Table 1. Response to Comments on May 2012 DRAFT Vapor Intrusion Guidance Document

#	Comment	Response	Commenter	DRAFT Section	FINAL Section
GENERAL					
1	Our member companies solicited a review from Dr. Blayne Hartman, a noted national expert. Dr. Hartman has previously worked with your staff. Except for that noted in the next paragraph, Dr. Hartman believes the DEQ draft is a good document and reasonable for petroleum sites.	Noted.	API/MPA/ MACS	Document	Document
2	It is one of the best State or Federal VI guidance's I have reviewed.	Noted.	Hartman	Document	Document
3	The proposed guidance is a substantial improvement over previous guidance.	Noted.	Shell	Document	Document
4	We appreciate MDEQ's efforts in engaging stakeholders during development of its vapor intrusion guidance, and hope that MDEQ will continue to work with stakeholders as it reviews the comments that it receives.	Noted.	GM	Document	Document
5	The scope of the draft guidance is appropriate and the level of detail is commendable. The writing is generally well-organized and clear.	Noted.	URS/Dow	Document	Document
6	We are especially glad to see that the guidance stresses the need for a conceptual site model and that it treats petroleum hydrocarbon sites and chlorinated solvent sites separately and differently.	Noted.	URS/Dow	Document	Document
7	We also appreciate that large non-residential buildings are treated differently than residential sized buildings.	Noted.	URS/Dow	Document	Document
8	Overall we feel that the guidance document is well prepared and is definitely attempting to provide valuable guidance to the regulated community.	Noted.	GES	Document	Document
9	We agree with the evolution of the Guidance from a sampling and mitigation procedure document (past drafts) to an investigation and decision making process document, supplemented with sampling and mitigation procedures.	Noted.	HMA	Document	Document
10	This transformation in the Guidance is significant as it makes strides toward self-implementation of the DEQ environmental protection program.	Noted.	HMA	Document	Document
11	We appreciate the extensive effort devoted to the development of the May 2012 draft Guidance Document for the Vapor Intrusion Pathway. Substantial progress has been made in establishing better discipline for the evaluation of potential vapor intrusion situations.	Noted.	RACER	Document	Document
12	. . . we have reviewed the document and found it to be comprehensive, flexible, and well written.	Noted.	Fibertec	Document	Document
13	The added alternative procedures to attain compliance for vapor intrusion (VI) risk in Appendix B are also a value.	Noted.	HMA	Appendix B	Appendix B
14	The list of key stakeholders and parties is partially alphabetized, but several listings need to move to make the list fully alphabetized.	Text has been revised.	URS/Dow	Key Stakeholders	Key Stakeholders
15	ASTM International was formerly known as the American Society for Testing and Materials. Add "formerly to definition. Change to "ASTM International".	Text has been revised.	URS/Dow	Definitions	Definitions
16	Definition is incorrect for "atm-m3/mole" delete first "per".	Text has been revised.	URS/Dow	Definitions	Definitions
17	Acronym is incorrect for sub-slab depressurization system. Change to "SSDS".	SSD is a term referred to by the ITRC, USEPA, and others.	URS/Dow	Definitions	Definitions

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18	Definition is incorrect for vapor intrusion. Change "process" to "pathway".	Text has been revised.	URS/Dow	Definitions	Definitions
19	Section 1.0 Introduction - The Guidance should not be limited to site conditions "where the generic criteria do not apply." This conflicts with the initial step of VI investigations which is to develop the CSM and determine if the pathway is complete. For example, there may be sites where the foundation does not meet the building concrete qualifications for generic criteria application, yet other physical aspects of the CSM, such as those listed in Table 1-2, indicate an incomplete pathway. Development of the CSM as the first step of VI pathway evaluations, before initiating sampling or making comparisons to screening levels (SLs), is a central feature addressed throughout our comments.	The text has been revised to indicate that the Guidance Document can be used in situations where the generic criteria apply, as well as, when the generic criteria do not apply.	HMA	1.0	1.0
20	Section 1.2 (Intent and Scope of this Document) should be moved ahead of Section 1.1.	Document has been revised to reflect the comments of submitters and has resulted in a re-ordering of the text.	GM	1.2	1.1
21	Section 1.2 Intent and Scope of this Document – Elements of Section 1.6 Investigative Process, fit with Section 1.2. Current Sections 1.3 through 1.5 would fit as subsections to the current Section 1.2. This restructuring may create a logical flow of topics, starting with a general description of the scope and processes, followed by a description of the pathway and the general factors affecting VI into buildings.	Document has been revised to reflect the comments of submitters and has resulted in a re-ordering of the text. Please see response to Comment #20.	HMA	1.2 to 1.6	1.2 to 1.5
22	Document indicates a site specific "may" be conducted and Rule 714(2)(a) & 724(2)(a) states a site specific "shall" be conducted.	Text has been revised.	Barr	1.1.1	1.3.1
23	Section 1.1.5 #1 is not clear. Change to the following: "Using previously collected soil and groundwater data and existing site knowledge to complete a screening level assessment regarding whether the VI pathway is complete (Section 3).	Text has been revised.	Barr	1.1.5	1.4
24	HVAC System in Table 1-1. Acknowledge that turning the system on can reduce indoor air concentrations.	Agreed. Text has been revised. However, HVAC systems are only effective when in operation and may not be a reliable long-term solution in many circumstances.	Arcadis	1.6 Table 1-1	1.4.1 Table 1-1
25	At non-UST sites, the surface boundary condition (e.g., pavement) may also have an effect on the source-separation distance.	Noted and is reflected in Table 1-2 under "Surface cover or seasonal effects" as well as under "Volatile chemical/concentrations".	Shell	1.4	1.4.1 Table 1-2
26	Surface Boundary conditions (paved, bldg, atmosphere) do not impact screening at UST sites. It can impact non-UST sites.	Please see response to Comment #25	Shell	1.6 Table 1-2	1.4.1 Table 1-2
27	Section 1.4 Factors Affecting Soil Vapor Migration and Intrusion – We recommend including chemical type within Table 2 as an "environmental factor" as chlorinated and petroleum hydrocarbons have different vapor migration characteristics.	Table 1-2 has been modified to reflect differences in vapor migration characteristics due to biodegradation.	HMA	1.6 Table 1-2	1.4.1 Table 1-2
28	DEQ needs to consider that the Guidance doc will be used for a wide range of situations other than closure, such as due care, property transactions, remedial assessments, etc.	Understood. The text in Section 1.6 was clariified and specifically notes that the desired enpoint needs to be understood when assessing the VI pathway. Appendix B was established to provide additional information or unique approaches. It is the intent of the MDEQ to provide additional alternative approaches and information on property transactions and due care in Appendix B in the near future.	GM	1.6	1.5 and Appendix B

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29	Section 2.0 MDEQ's Approach for Evaluating the Vapor Intrusion Pathway – Based on our previous recommendation to replace the current generic VI criteria with VISLs, and developing a CSM as the key first step in a VI evaluation, we do not agree with the first sentence in this section which states, "The MDEQ's approach has been established when the generic criteria do not apply and is based on a step-wise, risk-based approach emphasizing the use of empirical field data, rather than fate and transport modeling, to assess human health risks." Alternatively, we recommend that the MDEQ approach consist of a step-wise (or Tiered) investigative approach emphasizing the initial use of a CSM to determine if the pathway is complete, followed by collection of field data and comparison to VISLs, if necessary. This approach is consistent with recommendation "i" from the Office of Regulatory Reform to "allow the initial use of a conceptual site model and other site evaluation techniques before concluding the presence of a complete exposure pathway and vapor intrusion risk."	The text has been modified to provide further clarification. However, the guidance document has been found to be consistent with the recommendations from the ORR. Alternate approaches can be proposed; however, the current approach does allow a demonstration that the pathway is incomplete based on the use of a CSM with the appropriate site characterization.	HMA	2.0	2.0
30	Section 2.1 Conceptual Site Model – The four bullet items in this section are useful general guides. We suggest further adding that vapor migration and attenuation are the primary components needing to be evaluated for the VI pathway. To assess vapor migration and attenuation the following components should be assessed collectively (i.e., not independent of one another) to determine if a complete pathway exists, and if so, the type of data collection and collection schedule needed to evaluate the exposure potential: 1. Source depth and distance (laterally and vertically) to building; 2. Chemical type and concentrations (i.e., source strength); 3. Geology (including preferential flow paths) between source and building; 4. Building characteristics (openings, cracks etc.); and, 5. Receptor characteristics (function of building use)	The text has been modified to incorporate the need to evaluate data collectively.	HMA	2.1	2.1
31	Figure 2.1 is sensationalistic and may be misleading for most sites. Recommend replacing figure.	The figure has been replaced with previously released picture of a CSM by ITRC (2012). Reference is provided in the document.	URS/ Dow	2.1 Figure 2.1	2.1 Figure 2.1
32	Clarify how sites can screen out of the process. More detail is needed on what would trigger a screening out.	Section 2.2 is the introduction for the Investigative Framework. More details on the necessary details is provided in Sections 3 through 5 depending on the sampling methodology implemented. Text in each of the sections has been modified based on comments received and to aid in clarification. It should be noted that the process established by the document provides multiple opportunities to demonstrate that the pathway is not complete and does not pose a risk to human health.	Arcadis	2.2	2.2 with additional details provided in Sections 3.0 - 5.0

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33	Change Step 1 to "Pathway Screening Assessment" to clarify that this step does not involve comparison of available data to screening levels. As stated in the text, the purpose of this step is to use the CSM to "assist in determining if the site must be investigated for VI or if VI can be excluded as a pathway of concern." The last sentence in Step 1 could be considered Step 2, an evaluation, post-CSM, to compare available sample data to VISLs, as appropriate based on the CSM. It may be helpful to supply a format or application whereby the user could list the outcomes from completing the CSM for a site, such that the next steps of the VI evaluation process are properly selected. • Given the uncertainties with outcomes from Step 1, we recommend modifying the title of Step 2 to "VI Sampling Investigation." As DEQ has stated, different pathway assessment options may result from the CSM, such that a soil gas investigation may not be included, or may be one component of the overall VI investigation. • The process discussed as Step 3 in the Guidance appears pertinent to Step 1 – attributes of the pathway evaluation associated with development of the CSM.	The name of step 1 was changed to Pathway Screening Assessment as it incorporates more than just a comparison to a screening level. The text was clarified that this step includes the development of a CSM and includes collectively assessing the site characteristics, as discussed in Section 2.1 of the Guidance. As identified in the document, all available data should be considered in the development of the CSM. Step 2 remains soil gas sampling and therefore, the name does not need to be changed. Regarding reference to the CSM in Step 3, each step will involve the use and updating of the CSM, which should be constantly evolving as more data become available.	HMA	2.2	2.2
34	Text refers to App D.1 through D.3 as Tables B-1 through B-3.	Text has been revised.	Barr	2.34	2.3.4
35	Why the need to collect lithology and moisture content info?	This info is needed to fully characterize the site. If it is already available via previous soil sampling events, there is no need to collect it during vapor sampling. It was not the intent of this section for the samples to have a geotechnical analysis performed but rather to document the site conditions in accordance with standard logging techniques on the visual observations of moisture and soil type. The text has been modified to provide better clarification.	Hartman	2.4.1	2.4.1
36	Section 2.4.1 Field Sampling – The DEQ should specify the intended use of the soil moisture content measurement. Regardless, if the result from lab analysis is later determined as unaccepted by DEQ, this presents a significant inefficiency and increased cost to the data collection process.	Text revised to clarify it is referring to field classification of moisture content. Please see response to Comment #36.	HMA	2.4.1	2.4.1
37	Section 3.0 Step 1: Screening Level Assessment – As correctly stated in the first sentence of this section, the intent is to determine if the pathway is complete. Consequently, as suggested previously, we recommend changing the title of Step 1 to "Pathway Screening Assessment." We suggest a Step 2 to follow as a SLs assessment to determine if comparison to media-specific VISLs or IRASLs is appropriate, and if so, identify the pertinent SLs for investigation or remediation purposes. A defined process such as our proposed Step 2 can help guide the selection of appropriate SLs and, therefore, improve the design and reliability of follow-up investigation plans, if deemed necessary.	Please see response to Comment #33.	HMA	3.0	3.0

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38	Section 3.2.1 Impacted Groundwater – The Guidance does not contain a basis for using a 100 foot vertical or lateral separation distance between VOC source and a building/receptor. This issue can be resolved through requiring data collection to demonstrate whether the pathway is complete and/or a risk, or consult other VI guidance documents which specify other processes that may be used to screen/identify the separation distances between source and building, and geologies, that negate further evaluation of the pathway.	The 100-foot distance was based on USEPA publications. More recently it has been identified in the E2600-10 Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions which identified using a critical distance for chlorinated vapor from the edge of groundwater or soil plumes. These values were based on Task Group member experience in the field working on many of the major vapor intrusion sites in the U.S. and their published works. In addition, the Task Group was able to rely on the experience of a number of participating organizations, including USEPA, the American Petroleum Institute and the Halogenated Solvents Institute. Other publications that discus the distance include: Phil Lowell's and Bart Eklund's publication, VOC Emission Fluxes as a Function of Lateral Distance from the Source, in AIChE's Environmental Progress, Vol. 23, No.1, published in April 2004; Robin Davis's publication, Vapor Attenuation in the Subsurface from Petroleum Hydrocarbon Sources, in LustLine Bulletin 52, May 2006; Tom Hugh's Evaluation of Vapor Attenuation at Petroleum Hydrocarbon Sites: Considerations for Site Screening and Investigation, published in the International Journal of Soil and Sediment Contamination, Vol. 19, No. 10, July/August 2010; the extensive modeling work by Lilian Abreu and Paul Johnson, including their 2005 publication in Environmental Science and Technology (Vol. 39, No. 12), and Effect of Vapor Source - Building Separation and Building Construction on Soil Vapor Intrusion as Studies with a Three Dimensional Numerical Model (Buonicore, 2011). Reference: Buonicore, A. 2011. E2600 VES - Critical Distances for Vapor Migration. Commonground. http://commonground.edrnet.com/posts/e42e730fc0	HMA	3.2.1	3.2.3
39	With regards to the overall approach, it appears that if we must consider future land use and building construction, then the question of setback distances or screening radii become moot and sites will always have a potential receptor, unless explicit deed restrictions are implemented. We feel that a requirement of evaluation on parcels without a structure is unreasonable.	Clarification of this issue was provided in the guidance document indicating that it may be possible to delay the soil vapor investigation until redevelopment of the site occurs; however, if closure is sought prior to construction of a building, an evaluation or appropriate deed restrictions may be necessary.	GES	2.0 Text Box	3.4.6
40	Should be able to delay soil vapor investigation until building is constructed.	Agreed. Please see response to Comment #39.	Arcadis	2.0 Text Box	3.4.6
41	Might be appropriate to evaluate soil gas concentrations at the source to determine the worst-case scenario rather than to evaluate soil gas near receptors	Text has been further clarified and is described now in Section 4.1 under Collecting Representative Soil Gas Samples. The extent of the evaluation needed will depend on the presence of a receptor or potential receptor as well as the concentration detected.	Barr	2.0	4.1

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42	Clarify lateral distance from building for a sample to be considered a near slab sample. (the text calls out a depth (<5' bgs) but not a lateral distance.	The text has been revised and clarified to explain the difference in a soil gas sample (4.1) and a sub-slab soil gas sample (5.3). The text does not limit or establish a lateral distance that a soil gas sample may be collected but does rely on the depth that the soil gas sample is collected.	Arcadis	2.3.4 Text Box	4.1 and 5.3
43	Section 5.0 should be revised to provide for the assessment of properties without buildings in a way that does not automatically result in the need for restrictive covenants, as is implied in the draft guidance. As discussed above, we believe site-specific use of the JEM is likely the only valid option for this situation. This option would minimize the use of restrictive covenant that are not necessary, which would reduce impediments to brownfield redevelopment or expansion of existing commercial/industrial operations. This option also would be useful for properties with buildings because it would provide an assessment of potential future conditions which cannot be assessed by collecting soil gas and indoor air data over a short time span (e.g., the two rounds of sampling suggested in Table 5-3) in the event the buildings or uses of the buildings change over time.	There are many circumstances when utilizing a site-specific application of the J&E Model would still require the implementation of deed restrictions, especially if any use restrictions are identified above unrestricted residential. The need for a restriction would depend on what parameters are being modified rather than the actual use of the model. The text states that "it may be necessary" to supplement the approach with restrictive covenants or other measures as identified in Section 6. It does not say they are required in all circumstances.	GM	5.0 Text Box	5.0
44	The following text in the 6th and 7th lines is confusing: "However, because of the variation and potential for ambient air samples to be influenced by ambient air sources…." recommend changing "ambient air samples" to "indoor air samples"	Text has been modified.	URS/ Dow	5.3	5.3
45	Post-construction testing of control systems should rely upon physical Measurements (URS, DOW, 2012). The draft text indicates that indoor air testing may be required to verify system performance and effectiveness (e.g., Section 6.4.1 on page 6-8). Experience has shown that this will lead to problems because indoor air results may be inconclusive. In some cases, control systems will be installed at buildings where no vapor intrusion actually is occurring, either as a presumptive mitigation step or for community relations purposes (putting in a control system for a concerned neighbor). In those cases, pre- and post-construction results will not show any significant change. Post-construction testing of sub-slab depression systems (SSDS) should rely upon physical measurements. The USEPA radon guidance requires a negative differential pressure across the slab of at least 0.004 "H2O during cold weather and when any exhaust fans are running. The NY Department of Health uses the same value. To be conservative, a minimum negative pressure of 0.025 to 0.035 "H2O (i.e., inches of water column ["WC]) is recommended (see Attachment Three). In addition, measurements can be made of the exhaust gas flow rate to see if this value is consistent with the expected flow rate.	The intent of the text was to allow a party the opportunity to evaluate the effectiveness of the mitigation system through the use of indoor air sampling. The MDEQ supports the use of physical measurements and the text has been revised to clarify this.	URS/DOW	6.4.1	6.4.1

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46	Section 4.3 Unique Vapor Intrusion Conditions – We recommend placing the discussion in this section into an appendix that is also linked with Appendix C.2 Checklist for Developing a Conceptual Site Model. This is because the physical, chemical and environmental conditions discussed in this section should be considered within the CSM process to guide the user to these alternative VISL applications and to appropriate investigation processes.	The text in Appendix C.2 was modified to include a discussion on Unique VI Conditions and the need to consider them when developing the CSM.	HMA	Appendix C.2	Appendix C.2
47	For the SOPs in Appendix F, the draft guidance should be revised to delete phrases and words that give the impression MDEQ considers some or all of the guidance to have the effect of being requirements. Although the SOPs in Appendix F begin with a statement that indicates the SOPs are intended to provide guidance which may be modified as appropriate, the SOPs also include phrases such as "departures from this guidance will often need to include information for a more detailed review" and they frequently use the word "must", which give the impression that the SOPs are effectively "requirements" and deviations require MDEQ approval. MDEQ should delete such phrases and words.	Text has been added to all SOPs to clarify that the procedures are written for MDEQ staff and their contractors and are optional for all others.	GM	Appendix F	Appendix F
48	We are aware that many states already have guidance in place which is working to address the vapor intrusion pathway (i.e. CA, NY). Why are we not borrowing guidance directly from these states, rather than spending additional time and effort drafting new guidance?	The current guidance utilized several other state guidance documents as its basis. However, because Part 201 obligations begin with a facility, as opposed to the presence of a contaminant, many of the previously written guidance documents required modification. It is important to note that this document has recently been identified and recommended as a model for other states to utilize.	GES	General	General
49	The Guidance mostly contains the necessary content to conduct a VI pathway evaluation; however, a re-ordering of the content (evaluation processes) would help increase consideration of the appropriate elements of the pathway, and at appropriate points in the evaluation process. There is a general order of events and key considerations that should be followed when conducting VI pathway evaluations, as shown in Appendix A – the pathway evaluation flowcharts. The Guidance text and the flowcharts should be consistent.	Document has been revised to reflect the comments of submitters and in many circumstances has resulted in a re-ordering of the text as suggested. Please see response to Comment #33.	HMA	General	General
50	Restructuring the sequence of topics and consolidating related topics should aide an orderly consideration of the key aspects of VI evaluations and prevent misapplication of screening values and decisions that are not supported by the conceptual site model (CSM). For example, Section 2.5 (Identify Objectives and Strategy) and Sections 3.2 (Vapor Intrusion Screening and Receptor Evaluations) are pertinent to development of the CSM of a site, Section 2.1 Conceptual Site Model.	Please see response to Comment #49.	HMA	General	General
51	We encourage the DEQ to consider the complete context of pathway evaluation processes in developing compliance decision matrices.	Noted. The document has been revised to reflect the comments of submitters and in many circumstances has resulted in clarifications and additions to the text that provide better context to the pathway evaluation process.	HMA	General	General

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52	Additionally, the guidance and the MDEQ approach is extremely lacking with respect to assessment for those sites where soil gas and sub-slab sampling is infeasible or inappropriate and the assumptions of other screening levels do not apply.	The MDEQ feels that this approach will be applicable in most situations. Further clarification can not be provided without additional detail on why the collection of vapor samples is not feasible. In addition, unique situations not addressed by this document can be evaluated on a case-by-case basis.	Brady	General	General
53	I would like to comment further once I have received the additional technical information mentioned above (which is necessary for a complete and thorough review) and the other additional information the MDEQ has committed to including in the guidance.	Comments regarding the Department's guidance document are welcome at any time; however, the final document will be published in early 2013. Items that will not be included in the final release of the document (i.e. the final screening levels, some of the alternate approaches that have not been completed yet, etc.) will undergo a peer review process to assure stakeholder involvement in their development.	Brady	General	General
JOHNSON-ETTINGER MODEL AND OTHER MODELING RELATED ISSUES					
54	Generic screening criteria were developed based solely on modeling. If modeling is not acceptable to screen sites out, it should not be used to screen sites in.	Under Part 201 and Part 213 a party's obligations do not begin until it has been determined that the site is a facility. Therefore, if there were no generic criteria established, a party would not have any obligations to assess the pathway. In addition, it is important to note that modeling can be utilized in many site-specific applications and has this point been clarified in the text throughout the document.	Shell	1.1	1.3
55	1.1.4 cites USEPA (2005) as the basis for the claim that the JEM is less reliable when multiple contaminants or NAPL is present. This claim also mischaracterizes the cited USEPA report, and should be deleted. As discuss above, the cited USEPA document simply described a sensitivity analysis of the JEM, and did not assess the reliability of the model in any respect.	Modification made to text.	GM	1.1.4	1.3.4
56	The model (J&E) does not account for aerobic biodegradation of petroleum hydrocarbons (PHCs). Recommend including potential for over-predicting impacts for PHCs as a limitation of the model.	Modification made to text.	URS/Dow	1.1.4	1.3.4
57	References to modeling within the document, suggests a reluctance to the use of predictive modeling to evaluate vapor intrusion pathway. Modeling is a standard method applied by the United States Environmental Protection Agency (USEPA) and other states to quantify and evaluate the vapor intrusion pathway. How can industry/stakeholders be certain models will be given appropriate consideration without also defaulting to analytical data collection?	Many of the references to the J&E Model within the document are referring to the MDEQ use of the model in the development of its criteria. There is a great amount of confusion regarding use of the criteria and when site conditions make the use of criteria not applicable. We have made changes in the text in a number of locations to clarify this. It should be noted that analytical models are a tool that can be used to evaluate the VI pathway; however, data collection may also be necessary to verify the model results. Exclusive use of models, without data with which to correlate the model, often results in the inappropriate use of modeling tools. Most models require the collection of data to verify and justify its findings. All alternative approaches are given consideration as stated throughout the document.	GES	1.1.5	1.4

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58	**Big Building Model-** the use of this should be clarified and DEQ use is too conservative. MDEQ expectations for compliance and closure using the model (Appendix B Section 5.0) should be clarified. Appendix B, Section 5.0 states that there should be multiple model runs with varying inputs; this is demonstrated in the example scenario described on Table 2 of Appendix B. The example presented has a data set consisting of many sub-slab soil gas samples. Therefore, it is unclear why the maximum concentrations and zone sizes in model runs 2, 3, and 4 were inflated three fold. Using the model in this way is overly conservative and misleading, especially when there are representative sub-slab sample results. Instead, we suggest outlining realistic parameters to be used in the "multiple model runs" in the document.	The purpose of inflating the values of the soil gas results was to remove further discussion on whether the facility was fully characterized or not. In addition, using lines of evidence requires the user to establish a "weight" of evidence on the various lines collected. Applying an overly conservative value should in most cases provide a stronger line of evidence that would support the conclusion that the site conditions are protective of human health. The text currently states: "The more the evaluation can be shown to remain protective, as the model inputs exceed the "normal" or "expected" site conditions, the stronger the line-of-evidence supporting the conclusion presented." Therefore, depending on the site history, the site characterization completed, and other lines of evidence available, actual concentrations may be appropriate. No change necessary.	Arcadis	Appendix B.1 Section 5.0	Appendix B.1 Section 5.0
59	The use of **AERMOD** adds a great deal of complexity and effort that is not needed in the vast majority of cases. We recommend that "The emission flux data should be used as input to a simple box model to estimate worst-case ambient air impacts. If these prove to be unacceptable, a more rigorous modeling exercise using AERMOD or a similar regulatory model may be necessary."	The use of a box model was considered during the evaluation for alternate methods to determine compliance with the alternate air criteria as established under Part 201. However, In consultation with various stakeholders AERMOD was ultimately selected as it evaluates the possibility that the in order to address the potential that the sum of the flux over the entire facility may represent more of a risk than the flux at any single sampling point. A box model does not account for this situation. Furthermore, AERMOD is currently utilized by MDEQ's Air Division, allowing for consistency of approach and an established MDEQ expertise that will better allow for MDEQ support and assistance to those parties wishing to complete the alternate evaluation.	URS, DOW	Appendix B.2 Section 3.0	Appendix B.2 Section 3.0
60	Some items identified in App C.1 to determine if generic applies are not spelled out in rule. Is it the expectation that failure to meet the conditions of the J&E Model will result in a site-specific evaluation?	There is an expectation that when certain conditions are present (as identified in Appendix C) the assumptions used in the J&E Model to generate the generic criteria are not valid and would result in the need to perform a site specific evaluation. The text has been clarified to address this issue.	Barr	Appendix C.1	Appendix C.1
61	Appendix C.1 lists a number of situations where the "application of the Johnson and Ettinger Model is precluded" with a reference to USEPA. MDEQ should recognize that these limitations are either relevant to only USEPA's early, simplified spreadsheet version of the JEM (rather than the actual JEM) or are not based on any documented evidence. For example, the first limitation attributed to USEPA is "the presence of NAPL". USEPA eliminated this limitation by developing a more rigorous version of the JEM to specifically model vapor emission from NAPL (using Raoult's law). The second limitation is "the presence of heterogeneous geologic materials". USEPA addressed this limitation by developing a version of the spreadsheets that accommodates up to three layers of different geologic materials, and pointed out that more rigorous modeling of heterogeneous stratigraphy can be performed using other existing models such as HYDRUS.	It is important to note that the generic criteria developed under Part 201 and Part 213 utilized an earlier version (1994) of the J&E Model. It is this model and its limitations that determine if the generic criteria can be utilized. New J&E Models may be utilized and proposed as a site-specific approach; however, the details of that process are not included as part of this guidance document. This was clarified in Appendix C's discussion of the J&E Model.	GM	Appendix C.1	Appendix C.1

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62	In our site specific use of the JEM, we have used such more-advanced versions of the JEM with other models like HYDRUS, and have found conservative methods for addressing most if not all the limitations listed in Appendix C.1. As discussed in our June 2012 comments (top of page 9), we believe that a critical technical analysis of the JEM shows that it is as valid as many models that are commonly use in risk assessment, and like these other models, the JEM can be applied in a conservative way to produce protective results, i.e., result that are at least as protective over the long-term as snapshots of soil gas or indoor air concentrations.	The use of other appropriate models is allowed if the model utilizes valid inputs and completes a sensitivity analysis to support the conclusion(s) identified.	GM	Appendix C.1	Appendix C.1
PETROLEUM HYDROCARBONS					
63	The MDEQ is cautioned on the use of attenuation factors to support Generic Criteria for petroleum hydrocarbons (Section 1.1) given that they have limited applicability for reactive VOCs.	The DEQ has provided an exclusion zone in lieu of attenuation factor approach for petroleum hydrocarbons in our Alternate Approach for Investigating Vapors for Petroleum Hydrocarbons Considering Biodegradation, found in Appendix B.3.	Shell	2.3.1	2.3.1
64	MDEQ should be cautious in the use of attenuation factors for hydrocarbons. Exclusions zones may be more appropriate for hydrocarbons.	Text has been revised to stregthen applicability and use of exclusion zones. Please see response Comment #63.	Shell	2.3.1	2.3.1
65	Section 2.3.1 Screening Values for Vapor – HMA recommends that the CSM Step 1 process be used to distinguish the petroleum hydrocarbon sites from the others, and allow application of the alternative approaches provided in Appendix B.3 to evaluate VI pathway risk. This concept can also be added to the flowcharts in Appendix A.	The CSM should identify all contaminants that are present at a facility and use all available data to justify the conclusions obtained. If petroleum hydrocarbons are the only contaminants present at the site, the existing process allows for moving to the alternate approach provided in Appendix B.3 to evaluate the pathway. Clarification provided in Section 2.1.1.	HMA	2.3.1	2.3.1
66	Different site assessment strategies may be appropriate depending on whether source is dissolved-phase or LNAPL. Depth to groundwater may be the driver for dissolved phase sources, not the groundwater concentration. For LNAPL sources the driver is source and attenuation in unsaturated zone. In this case, soil gas sampling and signatures of bio (O2, CO2, CH4) may be of benefit.	In Section 2.5 "Identify Objectives and Strategy", the text was modified in the bullet point regarding petroleum hydrocarbons to clarify that the strategy used may depend on the nature of the source.	Shell	2.5 and Appendix B.3 Section 2.0	2.5 and Appendix B.3 Section 2.0

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#	Comment	Response	Commenter	DRAFT Section	FINAL Section
67	Bioattenuation is likely to be significant at all dissolved-phase sites (Lahvis et al. written communication; Davis, 2012; Hers et al, 2012; Lahvis, 2012; Peargin and Kohlhatkar, 2012; Wright, 2012), even for dissolved-phase benzene concentrations greater than 1 mg/L. Groundwater would essentially have to be in contact with the building foundation for there to be a potential for vapor intrusion. In such cases, it may be practical to establish a 1 m (3 ft) buffer distance (consistent with the one proposed in the MDEQ guidance) to account for uncertainty in the source depth (water-table elevation). Of note, the maximum benzene concentrations in soil gas observed above dissolved-phase hydrocarbon sources containing benzene < 1 mg/L are well less than the 160 ug/m3 screening level proposed in the vapor intrusion guidance (see attached figure from California State Water Resources Control Board, 2012). (Shell, 2012)	Though biodegradation has been shown to take place in distances less than 3 meters, in many circumstances, it cannot be easily determined without collecting additional data specific information. While the MDEQ concurs that the biodegradation of PHCs is well documented and occurs in many circumstances, it is also true that there are certain site conditions in which biodegradation will not or cannot occur (Roggemans et al., 2001). The MDEQ allows for sites to demonstrate that biodegradation can occur at distances of < 3m. Appendix B.3 was intended to help categorize biodegradation at petroleum hydrocarbon (PHC) impacted sites into one of three categories: 1. Those in which biodegradation clearly occurs and there is, therefore, a low potential for VI; 2. Those in which biodegradation clearly does not occur and the potential for VI must be evaluated; and, 3. Those in which a conclusion regarding biodegradation cannot be drawn without further evaluation. Once it has been established that biodegradation is occuring, the reduced buffer distance can then be applied. It is important to note that the data required for sources greater than 3 meters are significantly less and for most sites can be completed as part of a site's initial characterization.	Shell	4.3.1 and Appendix B.3	3.4.1 and Appendix B.3
68	Appendix B3: Alternative Approach for Petroleum Hydrocarbons – Overall, this section and the approach are excellent	Noted.	Hartman	Appendix B.3	Appendix B.3
69	On exclusion distances and their use for petroleum hydrocarbons - This ambiguity supports an approach based on exclusion (source-foundation separation) distances.	Noted.	Shell	Appendix B.3	Appendix B.3
70	For dissolved-phase petroleum hydrocarbon sources (in the absence of residual-phase LNAPL), depth to groundwater is likely to be the critical control on petroleum vapor intrusion risk, not the hydrocarbon concentration in ground water. It may be prudent, therefore, to focus additional monitoring or data collection on the potential for ground water to contact a building foundation rather than ground-water sampling.	Noted. The MDEQ will be reevaluating its approach for or Petroleum Hydrocarbons Considering Biodegradation, found in Appendix B.3 based on recommendations anticipated in 2013 from the USEPA and ITRC.	Shell	Appendix B.3	Appendix B.3
71	Earthen floors are not an issue for Petroleum Hydrocarbons, keep this in mind when writing the alternate approach for crawlspaces.	Noted. Please see response to Comment #70.	Shell	Appendix B.3	Appendix B.3
72	The risk for VI is fundamentally different for LNAPL (residual- or free-phase) and dissolved-phase sources. This should be identified clearly in the CSM discussion in the Petroleum Bio alternate procedure (section 2.0, appendix B.3), as it will greatly affect site screening and strategies for characterization.	Shell comments have been incorporated into the CSM section of Appendix B.3.	Shell	Appendix B.3 Section 2.0	Appendix B.3 Section 2.0

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73	Benzene is likely to be the primary risk driver for VI at Petroleum hydrocarbon sites	Noted. The MDEQ will be reevaluating its approach for or Petroleum Hydrocarbons Considering Biodegradation, found in Appendix B.3 based on recommendations anticipated in 2013 from the USEPA and ITRC. Plese see response to Comment #70.	Shell	Appendix B.3 Section 2.0	Appendix B.3 Section 2.0
74	Page B.3-5 states that the conditions in this zone do not support biodegradation and therefore are excluded from consideration of site-specific attenuation factors, site-specific criteria, etc., WHILE section 3.2 states that site specific criteria can be developed in the vapor intrusion zone. Please clarify.	The statement on page B.3-5 is intended to address the situation where biodegradation is occuring. In that circumstance, the alternative procedure for bioattenuation is not applicable and therefore, the modifications to attenuation factors, site-specific criteria, etc., that are tied to bio are excluded from consideration. At that point the standard approach to VI, as detailed in the main portion of the guidance document, is applicable. This would allow for site specific criteria to be generated, although bio would not be a component of the site specific analysis. Text has been clarified.	Barr	Appendix B.3 Sections 3.0 & 3.2	Appendix B.3 Sections 3.0 & 3.2
75	The field studies show that a larger source-separation distance (8 – 30 ft) is needed to attenuate vapors below levels of potential concern above LNAPL sources. Hers et al. (2012) have noted that the separation distance depends on source size (i.e., UST vs. non UST site). Lahvis (2012), Hers et al. (2012), Peargin and Kohlhatkar (2011) have noted a separation distance of around 15 ft. for UST sites. Hers et al. (2012) have noted a separation distance of around 30 ft. for non-UST sites.	Text has been updated to reflect provided information.	Shell	Appendix B.3 Section 3.1	Appendix B.3 Section 3.1
76	Reduce separation distance from 10' to 5'.	Please see response to Comment #67.	Hartman	Appendix B.3 Section 3.1	Appendix B.3 Section 3.1
77	The Australian data are based on transport distance, not the overall size of the building footprint. So, long narrow buildings may be different than square buildings of the same total square footage. Recommend changing 2500 sft to building slab is no more than 50 feet (15m) wide and revising accompanying text.	Understood. The 2500 square feet was utilized for ease of implementation. The text does state that the limiting factor is the building size. The MDEQ acknwledges that it may be appropropriate to evaluate building width and the document has been modified to reflect this point.	URS/DOW	Appendix B.3 Section 3.2	Appendix B.3 Section 3.2
78	A fixed depth for the biologically active soil zone should be defined in the guidance.	The approach outlined in Appendix B.3 identifies the need for a sufficiently thick layer of biologically active soil to prevent vapors from entering into a structure. Providing a fixed thickness of this layer is not appropriate, as it will vary depending on site conditions.	Arcadis	Appendix B.3 Section 3.2	Appendix B.3 Section 3.2
79	Number of sampling events for vertical profiles needed for petroleum bio approach is specified as 2 in some places and 4 in others. Which is correct?	The 2 events refer to PHC sampling and the 4 events refers to collection of vertical profile data. This has been clarified in the text.	Hartman	Appendix B.3 Section 3.3.1	Appendix B.3 Section 3.3.1
80	It is important, however, that the agency consider some very recent field studies on petroleum vapor intrusion screening conducted by Peargiri and Kohlhatkar (2011), Lahvis (2012), Hers et al. (2012), and Wright (2012). These studies are currently being used to support federal (US EPA OUST) and ITRC guidance development. These references are included in some additional comments provided by Shell Global Solutions.	Noted. Please see response to Comment # 70.	API/MPA/ MACS	General	General

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#	Comment	Response	Commenter	DRAFT Section	FINAL Section
SAMPLING AND ANALYTICAL METHODS					
81	We agree generally with the basic 4-step process outlined in this section	Noted.	HMA	2.2	2.2
82	The standard list for compounds to analyze is discussed in Section 2.4 (page 2-6) and given in Appendix E (the list contains 59 entries). The guidance should include the flexibility to use a shorter list for sites that are already well characterized. For example, the analysis of soil gas or indoor air samples may be limited to VOCs previously detected in groundwater or detected in groundwater at some specified frequency.	Appendix D and E were developed for two unique and different purposes. Appendix D identifies a list of compounds in accordance with R 299.5714 (Generic cleanup criteria for groundwater based on hazardous substance vapors emanating from groundwater to indoor air) and R 299.5724 (Generic cleanup criteria for soil based on indoor inhalation of hazardous substance vapors volatilized from soil) that are based on hazardous substances that have a Henry's law constant greater than or equal to 0.00001 atm-m3/mole. Appendix E contains a list of compounds that should be analyzed in evaluating the potential for vapor intrusion when running either TO-15 or TO-17. Releases in general, rarely contain only a single compound. The compounds identified in Appendix E contain a standard list of VOCs including benzene, toluene, ethylbenzene, and xylenes (BTEX), as well as common chlorinated solvents. The list should be expanded if there are compounds identified at a facility that are not included. The text has been modified to indicate that it may be possible to reduce the number of compounds in the chemical analysis when a site has been fully characterized and a health evaluation has been conducted (similar to the Risk Assessment Guidance for Superfund (RAGS) Part A). This list in Appendix E was generated in discussions with various laboratories that run and analyze TO-15. For Part 213, in accordance with 324.21302(g) the analysis may be limited to the regulated substances that have been released from the leaking underground storage tank system. However, this may limit the amount of information available to the scientist interpreting the data set or the engineer designing the mitigation system. For TO-15, it is important to note that reducing the number of compounds does not necessarily reduce the overall cost of the analysis. Most laboratories utilize one standard mixture and knowledge of any additional compounds may be beneficial in assessing any proposed remedial or mitigation actions.	URS/DOW	Section 2.4 and Appendix E	Section 2.4 and Appendix E

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83	Analysis of PCB/PNAs should be limited as current lab detection limits cannot be met.	The conclusion drawn in Davis et al. 2002 is that indoor air contamination should be evaluated at sites with high concentrations of PCBs in soil or ground water (Davis and Wade, 2003). In addition, the referenced paper discusses that the application of cancer slope factors, derived from Aroclor bioassays to PCB mixtures in the environment, entails a great deal of uncertainty; not that it is unlikely that the heavier compounds are not associated with vapor intrusion. This conclusion is based mainly on the fact that the congener makeup of environmental samples may be very different than the mixture for which toxicity criteria were determined and the traditional focus on carcinogenicity may result in overlooking potential noncarcinogenic PCB toxicity issues such as bioaccumulation. Sorbent tube methods can be utilized to detect polar and non-polar VOCs as well as PCBs. As with all sorbent laboratory methods, the detection level that can be achieved is highly dependent upon many items, including the volume of air that passes through the solid adsorbent tube. One of the key elements in assessing the use of an appropriate laboratory method will be that the collection rate required for the sampling methodology is compared to the rate that vapors migrate from the source. Though many ambient air methods require high (>1 L/min) sampling rates, there are methods such TO-17 and NIOSHA 5503 where sampling rates as low as 50 ml/min are possible. Where soil conditions are not susceptible there are other methods available such as passive sampling methods that may be able to assist or identify contaminants that are present.	Arcadis	2.4.2	2.4.2
84	Should allow for partial TO-15 scan rather than running full scan.	Please see response to Comment #82.	Arcadis	2.4.2	2.4.2
85	In addition to the revisions discussed at the beginning of this comment, Section 3.2.1 should be revised to delete the claim that VOC data from soil samples are low-biased and the reference to the articles cited to support this claim, which is misleading. The cited articles are from the 1990s which evaluated the effectiveness of different soil sample collection methods in minimizing VOC loss (e.g., EnCore samplers), and provided the basis for subsequent SW-846 recommendations to use new sampling methods to minimize VOC loss. USEPA, MDEQ and most, if not all state agencies, have been requiring the use of the new soil sample collection methods, including the use of an immediate methanol preservation step, for at least a decade. Therefore, the loss of VOCs from soil samples has been minimized to acceptable levels for many years. The uncertainties associated with VOC loss in soil samples are now negligible compared to the uncertainties (i.e., conservatism) in the many assumptions used to evaluate the data (e.g., attenuation factors, exposure factors, toxicity values)	The text has been modified to remove the discussion on the uncertainties associated with VOC losses during sample collection.	GM	3.2.1	3.2.1

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86	Screen Lengths – Standard screen lengths for groundwater investigations are typically 5 feet in nominal length. The actual slotted portion of the well screen is between 4.0 and 4.8 feet (depending on the manufacturer). Well screens splitting the water table will have perhaps 2 to 4 feet of the slotted section within the saturated zone. Groundwater quality over this vertical distance of the aquifer may vary based on micro heterogeneities. However, overall water quality should be represented by a 5-foot well screen splitting the water table. Specification of well screens on page 3-3 of "less than five feet" is not justified based on diluting the groundwater concentration with "clean" water and would compromise groundwater data collection (water levels with usual fluctuations and sample collection if a small portion of the screen is submerged). A 5-foot well screen should be adequate for the purpose of assessment of VI evaluations.	Text was revised for clarification to indicate well screens should be 5' or less in length.	HMA	3.2.1	3.2.2
87	The size of the rain event that should limit sampling is not defined. Per Eklund 1992, trace precipitation has no effect. Recommend change to "after a rain event of 0.4 inches (1 cm)".	The text has been modified to reflect that sampling after a rain event should not be conducted until site conditions return to pre-precipitation conditions.	URS/ Dow	4.1	4.1
88	Clarification is needed on what is considered a rain event and when samples can be collected after such an event. Recommend limiting sampling if 0.5" in 24-hr period. Guidance says wait 48-hrs, SOP says wait 72-hrs.	Text has been modified.	Arcadis	4.1 and Appendix F.3 Section 2.0	4.1 and Appendix F.3 Section 2.0
89	Results below screening levels should not require additional sampling (Table 4-1 & 5-3) if below screening levels.	Soil gas samples are required to be collected multiple times due to the variation of sampling results that are known to exist. This is also similar to the repeated sampling typically required for groundwater and in response to a remedial action. The MDEQ has provided reduced sampling alternatives in both of the referenced sections when the sampling results remain below the screening values when considering the expected variability. The tables have been revised for better clarification.	Arcadis	4.2 Table 4-1 and 5.4 Table 5-3	4.2 Table 4-1 and 5.4 Table 5-3
90	We have a similar disconnect for the DEQ's rationale for the next decision matrix in the table noting that 4 sampling events are needed when a known source remains. Please include discussion in the Guidance for the contingencies (i.e., remedial actions and known source) being required despite repeated sampling events with results that are below SLs.	Tables 4-1 and 5-3 were modified to provide clarification and consistency between the tables. In addition, the text in the document was modified to provide further clarification.	HMA	4.2 Table 4-1	4.2 Table 4-1
91	...the decision matrix in Table 4-1, we are supportive of using a 10X factor. However, it is not clear why 3 sampling events below the SGvi and an implemented remedial action are necessary to achieve an outcome that the VI pathway is not complete – presumably no further action. This specific condition was also not discussed in the narrative of the Guidance, and as a result we do not understand DEQ's position that a remedial action in particular is required with 3 sampling events below the SGvi.	Please see response to Comment #90.	HMA	4.2 Table 4-1	4.2 Table 4-1

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92	Revise the number of rounds of testing that are recommended. The number of sampling events in Table 4-1 (page 4-3) is more than necessary. We suggest changing the 2nd and 3rd row of examples to both be "2 sampling events to include full QA/QC." The same suggestion applies to Table 5-3 (page 5-5).	Please see response to Comment #90.	URS/DOW	4.2 Table 4-1 and 5.4 Table 5-3	4.2 Table 4-1 and 5.4 Table 5-3
93	The text states "soil gas concentrations 10x less than their respective SGvi concentration represent a relatively low risk". Recommend if this is the case the screening levels should be adjusted upwards by 10x.	Please see response to Comment #90.	URS/DOW		4.2.1
94	Table 4-1 and Table 5-3 have inconsistent language in results column. In Table 5-3 if concentrations above IRASLs or Sgviss it is unlikely that an evaluation/ mitigation would occur after each sampling event.	Please see response to Comment #90.	Barr	4.2 Table 4-1 and 5.4 Table 5-3	4.2 Table 4-1 and 5.4 Table 5-3
95	Section 4.3.3, which discusses outdoor air inhalation criteria, is irrelevant to the purpose of this guidance on vapor intrusion, and should be deleted. Although irrelevant to vapor intrusion, we believe the recommendation to use soil gas data from a flux chamber without accounting for air dispersion is an overly conservative method to evaluate compliance with ambient air criteria.	Discussion of the ambient air pathway has been included in this guidance document because the analysis and sampling methodology, as well as the data requirements, are almost identical to those of the vapor intrusion pathway. This has been clarified in the text. Please note that the identified approach actually collects an air sample to directly identify the flux of the contaminant after it has been released from the ground surface into the atmosphere. Air dispersion is also accounted for in the alternate approach, through the use of AERMOD. AERMOD is the modeling program utilized in establishing air permits and the alternate approach evaluates the actual discharge in a similar manner.	GM	4.3.3	3.4.3
96	Flux chamber sampling performed when there is no building on site is overly conservative and should be removed from the document.	There is currently nothing in the document that indicates when or even if flux chamber sampling is required. It merely describes how to do it and when it can be utilized. The approached identified in B.2 is not a requirement. It is provided as an alternative approach to demonstrate compliance and other alternate approaches may be proposed. The text was clarified in Section 3.4.3.	Arcadis	4.3.3 and Appendix B.2	3.4.3 and Appendix B.2
97	Sub Slab locations may need to accommodate soil gas locations based on building layout, etc.	Text has been revised to allow for greater flexibility.	Arcadis	5.3	5.3
98	There is no need to modify the "airflow collection rates" for shallow soil gas samples collected at crawlspaces. Recommend deleting last two sentences of paragraph discussing this issue.	Text was deleted.	URS/DOW	5.3	5.3
99	3rd paragraph indicates that soil gas concentrations above a compounds individual SGvi "is a strong indication of potential risk". This is not consistent with 4.2.1. Delete this paragraph	Please see response to Comment #90.	URS/DOW	5.4	5.4.3

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100	Section 5.4 Evaluation of Sub-Slab Soil Gas Results – With one exception as noted in the following sentence, we reiterate the same issues and encourage the same in terms of recommendations as presented above for Section 4.2 Evaluation of Soil Gas Results. Table 4-1 recommended one sample event if soil gas sample results are 10x less than SVvi. Table 5-3 and the note in 5.6.1 recommend two events. What is the rationale for this difference in sampling events? If sample results are 10x less than SVvi, one sample event should be adequate. (HMA, 2012)	Please see response to Comment #90.	HMA	5.4 Table 5-3 and 4.2 Table 4-1 and 5.6.1 Text Box	5.4 Table 5-3 and 4.2 Table 4-1 and 5.6.1 Text Box
101	Section 5.5 and the flowcharts in Appendix A use but do not adequately define terms such as "enough events" or "sufficient data". We recognize that adequately defining such terms is difficult due to the spatial and temporal variability of soil gas and indoor air data. (GM, 2012)	The flowcharts were intended to provide a general overview of the approach described in the guidance document. A footnote will be placed to describe that more information is provided in the document.	GM	5.5	5.5
102	Collect indoor air samples at a frequency of 1 per 1000 sft is overly conservative and expensive for commercial properties.	As identified by Eklund (2007), the MDEQ agrees that the spatial variability tends to be the dominant source of variability below ground whereas above ground, temporal variability tends to be the dominant source of variability. However, indoor VOC concentrations can change over relatively short periods of time due to changes in building operation (e.g., ventilation) or fluctuations in the strength of indoor emission sources. The text was changed to: • Reflect that the number of samples should be established by evaluating the building construction as well as the location of the sources. • A smaller number of samples may be appropriate for larger open spaces. • Samples need not be collected from the entire structure and should only be based on the location of the source of vapors. • Sampling locations should reflect where the inhabitants spend their time indoors and be centrally located to be representative of as large an area as possible, so living rooms or family rooms are often the sampling locations of choice. • Avoid locations where dilution air enters the building (e.g., near outside doorways) or where indoor emission sources may be nearby (e.g., utility rooms connecting the house to the garage).	Hartman	5.5	5.5
103	The text indicates that indoor air sampling events for evaluating immediate risk should occur "over at least three seasons" (page 5-6). Again, we think this is more rounds of testing than are needed and two rounds of testing should be sufficient.	The MDEQ has been asked by other members of the regulated community to establish how many rounds of sampling are needed to demonstrate seasonal variation. The language has been modified to indicate that in most circumstances, three sampling events may be sufficient.	URS/DOW	5.5	5.5
104	In last paragraph on page, text states that survey should be completed "at least two weeks prior to collecting indoor air samples." Delete this requirement. Survey can be performed one or two days prior, in most cases	Text has been revised.	URS/DOW	5.5	5.5

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105	MDEQ should delete the third sentence in the third paragraph in Section 5.5 which says, "In summer months, windows should be closed to minimize the contribution of ambient air". This statement contradicts the more appropriate first sentence in the same paragraph which says, "Indoor air samples should be collected under conditions that are representative of normal operational conditions". Similar revisions should be made to Appendix F.4 (e.g., delete the first two bullets on page 5 of 23; delete the third bullet on page 13 of 23).	The approach identified in the MDEQ's Guidance Document was intended to minimize the contribution from sources not related to the volatilization of sources into the structure. The text was modified to eliminate conflicting statements in Section 5.5 and revised as suggested in Appendix F.4.	GM	5.5 and Appendix F.4 Section 3.0	5.5 and Appendix F.4 Section 3.0
106	Indoor air samples should only be collected from basement or 1st floor. Guidance indicates each occupied floor as well, SOP does not.	Text has been revised.	Arcadis	5.5 and Appendix F.4 Section 4.0	5.5 and Appendix F.4 Section 4.0
107	Table 4-1 and text box 5.6.1 refer to a different number of required sampling events. Should acronym SVVI actually be SGVI?	Text was correct as written, but confusing. The difference in the number of sampling events was based on soil gas vs. sub-slab sampling and the expected variability. In order to correct the situation the text has been revised.	Hartman	5.6.1	5.6.1
108	Clarify if / when preferential pathway evaluation is needed	Text has been revised.	Arcadis	5.6.2	5.6.2
109	Technique for monitoring sub slab after the liner is installed should be looked at closely. Provided some suggestions via attached paper	Text has been revised.	Cetco	6.4.1	6.4.1
110	We do not think it necessary to have a minimum of three rounds of sub-slab soil gas data to address temporal variability (especially if there is data for groundwater concentrations over time). Delete the sentence in the last paragraph that refers to rounds of sampling.	The MDEQ has been asked by other members of the regulated community to establish how many rounds of sampling are needed to demonstrate seasonal variation. The language has been modified to indicate that in most circumstances, three sampling events may be sufficient.	URS/DOW	Appendix B.1 Section 3.1	Appendix B.1 Section 3.1
111	There should be a good technical basis to support the recommendation that preferential pathways could potentially influence vapor transport from 30-ft away.	The text has been modified to reflect what zone the perferential pathway is in (biodegradation, vapor intrusion, and further assement) and not the distance from the source to establish the preliminary screening area. In addition, the text has also been modified to reflect that perferential pathways of significance are not a common occurrence and are generally restricted to sites with sewer lines that intersect high concentration dissolved phase hydrocarbon/LNAPL plumes and building foundations (e.g., Pennsylvania DEP, 2001; Riis et al.,2010, Lavis, 2012).	Shell	Appendix B.3 Sections 3.1 and 3.2	Appendix B.3 Sections 3.1 and 3.2

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112	Collecting vertical profiles under slabs is difficult. Can soil gas vertical profiles collected just outside the structure be used instead?	The answer depends on the size of the structure. Simulation results presented by the USEPA in 2012 illustrate how different site and building conditions might influence both the distribution of VOCs in the subsurface and the indoor air quality of structures in the vicinity of a soil or groundwater VOC source. The MDEQ's approach should allow most smaller structures and single residential structures to be evaluated without going inside, as long as the source of the vapors can be evaluated between the source and the structure. A note was added indicating that when there are physical limitations posed by the structure that make collecting sub slab vertical profiles difficult, particularly in the case of small residential structures, soil gas profiles collected just outside of the structure may be acceptable.	Hartman	Appendix B.3 Section 3.3.1	Appendix B.3 Section 3.3.1
113	C.3 states peristaltic pumps were not used, C.4 states vacuum pumps were not used. Should be consistent	Text has been corrected to reflect both peristaltic and vacuum pumps.	Barr	Appendix C.3 & C.4	Appendix C.3 & C.4
114	MDEQ should allow for the collection of soil gas samples from depths shallower than 5 feet in situations where groundwater is shallow. Successful sampling ports have been shown to be installed at 3' depths.	Text has been revised.	Arcadis	Appendix C.3 Section 2.0	Appendix C.3 Section 2.0
115	C.3, Section 4.0 states that you should use industry standard protocols to verify sample was obtained at the screened interval. No industry reference was provided. Please clarify or provide examples.	Text has been revised.	Barr	Appendix C.3 Section 4.0	Appendix C.3 Section 4.0
116	Change recommendation for purge volumes. Recommend changing from "Maximum of 3 purge volumes" to "minimum of 3 purge volumes"	Text has been revised.	URS/DOW	Appendix C.3 & C.4	Appendix C.3 & C.4
117	Change recommendation for sampling rate. Recommend deleting 200 mL/min limit on sampling rate.	This is the acceptable sampling rate identified by USEPA and other state and federal agencies that was adopted by the MDEQ. Higher sampling rates may be possible; however, site conditions should be evaluated. No change needed.	URS/DOW	Appendix C.3 & C.4	Appendix C.3 & C.4
118	Bullet item that states "points installed at least five feet below ground surface for deep soil gas samples" does not apply in this section.	Text has been revised.	Barr	Appendix C.4	Appendix C.4
119	List aliphatic compounds not in EPA screening level tables. Is appropriate to have screening criteria for them if EPA does not?	Please see response to Comment #82	Hartman	Appendix D	Appendix D
120	Appendix E compounds don't match Appendix D compounds	Please see response to Comment #82	Hartman	Appendix E	Appendix E
121	Refer users to latest ASTM standard for active soil gas sampling.	The MDEQ SOP was modified for use with equipment and supplies that it has available. Alternate methods may be utilized by the regulated community.	URS/DOW	Appendix F.1	Appendix F.1
122	Collecting soil gas samples for a 12-inch sandpack interval provides a more discrete sample. DEQ's SOP calls for an 18-inch sandpack.	Agreed. The MDEQ currently uses a 12-inch sandpack interval, as the sampling screens currently utilized by the MDEQ are approximately 1" in length. To allow for the use of other screen materials, the procedure was written to be less prescriptive.	Arcadis	Appendix F.1 Section 2.3	Appendix F.1 Section 2.3
123	Sample probe tubing is not consistent in Appendices F.1, F.3, & F.5. Please be consistent within document and with national standards.	Text has been generalized and corrected to make materials specified in App F.1, F.3, and F.5 consistent.	Barr	Appendix F.1, F.3, and F.5	Appendix F.1, F.3, and F.5

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124	Appendix F.2 should be revised to indicate that the use of a screen is not essential for installation of subslab soil gas sampling ports. In fact, use of a screen is atypical. In our experience in many states with mature SOPs for subslab soil gas sampling, we have never installed a subslab soil gas sampling port with a screen.	Agreed. To that end, we have provided the alternate Cox Colvin method to address this issue.	GM	Appendix F.2 Section 2.2	Appendix F.2 Section 2.2
125	Materials used to ensure adequate sealing of sub-slab soil gas installations should be VOC free. SOP indicates use of plumber's putty which often contains VOCs. VOC free modeling clay is a better choice.	Text has been revised.	Arcadis	Appendix F.2 Section 2.2 and 2.3	Appendix F.2 Section 2.2 and 2.3
126	The specified drill bits (1" and 2") are much larger than needed. Recommend changing to 3/4" and 5/16".	Alternate methods may be utilized by the regulated community.	URS/DOW	Appendix F.2 Section 2.3	Appendix F.2 Section 2.3
127	During sub-slab installation steps should be taken to minimize the time the drilled hole is open to the atmosphere. DEQ indicates that hole should be drilled prior to assembling probe, conflicts with EPA.	By assembling the points prior to installation, the sampling assembly may not extend through the entire length of the concrete which has been shown to be a potential source of vapors not related to the subsurface. In most cases the time to cut the tubing and assemble the sampling device is less than 2 minutes. The MDEQ sampling procedure identifies that care must be used during all aspects of sample collection to ensure that sampling error is minimized and high quality data are obtained. If the boring remains open for an extended period of time, more time should be utilized to allow site conditions to return to normal.	Arcadis	Appendix F.2, Section 2.3.	Appendix F.2, Section 2.3.
128	Using a vacuum to remove the cuttings disturbs the sub-slab environment, requiring a longer period for probe to reach equilibrium. Text should be changed to indicate that cuttings can be removed from the hole via vacuum prior to drilling all the way through the slab but once slab is penetrated, care should be taken to not apply vacuum under the slab.	Text has been revised.	Arcadis	Appendix F.2, Section 2.3.	Appendix F.2, Section 2.3.
129	For sub slab sampling, quick dry cement can cure in 45 minutes rather than the 24 hour cure time indicated in guidance	The standard operating procedure has been modified to reflect the potential use of quick dry cement	Hartman	Appendix F.2 Section 2.3	Appendix F.2 Section 2.3
130	No need to use cement and allow 24 hours to cure. Suggest use of modeling clay to seal probe	Text has been revised.	URS/DOW	Appendix F.2 Section 2.3	Appendix F.2 Section 2.3
131	SOP needs to be redone to make it less specific. Should not just be for TO-15 and Bottle Vacs®.	The Standard Operating Procedures (SOP) identified in Appendix F were developed for use by and to provide guidance to MDEQ staff and their contractors conducting investigations and remedial activities at sites with known or potential vapor intrusion issues. The methodology identified in the SOP is based on equipment and laboratory methods that are both available to the MDEQ and that are known to produce reliable data that can support the various decisions required throughout the environmental process. The SOPs identified in this Appendix are not intended to prohibit those conducting evaluations from using alternate methodologies; however, departures from this guidance will often need to include additional information for staff due to the unfamiliarity and lack of experience with the alternate methodology.	Hartman	Appendix F.3	Appendix F.3
132	No need to limit sample flow rate to 200 mL/min. Recommend deleting flow rate limit. See Eklund 2011 paper.	Please see response in Comment #131.	URS/DOW	Appendix F.3 Section 2.0	Appendix F.3 Section 2.0

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133	Provide a quantitative tracer gas method in the guidance documents for use as an option to determine whether or not an ambient air leak of up to 5 percent has occurred.	Though the MDEQ would not be opposed to a quantitative evaluation, we have found that in most cases the use of a qualitative field method to assess if a leak is present reduces the need for this evaluation. Therefore the MDEQ does not utilize a quantitative method. The field qualitative method allows for modification and correction of any leaks in the field; therefore, there is less chance that samples that do not meet QA/QC requirements are not identified until after the field work is completed.	Barr	Appendix F.3 Section 2.2	Appendix F.3 Section 2.2
134	Leak rate of 5% is overly conservative and not consistent with ASTM 7663-12. A leak rate of 10% will not affect decisions based on the data. Recommend changing to 10%.	Text has been revised to reflect 10%	URS/DOW	Appendix F.3 Section 2.2	Appendix F.3 Section 2.2
135	The size of the rain event that should limit sampling is not defined. Per Eklund 1992, trace precipitation has no effect. Recommend change to "after a rain event of 0.4 inches (1 cm)".	Text has been revised.	URS/DOW	Appendix F.3 Section 2.3	Appendix F.3 Section 2.3
136	Revise step 12 as follows: "If He detected at 10% of the shroud He concentration, then return to step 5"	Text has been revised.	Hartman	Appendix F.3 Section 2.3	Appendix F.3 Section 2.3
137	Sample container should be included in the leak test in accordance with ASTM D7663-11.	The MDEQ's SOP has the complete sampling train assembled and leak tested and is in accordance with the guidance provided by the manufacturer. After the sampling train has been verified to be free of leaks it is connected directly to the Bottle Vac® using an air fitting. If a leak were to occur in this location prior to the bottle being attached to the sampling assembly, the Bottle Vac® would not be at negative pressure. Please see response in Comment #131.	Barr	Appendix F.3 Section 2.3	Appendix F.3 Section 2.3
138	In accordance with ASTM D7663-11, a vacuum test should be performed prior to the collection of every sample. Revise to reflect national standards.	In ASTM D766-11, two procedures are given for checking for leaks within the sampling assembly for any depth of soil-gas sampling: one involving inducing a vacuum in the sampling system and a separate, additional leak check procedure involving a tracer gas. The MDEQ has chosen to utilize only the tracer gas because it feels it is a more reliable method. As indicated throughout the document, this is the method that MDEQ utilizes and a party is free to utilize other methods as they deem appropriate. Please see response in Comment #131.	Barr	Appendix F.3 Section 2.3	Appendix F.3 Section 2.3
139	Section 3.0 discusses appropriate QA/QC procedures including taking pressure readings throughout the sampling event and collection of duplicate samples. DEQ did a field demo in May and did not employ these two procedures. Please make field demonstrations that you provide (as a service to the public) consistent with guidance.	During the field demonstrations the intent is to give a brief overview of the sampling procedures. When performing the demonstration the MDEQ often utilizes uncharged Bottle Vacs® in order to keep its costs low and so that it can be made available to multiple parties upon request. It is made clear during the event that the actual sampling procedure is provided in the SOP. As indicated in Section 3, one duplicate sample is recommended to be collected per sampling event (or per 20 samples). During field demonstrations, the intent is typically to give folks an overview of our sampling procedure and they are not intended to cover every possible detail of a sampling event.	Barr	Appendix F.3 Section 3.0	Appendix F.3 Section 3.0

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140	Soil gas equipment blanks should be encouraged but not required.	Added language that indicates that equipment blanks could be considered.	Hartman	Appendix F.3 Section 3.0	Appendix F.3 Section 3.0
141	The testing described in the 1st paragraph of Section 3.0 will not be sensitive enough to find sources with small emission rates. Recommend that it is indicated that the testing is qualitative, if a PID or FID is used.	Text has been revised.	URS/DOW	Appendix F.4 Section 3.0	Appendix F.4 Section 3.0
142	Indoor air sample every 250 sft requirement is called out here (and too restrictive) and in section5.5 of guidance 1 sample per 1000 sft is called out. Which is it?	Changes have been made to the text in Appendix F.4 including the removal of the 250 sq. ft. to provide consistency with section 5.5 requirement of 1 per 1000 sft.	Hartman	Appendix F.4 Section 4.0	Appendix F.4 Section 4.0
143	Appendix F.4, Section 4.0 should be revised to delete the minimum required number of samples, and instead indicate that the appropriate number of indoor air samples for a particular building should be determined based on building-specific factors. The SOP should list such building-specific factors (such as those already listed in the SOP), instead of prejudging the number of samples required for all buildings. For example, we do not believe that a minimum of 100 indoor air samples must always be collected for every nonresidential building that is 100,000 ft^2, as the SOP indicates.	Text has been revised.	GM	Appendix F.4 Section 4.0	Appendix F.4 Section 4.0
144	MDEQ recommended hold time of 14 days is contrary to USEPA Method TO-15 and most published sample stability studies. Recommend changing to 28 days.	Text has been revised.	URS/DOW	Appendix F.4 Section 4.5	Appendix F.4 Section 4.5
145	Statement about legality of shipping samples may not be correct. One-liter cans can be shipped even if they > LEL. This issue seems out of place in this section, because it is more applicable to soil gas than to indoor air. Recommend deleting this from appendix. Suggest user check applicable regulations and guidance for the shipper they plan to use.	Text has been revised.	URS/DOW	Appendix F.4 Section 5.4	Appendix F.4 Section 5.4
146	SUMMA Canister should be added under Analytical Techniques to be consistent with section 4.1 (pg 8 of 12).	Text has been revised.	Barr	Appendix F.5 Section 2.0	Appendix F.5 Section 2.0
147	The ratio of 25 L/m of air per m^2 is lower than the USEPA design, which is 38. Change recommendation to "The sweep air flow rate should be set based on results of past method development work or the chamber vendor's recommendation".	Text has been revised.	URS/DOW	Appendix F.5 Section 2.0	Appendix F.5 Section 2.0
148	Item #7 of the Field procedures is incorrect. It is better not to seal all openings of the flux chamber so that there is not a positive pressure within the chamber. Any leaks out are assumed to be well mixed. Recommend deleting Item #7.	The text states that the exhaust/sampling port should remain open. Additional clarification was provided to indicate the need to avoid positive pressure developing within the chamber.	URS/DOW	Appendix F.5 Section 4.2	Appendix F.5 Section 4.2
149	Approaches other than Cox-Colvin Vapor Pins should be acceptable.	Appendix F.2 specifically details an alternate approach that does not utilize the Cox-Colvin Pin.	Arcadis	Appendix F.7	Appendix F.7

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150	Appendix F.7 should be revised to indicate that standard methods (such as described in Appendix F.2) may be used for collecting subslab soil gas, instead of using the proprietary device (Vapor Pin™) recommended in this SOP. MDEQ could include this proprietary device as another alternative method in Appendix F.2.	The MDEQ has provided an alternate method in Appendix F.2 that may be utilized to collect sub-slab soil gas. The reason the Cox-Colvin vapor pin procedure appears as its own SOP is due to the fact that the installation methodology is unique and requires a different approach.	GM	Appendix F.7	Appendix F.7
151	REQ: Flag any concentration reported above the reporting limit for this compound up to ten times the level measured in the blank. Comment: Standard flagging convention when compounds are detected above the RL in the blank is to flag sample concentrations reported above the RL regardless of the level.	Suggestion is in accordance with TO-15 (10.7.6). From a practical standpoint, however, when a compound is found in a sample that is at least 10 times that found in the method blank, then the contaminant contribution is considered insignificant.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
152	REQ: Area responses for the IS must be within ±50% of the area of the most recent calibration. COMMENT: The TO-15 method has a tighter criterion and requires IS areas to be within +40% of the most recent calibration (daily CCV or ICAL as appropriate).	Text has been revised.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
153	REQ: Method blanks to be run every 20 samples or 24 hours whichever is more frequent. One LCS will be run every 24 hours. COMMENT: The sample batch definition is not clear here. Is a batch 24 hours or 20 samples?	TO-15 uses 24 hours. A minimum of 1 method blank per 24 hours is required (10.7.1). An LCS is not required per TO-15, but is a useful QC procedure. The 20 samples per batch is a water/soil criteria. The intent of the method is that a minimum of one blank will be run every 24 hours and if more than 20 samples are run during that time, a blank will be run for every 20 samples.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
154	REQ: The chromatogram for each analysis will have at least 50% of the compounds identified in Appendix C clearly identified. COMMENT: This requirement is not clear. A sample chromatogram has peaks which are labeled by the data processing software based on the identity of the compound eluting at the peak retention time (coeluting peaks will only have 1 name listed.)	Text was revised to correct reference from Appendix C to Appendix E. Most data processing software will meet this requirement; however, there are programs that do not identify all known peaks.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
155	REQ: Report all compounds in units of ug/m3 at the standard temperature and pressure (STP). COMMENT: TO-15 uses standard ambient temperature and pressure (SATP).	TO-15 uses a standard ambient temperature of 25C and pressure of 760mm Hg (9.2.5.7). Actual temperature and pressure conditions were clarified.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
156	REQ: Final report should contain the assigned regulator and flow rate. COMMENT: It is unclear what value is added by including this information in the data report. For integrated samples such as indoor air, the receipt vacuum will indicate that proper volume was collected over the period.	Assigned regulator and flow rate is documented in the laboratory to satisfy traceability requirements. These records are available to clients upon request. The status of the vacuum is used by the lab to assure that the sample is 'intact'. If the sample was collected to ambient pressure, no 'intact' evaluation is possible.	URS/DOW	Appendix G Secction A	Appendix G Secction A
157	REQ: Maintain the data for a minimum of 10 years. COMMENT: NELAP requires 5 years.	Text has been revised.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B

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158	REQ: Verify RL once per month. Recovery shall be +/-40% of expected value. COMMENT: What is the corrective action if this isn't met? Does this mean sample analysis cannot continue? With a long list of compounds it is not unexpected that there may be a non-compliant compound even though the linearity requirement is met (<30%RSD). DoD requires LOQ evaluation on a quarterly basis in which bias is calculated for each compound.	If the RL cannot be confirmed within a specified criteria, then the sensitivity of the system is insufficient to report down to the required RL. NELAC requires an LOQ annually and defines it as "the minimum levels, concentrations, or quantities of a target variable that can be reported with a specified degree of confidence." Many labs have chosen the concentration where at least ± 50 % recovery is seen for the target analyte. Based on the number of target compounds analyzed, a percentage of them can be expected to fail. NELAC does not provide much guidance, but the LOQ could be repeated, corrective action could be performed followed by another LOQ, or a higher concentration LOQ could be analyzed for those target analytes with a subsequent elevated RL.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
159	REQ: BFB is the suggested tuning standard. COMMENT: As a technicality, BFB is the tune check standard analyzed with each 24 hour clock. (PFTBA is the actual tuning standard.)	BFB is a tune check compound. The text has been corrected to reflect this point.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
160	REQ: Holding time of 21 days for TO-15. COMMENT: The method states up to 30 days for TO-15. Most programs are adopting the 30-day storage requirement.	Text has been revised.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
161	REQ: If carry-over is detected, column bake out should be performed. COMMENT: Carry-over from a previously high concentration sample is typically not resolved by column bake out. The contamination resides in the air concentrator and introduction lines.	Text has been modified to indicate that when a MB contains target analytes following a high concentration sample, the lab should take corrective action to resolve.	URS/DOW	Appendix G Section A	Appendix G Section A
162	REQ: MDLs should be ≤0.5 ppbv for all target analytes. COMMENT: For compounds with reporting limits greater than 0.5 ppbv such as typical lab contaminants including acetone and methylene chloride, MDL values may be greater than 0.5 ppbv but still << than the RL. There is no loss in quality or data usability in these situations. It would be more appropriate to state that the MDL < RL for all target analytes to account for differences in the RL.	Text has been revised.	URS/DOW	Appendix G Sections A & B	Appendix G Sections A & B
163	Appendix E – Does Appendix E mean that all of these compounds must be analyzed at sites where the VI pathway is being evaluated regardless of whether these compounds have been identified in groundwater or soil at the site? For example, at a gasoline release site, are analyses to include chlorinated hydrocarbons and other non-petroleum related compounds?	See Comment #82	HMA	Appendix E	Appendix E
164	The soil gas compounds screening list should be re-evaluated. Release specific indicator compound lists would be appropriate (similar to the indicator compound lists used for soil and groundwater samples collected for Part 213 sites). As many sites in Michigan have been investigated for decades, the MDEQ should seek to maintain consistency (when technically appropriate) between the analytes required by this guidance and analytes previously required by other MDEQ guidance and/or policy.	See Comment #82	Brady	Appendix E	Appendix E

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165	Appendix F and G should be eliminated from the guidance. Developing and incorporating detailed field and lab procedures into MDEQ RD guidance seems inappropriate. Stipulating field and lab procedures is not a duty of the department under Part 201 or Part 213. I suggest Appendix F and G be eliminated from the document and efforts be directed to the information deficiencies mentioned above instead.	Appendices F is the Standard Operating Procedures (SOPs) that Department staff and State contractors utilize when conducting vapor intrusion investigations. As this is a guidance document geared to provide MDEQ staff with internal procedures, it is appropriate to inform our own staff as to the field and lab procedures we as a department use. As noted at the beginning of each of the SOPs, the procedures presented are for technical reference and are not intended to prohibit the use of other methods. You are under no obligation to use these procedures. Please see response in Comment #131.	Brady	Appendix F & G	Appendix F & G
166	Need more information in Field Sampling and Lab Analysis Section	Text has been revised.	Hartman	Appendix F & G and 2.4	Appendix F & G and 2.4
167	Alternate technically sound soil gas sampling approaches should also be allowed for sample collection (API 2005, Hartman 2002, KDHE 2011).	This is a MDEQ SOP. Alternate methods may be utilized by the regulated community. Please see response in Comment #131.	Arcadis	Appendix F.1	Appendix F.1
168	Appendix F.1, Section 2.1 should indicate that collection of soil cores during installation of vapor sampling points is not essential, and that a direct-push method of installation is acceptable.	Although the text indicates that it is "highly recommended" to collect soil cores during installation of vapor sampling points, it is not a requirement. If the site has been adequately characterized, it may not be necessary to classify soils during vapor point installation. Alternate approaches may be utilized by the regulated community.	GM	Appendix F.1 Section 2.1	Appendix F.1 Section 2.1
169	Appendix F.1, Section 2.2 should be revised to delete the sentence stating, “Generally, nylon tubing is preferred as it exhibits lower adsorption rates and is more flexible and easier to work with than stainless steel.” In our experience, other types of tubing are also effective and the choice depends on site-specific considerations that go beyond those listed in the above quote.	Text was modified to clarify that tubing choice is dependent on site-specific considerations. In general, MDEQ prefers to use nylon tubing and this will be retained in our guidance. The regulated community is not obligated to follow MDEQ SOPs. Please see response in Comment #131.	GM	Appendix F.1 2.2	Appendix F.1 2.2
170	Appendix F.1, Section 2.2 also should be revised to clarify that screens and sand packs are not always essential. For example, useful soil gas samples for initial assessments can be efficiently collected without installing a vapor well.	The MDEQ prefers to install soil gas points with the use of screens and sand packs. The regulated community is not obligated to follow MDEQ SOPs. Please see response in Comment #131.	GM	Appendix F.1 Section 2.2	Appendix F.1 Section 2.2
171	Appendix F.3 should be revised to indicate that standard sampling devices (such as a summa canister) may be used for collecting soil gas, instead of using the proprietary device (Bottle-Vac®) recommended in this SOP.	The MDEQ prefers the use of the Bottle-Vac as that is the sampling device the MDEQ laboratory has been set up for. The regulated community is not obligated to follow MDEQ SOPs. Please see response in Comment #131.	GM	Appendix F.3	Appendix F.3
172	Inclusion of alternate methods to Helium tracer gas test. Specifically include Cox-Colvin method to perform leak test using water.	The MDEQ has chosen to utilize only the tracer gas because it feels it is a more reliable method; however, other methods may be utilized. It is important to note that the Cox-Covin method referenced in the comment only verifies that leakage does not occur from around the sampling point. In the MDEQ's experience most leaks occur in hardware and tubing connections between the sampling point and the sampling container.	Barr	Appendix F.3	Appendix F.3
173	Method does not include checking vacuum before and after sampling. Should use a dedicated vacuum gauge to check this.	The MDEQ has chosen to utilize only the tracer gas because it feels it is a more reliable method; however, other methods may be utilized.	Barr	Appendix F.3	Appendix F.3

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174	Multiple samples from nested soil gas sample ports can be collected simultaneously rather than waiting 30 minutes between sample events as DEQ specifies. DEQ should allow alternate procedures.	If it can be demonstrated that the vapor sample that is collected is representative of site conditions it would be acceptable. However, many site conditions would not allow for the continued or simultaneous collection of samples.	Arcadis	Appendix F.3 Section 2.0	Appendix F.3 Section 2.0
175	Do we need tracer gas for deep soil gas samples if sampling train passes a vacuum leak test?	A vacuum leak test on the sampling train would be an acceptable alternative for deep soil gas samples (>5' bgs). Please see response in Comment #131.	Hartman	Appendix F.3 Section 2.2	Appendix F.3 Section 2.2
176	Is Bottle Vac under shroud? Text and figure not clear.	The Bottle Vac is not beneath the shroud; however the entire sampling train that contains a quick connect air fitting is. Upon verification that the sample train is not leaking the quick connect is disconnected from the helium shroud and connected directly to the Vac bottle. A better picture is now provided.	Hartman	Appendix F.3 Section 2.3	Appendix F.3 Section 2.3
SITE-SPECIFIC CRITERIA					
177	The 3m depth is too stringent. The main concern is having the capillary fringe in contact with the building slab. Retain 3m as a default depth for screening values in tables, but allow users to calculate site-specific criteria for shallower depths. Recommend change to 1.5 m.	The 3m depth is established in Rule 714(2)(b) and cited in this section. Users will in fact need to calculate site specific criteria for shallower depths.	URS/Dow	1.1.3	1.3.3
178	The screening levels in the guidance will be essentially implemented by MDEQ staff as generic criteria or RBSLs. Site specific screening levels should be permissible in accordance with Part 201, Section 20120b or Part 213, Section 21304a.	The MDEQ is actively training and educating staff on the statutory difference between screening levels and criteria. As indicated in the guidance document in Sections 1.4 and 2.0, the development of site-specific screening levels is permissible in accordance with Sections 20120b and 21304a.	Brady	1.1.5	1.4
179	Section 1.1.5 also claims that "the site-specific data necessary for development of site-specific GVIIC are rarely available and collection is often cost-prohibitive." We disagree with this claim. In our experience, site-specific information on soil type and depth to groundwater are often inexpensive to obtain and have significant influence on site-specific use of the JEM for assessing vapor intrusion from groundwater.	Though soil type and depth to groundwater are often collected during the course of a normal investigation, the information to develop a site-specific J&E Model contains additional information that is not routinely collected...and depending on the site, it COULD be costly to gather that information. As this is not always the case, the text has been modified to reflect this.	GM	1.1.5	1.4
180	Section 1.1.5 should be revised to recognize that site-specific use of the JEM for evaluating vapor intrusion from soil is valid.	This section does not preclude the use of site-specific soil criteria when the generic criteria do not apply. This option is further discussed later in the document. The text was clarified to better relay this point.	GM	1.1.5	1.4

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181	The overall intent of the guidance, as reflected in the introductory materials, appears to limit when a site specific analysis can be performed. This view needs to be modified - do not limit when a site specific analysis may be available . . . As drafted the site specific analysis can only be used when generic criteria do not apply (i.e. distance to GW, presence of sumps, not enough concrete, etc.). If the CSM has not been developed yet it may be completely premature to conclude anything about compliance with generic criteria - particularly if a properly completed CSM subsequently concludes that a pathway is not present. Therefore, it is important in all cases that a CSM be completed BEFORE any criteria are reviewed. Only those criteria deemed relevant by the CSM should be considered. If an owner elects to default to generic criteria they may do so but do not limit the use of the guidance ONLY when generic criteria do not apply. It should be a tool available for use at any time.	The MDEQ agrees that the first step in any evaluation should be the development of a CSM. The CSM should assist in the determination of whether a site specific evaluation is appropriate or not. It is not the intent of this document to limit when a site specific analysis can be performed. Additionally, if the generic criteria apply, but a decision is made to pursue a site specific analysis, that is acceptable. The text was clarified in section 2.0 to state that the approach outlined in the guidance document can be utilized even when the criteria in Section 20120a apply.	RACER	2.0	2.0
182	Section 2.2 – Step 1: Screening Level Assessment and the flowcharts in Appendix A should be revised to clarify that this step should include generic and/or site-specific screening of available data, including soil data, to determine if vapor intrusion risks are low enough that additional investigation (e.g., soil gas sampling) is not necessary.	The text has been revised to clarify this issue.	GM	2.2	2.2
183	With few exceptions (petroleum compounds, big box model sites) the guidance relies on generic screening levels, soil gas and/or sub-slab sampling to demonstrate compliance with Part 201 or 213 for the vapor intrusion pathway. Many sites warrant site-specific screening levels and criteria (for example sites with NAPL, sites with shallow water tables, sites where soil gas and/or sub-slab sampling is not feasible or appropriate).	This guidance document does not limit the use of other or alternate site-specific screening levels if the general approach outlined in the guidance document does not fit your site. The text was clarified to address this issue.	Brady	General	General
184	We agree with your concepts of the number of soil gas sampling events, use of BioVapor, a risk level of I0-5 and a sub-slab attenuation factor of 0.02	Noted.	API/MPA/ MACS	General	General
185	This draft is well written, includes the latest state of the science, offers reasonable screening levels, and distinguishes between chlorinated and petroleum compounds	Noted.	Hartman	General	General
186	Consideration of field data in the development of site screening is also aligned with recent regulatory moves away from model only based screening criteria like the Generic Screening Criteria.	Noted.	Shell	General	General
187	I suggest the guidance discuss the MDEQ procedure and MDEQ staff that will be employed to review site-specific criteria.	These procedures are identified under Part 201 and Part 213. Development and approval of site-specific criteria for sites regulated under Part 201 are completed utilizing the Response Activity Plan or No Further Action processes, as described in Section 324.20120a. For sites regulated under Part 213, development and approval would be completed as a part of the Final Assessment Report (FAR) or Closure Report submittal. Review and approval or denial of site-specific criteria will be completed by staff from the Remediation and Redevelopment Division's Toxicology Unit.	Brady	General	General

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	SCREENING LEVELS				
188	Section 2.3.3 Screening Values for Soil – HMA does not support VISLs for soil, based on the principles that are known to DEQ and discussed in EPA's 2002 VI guidance. A subsequent section of the Guidance, Section 3.2.1, notes that "soil data are typically less than ideal for evaluating the potential risk from VI…", and further specifies valid reasons why they are unreliable data. The exposure media is air, suggesting that the most reliable measurement for risk evaluation is soil gas and/or indoor air sampling. There is only one state to our knowledge that uses soil data in its assessment of vapor intrusion risk.	Noted; however, multiple stakeholders identified and requested the development of soil screening levels.	HMA	2.3.3	2.3.3
189	If soils < S_{VI} is VI pathway NOT complete and no more sampling needed?	If the soil samples accurately represent and characterize the impacted soil in relation to the structure (and groundwater is not a source of vapors), then the pathway may not pose a risk. The text was revised.	Hartman	3.2.1	3.2.1
190	Section 3.2.1 Soil – Again, we believe that including soil VISLs is not supported scientifically. Given that these results are unreliable, we cannot concur with their use as a line-of-evidence.	Please see response to Comment #188.	HMA	3.2.1	3.2.1
191	Section 4.2 Evaluating Soil Gas Data – Regarding the four levels of risk (though we could not find a description)…..it appears there are only three.	Tables 4-1 and 5-3 were modified to provide clarification and consistency between the tables. In addition, the text in the document was also modified to provide further clarification.	HMA	4.2	4.2
192	Section 5.4 and Appendix B.1, Page 5-5 and Page 4 of 15 Comment: Section 5.4 refers to comparison of sub-slab soil gas concentrations to the SGvi-ss , whereas Appendix B.1 refers to comparison to ASGSCs. Suggestion: We recommend the consistent use of a single set of screening values for both standard and alternate approaches to demonstrating compliance. Please replace references to ASGSCs with references to Appendix D.1, D.2, and D.3. Appendix B.3, Section 3.0 and 3.2, Pages 5 and 9 of 18 (Barr, 2012)	Text has been revised.	Barr	5.4 Appendix B.1	5.4 Appendix B.1
193	Appendix A – We recommend that our comments on the evaluation processes related to the CSM and application of screening levels (as a Step 2) be considered in revising the flowcharts. (HMA, 2012)	Based on all of the comments received, the flowcharts have been modified.	HMA	Appendix A	Appendix A
194	Appendix B.1 refers to ASGSCs	Text has been corrected. Appendix B reference to ASGSCs should be changed to SGviss.	Barr	Appendix B.1	Appendix B.1
195	Appendix D – Consistent with our previous comments on soil SLs for VI, we recommend removing these values from the tables.	Noted. Please see response to Comment #188.	HMA	Appendix D	Appendix D

Table 1. Response to Comments on May 2012 DRAFT Vapor Intrusion Guidance Document

#	Comment	Response	Commenter	DRAFT Section	FINAL Section
REFERRED TO DEQ RRD TOXICOLOGISTS FOR DISCUSSION AS PART OF THE CSI PROCESS					
196	The current criteria were developed based on best available information and formulas dating back to 1998. To avoid unintended consequences and confusion, we recommend that the current criteria (i.e., GVIIC and SVIIC) be replaced with the proposed screening levels using updated attenuation factors and best current available information including EPA's Vapor Intrusion Database and the guidance derived therefrom.	The MDEQ agrees with commenter and is moving forward with this recommendation as part of the CSI Stakeholder process.	RACER	1.1	1.3
197	MDEQ should retain the Johnson and Ettinger model in the derivation of its generic criteria, and allow the model to be used for semi-site-specific screening and site-specific assessments before requiring soil gas and indoor air sampling.	The CSI Stakeholder process has decided that the Johnson and Ettinger (J&E, 1991) model of subsurface vapor transport is inappropriate for generic VI criteria development. However, the J&E Model is an acceptable alternative for development of site-specific screening levels for soil gas and groundwater.	GM	1.1	1.3
198	Section 1.1 Generic Criteria – We suggest the current VI criteria (i.e., GVIIC and SVIIC) and associated rules be rescinded and replaced with the values derived from the media-specific VISL methodologies presented in the Guidance, with exception of soil SLs as discussed in later comments. The generic VI criteria are outdated (1998) and based on certain Johnson and Ettinger model default input values that do not represent current science, and most importantly are not consistent with actual site data as presented in the U.S. Environmental Protection Agency (EPA) VI database for residential buildings. The subsequent subsections 1.1.1 through 1.1.5 can be deleted consistent with elimination of the GVIIC and SVIIC. Some of the information presented in Section 1.1.5 Site-Specific Evaluation, can be incorporated into relevant areas of a re-structured guidance document as suggested previously.	The MDEQ as part of the CSI Stakeholder process will be recommending that the generic GVIIC and SVIIC found in R 299.5714 and R 299.5724, respectively, are rescinded. The VI Guidance will be modified as appropriate if and when such regulatory changes are in effect.	HMA	1.1.1 - 1.1.5	1.3 and 1.4
199	Site specific assessment should use site-specific information instead of generic assumptions.	Under Section 20120b of Part 201, site-specific criteria may be approved by the department "if such criteria, in comparison to generic criteria, better reflect best available information concerning the toxicity or exposure risk posed by the hazardous substance or other factors."	GM	1.1.5	1.4
200	Section 1.1.5 says that an available option for site-specific evaluation that is not discussed in the guidance is the site-specific use of the JEM to assess vapor intrusion from groundwater. We see two problems with not discussing site-specific use of the JEM. First, site-specific use of the JEM is an important option in many cases (as discussed above), and as such, deserves a section in the guidance that specifically discusses its merits and limitations. Not discussing this option in the guidance may give readers the false impression that this option is less technically sound, less effective, or less acceptable to MDEQ. Second, this option should not be limited to the assessment of vapor intrusion from only groundwater (as the guidance implies by mentioning only the GVIIC). This option should be available for site-specific assessment of all media, including soil, groundwater, and NAPL.	It was not the intent of the MDEQ to give the impression that the use of the J&E model or other fate and transport models are less technically sound or effective at quantifying human health risk or making risk management decisions. However, the MDEQ intends to makes it clear that the sole use of J&E model is less acceptable in many VI situations, especially as a generic screen. Modeling is considered one of several "lines of evidence" and may not be used as the sole line of evidence for closing a VI site. The text has been modified to more clearly address the site-specific use of the J&E Model.	GM	1.1.5	1.4

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201	The presence of shallow groundwater has previously been a serious concern for the MDEQ with regards to the assessment of the vapor intrusion pathway. It has been documented that the Tier 1 GVIIC criteria cannot be applied to sites where groundwater is less than 3 meters below ground surface or 1 meter below a basement, and that site specific evaluations are required. In the past GES has completed site specific Tier II evaluations for vapor intrusion utilizing the J&E Model and presented these to the MDEQ. To date, no detailed response has been forthcoming from the MDEQ to explain specifically why the J&E Model was not appropriate for the site. While GES is happy to see that the MDEQ has generated new conservative generic screening values for this pathway, and is allowing the use of the BioVapor model at sites with documented aerobic conditions present, GES has concerns that the modeling results will not be accepted based on past experience.	DEQ fully intends to consider the appropriate use of models for site specific evaluations. Modeling results will be accepted if appropriately derived and representative of site conditions. Currently there are no department-approved or recommended models or applications for evaluating VI fate and transport. Each model and its application will be reviewed as submitted to the department and approved on its merits.	GES	1.1.5	1.4
202	Section 2.0 (MDEQ's Approach for Evaluating the Vapor Intrusion Pathway) should be revised to point out the serious limitations of using generic, residential, empirical attenuation factors for chlorinated VOCs as a general approach to site-specific vapor intrusion assessments. The revisions should also point out that site-specific use of the JEM is a valid alternate approach.	As proposed for application in the Part 201/213 program, the MDEQ finds the empirically-derived attenuation coefficients (EPA, 2012) to be appropriate and acceptable for development of generic soil gas, soil, and groundwater screening levels, and preferred to modeled values. Other commenters have recommended the removal of the J&E-based SVIIC and GVIIC currently in rule and request the empirically-derived attenuation coefficients. The CSI stakeholder process reached consensus on a proposal to move forward with the application of attenuation coefficients for predicting indoor air concentrations from subsurface soil gas and groundwater. The MDEQ agrees with the commenter that the guidance should discuss any limitations or assumptions for application of generic attenuation coefficients. The department agrees with the commenter that the use of the J&E Model or other fate and transport models is valid and appropriate as an alternative approach under specified conditions. The application of site-specific models requires a site-specific closure or remedy. The text was modified to provide clarification.	GM	2.0	2.0
203	Section 2.2 should be revised to insert a step for site-specific use of the JEM to screen data, including soil data (as discussed in the preceding comment) before conducting soil gas and indoor air sampling. As discussed above, this intermediate step often avoids the needless costs of soil gas sampling, as well as the need to account for spatial and/or temporal variability in soil gas and indoor air data, which are usually greater than those for soil and groundwater data.	This approach can be completed on a site-specific basis if the submitter feels it is warranted and is willing to complete a sensitivity and detailed analysis of the inputs utilized.	GM	2.3	2.3
204	DEQ should consider separate screening criteria for UST and non-UST sites.	The department considered this option and decided to go forward with exclusion distances and field demonstrations of "clean" buffer soils and soil oxygen content rather than modifications to the attenuation coefficients.	Shell	2.3 Appendix B.3	2.3 Appendix B.3

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205	Section 2.3.1 Screening Values for Vapor – It isn't clear from the Guidance whether SLs developed from the AFs will be applied to all chemicals. The EPA VI database consists of AFs specifically for chlorinated VOCs and it is well established that AFs for petroleum hydrocarbons are much lower.	The attenuation coefficients will be applied to all volatiles. Biodegradation of petroleum hydrocarbons in the subsurface is recognized by the department and to address this situation is provided in Appendix B.3. Please see response to Comment #206.	HMA	2.3.1	2.3.1
206	Attenuation Coefficient - The EPA Vapor Intrusion Database analysis supports a less conservative sub-slab attenuation factor ("AF") than 0.02.	More information is necessary to respond appropriately to the comment. The USEPA recommended several different attenuation coefficients for sub-slab soil gas based on different exposure scenarios and building structure. The recommendations reflected upper and mid-range percentiles of the data evaluated. Support for a "less conservative" attenuation coefficient is therefore relative. The CSI stakeholders discussed the USEPA's evaluation of their Vapor Intrusion Database (USEPA, 2012) and have not reached consensus on an appropriate and/or protective sub-slab attenuation coefficient. Discussion on the sub-slab attenuation coefficient is on-going within the MDEQ. At this time the MDEQ is comfortable increasing the attenuation factor to 0.03(for subslab) and 0.003 (for deep soil gas) and has done so in this document. Please see response to Comment #212.	RACER	2.3.1	2.3.1
207	Attenuation factors determined from the data set may be too conservative because they were based on some indoor air concentrations from alternative or background sources.	The MDEQ will be relying on EPA's recommendation for subslab and deep soil gas and groundwater attenuation coefficients. The MDEQ has not conducted an independent review of the EPA's dataset. It is common for the MDEQ to adopt EPA-recommended risk assessment methodologies. The EPA's Database Evaluation (EPA, 2012) provides details regarding how indoor air background was screened out of the data and the MDEQ is relying on EPA's expertise to conduct these types of data screens. At this time the MDEQ is comfortable increasing the attenuation factor to 0.03 (for subslab) and 0.003 (for deep soil gas) and has done so in this document. Please see response to Comment #212.	Brady	2.3.1	2.3.1
208	Attenuation Factors – HMA understands through participation in VI and Criteria Stakeholder Groups that DEQ is in the process of evaluating the development of default attenuation factors (AF), which are used to derive the groundwater and soil gas SLs for Part 201/213. In an April EPA Region 5 roundtable meeting, EPA briefly indicated consideration of the 75th/80th percentile AF values for screening sites. HMA supports adoption of these percentile values over 95th percentile values given the context of the data used in the evaluations. For example, paired data were not collected with consistent techniques or methods within or across sites, lending little credibility to the reliability of upper percentile estimates. Several additional variability and uncertainties are naturally implicit to these data, most notably the indoor air data which is the origin of the AFs. As a result, there can be little confidence that an upper percentile AF is representative of field measurements, thus appropriate for use in screening VI pathway risk.	The department is currently proposing the 95th percentile attenuation coefficient for "all residences" for development of generic soil gas screening levels to address concerns about common Michigan specific exposure scenarios that may not be a significant part of EPA's attenuation coefficient evaluation (e.g., basements in contact with shallow groundwater, sandy soils on the western and northern parts of the State, homes with sumps, earthen floors and walls, fractured clays in southeast portions of the state). The department appreciates the recommendation and will take this into consideration when reviewing EPA's final VI guidance. The final VI Guidance is expected in early to mid-2013. The department is also open to further discussion of the attenuation coefficient as part of the ongoing CSI Stakeholder process.	HMA	2.3.1	2.3.1

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#	Comment	Response	Commenter	DRAFT Section	FINAL Section
209	Attenuation factors do not account for type of building (e.g. residential vs. industrial). Recommend indicating that alpha may be lower for non-residential buildings.	The CSI Stakeholder process addressed this issue and reached consensus on a proposal to adjust the soil gas and groundwater attenuation coefficients for nonresidential structures by a modifying factor of 4. A discussion of the modifying factor will be included in the final recommendations to the Director.	URS/Dow	2.3.1	2.3.1
210	Much soil gas sampling at sites with slab-on grade construction is 5-ft bgs. This depth is defined as being deep soil gas and therefore the alpha=0.002 value will apply. No change needed.	The CSI Stakeholder process addressed this issue and reached consensus on a proposal to adjust the deep soil gas attenuation coefficient from the originally proposed value of 0.002 to 0.003 (consistent with EPA's recommended subslab attenuation coefficient for "all residences" of 0.03 with a ten-fold dilution to account for greater distance from the structure).	URS/Dow	2.3.1	2.3.1
211	The alpha=0.001 for groundwater is a factor of 2x different than the deep gas value, whereas the USEPA has a 10x difference. No change needed. It is noted that the GW value is more conservative than the soil gas values.	The commenter is incorrect. The GW attenuation coefficient is less conservative than the proposed soil gas attenuation coefficients. The groundwater attenuation coefficient allows a multiplier of 1000-fold, the proposed deep soil gas attenuation coefficient allows a multiplier of 500-fold. The alpha=0.001 for groundwater is recommended by EPA. The EPA's groundwater attenuation coefficient dataset is much more robust than the soil gas attenuation coefficient dataset and USEPA has indicated a higher level of confidence in this value.	URS/Dow	2.3.1	2.3.1
212	Section 2.3.2 states that criteria for groundwater in direct contact with or entering a structure (GWvi-sump), including water in sumps, are the same as the groundwater vapor intrusion criteria (GWvi) except they assume no attenuation (i.e., they use an attenuation factor of 1 instead of 0.001). We believe this assumption is unrealistically conservative by at least two orders of magnitude and should be revised, as discussed below.	The GWvi-sump values are intended for screening purposes only and are conservative in nature. Groundwater concentrations above these screening levels in a sump or in groundwater that is in contact with a structure requires further evaluation but are not legally a "facility". The CSI Stakeholder process has determined that it may be inappropriate to modify the screening levels by two orders of magnitude as suggested by the commenter. Shallow groundwater, groundwater seeping into basements, "Michigan basements", and/or contaminated groundwater in a residential sump are all exposure scenarios that have not been evaluated by the USEPA and, therefore, no generic attenuation coefficient is recommended. Because the exposure scenarios addressed by these screening levels represent exposures outside of a typical "worst-case" for vapor intrusion, the potential for unacceptable exposure may be greater. More Michigan-specific case studies are necessary. At this time the MDEQ cannot verify that the GWvi-sump screening levels are "unrealistically conservative" and continue to support their calculation as proposed in the guidance though it will continue to evaluate this issue in the future.	GM	2.3.2	2.3.2
213	Section 2.3.3 should be revised to treat the use of soil data as being as valid as the use of groundwater or soil gas data. As discussed above, the claim that vapor intrusion assessments based on soil data have greater uncertainty is unfounded.	Soil screening levels for the vapor intrusion pathway were developed as part of the ongoing CSI stakeholder process. Guidance for the appropriate application of the soil screening levels is provided in the document. It should be noted that comments were also received in oposition to the use of soil screening levels (see Comments #188, #190, and #196).	GM	2.3.3	2.3.3

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#	Comment	Response	Commenter	DRAFT Section	FINAL Section
214	The concept of soil gas IRASLs is unsound and should be abandoned. Any trigger levels should be based on indoor air concentrations, not soil gas concentrations. The IRASL values are not given in the draft document (Appendix D.3 is "currently under development"). In general, however, we do not think any level of soil gas (or groundwater) should automatically trigger presumptive mitigation or other immediate action. There is no soil gas concentration (even methane at 100%) that is certain to result in unacceptable indoor air impacts. If, for example, there is an isolated "hot spot" in the soil gas beneath a dry cleaning facility, there may be a small area with very high soil gas concentrations. Even so, the resulting indoor air impacts may be negligible. Such hot spots may not require any action and certainly may not require building-wide mitigation. Soil gas concentrations at depth (e.g., near the water table) should not be used to drive decision making. Also the same argument made in this comment for soil gas at depth applies as well to groundwater and subslab soil gas.	The purpose of environmental screening levels is primarily prevention, and this is particularly true when evaluating potential acute toxicity. There is no regulatory requirement for demonstrating certain unacceptable impact or certain health impact. In fact, the substantive statutory requirement allowing a level of cancer risk no greater than 1 additional cancer in 10,000 persons above the general population cancer risk from one chemical, exposed by one pathway, in one environmental medium, illustrates the primary preventative role of environmental screening levels. There is no study that could be designed with any statistical power to validate, verify or provide certainty that 1 or more cancer occurred in such populations. A control population is not available. Controlling to one pathway is impossible. Environmental risk assessment methodologies are not designed to predict cancer rates to any degree of certainty nor are they derived to provide certainty of acutely toxic effects. The MDEQ is evaluating the IRASLs and their methodology. The intent is to trigger immediate action only in situations that warrant immediate action. The MDEQ recognizes that obtaining soil gas and indoor air concentration data takes days to weeks following a sampling event. Requiring immediate actions for results days to weeks old is not appropriate. The IRASLs are screening levels designed to assist project managers in allocating resources and directing exposure evaluations when occupants of a structure may be exposed.	URS/Dow	2.3.4 Appendix D.3	2.3.4 Appendix D.3
215	Soil data are as valid as other data for vapor intrusion assessments.	Please see response to Comment #215.	GM	3.2.1	3.2.1
216	The discussion of methane hazard requires revision. The soil gas criterion for methane given in Section 3.3 (page 3-4) is extremely conservative and will generate a large number of false positives. We suggest deleting "…and the party must consider the need for emergency assessment and response" and focus on what level of methane in soil gas triggers the need for further evaluation. We further suggest that the guidance reference the Eklund 2011 article on evaluating methane (included as Attachment One to these comments) and indicate that "concentration alone is insufficient to evaluate the potential hazard due to methane and users should evaluate hazard on the basis of concentration, volume, and pressure." Other useful references are Sepich 2008 and Sepich 2012. Note that ASTM E50 is developing a standard for evaluating methane in the vadose zone. John Sepich is head of the task force. Mr. Eklund is a member of the task force.	Further discussion on methane is expected in 2013.	URS/Dow	3.3	3.3

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#	Comment	Response	Commenter	DRAFT Section	FINAL Section
217	In Section 4.33 (page 4-4) and in Appendix B.2, the draft text states "volatilization of organic compounds from contaminated soil or groundwater into the ambient air represents a major potential source of exposure." We have extensive experience in this area and have found this not to be the case. Subsurface contamination does not give rise to ambient air quality issues unless or until the contamination is exposed at the ground surface. See relevant discussion on page 8 in Eklund 2007 (included as Attachment Two).	Text has been revised to remove "major" from the identified sections.	URS/Dow	4.3.3, Appendix B.2	3.4.3, Appendix B.2
218	A potentially helpful consideration related to the above contingencies is to acknowledge that the primary driver in the VISLs is the "acceptable indoor air value" (IAVI); that daily exposure to indoor air concentrations for 30 years above the IAVI is necessary to result in adverse health effects. Stated more specifically, the vapor source, migration, and intrusion conditions must be generally stable over a 30-year period to sustain an indoor air concentration above the IAVI for 30 years to cause adverse health effects to the building occupants.	Noted. The CSI group is still considering this as part of its evaluation.	HMA	4.2	4.2
219	The screening values proposed are orders of magnitude lower than the original Risk-Based Soil and Groundwater Volatilization to Indoor Inhalation (SVIIC and GVIIC) number previously utilized. Why are the MIOSHA work place exposure numbers not being utilized to determine if a true exposure condition exists on a commercial property? States such as California recognize that volatilization concerns related to petroleum release sites do fall under work place exposures and as such fall under state OSHA regulations. In addition, IRASLs have yet to be determined but are to be part of this document. Will a public commentary period be available to review and vet the new criteria prior to implementation by the MDEQ?	The MDEQ agrees with the commenter's observation that the proposed screening values are orders of magnitude lower than the original SVIIC and GVIIC. The MIOSHA work place exposure numbers are not appropriate for evaluating environmental releases and do not adequately address exposure conditions on most commercial properties (e.g., exposure to historical environmental releases of PCE in the indoor air at a library). Environmental contamination is not regulated by MIOSHA. The MDEQ interprets California's guidance differently than the commenter. Environmental petroleum releases in California do not appear to fall under the State's OSHA regulations. Please see the link to Appendix F of California's final Vapor Intrusion Guidance for further clarification: http://www.dtsc.ca.gov/AssessingRisk/upload/Final_VIG_Oct_2011.pdf. All criteria and methodology are under review by the CSI stakeholder process. The criteria and methodology will be included in the proposed rules and will therefore be subject to public comment. Recent revisions to Part 201 do allow for the use of MIOSHA work place exposure numbers in very specific conditions. The text has been revised to reflect this.	GES	Appendix D	Appendix D
220	The screening levels in Appendix D are too conservative. The guidance states attenuation factors used to determine screening levels were determined from the USEPA's data set. However, the guidance does not describe how indoor air concentrations from alternative or background sources were screened out of the data used to determine attenuation coefficients.	The MDEQ will be relying on EPA's recommendation for subslab and deep soil gas and groundwater attenuation coefficients. The MDEQ has not conducted an independent review of the EPA's dataset. It is common for the MDEQ to adopt EPA-recommended risk assessment methodologies. The EPA's Database Evaluation (EPA, 2012) provides details regarding how indoor air background was screened out of the data and the MDEQ is relying on EPA's expertise to conduct these types of data screens.	Brady	Appendix D	Appendix D

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#	Comment	Response	Commenter	DRAFT Section	FINAL Section
221	It appears the screening levels included in the guidance are too conservative and will result in misuse of resources.	Each screening level is derived using algorithms that contain a mix of chemical-specific toxicity inputs, exposure assumptions (mid-range and upper end estimates), and fate and transport assumptions. It is difficult to respond to the general comment that the screening levels are "too conservative" without specific information, proof or evidence provided to suggest that the screening levels or their input assumptions are “too conservative”. More information or data is necessary to support the conclusion that the screening levels “will result in misuse of resources”. Under the present statute, polluters have the option to demonstrate that alternative screening levels are more appropriate and adequate in managing risks to predetermined acceptable levels (regulatory or policy). This option requires consideration of the amount of data necessary or available to make risk conclusions, the number of acceptable false negatives, the cancer and non-cancer risk level, and the type of structure and exposed population.	Brady	Appendix D	Appendix D
222	The sump screening levels in Appendix D are too conservative. It appears the sump screening levels were calculated assuming the breathing space is within a closed sump. This is not a realistic exposure scenario. Algorithms and inputs used to develop the sump screening levels should be provided in the MDEQ guidance so that stakeholders and the public can comment thoroughly.	The sump screening levels are considered reasonable and relevant for shallow groundwater conditions. Although the MDEQ acknowledges that the methodology may be conservative and technically reflects concentrations in the breathing space of an enclosed sump, the intent is to facilitate further investigation and force resources to potentially more critical exposure scenarios, especially those where the environmental release has entered a residential home through its sump or may be seeping into a structure via floor cracks, drains, or a "Michigan basement". These exposures may allow for a greater mass of contaminants than the sump scenario, but are more difficult to model and inappropriate to derive predictions based on generic input assumption.	Brady	Appendix D	Appendix D
223	In our experience, sumps are not a significant source because the total mass of VOCs in the sump is very small relative to the volume of air moving through the indoor space. Recommend increasing sump values by 100x.	The MDEQ disagrees with the commenter. The exposure pathway requires evaluation, especially under conditions where the environmental release has entered a residential home through its sump.	URS/DOW	Appendix D	Appendix D
224	Additional info on calculation of screening levels (J&E model inputs, etc.) should be provided.	The department intends to be completely transparent with screening level methodology and calculations and input assumptions will be included in rule or in a technical support document available to the public following the CSI stakeholder process.	Arcadis	Appendix D	Appendix D
225	We also think that certain compounds (e.g., acetone, ethanol, 2-propanol, methylene chloride, carbon disulfide, and 2-butanone) should be deleted from the list (see Table 1, tabulated specific comments below).	The department has considered various options for determining whether a hazardous substance is relevant for the vapor intrusion pathway. Vapor intrusion shall be considered a reasonable and relevant exposure pathway for volatile organic chemicals and other hazardous substances that have a Henry’s law constant greater than or equal to 1.0E-05 atm-m3/mol at 25 degrees Celsius. If these substances are legitimate environmental contaminants at a site and fall within this HLC threshold, then they are a concern for vapor intrusion.	URS/Dow	Appendix E	Appendix E

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226	If the MDEQ decides not to include the additional information regarding acceptable indoor air concentrations, attenuation coefficient statistics and screening levels algorithms/inputs in the guidance, I hope the MDEQ will at least make this information available to the public through a Freedom of Information Act request.	All methodologies (algorithms), inputs, and rationale for input assumptions are available through FOIA. The department intends to be completely transparent with this information. They will be presented in rule or in a technical support document which will be made available to the public following the CSI stakeholder process.	Brady	General	General
REFERRED TO NAPL TAPS TEAM					
227	DEQ should be cautious when using groundwater other than for screening at petroleum sites. There is a poor correlation between soil gas and ground water values due to bio, potential residual LNAPL, and screens beneath the water table.	Text modified in Section 3.2.2 of the guidance.	Shell	2.3 Appendix B.3	2.3 3.2.2 Appendix B.3
228	The identification of residual-phase LNAPL can be challenging. The agency may want to consider developing LNAPL indicator criteria similar to those shown in the attached table.	This comment has been forwarded to the NAPL Technical and Program Support Team for consideration.	Shell	Appendix B.3	Appendix B.3
229	Need to distinguish between dissolved and residual phase petroleum hydrocarbon sources during early stages of site investigation. DEQ should provide very clear guidance on how to access source type early on.	This comment has been forwarded to the NAPL Technical and Program Support Team for consideration.	Shell	Appendix B.3	Appendix B.3

Key:

GENERAL
JOHNSON-ETTINGER MODEL AND OTHER MODELING RELATED ISSUES
PETROLEUM HYDROCARBONS
SAMPLING AND ANALYTICAL METHODS
SITE-SPECIFIC CRITERIA
SCREENING LEVELS
REFERRED TO DEQ RRD TOXICOLOGISTS
REFERRED TO NAPL TAPS TEAM