GW-2 standards, provided the data selected represents seasonal and other time-related variability." Comment: What does "most representative time period" mean? Is MassDEP suggesting that you cannot average temporally for this comparison? Given that this is a screening evaluation, averaging groundwater concentrations detected in different monitoring wells is not recommended at potential vapor intrusion sites." Does the DEP ever recommend averaging groundwater concentrations in different monitoring wells?	14, 39	The use of averaging is discussed with respect to interpreting lines of evidence and establishing Exposure Point Concentrations in Section 2. Averaging should not be employed when determining whether or not a VI evaluation should be conducted. The text has been clarified.
18	1.3.2	The guidance focuses too heavily on the assumption that groundwater concentrations > GW-2 will lead to a completed vapor intrusion pathway, versus just a potential vapor intrusion pathway, and does not consider whether the soils or slabs above the potential groundwater source are being impacted or are providing sufficient attenuation. Wording in last sentence	15	Section 1 is intended to indicate when the Vapor Intrusion Pathway should be *evaluated;* it is not for conclusions that vapor intrusion pathway is complete. This distinction has been further emphasized in the text and Figure 1-1. An exceedance of the GW-2 does not mean that a complete VI pathway exists, it means you should evaluate the VI pathway. Part of that evaluation could

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		should be edited to match the wording in the regulatory citation to be more precise. Change to "If OHM has actually…, then Method 1 alone (including the GW-2 distance criteria) shall not be used to characterize the risk (310 CMR….")		include an assessment of subsurface soil, the slab, etc. The citation in the draft does track the regulation at 40.0942(1)(b) which states: If OHM…"is present in, or is likely to migrate at potentially significant concentrations.."
19	1.3.2	VOCs in groundwater: In para. 5, it states "…data from existing sites has shown that high contaminant concentrations in groundwater beyond the GW-2 distances may act as a source for indoor air contamination". This is misleading based on the results of the soil-gas database evaluations by Davis (2006) and Davis (2009), which indicate that LNAPL could be present at a depth of 15' below ground surface and still not be an issue for vapor intrusion.	22	This section does not conclude that any of these conditions have resulted or will result in vapor intrusion. This section states that the pathway should be evaluated when these conditions exist. LNAPL present at depths of 15' could result in a vapor intrusion problem and that potential should be further evaluated.
20	1.3.2	The 100 foot radius criterion will stigmatize properties and affect property values. "The impact of this policy on property values and potential for blight in urban areas is not addressed anywhere within this policy.	8	The 100 foot radius criterion is guidance not regulation. It is a potential flag for further investigation; adequate investigation of potential for vapor intrusion should have a positive impact on property values.
21	1.3.2	How will the 100 foot radius criterion affect DPS Opinions where OHM has not been detected in soil or groundwater, but where OHM has been detected in indoor air or soil gas?	8	Figure 1-1 and 100 foot criterion has no bearing on the DPS requirements; the 100 ft criterion is not regulatory. It is a potential consideration for further investigation; it does not indicate a confirmed pathway.
22	1.3.3	"Volatile" light or dense non-aqueous phase liquid should be defined. The definition of a "volatile" NAPL would seem to be readily apparent in some cases (e.g. gasoline, tetrachloroethene), but less obvious in other cases (i.e. LNAPL from a motor oil or fuel oil release).	10	An assessment to evaluate the potential for vapor intrusion would take into consideration the type of NAPL.
23	1.3.3	Preferential Pathways: Preferential pathways will tend to play a limited role in enhancing the potential for vapor intrusion unless a) they intersect a plume of groundwater contamination and a building foundation, they have cracks, joints or openings to groundwater, and the building has inadequate drains (pea traps), or b) the building foundation overlies fractures that directly connect to the source to the crack in the building foundation (which is highly unlikely). Preferential pathways will not play a significant role if simply located between the source and the building foundation.	22	These issues would be considered as part of the vapor intrusion evaluation and disposal site Conceptual Site Model.

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24	1.3	The use of odors attributable to groundwater and/or soil contaminants is subjective and this box should be combined with the second box. Need to consider confounders - products used in the property Use building survey as part of assessment Sub-slab soil gas should be used...	8, 37	This flow chart, and Section 1 indicate when a Vapor Intrusion assessment should be conducted… Part of that assessment could be the identification of confounders that might rule out VI as the source of odors.
25	1.3 and 1.3.3	Figure 1-1 would also require the pursuit of multiple lines of evidence if LNAPL or DNAPL is present within 30 (presumably horizontal) feet of an occupied building, apparently irrespective of depth. This two-dimensional approach may not be unreasonable for LNAPL, but for DNAPL located below the water table, the migration into soil gas and then into indoor air would only be through groundwater. Thus, if DNAPL is present, it would only be a concern if the concentrations in the overlying groundwater were significant. We suggest that Figure 1-1 (and the corresponding text) be modified: to include a comparison to standards early in the flow chart, and to indicate that if the standards are not exceeded, then the potential vapor intrusion pathway may be considered incomplete; and to limit the reference to VOCs in the vadose zone to LNAPL. In addition there is no technical basis for the 30 ft off-set for NAPL, what is meant by NAPL.	8, 12, 14, 15, 22, 41	Figure 1-1 and text has been modified consistent with the suggestions. The 30 ft distance for LNAPL comes from earlier MassDEP guidance (Q&A January 2001). It is related to a concern that the LNAPL may be acting as a separate source (separate from dissolved phase groundwater concentrations) for vapor intrusion.
26	1.3.2	Pages 7-8: The statement “In cases where a monitoring well has not been or cannot be installed within 30 feet of a building, the groundwater concentrations of VOCs from the nearest monitoring wells should be used for comparison to the GW-2 Standards to evaluate the need for further evaluation of the vapor intrusion pathway” should be clarified with regard to the relative location of the source, receptors, and monitoring well(s). This paragraph implies that the nearest well, regardless of its distance (for example, as much as 500 feet) to a structure should be used to make a GW-2 comparison in the absence of closer wells. Constituent concentrations in wells beyond a certain distance from a structure provide no information whatsoever about the conditions beneath or in the structure. It is the responsibility of the LSP to adequately characterize the site and use the available information to assess whether or not	8, 15, 23, 39	The text has been modified to indicate In cases where a monitoring well has not been or cannot be installed within 30 feet of a building, the extent of groundwater where concentrations of VOCs exceed the GW-2 Standards can be extrapolated from an understanding of the source area, groundwater flow direction and the groundwater quality from the monitoring wells in the vicinity of the building and structures of concern. As the assessment of the extent of GW-2 exceedance is developed, concentrations from the nearest monitoring wells should be used for comparison to the GW-2 Standards to evaluate the need for further evaluation of the vapor intrusion pathway.

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		known groundwater contamination has the potential to affect the indoor air of occupied buildings. We recommend that this section be deleted or replaced with a recommendation that calls on the LSP to use his or her judgment. Depending on the distance of this nearby well from the building, perhaps a distance-dependent portion of the GW-2 standard should be used as a comparison value. If placement of a monitoring is not impossible, it should be required that such a well be installed, rather than using a close-by well.		
27	1.3.2	Averaging – It appears that averaging has been precluded as a way to establish most Exposure Point Concentrations (EPCs). The LSP should have the flexibility to use the most appropriate method for estimating EPCs (within the limits established under the MCP and the Risk Assessment Guidance) including averaging results of samples from the same location over time only when groundwater concentrations are not increasing, and an adequate number of samples is used in averaging. This restriction seems to extend the requirement for a minimum of 4 seasonal data point to a potentially infinite number of samples. It should be stated that 4 samples should be sufficient in averaging. These should all be considered when determining the number of samples and sample collection times. Four samples are generally collected to calculate an annual average. To discern or rule out a long-term trend, samples should be compared over a period of several years.	12, 14, 41	Averaging with respect to Figure 1-1 is more limited because this is a screening tool to flag potential issues and by design is more inclusive. It is not intended in any way to limit averaging conducted as part of risk characterization. This has been clarified in Section 2 and reflects the flexibility and limits established by the MCP and the *Guidance for Disposal Site Risk Characterization*.

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28	1.3	Even at sites where the Method 1 GW-2 Standards don't apply, the possibility of VI must be evaluated through multiple lines of evidence if the VOCs >10X the GW-2 within 100 feet of occupied building. It appears as if the guidance is establishing a new Method 1 Category and Standards, or where low concentrations exist and there is an earthen floor, etc., does groundwater flow direction come into play, needs clarification. Many comments RE: the metrics (100 ft, 10X GW-2, etc in this figure). If DEP desires to redefine the GW-2 definition then that should be done by regulation and not through guidance. The GW-2 standard was derived to provide protective criteria assuming contamination beneath the building and within a 30-foot radius around the building. In addition, when DEP is considering VOCs in groundwater distant from a building, the direction of groundwater flow must be taken into consideration. If constituent concentrations are not greater than GW-2 standards within 30 feet of a building, or if they exceed GW-2 standards at a location that is not upgradient from the structure, then the proposed criteria should not apply. Needs more guidance...	8,12,14,15,17, 29,36, 39, 42	DEP is not trying to establish new standards. This section is attempting to identify situations where the indoor air may be impacted that are outside the GW-2 criteria. Metrics that are not specifically based on an MCP provisions are recommendations based on the MassDEP's work on Vapor Intrusion Sites and the review of many other references. MassDEP does not intend to apply these metrics as regulation; they are strictly guidance. LSPs should use their professional judgment in applying these metrics or employing alternative approaches. Moving forward, as the program gains more experience with vapor intrusion assessments that use these metrics a data set may be established that better defines these conditions and metrics. Such a data set may also help to determine to what extent metrics of this kind should be incorporated into regulation.
29	2.0	The ability for LSPs to use their professional judgment should be given more weight in vapor intrusion evaluations.	17	The guidance presents both MCP requirements related to vapor intrusion and MassDEP recommendations. Recommendations that are not backed by specific regulation are not requirements; these recommendations should be considered in conjunction with professional judgment of LSPs when assessing the VI pathway.
30	2.0	It is important for the Agency consider new information regarding the biodegradation of petroleum compounds.	22	The guidance addresses biodegradation of petroleum compounds throughout the vadose zone by using GW-2 standards that incorporate a biodegradation component. Biodegradation is discussed in this section.
31	2.1	The recommendation that sub-slab soil gas be sampled prior to indoor air sampling contradicts the concurrent sampling recommended in Section 2.3.3.	17	The apparent contradiction has been clarified.
32	2.1	It is unclear how one can predict an Imminent Hazard without indoor air data and incomplete subsurface information. We recommend that this concept be explained further or deleted.	17	The text was not intended to imply a prediction, but rather to emphasize that where limited data indicate concentrations could pose an IH, expedited sampling is needed. The statement has been

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				clarified. Guidance has been revised to indicate that indoor air data is needed to identify Imminent Hazard Conditions.
33	2.2	Clarify the term "planned to be occupied". A vacant building should not qualify as "planned to be occupied" if it is merely habitable.	17	The term has been clarified as "where there are specific plans for occupation."
34	2.2.1	Is soil gas outside the building footprint considered as an accepted line of evidence?	9	The guidance states that MassDEP recommends use of soil gas data obtained outside the building footprint as a line of evidence only when it is impractical to obtain soil gas samples directly under the slab.
35	2.2.1	Increase the number of lines of evidence. Specific additions suggested.	10, 15, 17	MassDEP considers the specific additions suggested (e.g. building characteristics, contaminant concentration gradients, soil type etc.) to be factors that may affect vapor intrusion rather than specific lines of evidence for a complete pathway. The degree to which the recommended additions influence vapor intrusion is not as well established as the lines of evidence emphasized in Section 2. The guidance has been clarified.
36	2.2.1	Section assumes that indoor air contamination is present and the issue is determining whether the contamination is due to vapor intrusion or not. Revised text suggested.	17	Text has been revised consistent with suggested text.
37	2.2.1	Change "sub-slab soil gas" to the EPA term "sub-slab gas" to differentiate it from "soil gas" (collected exterior to a building.)	17	MassDEP considers the term "sub-slab soil gas" to be more descriptive.
38	2.2.1	LNAPL will not be an issue for VI unless the water table is in direct contact with the building foundation.	22	LNAPL can enter indoor air via intermediate transfer through soil gas.
39	2.2.1	A preferential pathway should intersect a plume in groundwater in order to be considered evidence for vapor intrusion.	22	A preferential pathway in a building that intersects any contaminated subsurface medium (soil and/or soil gas) would also be a valid line of evidence.
40	2.2.1	Provide an "exclusion distance" for LNAPL. LNAPL beyond the "exclusion distance" would not be considered a line of evidence for vapor intrusion.	22	This section (now Section 2.2) simply presents a list of Lines of Evidence. Section 1 provides more detail on when LNAPL would be of potential concern; specifically, it includes a recommendation regarding distance from contamination to building that also applies to LNAPL.
41	2.2.1	The Conceptual Site Models for petroleum sites are different than those for cVOC sites, primarily due to differences in the biodegradation, risks, and confounding background sources. The guidance does not take this into account.	22	The different properties between cVOCs and petroleum compounds are already reflected GW-2 standards (biodegradation), dose-response values (risks), Typical Indoor Air Concentrations, and Threshold Values (risks and background sources). The guidance discusses biodegradation for petroleum-

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				related compounds as distinguishing them from other VOCs.
42	2.2.2	The guidance takes a skeptical stance against modeling but then recommends it at locations with confounding indoor sources and uses it to develop the Method 1 GW-2 standards. The commenters disagree with this skeptical stance, noting that MCP, per CMR 40.0926(6), states that EPCs may be developed through the use of fate and transport models. (12, 15, 17, 22)	10, 12, 15, 17, 22	The guidance provides recommendations for when it is appropriate to use modeling. Different types of modeling are appropriate for different situations and how it can be performed in a way that fulfills the requirement that an EPC must represent a conservative estimate of the average concentration contacted by the receptor (310 CMR 40.0926(3)). The guidance has been revised to better reflect MassDEP's position on different models and when it appropriate to use them.
43	2.2.2	The Guidance should acknowledge the value of modeling from subslab and/or deep soil vapor data in the process of vapor intrusion evaluations and site closure.	14, 15, 17	The guidance employs an empirical model for use with soil gas data – the Soil Gas Screening Values. MassDEP has researched the use of deep soil gas in the literature and by following up with commenters that recommended its use and has not been able to find data to support its use at this time. MassDEP is concerned that deep soil gas samples taken at the water table would be subject to the same dilution/soil moisture issues that affect soil gas samples taken adjacent to building foundations.
44	2.2.2	The "long-standing guidance" of MassDEP should be provided with some references to where this guidance is found.	15	That statement refers to guidance in the *Guidance on Disposal Site Risk Characterization* (1995), *Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach* (2002), as well as MCP Q&As and training. The guidance has been revised accordingly.
45	2.2.3	Revise to reflect the fact that DNAPL may be a source of groundwater contamination (as opposed to indoor air, as stated by the text) which could, in turn, be a source of indoor air contamination.	15	The guidance has been revised accordingly
46	2.2.3	Swap sections 2.2.3.2 and 2.2.3.3 to reflect an iterative approach that proceeds from groundwater to soil gas to indoor air.	15	The order of these sections is not intended to imply any of order of investigation is intended.
47	2.2.3.2	The commenter supports the development of threshold values that are specific to exposures in commercial/industrial buildings and are separate from those derived for residential properties.	8	MassDEP has developed commercial/industrial Threshold Values based on commercial/industrial exposure (see Appendix II).
48	2.2.3.2	The Guidance needs to provide suggested protocols (including modeling if appropriate) to separate MCP from non-MCP regulated concentrations, especially commercial/industrial operations with confounding sources.	12	Refer to Section 2 discussion on using subslab soil gas in conjunction with dilution factor.

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49	2.2.3.2	Two rounds, especially if both in winter, can be adequate for VI assessment. Suggest replacing "several rounds" with "at least three rounds over at least one year, with at least one round during the heating season."	15, 17	The text has been revised to recommend multiple rounds of indoor air sampling to address temporal variability with at least one round taken in the winter, unless the Conceptual Site Model indicates that another time of year is the likely worst case (e.g., high groundwater table in the Spring): • For daycares, schools, and residences, MassDEP recommends at least two to four rounds depending of the degree of subsurface contamination. • For commercial and industrial buildings, MassDEP recommends two rounds obtained in different seasons.
50	2.2.3.2	Low indoor air concentrations provide a line of evidence against vapor intrusion even if the sub-slab concentrations are high.	17	This concept is incorporated into the "Interpreting Lines of Evidence" Tables 2-1 and 2-2.
51	2.2.3.2	Add text noting that basement/first floor comparisons are useful.	17	The text has been revised to note that higher concentrations of COCs in a basement compared to the first floor may be indicative of VI. Conversely, higher concentrations of COCs on the upper levels compared to the first floor/basement may be indicative of an indoor air source.
52	2.2.3.2	Contaminants detected in indoor air but not in the subsurface should not indicate vapor intrusion.	17	The assessment section of the guidance, including the lines of evidence discussion and Tables, reflects this concept.
53	2.2.3.2	Remove the "greatest weight" presumption from indoor air data in industrial/commercial settings.	15, 24	This language has been modified to indicate that indoor air data provides the most direct measurement of the vapor intrusion pathway. The Lines of Evidence section provides additional detail on weighing data.
54	2.2.3.2	OSHA already governs workplace exposure. MassDEP should not set more stringent standards.	24	OSHA addresses workplace exposure from commercial/industrial operations; it does not address exposures from disposal sites that have impacted indoor air. MassDEP is required to regulate risks associated with disposal sites including site-related contamination that has migrated into workplace indoor air.
55	2.2.3.3	For petroleum releases, the Method 2 Approach to Demonstrating 'No Impact' to Indoor Air, as summarized in the VPH/EPH Guidance, should remain valid. Specifically, the use of a PID to screen soil vapor points should remain a valid tool.	15	Total organic vapor measurements, while useful as a screening tool to potentially locate preferential pathways (as described in Appendix III) are not sufficiently chemical-specific to assess VI with an appropriate degree of confidence.
56	2.2.3.3	An interior source could cause high contaminant concentrations in indoor air compared to soil vapor concentrations. A detailed survey of the structure needs to be done to assess whether the indoor air concentrations are coming from an indoor source.	17	This issue is addressed in Section 2 as well as in Appendix III.

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57	2.2.3.3	The source of the generic sub-slab soil gas to indoor air dilution factor of 50 appears incorrect.	17	The reference has been changed. MassDEP is recommending use of a soil gas to indoor air dilution factor of 70.This generic dilution factor corresponds to the inverse of the 80th percentile of the sub-slab soil gas attenuation factors in the USEPA database (Figure 11, "USEPA Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors," Office of Soil Waste, Draft, March 4, 2008.
58	2.2.3.3	It should be noted that the EPA document referenced is in draft form.	17	The text has been revised accordingly.
59	2.2.3.3	The relationship between the 2002 VPH/EPH guidance and this Vapor Intrusion Guidance should be further clarified.	17	This document, once finalized, will supersede earlier guidance documents, including the VPH/EPH document ; earlier guidance documents will be revised accordingly.
60	2.2.3.3	The commenter recommends using the 75th percentile attenuation factor of 100 for use in VI assessments.	17	MassDEP is recommending use of a soil gas to indoor air dilution factor of 70.This generic dilution factor corresponds to the inverse of the 80th percentile of the sub-slab soil gas attenuation factors in the USEPA database (Figure 11, "USEPA Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors," Office of Soil Waste, Draft, March 4, 2008.
61	2.2.3.3	Statistically speaking, the percentile attenuation factor should be consistent with the Typical Indoor Air Concentration (TIAC) guidance.	17	TIACS and sub-slab soil gas attenuation factors serve different purposes and warrant different levels of conservatism. TIACs represent levels that are typically found in residences. TIACs are employed in establishing Threshold Values (TVs), to screen out buildings that are consistent with typical indoor air concentrations. The sub-slab attenuation factor is used to estimate if a vapor intrusion pathway is complete once you've established the presence of VOCs beneath the building slab. MassDEP uses a more conservative approach with the attenuation factor in order to minimize screening out buildings where the vapor intrusion pathway is actually complete.
62	2.2.3.3	Excluding benzene from the 1,000-fold attenuation factor means that the attenuation factor will likely be 50 for all gasoline sites, because the presence of benzene would drive the evaluation. Benzene should be treated similarly to the other gasoline-associated compounds.	17	MassDEP has not found evidence to support a different soil gas attenuation factor for petroleum and CVOCs. MassDEP is proposing, therefore, to use a soil gas to indoor air dilution factor of 70 for all contaminants; this is a change from the December 2010 where a dilution factor of 1000 was proposed for C5-C8 aliphatics, C9 – C12 aliphatics, C9 – C18 aliphatics, C9-C10 aromatics, toluene, ethylbenzene, and xylenes.
63	2.2.3.3	Commenter recommends against using sub-slab soil-gas data	22	The section discusses use of using sub-slab soil gas data for

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		for risk assessment.		assessing the potential for vapor intrusion, not for risk characterization. This distinction has been emphasized.
64	2.2.3.3	For sub-slab soil gas to indoor air attenuation, the document distinguishes between cVOC and petroleum compounds. Justify this distinction or treat the two groups the same.	12, 23	MassDEP has not found evidence to support a different soil gas attenuation factor for petroleum and CVOCs. MassDEP is proposing therefore, to use a soil gas to indoor air dilution factor of 70 for all contaminants; this is a change from the December 2010 where a dilution factor of 1000 was proposed for C5-C8 aliphatics, C9 – C12 aliphatics, C9 – C18 aliphatics, C9-C10 aromatics, toluene, ethylbenzene, and xylenes.
66	2.2.3.4	Removal of all potential indoor sources of contamination is a burden to homeowners.	8	Removal of household products that contain COCs is recommended to reduce the potential for measuring VOCs from indoor sources that may in turn require additional evaluation to confirm that the VOCs are not the result of vapor intrusion. Such additional evaluation also puts a burden on homeowners. MassDEP will revise text to specify only items that potentially contain site-related chemicals be removed from the building to the extent practical.
67	2.2.3.4	Burning candles or gel chafing fuel (Sterno) should be avoided and all dry cleaned clothing should be removed from the residence prior to sampling.	8	MassDEP agrees, but they only need to be removed if they contain chemicals associated with the site (e.g. COCs).
68	2.2.3.4	The recommendation for "low-level" canisters may almost double the cost of analysis.	8	When lower detection limits than typically provided by the laboratory are needed, Selected Ion Monitoring can be requested, the additional cost of which is low.
69	2.2.3.4	Soil gas contaminant data take the presence of LNAPL and DNAPL into account because soil gas data reflects vapor emissions from all subsurface sources, NAPL included.	14, 22	The text has been revised accordingly.
70	2.2.3.4	This section should be expanded to discuss the influence of commonly used products and building materials on the indoor air in commercial and industrial buildings as well.	17	The text has been amended accordingly. It also notes that materials used in building construction and other products can contain COCs.
71	2.2.3.2	Stating that the Residential TVs "help in the identification of concentrations that are likely the result of indoor sources in residential settings" is misleading because TVs reflect not only TIACs but also risk and lab detection considerations. References to the TVs in this regard should be removed.	17	The text has been revised accordingly to reflect that TVs do not strictly reflect "background" concentrations; the description of TVs has been expanded to explain the use of risk and lab detection considerations.
72	2.2.3.2	The importance of sub-slab soil gas data is understated. Sub-slab soil gas samples could provide valuable information in	17	The presence of NAPL under or near a building represents a strong potential for VI. Given the variability in, and the difficulty of fully

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		evaluating the potential impact of NAPL on indoor air before indoor air sampling is performed.		characterizing subslab soil gas, it is recommended that both indoor air and subslab soil gas concurrently in order provide an additional line of evidence at sites with NAPL under or near a building.
73	2.2.4	Discuss application of a CSM to data gap analysis, investigation planning and data analysis.	10	Text has been added to discuss the application of the CSM to planning, data gaps and consistency with CSM.
74	2.2.4	Guidance should recommend sampling subsurface prior to sampling indoor air.	15, 22, 24	The guidance does provide recommendations for when sub-slab results can be used to rule out the need for indoor air sampling. While sub-slab soil gas data is an important component in evaluating VI, it can be variable. Building-specific assessment of the vapor intrusion pathway in many cases warrants multiple lines of evidence, including indoor air samples.
75	2.2.4	Use of a 2x GW-2 screen is not sufficiently conservative.	16	MassDEP considers this approach to be sufficiently conservative because the screen is not based solely upon contaminant levels in groundwater being below 2x GW-2, but is coupled with the additional line of evidence of low sub-slab soil gas levels (i.e., <70x TV). Taken together, these conditions present little potential for significant vapor intrusion.
76	2.2.4	Use of a 2x GW-2 factor is overly conservative, citing examples of actual Method 2 evaluations that suggest it should be higher.	2, 15	MassDEP does not consider this approach to be overly conservative as a screening factor because it is designed to cover a wide range of site conditions. If the soil gas concentrations do not meet the screening criteria, site-specific indoor air testing can still be performed to rule out the pathway.
77	2.2.4	What is the technical justification for use of the multiples of GW-2 standards for screening purposes?	5, 8, 12, 17	The goal of this screening value was to not recommend testing of indoor air at every site where groundwater contaminant concentrations were slightly above GW-2 standard. Instead, an additional line of evidence (i.e., soil gas concentrations) can be used to rule out the pathway without the need to test indoor air.
78	2.2.4	Deep soil gas should be included as a line of evidence for the current and future vapor intrusion pathways.	2, 14, 15, 17	MassDEP has researched the deep soil gas issue for future buildings in the literature and by following up with commenters that recommended its use and has not been able to find data to support its use at this time. MassDEP is concerned that deep soil gas samples taken at the water table would be subject to the same dilution/soil moisture issues that affect soil gas samples taken adjacent to building foundations.
79	2.2.4	For the comparison of subslab soil gas concentrations to threshold values, may average values be used or is it restricted	5	The highest sub-slab result should be used for comparison.

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		to a point-by-point comparison?		
80	2.2.4	If you screen against commercial/industrial soil gas screening levels and determine a VI pathway is incomplete, would you need an AUL?	5	Soil gas screening values for commercial/industrial uses are not protective of residential use. Therefore, the pathway must be evaluated under residential use unless an AUL is used to rule it out.
81	2.2.4	Does any deviation from the listed matrix require indoor air sampling? Spell out all scenarios.	9	The matrices are a tool for weighing lines of evidence and do not dictate when indoor air must be sampled. The matrices apply to scenarios under which the potential for VI has already been established per Section 1 and Figure 1-1.
82	2.2.4	Commenters state that the guidance overly discourages temporal and spatial averaging.	11, 15, 17	Consistent with 310 CMR 40.0926 and MassDEP's Guidance for Disposal Site Risk Characterization (July, 1995), indoor air sample results from a given location may be averaged there is sufficient data (consistent and representative) to support such averaging as a conservative estimate of the average exposure. EPCs must provide a conservative estimate of the exposure to the site-related compounds per 310 CMR 40.0920. Otherwise, pursuant to 310 CMR 40.0926(3)(a), when data is variable or limited, a maximum value should be used to develop an EPC. This approach is also applicable to soil vapor data. The guidance has been revised to more closely reflect the regulatory provisions on averaging.
83	2.2.4	50X dilution factor too conservative for commercial industrial buildings.	12	There is not sufficient data to support a differentiation between vapor intrusion into commercial buildings and residential buildings. However, differences between residential exposure and commercial exposure are reflected in the different TVs and accounted for in risk assessment exposure assumptions. (Note: the dilution factor has been changed to 70 in the Interim Final Guidance).
84	2.2.4	It is not appropriate to notify for a condition of SRM when the vapor intrusion exposure pathway is "possible". Revise Tables 2-1 and 2-2 to indicate "additional evaluation" when a current pathway is "possible".	14	The table has been revised accordingly.
85	2.2.4	In Table 2-1, the box that indicates "yes" to a SRM when the pathway has been identified as "possibly" should be modified to recommend the collection of additional data.	14	The table has been revised accordingly.
86	2.2.4	The last row in Tables 2-1 and 2-2 is asking a question of whether there is SRM Notification, not if you should sample.	15	The table has been revised accordingly. The table indicates that if either groundwater or subslab soil gas contaminant concentrations

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		There is often the case that you would do soil gas sampling before proceeding to indoor air sampling as suggested.		are elevated, an additional line of evidence is needed.
87	2.2.4	Indoor air sampling in the industrial/commercial scenario should be considered a single, but not necessarily the primary, Line of Evidence for assessing potential vapor intrusion.	15	Determining whether or not the VI pathway is complete uses the same methodology from building to building, regardless of who occupies the structure. While indoor air data is the most direct line of evidence, it must be considered along with other lines of evidence, including use of COC-containing products in both residential and commercial/industrial buildings.
88	2.2.4	Page16, Table 2-1, 5th column, 7th row. Change "Likely" to "Possibly" and in next row/same column change "Sample Indoor Air" to "No". It is too conservative as stated.	15	The boxes have been modified for clarity based on other comments. If either groundwater or sub-slab soil gas contaminant concentrations are elevated, an additional line of evidence is needed to rule out SRM.
89	2.2.4	CEP assessments should not extend to institutional uses, such as assisted living facilities or dormitories on college campuses.	15, 17	Assisted living facilities and dormitories are considered residences and therefore are considered when assessing CEP; CEP would not apply to transient living quarters, such as hospitals or hotels.
90	2.2.4	The attenuation factor that DEP is using to derive a GW-2 standard for PCE is essentially the 99.99th percentile value from EPA's database. We do not see a valid scientific or health based reason to use such a conservative value here.	17	The guidance cannot change the GW-2 standard. This would require a regulation change.
91	2.2.4	The guidance does not define the term "location."	17	The text has been revised to insert "sampling" to qualify location.
92	2.2.4	Tables 2-1 and 2-2 provide criteria for "groundwater contaminant levels," but the proposed Guidance does not state the location of these groundwater levels relative to the building at issue.	17	Text has been revised accordingly under the Groundwater subsection to indicate that groundwater data used as a line of evidence for vapor intrusion should provide a conservative indication of contaminant levels under or in the immediate vicinity of the building of interest.
93	2.2.4	Indoor air measurements are not the most direct lines of evidence for petroleum compounds due to the prevalence of background sources.	22	Indoor air is the most direct line of evidence, but it may be subject to confounding sources of indoor air contamination that are present and cannot be removed during sampling; these sources should be considered when interpreting the indoor air data.
94	2.2.4	Threshold Values would be inappropriate if applied to gasoline filling stations.	22	Threshold Values for commercial/industrial sites like gasoline filling stations are risk based using commercial/industrial exposure assumptions. Consideration of outdoor air results would likely be necessary in evaluating or ruling out vapor intrusion at such facilities. Guidance on assessing vapor intrusion at sites where ongoing commercial operations use site COCs is presented in Section 2.

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95	2.2.4	Page 16, Tables 2-1 and 2-2 - The absence of indoor air sampling should be treated more conservatively and be associated with a "possibly," not "unlikely", current pathway category.	23	MassDEP considers this conservative because relatively low contaminant concentrations in groundwater and subslab soil gas are sufficient lines of evidence to rule out a current pathway; low soil gas would be consistent with the CSM.
96	2.3	Testing for all target analytes should not be recommended once the COCs have been identified.	14	The text has been revised to indicate that analytes may be limited to disposal site COCs.
97	2.3	In Section 2.1, DEP recommends sub-slab soil gas sampling in the absence of indoor air sampling, but in Section 2.3, DEP recommends that sub-slab soil gas and indoor air be sampled together in all cases. We recommend that DEP make the proposed Guidance consistent from section to section by stating that sampling plans can vary depending on site characteristics.	17	The implied inconsistency has been corrected.
98	2.3	Text implies that sub-slab soil gas and outdoor air measurements should be the main focus for VI investigations. These measurements should not be the main focus for all petroleum sites.	22	The text says that these measurements should also be included. That does not mean they are a "main focus."
99	2.3.2	The text "Sampling locations at sites with current/former solvent use should include…" should be changed to "Sampling locations that should be considered for investigation should include…" since there may be other lines of evidence or information about the facility that would allow the LSP to eliminate some of these sampling locations.	8	The text has been revised accordingly.
100	2.3.2	Paragraph 1 says that soil samples and sub-slab data need to be collected to evaluate vapor intrusion from a soil source. It is not clear why the guidance requires sub-slab soil gas and is silent on having soil gas from other locations adjacent to the building. Paragraph one in Section 2.2.3.3 says that soil data cannot be used to rule out the vapor intrusion pathway. The LSPA believes that this contradiction be addressed and soil gas from other locations, should be included at the determination of the LSP.	15	As discussed in Section 2, MassDEP does not consider soil gas outside the footprint of the building to be a valid Line of Evidence for vapor intrusion potential. It may be useful in defining nature and extent of soil contamination. In this case soil gas sampling is being used to determine if the soil is impacted. For the purpose of evaluating vapor intrusion the guidance discusses why sub-slab soil gas samples should be used. Soil gas around the building is useful in assessing the nature and extent of VOCs in soil.
101	2.3.3	Target analytes for sub-slab soil gas and indoor air should be restricted to site-related compounds.	8, 10	The text has been revised to indicate that analytes may be limited to disposal site COCs.
102	2.3.3	Author recommends that either one or two rounds be established as the minimum for both subslab soil gas and indoor air rather than one to two for the former and two to four for	8	MassDEP believes that more than one indoor air sample is necessary to adequately characterize variability at the exposure point.

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		the latter.		
103	2.3.3	Resolve conflict between the recommendation to collect a winter sample and WSC 02-430 which references high sub-slab contamination in Spring or Fall.	8	Because of the stack effect, winter sampling is generally considered worst case. However, if the CSM indicates another season is worst case, then sampling should be done at that time.
104	2.3.3	Larger sample volumes should be used when collecting soil vapor samples to obtain more representative data, and manage spatial variability. This comment referenced the guidance statement that" Sub-slab and indoor air samples should be obtained at the same time to reduce variability in evaluating the vapor intrusion pathway."	10	Sample volume is addressed in Appendix III. MassDEP agrees that larger sample volumes collected and analyzed will provide better, more representative data.
105	2.3.3	Two to four sub-slab samples is high for a typical residence. Revise recommendation and document justification.	15, 16	Two to four sample locations is a recommendation and does not preclude professional judgment. The recommendation is based on the variability observed under residential buildings. Fewer sample locations has the potential to miss pockets of higher contamination.
106	2.3.3	The recommendation to collect concurrent sub-slab and indoor air samples contradicts the guidance provided in Section 2.1. We recommend that DEP make the proposed Guidance consistent from section to section by stating that sampling plans can vary depending on site characteristics.	17	The describes initial sampling events of different media. The recommendation is aimed subsequent sampling events. This has been clarified.
107	2.3.3	Sub-slab soil gas data has no added benefit over data collected outside the footprint of the building when assessing vapor intrusion at petroleum sites.	22	Samples collected outside the footprint of the building are subject to dilution and are not representative of the dry soil conditions under the slab.
108	2.3.3	Limit the requirement for sub-slab sampling to sites where LNAPL sources are present at distances less than 15 ft. bgs.	22	LNAPL in the subsurface represents a significant potential source of vapors and when it is present, even at greater than 15 ft. bgs., it should be evaluated.
109	2.3.4	State that it may be beneficial to collect indoor air samples over durations greater than 24 hours.	10	The text has been revised accordingly.
110	2.3.4	Sampling on higher floors than the basement is generally unnecessary.	10	Sampling on higher floors provides valuable information for the exposure assessment.
111	2.3.4	Only analyze for compounds in indoor air that have been identified as COCs for the site.	10, 11, 17	The text has been revised to indicate that analytes may be limited to disposal site COCs. Analyzing for additional VOCs in indoor air can provide building inhabitants with information on other aspects of indoor air quality that are not related to vapor intrusion, but such analyses are not be required as part of an MCP assessment.

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112	2.3.4	What is the technical basis for including "soil saturated with rain" as a conservative condition?	15, 17	When soil outside the building footprint is saturated with rain water, underlying vapors cannot migrate vertically and can be diverted towards drier soil under the building. Therefore, wet soil outside the building footprint prevents dissipation to outdoor air.
113	2.3.4	Include water table depth and pressure differentials between the building's interior and the outdoor environment in Table 2-3.	15, 17	The Table has been revised accordingly.
114	2.3.4	Delete the recommendation of a 4 hour sampling time minimum.	16	Shorter sampling times are inadequate to incorporate temporal variability in indoor air contaminant concentrations.
115	2.3.4	Record HVAC settings during indoor air sampling.	17	Text has been revised in Appendix III to indicate that samples should be obtained during normal operational condition of the HVAC system.
116	2.3.4	Two to three indoor air sampling rounds, including up to two Winter rounds, are sufficient in most cases.	17	It is often the case that two to three sampling rounds, coupled with a robust subsurface dataset, can adequately characterize the pathway. The text has been revised to provide a range of sampling rounds, consistent with the comment.
117	2.3.4	Consider removing the requirements for seasonal and wintertime sampling at petroleum hydrocarbon sites unless a strong correlation between indoor air concentrations and season can be documented.	22	This is a recommendation, not a requirement. The effect of season on vapor intrusion is not fully understood. In order to adequately characterize the pathway, MassDEP recommends indoor air samples obtained over a variety of seasons. Winter sampling is specifically recommended because of the so-called "stack effect".
118	2.3.5	Outdoor air samples should be obtained from areas of outdoor emissions.	15, 17	The location and timing of outdoor air sampling depends on the goal of the sampling plan. If the goal of the sampling plan is to determine if vapor intrusion is a complete pathway, sampling should be performed on days when contaminant generating activity is a minimum. If the sampling is to identify potential confounding sources of indoor air contamination (i.e., sources not related to vapor intrusion), then sampling during those activities would be warranted. The text has been revised to reflect these different goals.
119	2.3.5	Sampling air on all sides of a building is unnecessary.	17	The text has been revised accordingly.
120	2.4.1	Commenter inquires about the need to test for additional for petroleum additives that aren't covered by the CAM and the subsequent need for corresponding Threshold Values.	23	MassDEP recently (July 1, 2010) finalized the APH CAM Method, which is WSC-CAM-IXA Quality Control Requirements and Performance Standards for the Analysis of Air-Phase Petroleum Hydrocarbons (APH) by Gas Chromatography/Mass Spectrometry

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				(GC/MS) in Support of Response Actions under the Massachusetts Contingency Plan (MCP). The CAM Method describes the list of hydrocarbon ranges, and the target analyte list. All other petroleum constituents, not listed as a target analyte, need not be analyzed separately. There are Threshold Values for the petroleum fractions and most of the target analytes. TVs were developed from indoor air studies of residences unaffected by vapor intrusion and were thus limited to chemicals covered in those studies.
121	2.4.2	Wording contradicts MCP description of GW-2 category.	8	Text has been revised accordingly.
122	2.4.2	Allow closure of sites that use COCs.	8, 10, 11, 12, 15, 17	Closure of sites that use COCs is allowed, but may be complicated by the evaluation to discern whether and to what extent vapor intrusion is contributing to indoor air contamination. Soil gas data may be used in this evaluation.
123	2.4.2	Allow closure of sites without an Activity and Use Limitation (AUL) if conservative J&E modeling demonstrates NSR, or an AUL that just specifics building parameters	10, 11, 15, 17, 19	The GW-2 standards are the result of conservative J&E modeling. Use of the J&E model as a screening tool using the same conservative inputs used by MassDEP to develop the GW-2 standards is an acceptable approach.
124	2.4.2	Commenter states, the groundwater data should be representative of concentrations at the top of the water-table. Therefore, groundwater samples should be collected from as close as practicable to the water table, using methods that minimize volatilization losses during sampling. (10)	10	MassDEP will add text to address this point. Groundwater close to the water table will generally be most representative of the groundwater source concentration from which soil vapor is generated. This is likely to be true with the caveat that, after heavy precipitation, there may be a period of time where the clean rain/snow water will dilute the very near water table concentrations and not be representative of the groundwater source concentration.
125	2.4.2	The requirement to consider vapor intrusion for a new building on an undeveloped site or the modification of an existing building and change in use is logical. However MassDEP should consider that an infinite number of types and sizes of buildings could be constructed and/or modified. The regulations already require that a LSP consider a whether such changes are consistent with a previously filed RAO.	14	If an AUL is used to condition future construction, then an LSP evaluation would be triggered by the Post-RAO provisions. AULs should be written to provide flexibility for different building types.
126	2.4.2	If there is no Imminent Hazard or Substantial Hazard in a neighboring space, would the disposal site be limited to the source area?	14	This section was not intended to define the disposal site. The disposal site, as defined in 310 CMR 40.0006, is where the contamination has come to be located and that is not limited to IH and Substantial Hazard conditions.

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127	2.4.2	Collect indoor air samples when dry cleaning operations are not ongoing.	17	Text in Section 2.3.4 has been modified to emphasize this issue.
128	2.4.2	The MCP is not the correct regulatory program to use to eliminate volatile chemicals from neighboring tenant spaces when the principal source of those contaminants is fugitive emissions and not vapor intrusion.	17	MassDEP agrees that fugitive emissions do not fall under the jurisdiction of the MCP. Text has been added to indicate that emissions from operations are addressed under the Air Quality Program.
129	2.4.2	Modeling should be allowed to determine whether there is potential for vapor intrusion in a future building. "The detailed modeling evaluation conducted for the Colorado Department of Transportation Materials Testing Laboratory (CDOT-MTL) site found that the modeled vapor intrusion attenuation factors compared well with field data-derived values to within an order of magnitude (Johnson et al., 2002).	10	Results that vary within an order of magnitude are not sufficiently predictive to characterize exposure.
130	2.4.3	The definition of basement as a living space is too restrictive.	8, 11	Text has been revised to read "…current use as living or working space."
131	2.4.3	Page 24. For evaluation of CEP and Imminent Hazards, the actual, current use of the basement in a residence should be considered rather than assuming it is living space in all circumstances where ceiling height is 7 feet or higher.	15	Document has been revised accordingly.
132	2.4.3	Averaging of indoor air data should follow same guidance as that for other environmental media.	15, 17	If multiple samples are obtained from the same floor in locations that have the same exposure duration, then averaging is appropriate, assuming the requirements of 40.0926(3)(b) are met. Guidance has been clarified.
133	2.4.3.1	Variability alone should not preclude averaging of indoor air concentrations when developing EPCs, if the variability is seasonably consistent.	8. 10, 11, 17	MassDEP agrees, provided the data is available to demonstrate seasonal variability. Text has been expanded to reflect this point.
	2.4.3.1	There is no evidence that indoor air concentrations will change because the use of the building may change. Therefore, AUL should not be required if the concentrations pose NSR for a future resident.	11, 15 17	MassDEP takes the position that in the case of current residential building, an AUL to address future modifications to the building is not warranted. In the case of commercial buildings, substantial changes might be required to convert the building to residential use, including the installation of new utility conduits from the subsurface and/or the rearrangement of walls. An AUL would be needed to maintain NSR for future use. The guidance has been revised accordingly.
134	2.4.3.1	NON/NOAFs from MassDEP have requested future EPCs be estimated using the J&E model using the parameters used to	14	Guidance has been revised accordingly to reflect use the J&E model with the same conservative inputs used by MassDEP to

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		develop the GW-2 standards. This approach should be specified in the Guidance.		develop the GW-2 standards is an acceptable approach.
135	2.4.3.1	Currently, the guidance is structured such that future buildings at sites where buildings are not present are discussed in Section 4.7. It would be helpful to have more of this discussion in the EPC/risk assessment sections (2.4 and 2.5), rather than having it broken up into two areas.	14	Additional discussion has been added to Section 2 and cross-references have been added to Section 4.7.
136	2.4.3.1	Include consideration of 95th percentile when developing EPCs.	17	Text has been revised accordingly to include regulation citation to 40.0926(3).
137	2.4.3.1	Can TVs be used in accordance with 40.0926(3)(b) to determine whether or not a mean concentration can be used to represent an EPC?	23	The TVs are not "applicable standards" in regulation, nor are they strictly risk-based. In terms of the provision at 40.0926(3)(b), the risk-based concentration should be used to determine whether or not an average concentration meets 40.0926(3)(b).
138	2.4.3.2	When multiple rounds of data are available, temporally averaged data could be used.	11, 17	Yes, presuming the condition of 310 CMR 40.0926 are met.
139	2.5	Method 1 GW2 standards cannot be used in Method 3 risk assessments.	15	Use of the GW-2 value is designed to determine whether or not pathway is likely, not demonstration of NSR using Method 1 approach.
140	2.5.1	Update the "Construction of Buildings in Contaminated Areas" guidance to include the recommendation of SSD systems.	8	MassDEP will consider this recommendation.
141	2.5.1	Make it clear that MassDEP's recommendation to use AULs at Sites where groundwater is not currently classified as GW-2 is not a requirement of the MCP.	10	The text referenced describes the use of an AUL as a recommendation. This issue is discussed in more detail in Section 4.7 and its related Appendix.
142	2.5.2	The use of an AUL to restrict new construction is recommended. Why not allow an AUL to restrict all future exposures – new or existing buildings.	16	An AUL can limit use of existing buildings by limiting its use to commercial/industrial, provided that limitation is consistent with the building's current use – this is described in the text.
143	2.5.1	Does the recommendation for an AUL when concentrations in groundwater exceed the GW-2 standard apply to contamination below 15 feet.	15	MassDEP recommends use of professional judgment is such cases; high levels of contamination at depths close to 15 feet could be of concern.
144	2.5.1	Cite the re-notification requirement.	15	Potential notification may be triggered based on "knowledge" (as defined in 310 CMR 40.0006) of conditions that are inconsistent with the exposure conditions on which the RAO was based (i.e., if the RAO was not based on presence of a building on the site).
145	2.5.1	Requiring an AUL for all sites that do not meet GW-2 standards will have a large effect on real estate transactions.	23	The use of an AUL in this context is a recommendation, not a requirement.
146	2.5.1	Provide soil concentrations that are protective of potential VI.	23	During the development of soil standards, MassDEP evaluated the

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				vapor intrusion pathway and determined that incorporating this pathway resulted in impractically low standards. Therefore, for existing buildings, determining levels of VOCs in soil gas is a more practical approach to assessing the effects of soil contamination.
147	2.5.1	Develop GW-2 standards for commercial/industrial use.	23	That would require a change to the regulations which is beyond the scope of this guidance; such a change would not address the potential for future residential use.
148	2.5.1	Recommendation to put AUL on site based on gw concentration seems inconsistent with AUL guidance position on use of AULs to prevent the installation of wells and concern about OHM mobility in groundwater.	8	The current AUL guidance is being revised concurrently with the development of the VI draft. Final recommendations on the use of AULs to address VI issues will be made consistent between the two documents. The primary reason the MCP does not require AULs to prevent the installation of private drinking water supply wells is that local Boards of Health regulate the installation of new wells.
Section 3 - Mitigation				
149	3	General Comment: The proposed mitigation methods are too prescriptive (for example dictating the thickness of the vapor barrier). MassDEP should establish more performance based criteria to evaluate success or operation of a sub-slab vapor barrier or ventilation system rather than providing specs for the system in the guidance document.	14	The performance based criteria to evaluate the success of any mitigation system is indoor air quality sampling demonstrating that contaminants have been reduced to the remedial goals. Recommendations regarding different aspects of a mitigation system design are presented as a means of achieving adequate indoor air quality results. Text has been modified to make clear that alternative approaches and design are acceptable.
150	3	Comment suggests language to include technical and financial feasibility for existing buildings and language to expand the term "building construction".	17	This is a general introduction; other sections of the document address feasibility considerations (Section 4) and building design and building considerations (Section 3.2.1) in more detail.
151	3.1	Dissolved VOCs do not meet the definition of "source". Guidance cannot reinterpret the definition of "source". Delete the cited paragraph.	11,17	The paragraph has been modified to clarify that groundwater plays a role in intermedia transfer of contaminants to indoor air. Conditions that are resulting in *increasing* concentrations in another media, i.e., indoor air, are not considered controlled for the purposes of the MCP source control or elimination requirement. To the extent that high groundwater concentrations are contributing to *increasing* concentrations in indoor air, source control or elimination efforts would likely target reducing groundwater concentrations and or controlling migration/intermedia transfer.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
152	3.1	The establishment (e.g., using soil vapor extraction) and demonstration and documentation of pneumatic control of a vapor plume (through pressure/vacuum measurements and decreasing soil-gas concentration trends) should preclude requirements for indoor-air or sub-slab sampling.	22	MassDEP considers indoor air sampling as the most direct and reliable means of assessing indoor air concentrations. For active sub-slab depressurization systems, once a negative pressure value beneath the slab has been verified to be effective through indoor air sampling, then negative pressure value can then be used as a means of determining system effectiveness as suggested.
153	3.2	Comment suggests language 1. to reinforce the idea that building construction and configuration are highly variable and pressure differentials drive the migration of vapors into buildings; 2. to expand the use of passive systems on the basis of it being a site-specific decision with differential pressure monitoring included for passive systems as a measurement of success; and 3. to emphasize building design, construction and subsurface information as drivers for mitigation method.	17	1. Guidance recognizes variability of building features with respect to mitigation system design is adequately addressed. 2. Guidance provides for use of passive systems if remedial goals can be met; systems are not recommended for use to address IH conditions/higher levels of indoor air contamination based on considerable information from the radon industry that shows active SSD systems to be the more effective and reliable mitigation system. 3. Building design, construction and subsurface information are important factors to consider, however choosing a system that will achieve the necessary reductions in indoor air quality should be the primary design objective; active systems can be designed for a variety of conditions.
154	3.2	Active systems require temporary solutions. Passive systems can be effective. If MassDEP truly wants to promote active SSD systems then the MCP should be changed to allow a permanent solution for active SSD systems. Suggestions for framework to enable permanent solutions for SSD systems.	12	Active systems if incorporated as part of a remedy that will achieve a Permanent Solution can be operated under Remedy Operation Status (Phase V), which provides the same liability protection of a Permanent Solution if the system is operated to maintain NSR.
155	3.2	Omit any language supporting the use of SSD systems at petroleum sites. SSD systems entrain high concentrations from deeper in the subsurface. SVE systems/not SSD systems should be promoted at petroleum sites.	22	MassDEP supports the use of SVE systems to address petroleum sources. Releases of petroleum that result in unacceptable indoor air concentrations (e.g., IH, CEP, Significant risk) require efforts directed at elimination or mitigation of the exposure. SSD systems are recommended for reducing concentrations in indoor air resulting in vapor intrusion. SSD systems and SVE systems are similar technologies. Their design objective is largely what sets them apart. MassDEP recommends SSD systems because it is a dedicated system with a single design criterion to mitigate indoor air concentrations.
156	3.2.1	Comment suggests language recognizing the challenges to mitigation posed by the variability of structures and the historic evolution of many buildings (commercial/industrial). Suggested	17	Text has been modified accordingly.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
		language to include impacts of the heating and ventilation system on differential pressure measurements during the building survey.		
157	3.2.1	Building Survey Considerations. Regarding the statement “a PID survey may fail to detect contamination that is actually present”; is MassDEP retracting the Level 1 soil gas screening approach in the VPH/EPH guidance document?	23	PID measurements, while useful as a screening tool to locate preferential pathways, are not sufficiently sensitive or chemical-specific to assess VI with an appropriate degree of confidence. This guidance represents MassDEP’s current recommendations on PID use. Most PIDs measure in the parts per million (ppm) range while exposures representing significant risk can be observed in the parts per billion (ppb) range. PIDs that measure in the ppm range may not be capable of detecting concentrations that represent significant risk. PIDs that measure in the ppb range and calibrated properly may be helpful to identify VOC sources and entry points. Sections 2 and Appendix III discuss MassDEPs recommendations for assessing the vapor intrusion pathway. Calibrated PIDs may be used as a line of evidence but are generally not an appropriate tool to screen out the vapor intrusion pathway.
158	3.2.1	Seal bare dirt floors prior to SSD system installation. HG Hapsites (PPB Rae?) may help identify VOC sources and entry points.	22	Sealing bare dirt floors is mentioned in Section 3. Instruments capable of detecting VOCs in the parts per billion (ppb) range and are properly calibrated may be helpful to detect VOC sources and entry points.
159	3.2.2	Suggests language for emphasizing the achievement of adequate differential pressure rather than evaluation of sub-slab soil.	17	Achievement of adequate differential pressure is site-specific. Some SSD systems may achieve remedial goals with very low differential pressure values while others may require higher values. Evaluation of sub-slab soil helps practitioners design a system capable of achieving the remedial goals.
160	3.2.3	Include the term" seasonal high groundwater table" when discussing depth to groundwater as a consideration for mitigation.	17	The term "seasonal high groundwater table" has been incorporated in Section 3.2.3.
161	3.3	Comment suggests wording with respect to the categorization of systems in the appendix.	17	This suggestion appears to be what is already in the Guidance Document.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
162	3.3	The use of “crawlspace ventilation” systems are also effective in mitigating VI pathways, and may be applicable for consideration as an alternative to traditional SSD systems or as a feasible option where depressurization is not practical.	16, 18	Sub-membrane depressurization is recommended to mitigate crawlspaces. Crawlspace depressurization using a fan is not recommended (ASTM E 1465 - 08, Section 6.7.1). Natural ventilation of crawlspaces is generally not recommended as a stand-alone mitigation measure. Natural ventilation intended to augment sub-membrane depressurization in crawlspaces should be accomplished through the use of permanently installed, non-closable foundation vents (ASTM E 2121 - 03).
163	3.3.1.1	Suggests using the word "building" instead of "house" to include commercial/industrial buildings.	17	Text has been amended accordingly.
164	3.3.1.1	While Active Sub-Slab Depressurization (SSD) System are effective if properly designed and installed, they are easily forgotten if not routinely monitored and maintained due to blower failure. A maintenance contract requirement is recommended as part of an IRA/RAM plan for these systems.	18	Maintenance contracts are a good suggestion but MassDEP considers them outside the purview of this document. A recommendation for incorporating automated telemetry into the design of active systems is provided in Section 3 to send an alert when the system malfunctions. This can reduce incidents of extended shutdown or failure.
165	3.3.1	Suggests changing “negative pressure” to “vacuum”.	18	Added "(i.e., vacuum)" after the words negative pressure in this section.
166	3.3.1.1	Make the SSD system vacuum performance standard 4-10 Pa consistent throughout guidance document.	12	Language has been inserted to address the vacuum performance standard to indicate that the sub-slab differential pressure necessary for effective mitigation may vary. In buildings with very pervious sub-slab material, large volumes of air can be moved with little pressure drop. For other buildings with less pervious material beneath the slab, an SSD system designed to maintain 0.015 in.W.G. (approximately 4 Pa) measured across the slab in mild weather with exhaust appliances off should be adequate to avoid being overwhelmed by the stack effect during winter. Additional sub-slab depressurization may be necessary to overcome the operation of heating equipment, vent fans, etc.
167	3.3.1.1	Comment suggests a more specific definition of “competent professional” for design of these systems. Is a P.E. stamp required for design drawings (as is the case for HVAC design work)?	18	MassDEP has no requirements or certification for those who design or install mitigation system. It is the responsibility of the party conducting response actions and the LSP to ensure a mitigation system that meets response action goals is properly installed and operating.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
168	3.3.1.4	Why is a minimum 60 mil membrane required for sealing floors and walls? A more important consideration may be the compatibility of the membrane material swelling/breakthrough characteristics of the membrane and contaminant of concern. Also, certain membranes (such as PVC) attract rodents which are attracted by the plasticizer in the membrane.	18	The draft guidance recommended a 60-mil barrier based upon EPA's recommendation of 40-60 mil for vapor barriers (EPA, 2008). This recommendation has been modified to directly reflect EPA's vapor barrier thickness recommendation of 40-60 mil. as well as ITRC's recommendation of a 60-100-mil barriers to protect barriers from abuse during construction. A sentence regarding the compatibility of the membrane with contaminants has been added to the membrane system section.
169	3.3.1.5	Comment suggests wording for a new subsection to discuss passive SSD systems	17	Although passive venting systems may intermittently depressurize beneath the slab, there is no active component to ensure sub-slab depressurization occurs consistently. As such, it is misleading to categorize passive venting systems as depressurization systems. The discussion of passive venting systems currently included in the guidance appears more strongly supported by the existing literature (e.g., ASTM, EPA, ITRC).
170	3.3.2	Re: Indoor Air Treatment – suggests rewording sentence to read *Mitigation systems that incorporate high surface area sorbtion filters generally have better removal efficiencies due to the resulting better air-to-sorbent contact.*	17	The recommended language has been included.
171	3.3.2	Comment suggests changing “carbon sorption” to “activated carbon adsorption”.	18	The recommended language has been included.
172	3.4	Comment suggests wording to support the use of passive SSD systems in certain situations.	17	The use of passive venting systems is recognized in the guidance; use is supported provided achievement of remedial goals is demonstrated.
173	3.4.1.1	Comment suggests adding text about the use of HVAC systems to positively pressurize the lowest building level.	17	Text recognizes the use of HVAC modification to augment a separate, dedicated mitigation system by reducing forces the mitigation system would have to work to overcome. It is not recommended as a mitigation technique in and of itself if the HVAC system is operating outside the normal range of operations as it is not reasonable to assume that such operations will be maintained over time.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
174	3.4.1.1	In an existing structure with a HVAC system that creates positive pressure under normal operating conditions (i.e. with no modifications) and controls vapor intrusion even when high concentrations of contaminants are high, consideration should be given to allowing implementation of an AUL to maintain a condition of no significant risk.	14	In the case where the normal HVAC operations of the system create such conditions, this scenario may be reasonable. For operations outside of the normal range of operations, it is unlikely that an HVAC technician would consult the AUL prior to making adjustments. There could be a situation where maintaining a system to mitigate VI and maintaining normal HVAC conditions are mutually exclusive. It would be better to have a dedicated mitigation system than one with potentially competing objectives (i.e., mitigate VI, heating, cooling, maintaining X air exchanges/hour, etc.).
175	3.4.2	Comment suggests wording to include differential pressure monitoring as a means of verifying passive system effectiveness; passive systems should be allowed closure after 3 sampling events.	17	Differential pressure monitoring is not appropriate as a means of verifying passive venting system effectiveness because there is no active component to ensure the observed differential pressure will be reasonably maintained. Sampling recommendations are summarized in Table 3-1.
176	3.4.2.3	Comment suggests wording for membrane system recommendation and QA/QC paragraph of membrane system section.	17	Modified membrane system section to include EPA's recommendation for 40-60-mil barrier and ITRC's recommendation that thicker barriers may be necessary to avoid damage during construction (60-100-mil). Text discusses QA/QC in general with example of smoke testing as a method used to detect leaks in membrane. QA/QC results are not the performance standard. QA/QC is a means of increasing the certainty that the performance standard of indoor air results that meet remedial goals.
177	3.4.2.3	This section specifies a minimum 70 mil membrane for passive venting systems. Note that thinner materials can be equally effective depending on the contaminant of concern and membrane material. Also note that thick membrane materials can be very difficult to install. This is particularly true of HDPE under cold weather conditions.	18	MassDEP acknowledges that thicker membranes can be difficult to install. The guidance membrane recommendation has been changed to directly reflect EPA's vapor barrier thickness recommendation of 40-60 mil and ITRC's recommendation that 60-100-mil barriers to prevent damage during construction.
178	3.4.2.3	Comment suggests wording for membrane system section.	6	Modified membrane thickness recommendation to include EPA's recommendation of 40-60-mil barriers and ITRC's recommendation that 60-100-mil may be necessary to withstand construction. Incorporated the word "significantly" before "absorb".

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
179	3.4.2.3	Membrane systems should be fully adhered to the structure they are protecting to ensure durability and performance. Membrane systems that are not fully adhered to the structure could be exposed to stress due to sagging if the soils at the perimeter of the building settle or organic material in the soil decays and rots over time resulting in leaks.	13	Whether to adhere the membrane to the structure may be dependent on the membrane system; recommendation was not added as a general recommendation for this reason.
180	3.4.2.3	Membrane systems should have puncture resistance adequate for the environment to which they will be exposed. A concrete slab will typically be poured onto the membrane system. Therefore, the membrane systems should be capable of resisting punctures from rebar and rebar chairs placed on the membrane, traffic from construction trades before and during concrete application and the force of the concrete itself as it is applied.	13	This guidance references ITRC's recommendation that a 60-100-mil barrier may be necessary to withstand work occurring above the membrane during construction.
181	3.4.2.3	The minimum membrane thickness currently indicated in the Guidance document of 60 mils (page 36) and 70 mils (page 40) do not ensure performance. Performance requirements of the membrane system should be indicated rather than a minimum thickness. Increased thickness of a material not suitable for the intended use may not provide the barrier intended to prevent VOC-contaminated soil gas from entering a building.	13	Performance requirements for membranes are indoor air results that meet the remedial goals. 60-mil was based upon EPA's recommendation of 40-60 mil HDPE for vapor barriers (EPA, 2008). This recommendation has been modified to directly reflect EPA's vapor barrier thickness recommendation of 40-60 mil. ITRC's recommendation that 60-100-mil may be required to prevent damage during construction was also added. A sentence regarding the compatibility of the membrane with contaminants encountered has been added.
182	3.4.2.3	The document should clearly identify the membrane system inspection and testing required. Currently the document indicates that the membrane should be inspected and tested before the foundation is poured over the membrane. Informing the user of the document how to inspect the membrane and what tests to run on the installed membrane will standardize the process and help ensure expected performance.	13	Membrane inspection and testing is typically determined by the manufacturer and performed in order to increase certainty that the performance standard for membrane systems will be met (i.e., indoor air concentrations meet remedial goals).
183	3.4.2.3	Membrane Systems – This section is overly prescriptive and the requirement for a minimum 70 mil thick membrane is substantially over-conservative.	12	This recommendation has been modified to directly reflect EPA's vapor barrier thickness recommendation of 40-60 mil. ITRCs recommendation for 60-100-mil (ITRC, 2007) barriers to withstand abuse at construction sites was added.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
184	3.4.2.4	Passive Venting – The effectiveness of passive venting systems may be underestimated. Note that passive venting system have been used in building design for decades to control methane migration where buildings are in close proximity to landfills. The same design concepts and construction methods can be successfully applied to vapor intrusion problems concerning VOCs. A properly designed interceptor trench system with venting pipes can work well and is virtually maintenance free.	18	The use of passive venting systems is recognized in the guidance; use is supported provided achievement of remedial goals is demonstrated. The recommended performance standards outlined in Table 3-1 should identify systems that are not adequately reducing contaminant concentrations.
185	3.4.2.1	As discussed above, membrane diffusion coefficients can be used to estimate risk mitigation. Thus, we request that passive venting (along with a membrane barrier) not be limited to only cases when concentrations of contaminants in indoor air are at or near the Threshold Values.	6	Manufacturer derived membrane diffusion coefficients may be used to estimate performance. Where passive venting systems are used effectiveness must be demonstrated through indoor air sampling. They are not recommended for use to address IH conditions/higher levels of indoor air contamination.
186	3.4.2.1	If indoor air concentrations are at or near the Threshold Values, why would there be a need for a system? Can you provide an example?	14	A system put in place to address a CEP in a residence, school or daycare is an example where mitigation would be initiated for concentrations at or near threshold values.
187	3.4.2.4	Passive Venting – Designating wind turbines as active remedial systems that would preclude a Permanent Solution will only serve to discourage the use of these devices which can be beneficial in the correct circumstances.	12	Wind turbines may be beneficial and may be used. However, snow and ice may prevent the turbine from working properly. If the turbine is necessary for achieving remedial goals it would be deemed an active system as a mechanical device; if it is an add on that enhances system operation but not necessary for achieving remedial goals, it would not preclude achievement of a Permanent Solution.
188	3.5	Provide rationale for proposing >2 X GW-2 as a decision criterion. What does DEP mean by inferred GW concentrations. Table 3-1 should clarify that testing best be conducted until site closure or partial RAO.	17	The basis for proposing >2 x GW-2 as a decision criterion is professional judgment. The reference to "inferred groundwater results" is intended to mean interpolated from concentrations in nearby monitoring wells. Table 3-1 has been modified to clarify what is meant by site closure and revised to more clearly show what monitoring is recommended at each phase of the mitigation process and closure.
189	3.5	Table 3-1 should clarify that testing must be conducted until site closure or partial RAO.	11	Table 3-1 has been revised to more clearly show what is monitoring is recommended at each phase of the mitigation process and closure.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
190	Table 3-1	Comment observes that adequate differential pressure may be measured but ineffective. Suggests clarify as to why passive systems are not recommended for IH or NSR.	8	The initial indoor air sampling to demonstrate effectiveness should identify systems that require additional extraction points to establish a negative pressure field across the slab. Indoor air sampling is required to verify the negative pressure is actually adequate to prevent vapor intrusion. MassDEP's preference for active SSD systems over passive venting systems is based on information from the radon Industry regarding the effectiveness of passive systems: "... - fan-powered radon reduction systems can apply 50 times more suction pressure at the suction point than passive systems. The chief advantage of a fan-powered radon system is that it always achieves a greater and more reliable radon reduction than passive systems" (ASTM E 1465 - 08). Where contaminant concentrations in indoor are at IH levels/high, active SSD systems should be used because they provide a greater degree of certainty that contaminant concentrations will be reduced quickly and reliably.
191	Table 3-1	Maintenance for SSD systems appears inconsistent between Table 3-1 and Section 3.5.2.3. Make requirements consistent.	14	This section has been revised to be consistent with Table 3-1.
192	Table 3-1	Could "site closure" be defined more clearly? Specifically, with respect to mitigation as a post-RAO RAM.	14	Table 3-1 has been modified to define site closure more clearly and outline the maintenance and monitoring recommendations regardless of the Site's status within the MCP process (e.g., IRA, Phase IV, Class C RAO, Post RAO RAM, AUL).
193	3.5.2.1	Confirmation of Pressure Field of Active Mitigation Systems - Comment suggests adding a new paragraph at the end of this section that notes short term fluctuations in manometer readings are generally not a concern, provided the data collected over time demonstrate negative pressure on average when compared to the air pressure within the occupied space.	17	For active systems, a negative pressure field should be observed across the slab. Very permeable sub-slab material can provide effective mitigation with very little pressure drop. Depending upon the site, short term fluctuations in manometer readings may not be a concern. The inclusion of this language would imply some sort of averaging of the sub-slab pressures over time is appropriate to show effective mitigation which is inconsistent with the goal for active systems to consistently provide a negative pressure field across the slab adequate to prevent vapor intrusion. For any mitigation system indoor air sampling is required to verify effective mitigation.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
194	3.5.2.2	Reduction of indoor air concentrations below TIACs should not be identified as a remedial goal. For many contaminants NSR can be demonstrated with concentrations above TIACs.	11,17	Remedial goal references for Permanent Solutions have been changed from TIACs to No Significant Risk and background, to the extent feasible.
195	3.5.2.3	O&M discussion infers one VI site visit per year which appears inconsistent with Section 3.5.2.3 which implies maintenance during inspections or service calls. Distinction between performance std. and O&M is blurred and should be clarified.	14	O&M requirements in this section have been revised to be consistent with Table 3-1 and more clearly describe performance standard and O&M.
196	3.5.2.5	Active SSDS monitoring – the draft document indicates that "Annual checks for pressure drops and fan operation should be conducted until site closure". It is unclear as to what is meant by site closure. This should be defined.	12	Table 3-1 has been modified to define site closure more precisely and outline the maintenance and monitoring recommendations regardless of the Site's station within the MCP process (e.g., IRA, Phase IV, Class C RAO, Post RAO RAM, AUL).
197	3.6	Two years of data required to demonstrate effectiveness is excessive; 3 sampling rounds in one year should be sufficient to demonstrate closure.	17	Table 3-1 and text have been modified to recommend sampling regimens for active and passive mitigation systems to evaluate effectiveness within the first year of operation and sampling to support closure with passive systems.
198	3.6	Closure monitoring for over a period of two years is excessive and not likely to be practical. The emphasis should be placed on collecting representative samples over variable conditions likely to exist at the site.	16	Closure should be based upon reproducible data to demonstrate and add certainty to the argument closure is appropriate. This recommendation is similar to the regulatory requirement for information to support groundwater treatment system termination listed in 310 CMR 40.0926(8)(d).
199	3.6	Closure Sampling - The duration for which an active system should be switched off prior to sampling should be flexible, based on the depth to the source of VOCs and the geological materials beneath the structure. In some cases, up to several weeks shut down may be appropriate.	10	There appears to be little information available suggesting consensus around a time interval for system shutdown during closure sampling MassDEP's recommendation is intended to address most situations with the understanding that more or less time may be required on a case-by-case basis.
200	3.6	Recent research suggests winter sampling may not represent worst case. May not be possible to collect winter sample in all cases. Could unnecessarily delay site closure.	11	There has been some information suggesting winter may not represent worst-case indoor air conditions. However, increased stack effect, closed windows, frozen exterior soil, and additional interior depressurization from combustion equipment and appliance use all suggest the indoor air would have a negative pressure compared to outside air and result in a general increase in VI during winter. The radon literature cites winter as worst-case with respect to radon intrusion.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
Section 4 – Regulatory Framework				
201	4.1.1	IH Evaluations should consider exposures based on how the structure is used; therefore, basements used for laundry/storage should be allowed to be evaluated for the time period actually used (not 12 hours) and based on a shorter (4 hour) sample.	11, 17	This issue is addressed in Section 2 under Exposure Assumptions. It has been clarified to say that exposure assumptions for IH Evaluations should be based on actual current building use. The values shown in Table 2-4 can be used as defaults, but the site-specific duration and frequency of building use should be determined and used to estimate exposure associated with an exposure period of 5 years. Section 2 also addresses sampling periods .
202	4.1.2.	Dormitories for post-secondary education and assisted living facilities should not be considered residential dwellings because of shorter exposure periods than for typical residences.	14, 15	MassDEP considers post-secondary education dormitories and assisted living facilities "occupied residential dwellings" under the MCP, based on their use as residences. The CEP definition in the MCP does not include a specific exposure requirement, such as full vs. half-day daycare or full vs. partial year residential occupancy. Shorter exposure periods, such as in dormitories and assisted living facilities, may be considered when evaluating the feasibility of undertaking response actions to address CEP.
203	4.1.3	Exemption for 2 cubic yards or less (310 CMR 40.0315) – This exemption only applies to oil and waste oil and the language should be modified to reflect this limitation.	12, 15	This reference to oil and/or waste oil contaminated soil in 310 40.0315(2) has been added to this section.
204	4.1.3	Note that a '120 day' reporting obligation per 310 CMR 40.0315 may still exist if environmental releases of oil or waste oil at levels less than the Reportable Quantity contaminate more than 2 contiguous cubic yards of soil at levels exceeding a Reportable Concentration applicable at the site, or if environmental releases of other hazardous materials at levels less than the Reportable Quantity contaminate soil or groundwater at levels	15	The text has been revised to reflect the comment.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
		exceeding a Reportable Concentration applicable at the site.		
205	4.3.1.1	The statement that schools and daycares are "locations where exposure potential and periods are greatest" should be removed from the Draft Guidance. Exposure periods for infants and children in an individual day care or school building are relatively short, typically a few years.	10, 17	This phrase has been removed.
206	4.3.1.1	For petroleum sites, the focus on CEP remediation regardless of the quantitative level of risk will result unnecessary remediation.	22	The MCP does not specifically distinguish between petroleum and other contaminants in terms of the presumption for CEP remediation. However, the differences in petroleum vs. more persistent contaminant behavior in the environment can be addressed during a CEP Feasibility Evaluation performed to evaluate the benefits and costs of CEP remediation. If petroleum contamination will be reduced without CEP remediation (e.g., based on potential for biodegradation), this would be reflected in the cost/benefit analysis.
207	4.3.1.2	Disagrees with the interpretation that basements with at least 7 ft. of head room in an occupied residential dwelling be considered "living or working space" in an evaluation of whether CEP exists; guidance definition based on evidence of current activity is too subjective.	11, 17	This section has been rewritten to focus on examples of what MassDEP considers "living or working space" in CEP evaluations of an occupied residential dwelling. Crawl spaces and basements with only incidental use, such as for storage and basic laundry, would not be considered living or working spaces. Finished basements and unfinished basements with evidence of more than incidental use (i.e. use for more than an hour at a time), should be considered living or working space. Evidence of this type of use would include areas used for a workshop, hobby area, exercise, or extended laundry (such as ironing or folding). The reference to 7 ft. of head room has been removed for IH and CEP evaluations. Note, however, that when evaluating a building for future uses, full use of a basement must be considered if there is 7 ft. of head room.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
208	4.3.2.1	Footnote 7 states: "See Section 2.0 for a discussion of assessing whether indoor air concentrations are attributable to a disposal site, and the application of Threshold Values for ruling out the need for additional assessment or mitigation of the vapor intrusion pathway." Section 2.0 does address use of Threshold Values for determining whether indoor air concentrations are attributable to a disposal site, but does not discuss using Threshold Values for ruling out the need for additional assessment or mitigation where indoor air values are or potentially are attributable to a disposal site. This path forward should be clearly described, likely in Section 4.	15	This footnote has been removed and Table 2-1 & Table 2-2 have been updated to indicate if levels are below the TV, there is no requirement for SRM notification and no further need for assessment of the pathway and/or mitigation. Note Tables 2-1 and 2-2 are only applicable to current pathways and exposures.
209	4.3.2.2	Whether or not the CEP poses Significant Risk, if the owner of property (owner-occupied or rental) does not wish to have the CEP condition addressed, then it is infeasible to do so. The level of risk presented by the CEP has no relevance with respect to feasibility.	11, 17	The CEP feasibility evaluation addresses both the benefits and costs of performing response actions to address CEP. The level of risk posed by exposure to contamination is relevant in evaluating the feasibility of response actions. When contaminant levels pose Significant Risk, the benefits of response actions to address CEP are higher, which changes the cost-benefit ratio for the response actions. MassDEP is limiting its statement about general infeasibility to No Significant Risk situations and to owner-occupants (whose decisions would be expected to balance health and property management concerns), but not owners of rental properties (whose decisions may be more affected by property management concerns.)
210	4.5.2.2	Example Vapor Intrusion Scenario – These are very worthwhile, and there should be consideration to include more of them throughout Section 4 in the final version.	2, 15	MassDEP will solicit suggestions for additional scenarios from the VI workgroup and add them to the Interim Final Guidance and/or training materials.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
211	4.3.2.3.	The Guidance should distinguish between rebutting the presumption for CEP elimination/mitigation vs. rebutting the presumption that a SSD system is infeasible (Section 4.3.2.1). It may be infeasible to install an SSD system due to physical site conditions; therefore, the benefits of risk reduction and the associated cost are irrelevant.	11, 17	The language on rebutting the presumption of taking action to address CEP has been expanded and clarified. Feasibility evaluations must consider both the benefits and the costs of response actions. Physical site conditions may increase the complexity or cost of response actions, but the benefits from risk reduction must be weighed against the increased costs. The requirement for a feasibility evaluation is not waived due to physical site conditions. The benefits of risk reduction may be outweighed by the cost, but they are not irrelevant to the evaluation.
212	4.3.2.3	This comment questions any theoretical uncertainty related to risk levels below No Significant Risk and states that the benefits of reducing risk below NSR level cannot be quantified. Reducing uncertainty is not a benefit identified by statute (17)	11, 17	Chapter 21E and the MCP clearly indicate a preference for reducing risk to levels that reach or approach background, where feasible. Background levels are usually lower than the No Significant Risk level.
213	4.3.2.3	The guidance should clearly state the quantitative financial benchmarks used to evaluate a "significant effect" to costs for response actions. The LSPA recommends consideration of some sort of “threshold” on the CEP elimination cost criteria, based on current property values.	11,15,17	Using a financial threshold based on current property values in deciding when CEP elimination costs are significant would result in less mitigation in homes with lower property values. This approach would result in less risk reduction in housing in lower-income areas and so it is not acceptable.
214	4.3.2.3	The two step process discussed in the second paragraph should be indicated in Figure 4-2.	15	Figure 4-2 has been revised accordingly.
215	4.3.2.3	MassDEP’s view of the costs of eliminating CEP conditions seems to focus on single family residential structures. The cost to eliminate CEP conditions in schools and multi-family structures is more significant due the larger amount of square footage which should be considered in the feasibility evaluation.	14	The estimated costs for response actions at larger buildings would be considered as part of any feasibility evaluation, and so would be addressed. The guidance uses single family residential structures as examples because they make up a large component of buildings impacted by vapor intrusion.
216	4.4	The text should also indicate that once the pathway has been mitigated, reevaluation of the scoring and reclassification of the site could occur.	14	Section 4.4 has been revised to reflect this comment.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
217	4.4	Disagrees with the use of Residential TIACs for commercial/ industrial sites. Clarify if this is to be used when there isn't sufficient data to determine whether the VI pathway exists.	15	The use of a reference value (which has been changed from TIACs to the appropriate residential or commercial/industrial Threshold Values) for comparison in NRS scoring of the indoor air pathway is for situations when there is not enough evidence to determine whether a VI pathway exists. If a multiple lines of evidence investigation (including data from groundwater, soil gas, indoor air, and outdoor air, and an evaluation of preferential pathways) demonstrates no air exposure pathway, the suggested scoring criteria would not apply. This section has been revised to clarify when the scoring sections in the guidance would apply.
218	4.4	The section should note that if response actions have been taken to eliminate the VI pathway, the site scoring would not include Air Exposure as a Likely or Confirmed Pathway.	17	Section 4.4 of the guidance has been edited to include this clarification.
219	4.4	The TIAC document refers to 90th, not 95th percentile values.	17	The references to TIACs have been changed to Threshold Values.
220	4.4	Evaluating whether a pathway exists using the UPV is not consistent with the MLE approach described in 2.2.4; MassDEP should make this consistent or explain why they need not be.	17	The recommendation to use a reference value (which has been changed from TIACs to Threshold Values) for comparison assumes that a multiple lines of evidence investigation has not been completed by the time of Tier Classification. On-going commercial or industrial processes resulting in indoor air contaminant levels above Threshold Values would not result in scoring air as a likely or confirmed exposure pathway. For site-related contamination, levels above Threshold Values should be scored as a Likely or Confirmed Exposure Pathway, unless a multiple lines of evidence investigation has been performed by the time of Tier Classification, and that investigation concluded that no vapor intrusion pathway exists.
221	4.4	Indoor air line of evidence is given too much weight for NRS.	17	This guidance document is being written using the current regulations and NRS point distribution for air exposure criteria. Note that the emphasis on the indoor air pathway was intentional, considering the unavoidable nature of air exposure and the efficiency of lungs in transferring contamination from the air into the bloodstream.
222	4.4	NRS criteria involving sub-slab soil vapor levels should distinguish between chlorinated and petroleum-based VOCs to be consistent with other areas of the guidance.	17	The suggested NRS criteria now reference the soil gas screening values used in other areas of the guidance.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
223	4.4	Clarify which percentile TIAC is referred to throughout this section.	17	The references to TIACs have been changed to Threshold Values.
224	4.4	Disagrees with the applicability of the earthen floor criteria for air pathway ranking; for petroleum site, the oxygen provided through lack of a slab is beneficial.	22	The NRS system was intended to be generic for easy scoring considering current conditions. Site-specific Issues related to contaminant biodegradability would be addressed later in the MCP process when evaluating the feasibility of various remediation options.
225	4.5.1	CEP standard applies "pending" completion of risk characterization. CEP IRAs can be closed once a risk characterization is performed.	11	310 CMR 40.0427(1)c describes the conditions required to submit an IRAC and includes the assurance that the CEP is eliminated/prevented/mitigated without the O & M of an active remedial system pending completion of the risk assessment and feasibility study. Once they are completed, the IRAC can be submitted and the CEP mitigation would be incorporated into the CRA (if needed based on the results of the risk assessment and feasibility study), unless the requirements for an RAO are met. 310 CMR 40.0427(1)c is one condition for the submittal of an IRAC, it does not imply a limit to the duration of response actions to address a CEP.
226	4.5.1.1	The requirement for post-remediation indoor air monitoring of at least three samples collected over a two year period seems excessive.	2, 15, 16	Please see Table 3-1 and Section 3 for details about recommended indoor air monitoring schedules.
227	4.5.1.2	The MCP requirements to address CEP only apply prior to the completion of a risk assessment and feasibility evaluation. All CEP situations (whether mitigated or not) should be closed with an IRAC at the time of Phase IV submittal.	11, 17	IRAs can be closed, per 310 CMR 40.0427(1)(c),if the CEP has been addressed without the need for an active system while awaiting the completion of the risk assessment and feasibility study. An IRA would also be closed if the CEP feasibility evaluation concluded that neither elimination nor mitigation of the CEP is feasible. Figure 4-2 has been revised to include the possible points at which an IRA Completion Report may be submitted. The definition of CEP does not include a time limit which ends when the risk assessment and feasibility evaluation are completed. The submittal of an IRAC Report does not necessary mean that a CEP no longer exists, but rather that the CEP conditions, if present, are no longer being addressed as an IRA.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
228	4.5.1.3	Elimination or mitigation of the CEP should not be necessary at sites with No Significant Risk.	11	The MCP does not limit the presumption of CEP elimination/mitigation to those sites with conditions that pose Significant Risk. The feasibility of eliminating or mitigating CEP as part of IRAs may be evaluated where there is no Imminent Hazard. The level of risk present is one of the factors to be considered in the evaluation (along with the cost.) Where risk levels are low, the benefit of addressing CEP may not outweigh the costs if site-specific building considerations make the costs higher than typical. The Department considers the installation of a sub-slab depressurization system to be feasible at most buildings. Site-specific CEP feasibility evaluations must support the argument that the cost of eliminating/mitigating CEP outweighs the benefits of risk reduction.
229	4.5.2.2	The guidance document does not address CEPs that were not eliminated or mitigated as part of the IRA if it was infeasible.	11	The guidance has been revised to address this comment. See revised Section 4.5.1.1 and revised Figure 4-2.
230	4.5.3.1	The use of the word "most" (“For most vapor intrusion sites, meeting these criteria, as well as the general requirements identified above….”) points out the importance of MassDEP qualifying this Guidance to indicate that there are approaches other than what is described in the Guidance that can achieve or demonstrate No Significant Risk and a Permanent Solution at a particular Site.	15	Please see the introduction of the guidance for language about other acceptable alternatives for achieving and documenting compliance with the applicable regulatory requirements and performance standards of the MCP.
231	4.5.3.1	Remove #3 (meeting GW-2 Standards) as a performance standard for Permanent Solutions. Inclusion contradicts lines of evidence approach for verifying completion of VI pathway.	11	The performance standard language has been removed.
232	4.5.3.1	Allow Permanent Solutions where NAPL is present as long as NAPL UCL specified in 310 CMR 40.0996(4) has not been exceeded and the NAPL does not represent a continuing source (310 CMR 40.1003[5][a][3]).	11,15,17	The presence of NAPL or conditions indicative of NAPL (specifically, EPA's comparison to 1% solubility levels) are listed as issues to be considered when supporting a conclusion that a Permanent Solution has been achieved. The documentation for the RAO would need to demonstrate that the applicable UCLs have not been exceeded and that the NAPL does not represent a continuing source.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
233	4.5.3.1	The Permanent Solution criteria for removal/treatment of contaminated soil are inconsistent with the MCP requirement to address sources that result in increase of OHM.	11	MassDEP recommends considering whether contaminated soil *that is serving as a source* has been eliminated or controlled through removal or treatment. Contaminated soil is listed at 310 CMR 40.1003(5)(c)3. as a possible source. Based on Departmental observations at sites with vapor intrusion, it appears that: (1) leaving contaminated soil in place may contribute to increases in indoor air contaminant concentrations (an increase in OHM in an environmental medium through intermedia transfer); and (2) removal and/or treatment are the most effective means of addressing contaminated soil. The guidance's recommendation to consider whether contaminated soil sources have been removed/treated is consistent with the MCP.
234	4.5.3.1	For existing buildings, eliminate the performance standard for removal/treatment of contaminated soil that is serving as a source, because there is no metric to determine if soil is a source. For future buildings, develop numerical criteria to determine if soil could serve as a source.	14	The performance standard language has been removed from 4.5.3.1. However, the presence of contaminated soil that could serve as a source is listed as an issue to be considered when evaluating whether a Permanent Solution has been met at a site. Numerical criteria for vapor intrusion sources in soil were evaluated during the development of the Method 1 soil cleanup standards, but were rejected as impracticably low. The presence of soil containing contaminants of concern for vapor intrusion is a challenging issue for current and future buildings which is why removal/treatment is emphasized.
235	4.5.3.1	Regarding the 3rd criteria for providing presumptive certainty in support for a Permanent Solution (groundwater concentrations of COCs are to be less than GW-2 standards based on seasonally representative data), can the groundwater concentrations at each location (e.g., well) be averaged over time and then compared to standards, assuming there is a stable or downward trend?	2	Consistent with the guidance in Section 2 on interpreting lines of evidence, averaging the results of samples from the same well over time is appropriate when the contaminant concentrations are not increasing, and an adequate number of samples is used in averaging (310 CMR 40.0926).

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
236	4.5.3.1	NAPL may be present when not found in wells (permanent solution criterion); petroleum types differ from each other and from non-petroleum contamination.	22	The Department recommends using EPA's level of 1% of the contaminant's pure phase solubility as indicative of DNAPL (EPA 1992 and 1994). Specific types of petroleum contamination will be evaluated in the risk characterization for a site. The Department acknowledges the differences between petroleum and non-petroleum contamination in terms of persistence and biodegradability; however, the presence of petroleum LNAPL is a factor recommended for evaluation prior to RAO.
237	4.5.4	Partial Class B RAOs can also be written for portions of a site where lines of evidence have demonstrated that there is not a complete vapor intrusion pathway and response actions have not been performed. An AUL is not necessary in this situation.	11	The standards for Class B RAOs apply at vapor intrusion sites as they do at any other site. Source control or elimination is a requirement of partial Class B RAOs.
238	4.5.5	Add a reference to the Post-Class C OMM requirements in 40.0897.	16	This section has been revised to include a reference to the Post-Class C RAO Operation, Maintenance and/or Monitoring requirements in 310 CMR 40.0897.
239	4.6	This comment recommends deleting the section that discusses the continuation of VI mitigation outside the MCP process.	11	MassDEP has included this section in anticipation of questions regarding the continued operation of SSD systems once the MCP response actions have been completed. MassDEP encourages continued reduction of exposure to contaminants.
240	4.6	The comparison to drinking water POET systems needs clarification; it seems it would be difficult to prove the infeasibility of SSD systems, since they are less expensive to operate.	16	The comparison of POET systems in this section has been eliminated for clarity.
241	4.6	This comment recommends deleting references to radon because they imply that PRPs must test residences for radon.	17	Section 4.6 states the Department's recommendation that radon testing be performed by the owners or occupants of buildings (not the PRP) where contaminants have been detected in indoor air via vapor intrusion from the subsurface (see footnote 9 in Section 4.6). The reference to radon highlights a different public health issue to consider before dismantling a SSD system. The guidance identifies radon testing and the use of SSD systems to abate radon contamination as activities performed outside of the MCP process.

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242	4.7	Support the guidance in 4.7, Future Use Considerations, which enable an AUL to notify prospective purchasers that more work remains to be conducted at their property when future development occurs. Approach is consistent with providing predictability for property owners, sellers and purchasers.	4	Support noted.
243	4.7	Commenter objects to statement "…and groundwater remediation should be undertaken prior to closure to reduce potential impacts to future buildings" as it implies that groundwater remediation is required at every site.	17	Text has been revised to remove that statement.
244	4.7	The document is biased toward using an AUL to limit/control future building construction in any area where the GW-2 stds are exceeded. Commenter is concerned about this because 1. mere exceedance of GW-2 is not enough to warrant construction with a vapor barrier and sub-slab system; and 2. modeling can be used to rule out whether such a system is necessary.	12	As the commenter notes, the approach in section 4.7 is voluntary/not a requirement. MassDEP views the use of the AUL as a good and protective approach to address future construction in areas with contamination above GW-2. Not addressing future buildings at the time of RAO runs the risk of the issue arising post-construction when it will likely be more difficult to mitigate, disrupt use of the new construction and create conflict between property owners/developers/tenants, etc. MassDEP does not agree that use of a J&E model *using site-specific inputs* is predictive of the likelihood of vapor intrusion into *future* buildings; this type of modeling has not been shown to be predictive of vapor intrusion into *existing* buildings. Use of the J&E model as a screening tool using the same conservative inputs used by MassDEP to develop the GW-2 standards is an acceptable approach. The guidance reflects this approach.
245	4.7	The guidance references only two mechanisms under the MCP to ensure that the potential for vapor intrusion is addressed at a site that achieves NSR prior to construction of a future building: use of an AUL and new notification of a reportable condition. In fact there is a third mechanism which is to evaluate the possibility of vapor intrusion associated with a future building.	17	MassDEP does not agree that use of a J&E model *using site-specific inputs* is predictive of the likelihood of vapor intrusion into *future* buildings; this type of modeling has not been shown to be predictive of vapor intrusion into *existing* buildings. Use of the J&E model as a screening tool using the same conservative inputs used by MassDEP to develop the GW-2 standards is an acceptable approach. The guidance reflects this approach.
246	4.7	In order to limit future uncertainty, the document should provide avenues for allowing a consideration of future buildings in a Response Action Outcome.	12	Use of an AUL is one avenue that may be used with a Response Action Outcome. MassDEP is considering a potential regulation change, such as an RAO category that would identify the future building concern; such a change would require more discussion as well as consideration of other alternatives.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
247	4.7	It should be clear that this section is guidance rather than a requirement.	12	MassDEP will make it clearer that this is not required.
248	4.7	Requiring an AUL for all sites that do not meet GW-2 standards is likely to be an untenable situation for the regulated community.	23	The use of an AUL for future buildings is not a requirement, it is an option. MassDEP will make it clearer that this is not required.
249	4.7	Underground parking garages which are mechanically ventilated should be included in this section; they are recognized as intrinsically safe (ASTM E2600 Standard Practice for Assessment of Vapor Intrusion into Structures on Property Involved in Real Estate Transactions).	12,17	MassDEP agrees that a ventilated garage on the basement level would be analogous to the open air garage or to the barrier and SSDS combination used in the recommended future building approach and will incorporate this example into the guidance.
250	4.7, Figure 4-5	The figure and discussion are all based on GW results; how are soil concentrations that could pose a risk to future buildings addressed?	15	The Figure has been modified and more clearly labeled to indicate that it is focused on groundwater contamination. This discussion will highlight the issue of soil contamination as a risk to future buildings. As discussed previously, MassDEP does not have recommended levels of VOCs in soil for future building considerations.
251	4.7.2	The use of GW-2 in Figure 4-5 is understood, but the reference to GW-3 is inappropriate. This would only be true in the case of a Method 1 risk characterization.	15	The commenter is correct that the use of GW-3 oversimplifies the flow chart and assumes that Method 1 is being used to characterize risk. The flow chart has been modified to note this issue.
252	4.7.2	MassDEP seems to be discouraging the reliance on future notification of vapor intrusion issues (rather than reliance on an AUL) by identifying it as an "uncertain approach". We suggest clarifying that this is allowed and requires no technical justification, despite MassDEP's preferences.	15	The concern with reliance on a subsequent property owner who purchases a site with a Permanent Solution RAO to recognize that there may be a potential for vapor intrusion if new buildings are constructed is that it requires fairly specific knowledge of the MCP on the part of a subsequent property owner/developer to recognize that the RAO does not address such potential. While sophisticated owners/developers will conduct due diligence and identify this concern, others will not. The current regulations support notification and there is no requirement for technical justification for site closure that does not address the potential for vapor intrusion.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
253	4.7.3	It is stated that modeling cannot be relied upon as the sole determinant to assess potential future exposure. Commenter argues that it can be effective in cases where it can be demonstrated using conservative transport assumptions that vapor intrusion will be insignificant. Modeling is an effective tool for deciding on the need for an AUL.	22	Use of the J&E model as a screening tool using the same conservative inputs used by MassDEP to develop the GW-2 standards is an acceptable approach. The guidance reflects this approach.
254	4.7.3	This section describes MassDEP's position that modeling should not be relied upon as the soil determinant of potential exposures. GW-2 standards are based on modeling, as is interpretation of soil gas levels. MassDEP needs to be more specific as to what type of modeling is acceptable and what is not.	23	Use of the J&E model as a screening tool using the same conservative inputs used by MassDEP to develop the GW-2 standards is an acceptable approach. The soil gas screening levels are based on an empirical model (attenuation factor was derived from measured concentrations). MassDEP's position on the use of modeling has been clarified in Section 2.
255	4.7.4	For the three categories of groundwater concentrations for future building considerations, do you use the historically highest result, the latest round or other?	2	You should use concentrations that are representative of current conditions (at the time of closure) and conservative. This clarification has been added to the guidance.
256	4.7.4	Guidance should clarify that if the SSD system is turned off for sampling and found not to be needed to maintain NSR then the AUL is not necessary and may be removed.	17	An AUL that referenced operation of the system in such a case could be terminated. If a barrier is also in place the AUL would still be recommended for the maintenance of the barrier's integrity (i.e., to prevent puncturing barrier without resealing it during future renovations).
257	4.7.4	The recommendation to install a vapor barrier and SSD system for Category B petroleum sites is onerous as these sites will not pose a risk for vapor intrusion provided the foundation will not come in contact with groundwater.	22	The approach is a recommendation, not a requirement. It is unclear why the commenter suggests that contact between the foundation and the groundwater is considered necessary for vapor intrusion; this has not proved to be the case with actual sites.
258	4.7.4 Category C	Is it practical to expect a building to remain unoccupied for a period of two years to test the indoor air?	2	There is no intention for the building to remain vacant over the two year period of testing. Even in the event that high levels are detected, a properly designed/installed SSDS system will be able to mitigate vapor intrusion so that the building is safe for occupancy (that is a benefit of incorporating the SSDS system into the building construction). The only system shut down would be to conduct the sampling rounds; after sampling system operations should resume if found to be necessary.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
259	4.7.4 Category C	Where indoor air sampling indicates the presence of site-related VOCs in indoor air that are determined to be the result of vapor intrusion, this result should not be deemed to negate or change the determinations or statements of the RAO since these conditions were already considered; the notification exemption at 310 CMR 40.0317(17) applies. If testing indicates the vapor intrusion pathway is incomplete or there is NSR, is notification necessary? Guidance should clarify when new notification would be required.	17	The exposure conditions are not the same as what they were at the time of the RAO (new exposure condition was created with the construction of the building where vapor intrusion is occurring). The reporting exemption is based the absence of new exposure conditions that trigger response actions. When sampling indicates the need for the SSD system to maintain NSR levels, then ongoing response actions are needed to address the exposure.
260	4.7.4 Category C	The proposed approach is too onerous if a soil gas profile shows the pathway is incomplete.	22	A soil gas profile in the absence of a building does not indicate what conditions will be post-construction.
261	4.7.4.1	The last sentence of paragraph 2 should be revised to specify it pertains to post-RAO response actions “within an AUL area…”	17	Text has been revised as suggested.
Section 5 – Public Involvement				
262	5	"There is a strong need to address the public health issues around indoor air quality and this guidance is a step towards providing the needed protection to human health. As part of protection the public there is a responsibility to properly notify and educate the affected parties and that includes people who are not directly affected by the contamination." ..."Form letters and jargon are unacceptable when communicating with the public... "I would recommend one-page site-specific fact sheets, written in layman's terms..."	1	MassDEP agrees in the usefulness of fact sheets and has developed them for our publicly funded site work. We have made available our Vapor Intrusion fact sheet and are in the process of developing more for LSPs/PRPs to use; text has been added to emphasize the importance of communicating in jargon-free and accessible terms for the layperson.
263	5.1	The text refers to "potential" Affected Individuals, introducing a broader class of persons subject to public notification requirements. This broadening is inappropriate.	14,17	The text has been revised and the word "potential" has been removed.
264	5.1	Text on the purpose of the section is suggested that highlights the distinction between required and optional public involvement.	17	Text similar to that suggested was incorporated; required and optional public involvement is presented in separate and distinct sections.
265	5.2	The inclusion of "other interested parties" in a section entitled MCP Requirements for Notification of Property Owners in not appropriate/overly broad.	14	MassDEP will revise to make clear which parties require notification.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
266	5.2.1	The draft guidance suggests that "efforts should be made" to provide some context for the recipient of form BWSC123 as soon as possible after providing the analytical results. The regulations do not require this nor does the form. "Tabulation of data and comparison to applicable standards should be sufficient."	14	This section has been revised to make clear what is required versus what are optional measures that may be effective in improving communication about the sampling results. For example, the tables and comparison to standards mentioned by the commenter as being sufficient are not required by the MCP.
267	5.2.1	It should be noted that public entities (municipalities, state agencies and public authorities) are also considered property owners.	17	Text has been added as suggested.
268	5.2.2	A request for posting of the BWSC124 form is a regulatory requirement for the PRP, however, since the PRP may not have legal access to the property where the posting in required, a documented good faith effort should suffice.	14	This section of the guidance does not indicate what efforts are expected to confirm the posting.
269	5.2.2	The language should clarify that notices under 40.1403(11) are required only when IRAs to address IH or a CEP involves a remedial action.	17	The text does state that the requirement applies to remedial actions, but this distinction has been emphasized.
270	5.2.2	The discussion should specify that Affected Individual can include tenants of residential, commercial and industrial space.	17	Text has been revised as suggested.
271	5.2.3	The guidance should indicate that BWSC122 is provided at two milestones, as specified by 40.1406, Phase II and RAO.	14	Text has been revised as suggested.
272	5.3.1	Notification to Local Officials – the fifth bullet should describe the relevant regulatory requirement at 40.1403(3)(a) more specifically.	17	Text has been revised to more specifically track the MCP provision.
273	5.4	PIP sites – the fifth sentence should be clear that after PIP designation, the Public Involvement Plan and other steps are required, not optional.	17	Text has been revised to be clear that PIP activities are requirements.
274	5.5	Optional public involvement activities – commenter is concerned that optional activities will create new *de facto* requirements	17	These optional activities are clearly described as additional suggestions to help facilitate better communication with the goal of not only potentially improving parties' understanding of response action and risk issues, but also avoiding difficulties that can arise from incomplete or ineffective communication.
Appendices				
275	III.2.2.4 Sorbent Tubes	Commenter advocates the use of sorbent tubes for soil vapor sampling.	3	Sub-slab soil gas samples may be collected by a variety of methods, including sorbent tubes. The text has been revised to make this clear.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
276	III.2.3.1 Evacuated Canisters	When collecting a grab sample, care must be taken to avoid too high a sampling rate so that short circuiting of the soil gas sample does not occur.	3, 15, 17	The text has been revised to note this issue and recommends an air tight seal at the soil gas sampling point.
277	III.2.3.2 Glass Vials	Glass vials are not typically used to collect air samples.	7, 15, 22	Use of the glass vial approach is included in the document because it has been used successfully by MassDEP. MassDEP has used glass vials for grab samples as a screening method, but with appropriate QA/QC such samples could be used for other data objectives.
278	III.2.3.3 Passive Badge Samplers	Passive samplers not discussed in main text.	5	The main text only describes the most common method, which is the canister method. Other methods are described in Appendix III. A reference in Section 2 to other methods has been added.
279	III.2.3.3 Passive Badge Samplers	Several commenters advocate for the use of passive badge samplers, asserting that the sample volume can be determined by "experimentally measured data", and that the data is sufficiently accurate. Some references were provided highlighting passive samples with good correlation to canister results.	7,10,3	Passive samplers are fine for screening. Without a known sample volume, however, it cannot be determined how accurate the sample results are. Appendix III, MassDEP notes that passive samplers may be effective as a screening technique.
280	III.2.3.5 Tedlar Bags	Tedlar bags are not recommended by the draft guidance because of the possibility of absorption of COCs into the bag. Commenter recommends that Tedlar bags should not be used for indoor air samples, but may be used for screening purposes for soil vapor/sub-slab samples if desired.	7, 16	This section was retitled "Gas Sampling Bags" in Appendix III. The text was revised to note that gas sampling bags may be acceptable for screening, and other uses, provided commensurate QA/QC is performed.
281	III.2.4 Representative Indoor Air Sampling	Acknowledge the applicability of longer term (3 days or greater) sampling to get more representative exposure information.	15	The text in Appendix III Section 2.4 "Representative Indoor Air Sampling" discusses the value of longer sampling durations to address variability.
282	III.3 Sample Analytical Methods	Commenter advocates that the laboratory analyze and report only on the site COCs, instead of all the analytes on the CAM lists.	17	The text in Section 2 and Appendix III Section 4 "Laboratory Analytical Methods" has been revised to support limiting the analyte list to site VOCs. Note: as part of the CAM presumptive certainty requirements it is necessary to document the use of a reduced analyte list.
283	Attachment III.1 – Indoor Air Quality Building	Commenter requests that the Building Survey form not convey any personal information about the habits of the residents that might invite theft.	16	The Building Survey form has been edited accordingly.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
	Survey			
284	Attachment III.3, Section 1.0	Commenter points out inconsistency between the sub-slab probe design in this, and other, guidance documents.	15	MassDEP has edited the picture of the sub slab probe design to be generic.
285	Attachment III.3 Section 2.1 (Glass Vial Sub-slab Grab) Sample Collection	Check pressure before collecting sub-slab to ensure building pressure is not greater.	15	Text has been added about considering building pressure and making pressure measurements if this is a concern.
286	Attachment III.3, Section 2.2.1	Commenters note that 15 liter canister is generally not available.	7, 15	Text has been changed to describe most commonly used canister sizes (1, 3, and 6 L).
287	Attachment III.3 2.2.2 (Canister Sub-slab Grab) Sample Collection	Commenters support a more rigorous approach to collection of sub-slab soil vapor samples, including flow rate measurement, vacuum measurement, helium tracer leak checks, field screening of soil vapor. Similar to low flow sampling. And, describes helium as the best tracer substance.	7, 10	The appendix has been revised to acknowledge the potential benefits of these sampling practices.
288	Attachment III.3 2.2.2 (Canister Sub-slab Grab) Sample Collection	Flow rate limitation to avoid short circuiting of atmospheric air into the soil vapor sample is unnecessary.	10	The degree to which short-circuiting is an issue is difficult to know. The text mentions it as a consideration and recommends getting an air tight seal to prevent it at the sampling point.
289	Attachment III. 3, Section 2.2.1,	Remove word “Grab” from heading, and describe canister sizes 1, 3, and 6 liter.	15	The text has been revised accordingly.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
290	Attachment III.4, Section 3.0 , Sample Collection	Fixed orifice flow controller at low flow rates will provide a variable, not constant flow rate as pressure changes.	3	This guidance does not aim to provide such technical specificity in terms of describing the orifice and backplate pressure regulator on a sampling canister.
291	Attachment III.4, Section 3.0 , Sample Collection	The last sentence intends to describe that a canister pressure increase should be confirmed thereby indicating that an air sample was collected.	15	The text states that canister pressures should be recorded before and after sample collection.
292	Figure 1 - Example of a sub-slab soil gas probe.	Commenter states that, standard tubing size for connecting to canisters is ¼" outer diameter (OD) tubing. This figure should specify whether the dimensions for tubing are OD or inner diameter (ID).	15	This figure is only an example. Site specific equipment can vary. Figure 1 has been revised to be more generic and remove the tubing size and the solid tubing wall thickness labels.
293	Appendix VIII	Commenter appreciates the examples provided in the table to assist in the writing of AULs for future bldg construction. AULs do provide a caveat emptor, but do not provide certainty that the new property owner will remain out of the MCP system even if they follow the construction recommendations.	8	While additional MCP response actions may be necessary to address vapor intrusion issues identified after the construction, these actions may be conducted under the Post-RAO provisions.
294	Appendix VIII	AUL guidance revisions should be made consistent with Appendix VIII of VI draft.	8,15	Upon finalization of the VI guidance and the AUL guidance revisions, the two documents will be made consistent regarding the use of AULs to address VI.
295	Appendix VIII	Appendix should include less prescriptive examples – An AUL can be written to prohibit construction of occupied structures in specified areas until an LSP evaluation and opinion is completed of the vapor intrusion pathway.	15	Where there is the potential for a pathway it is difficult to see how such an evaluation could be done. The recommendations in Appendix VIII are meant only to apply where the potential for vapor intrusion in future construction has already been identified.
296	Appendix VIII and 4.7.4.1	This section on AULs and future building construction is far too prescriptive. Less prescriptive examples should be provided. Recommend providing as-built SSDS information in the [Post-RAO] RAM rather than include detailed design information in the documents recorded at the Registry of Deeds.	15,17	This section has been revised to be less prescriptive and to emphasize there is flexibility in writing the AUL. The detail in the AUL examples was intended to ensure that a different/subsequent property owner and LSPs understood the *elements* of the post-RAO work to be performed; it was not intended to replace an As-Built plan, which would involve considerably more detail than what is presented in this section and as suggested, should be contained in the Post-RAO RAM submittal.
297	Appendix VIII	Commenter disagrees with the need for an AUL amendment to document the presence of the vapor barrier and SSD system once the building is constructed if the construction is consistent	15	MassDEP agrees that this information can be documented in the response action submittals if it is implemented consistent with the AUL. The text has been revised accordingly.

Comment Number	Draft Guidance Section	Summary of Comment (s)	Comment Set(s)	MassDEP Response
		with the AUL. These details can be provided in the post-RAO status report.		
298	Appendix VIII 5.3.1	The design specifications for the vapor barrier and SSDS should not be provided as an Attachment to the AUL; they should be included in the RAO report. As-built specifications should not be included in the AUL.	15,17	MassDEP recommends that the AUL include a specific reference to minimum design specifications so that subsequent property owners install an adequate barrier since the types of barriers varies widely. The recommendation was not intended to mean attachment of detailed design specifications. Minimum specifications could also be summarized briefly in the obligations and conditions of the AUL.
299	Appendix VIII 5.3.1 and 5.3.2 and 1.3.1	MassDEP does not provide guidance on soils that are "categorically" considered a source of potential vapor intrusions. Along the same lines, the guidance discusses AULs for future buildings based on GW-2 levels, but does not address when VOCs in soil are a concern.	2	Appendix VIII has been modified to include mention of AUL use to address cases where VOCs in soil are a concern. As discussed in previous responses, MassDEP has not developed categorical levels in soil for this purpose.
300	Appendix VIII	Appendix VIII appears to be written to address sites where buildings do not exist at the time of the RAO. The guidance should consider how AULs should be written for future development sites that have existing buildings.	17	Considerations for AULs to address modifications or change of use of existing buildings is addressed in Section 2. The approach in Appendix VIII could be used for properties with existing buildings and space for additional buildings or the construction of new buildings after the demolition of existing buildings. Text has been added to identify this situation as applicable.
301	Appendix VIII.3	The proposed obligations for operation of the SSDS system refer to keeping the system operating “continuously.” As noted previously, this language is too prescriptive; maintenance of a system would require that it be shut down for repairs.	17	Language has been modified.
General				

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302		"There must be room to provide both protection for public health and safety; and to ensure that provisions impact on former and subsequent property owners will not be extraordinarily burdensome. Perhaps a tiered system and/or "grandparent" provisions that enable less stringent levels of compliance for such older situations and longer time periods for which to comply."	4	The guidance is written to promote a protective approach going forward. Where exposures exist, older sites may mean longer periods of exposure; longer time periods to comply are not reasonable in such cases.
303		The guidance in part negates or contradicts established policies and requirements (VPH/EPH and Construction of Buildings in Contaminated Areas).	15	The guidance does update and supersede existing guidance documents (i.e., the goal of developing the guidance was to provide most current recommendations on vapor intrusion). Contradictions in related guidance will be made consistent after the VI guidance is finalized.
304		Commenter provided a list of abbreviations to be incorporated into the Guidance.	20	