



July 23, 2009

Gerard Martin  
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Massachusetts Department of Environmental Protection  
One Winter Street  
Boston, MA 02108

**Re: Comments on Draft "MassDEP Indoor Air Guidance"**

Dear Gerard,

AMEC Earth & Environmental (AMEC) and GEI Consultants, Inc. (GEI) are submitting written comments on the integrated draft guidance document that MassDEP posted to its Indoor Air website and emailed to Workgroup members on July 7, 2009 (the Draft Guidance). We understand that this is an early draft, and we appreciate MassDEP's stated intention to give serious consideration to all comments it receives on the Draft Guidance as it is revised this summer and fall.

At the Workgroup's last combined meeting, you and Janine Commerford emphasized that specific comments on particular language and approaches stated in the Draft Guidance would be most helpful to you. We have tried to provide our comments in that form. Attached to this letter as **Exhibit A** is a full mark-up of the Draft Guidance, with proposed edits and comments directly inserted into the text.

As you know, we have participated actively in the meetings of the Regulatory and Assessment Subgroups, and the combined meetings of the Workgroup, throughout this process. We appreciate your attention to the issues we raised during the Workgroup meetings, and we recognize that MassDEP has made some changes to the Draft Guidance in response to our comments. Nevertheless, we and others in the regulated community continue to have a number of substantial concerns, and many of our comments on the current draft reiterate those concerns. We also note that many of our comments are consistent with those that the Licensed Site Professional Association (LSPA) submitted on June 17, 2009. We appreciate that, in your response to the LSPA's letter, you indicated you in fact agree with many of those comments, and that you expect that changes will be made to the Draft Guidance responsive to those comments. We hope the same will be true of our more detailed suggestions.

As outlined below and in the attached mark-up, our major concerns are:

*First*, the Draft Guidance does not yet articulate a regulatory and technical approach to Critical Exposure Pathways (CEPs) that is internally consistent and fits comfortably within the Massachusetts Contingency Plan (MCP).

*Second*, in defining the requirements for mitigating CEPs, the Draft Guidance tends to overstate the benefits of addressing risks from vapor intrusion that have been found not to be significant, through a comprehensive risk characterization conducted in accordance with the MCP.

*Third*, although MassDEP has revised some of the more black-and-white language that appeared in prior drafts, the Draft Guidance reduces the “Lines of Evidence” approach, in many cases, to a requirement that indoor air sampling be performed, even where use of other data is scientifically appropriate for screening and site characterization purposes.

*Fourth*, the Mitigation and Public Involvement sections have not received the same degree of attention and are not as far along as the other sections. We therefore have provided more general comments on those sections.

## **Major Issues in the Draft Guidance**

### **A. Critical Exposure Pathways**

The Draft Guidance discusses the mitigation requirements for Critical Exposure Pathways at length. We agree that CEPs are an important focus of the Draft Guidance because they have been a source of confusion in the past, but we are concerned that the Draft Guidance’s approach is not workable in the field and also goes further than specified in the MCP.

In the 1999 amendments to the MCP, the CEP concept was added to the *Preliminary* Response Action section of the MCP (310 CMR 40.0400). No separate CEP requirements were added either to the risk characterization requirements, or to the requirements that must be met to achieve any of the various categories of Response Action Outcome (RAO). The MCP now requires that CEPs be eliminated, mitigated, or prevented if feasible, but only if and at the time that an Immediate Response Action (IRA) is necessary to address sudden releases, Imminent Hazards (IHs) and other “time-critical release or site conditions,” including Conditions of Substantial Release Migration (SRM) (310 CMR 40.0405(2)).

MassDEP has said, and the MCP establishes, that CEPs are conditions that must be addressed immediately, through “preliminary” and “immediate” response actions on an interim basis, *pending implementation* of comprehensive response actions (310 CMR 40.0427(1)(c)). But MassDEP now says that addressing CEPs is part of the goal, under M.G.L. c. 21E, § 3A(g), “where feasible,” and “to the extent possible,” to reduce concentrations to “background” levels, which is a requirement of a permanent solution *following the completion* of comprehensive response actions. In the Draft Guidance, MassDEP also indicates that CEP mitigation, even beyond the risk-based standards of the MCP, is appropriate because those standards may not be protective enough when it comes to one exceptional exposure pathway, vapor intrusion. Finally, in the Draft Guidance, MassDEP implies that mitigation and monitoring of indoor air risks that

exist only at concentrations below what has been determined to be a condition of No Significant Risk (NSR) should continue even after a permanent solution otherwise has been achieved and an RAO has been completed.

As a result of these inconsistencies, the Draft Guidance may be read as prohibiting termination of CEP mitigation measures commenced during an IRA that are unnecessary to support a permanent solution under G. L. c. 21E, even at sites that pose NSR to human health. Worse, “active” measures may be required to continue forever as an IRA, and potentially, prevent site closure under the MCP. This would be a departure from MassDEP’s longstanding acceptance of closing IRAs as comprehensive assessments and remedial activities are conducted.

In any event, the concept of feasibility of reaching background assumes that there is an empirical measure of background for indoor air. But in its Draft Guidance, its Residential Typical Indoor Air Concentrations (TIACs) Technical Support Document, and its draft policy on Indoor Air Threshold Values (TVs) for the Evaluation of a Vapor Intrusion Pathway (TV Policy), MassDEP has repudiated the concept of “background” for indoor air.<sup>1</sup> The feasibility evaluation described in the Draft Guidance has no basis to proceed without the baseline reference specified in the statute, that is, “background.”

#### 1. Background

The Draft Guidance and recent statements by MassDEP, including its response to comments submitted by the National Association of Industrial and Office Properties (NAIOP), cite the statutory mandate to consider measures to achieve “background” as the basis for requiring perpetual CEP mitigation and monitoring, even if the site satisfies the criteria for an RAO.

We understand that the permanent solution provisions of the MCP (310 CMR 40.1010) require measures to reach or approach background levels if feasible, a goal the statute differentiates from the requirement that such measures achieve NSR. MassDEP’s reliance on this “background” requirement seems misplaced. The requirements for a permanent solution do not mention CEPs, nor do the CEP provisions of the MCP make any reference to background levels. Indeed, the requirement to address CEPs if feasible only arises when site conditions pose sufficient *risks* that MassDEP must be notified immediately under the MCP, not because background levels are exceeded. CEPs notwithstanding, sites that meet the requirements for a permanent solution (including completion of a feasibility evaluation for measures to reach or approach background) are eligible for a Class A or B RAO. In any event, there is absolutely no provision in either the statute or the MCP that would make room for measures or feasibility evaluations to be undertaken after the requirements for a permanent solution have been met.

Even if the CEP requirements derive from the statutory goal of achieving “background,” that goal is not automatically the same as “non-detect” or zero. In any case, that goal would not be

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<sup>1</sup> Background concentrations for compounds of concern are still integral to the GW-2 standards that MassDEP previously adopted and incorporated into the MCP. This additional inconsistency has been the subject of several Workgroup discussions.

more than reaching TIACs, which were developed from studies showing “a range of (oil and/or hazardous material [OHM]) concentrations commonly observed, absent a release.” In this regard, concentrations of more than half of the chemicals listed *are* detectable in typical indoor air in residences. The Draft Guidance should clarify, at a minimum, that there is no requirement to mitigate CEPs resulting in TIACs or lesser concentrations.

It bears emphasizing that a requirement for achieving “background” is meaningless if it is true, as MassDEP now says, that no one can reliably determine what indoor air background is. MassDEP has now repeatedly taken the position that it is not possible to know what background levels are in indoor air. (See discussion in Technical Update on “Residential Typical Indoor Air Concentrations” (Dec. 2008).) In meetings of the Workgroup and in written comments, AMEC, NAIOP, and others have disagreed with this change in MassDEP’s position on technical and legal grounds. As MassDEP’s position on indoor air background is reflected in the Draft Guidance (Draft Guidance § 3.4.2.5), we reiterate those objections here by reference. AMEC Comments on Draft Technical Updates: “Indoor Air Threshold Values for the Evaluation of a Vapor Intrusion Pathway” and “Typical Indoor Air Concentrations,” submitted to MassDEP on August 14, 2008, are attached as **Exhibit B**. If an endpoint cannot be determined, there is no way to know whether mitigation of a CEP is necessary to reach that endpoint or, in any event, whether feasible mitigation measures would make any difference in reaching or achieving it.

## 2. “Risk” Levels Below NSR

MassDEP also cites fears of toxicological and exposure “uncertainties” that heighten the “risks” of exposure to vapor intrusion at any level. As indicated in the more detailed comments in our mark-up, we recommend deletion of MassDEP’s language regarding “uncertainties” in risk assessments and exposures as a rationale for additional mitigation of CEPs beyond NSR levels.

Uncertainty is not unique to indoor air and cannot be a basis for heightening the MCP’s risk-based standards. Technical uncertainties that may be inherent in vapor intrusion assessments are already addressed by the Draft Guidance’s provisions favoring the Lines of Evidence approach and prescribing sampling methods, duration, and frequency where sampling is appropriate.

NSR is defined as “a level of control of each identified substance of concern at a site or in the surrounding environment such that no such substance of concern shall present a *significant risk* of harm to health, safety, public welfare or the environment during any foreseeable period of time” (M.G.L. c. 21E, § 3A(g).) Mitigating CEPs that do not pose a Significant Risk is addressing a “risk” that is, by definition, *de minimis*.

Public health and environmental agencies in other states and around the world recognize that when risk levels are sufficiently low, they are virtually equal to zero. For instance, in a community of 1,000 people, an Excess Lifetime Cancer Risk Level of one in one hundred thousand is essentially “zero risk,” because the number of cases of cancer predicted over a lifetime is 0.01 case. “Reducing” this risk level by a factor of 10, to  $1 \times 10^{-6}$  decreases the number of cases over a lifetime to 0.001, which has no effect on the absolute number of cases, which is still less than one. Risk benefit analysis would definitively demonstrate that taking action to

reduce risk from  $1 \times 10^{-5}$  to  $1 \times 10^{-6}$  or even to  $1 \times 10^{-9}$  provides no discernable benefit to public health. If the risk level associated with a CEP is not capable of measurement, then there is no benefit to reducing it further.

Moreover, the “uncertainty” inherent in existing risk assessment methodologies is all in the direction of *overestimating* risk. Every toxicological reference value used in the conduct of risk assessment overestimates the true risk to humans by at least one hundred-fold and in some cases thousands-fold. For example, AMEC recently conducted a population risk assessment to evaluate EPA’s recently proposed Unit Risk Factor for naphthalene. If the proposed value were a true reflection of the risk to humans posed by inhalation of naphthalene, the number of cases of a rare nasal tumor in the US Population should be over 26,000 per year. The actual number seen per year from all causes is 61 per year. In other cases, cancer risk values are based on liver tumors in the B6C3F1 mouse which is a strain of mouse that is highly susceptible to liver carcinogenesis regardless of external chemical exposures. Use of tumor response data from species and strains of animals that yield high reference values, but are not themselves good models of human responses, ensures that risk assessments in fact overestimate human risk. In this way, all risk assessments, including the MCP-required risk assessments of levels of OHM in indoor air, are specifically designed to vastly overestimate risk to humans.

Exposure assessments also overestimate risk by design. With regard to indoor air, MassDEP’s “homebound adult” receptor is a person who is assumed to breath indoor air in one building for 24 hours a day, 365 days a year over 30 years. MassDEP also assumes that an infant breathes air at their residence for 24 hours a day and never visits the doctor or the relatives, and a child breathes air at their residence for 20 hours a day even though MassDEP assumes that they also breathe air at a school for 8 hours a day during the school week. The former assumptions with regard to the homebound adult should be deleted from the Guidance, because the probability that there is even one person who could stay within one building and not leave the house or even venture onto their front porch for 30 years is zero. However, the infant and child assumptions, while clearly impossible for average infants and children, are understood to be conservative estimates that err on the side of health protection. When MassDEP overestimates exposures for infants and children by assuming they do not visit the doctor or attend school as required by law, they are establishing a risk assessment paradigm that intentionally overestimates risk, again, as a matter of science policy.

In the feasibility evaluation sections, the Draft Guidance deems *any* reduction of “uncertainty” a “benefit” of further CEP mitigation that must be weighed in feasibility evaluations. Such reductions are impossible to quantify and are not benefits recognized in the statute. “Uncertainty” by itself is not a risk to human health or the environment, nor does the term appear in the feasibility provisions of the statute. As explained above, the risk factors, exposure assumptions, and other parameters that the MCP requires already result in risk assessments that vastly overestimate risk to humans, and, therefore, provide ample protection regardless of which exposure pathway is being evaluated.

Beyond that, the statute treats remedial measures to achieve levels below NSR only of benefit to the extent they approach or achieve background levels, a goal that is, by statute and under the

MCP, distinct from, and unrelated to, reducing “uncertainty” or risk. MassDEP itself has repudiated the concept of background for the indoor air exposure pathway. Consistent with our proposed revisions, therefore, the provisions of the Draft Guidance recognizing the reduction of “uncertainty” as a benefit to CEP mitigation should be deleted.

### 3. Feasibility Evaluations for CEP Remedial Measures

In the Draft Guidance, MassDEP proposed two options for both types of CEP feasibility evaluations described and asked for commenters preferences. As between these two options, and with the markups we propose, we favor Options “A” for feasibility evaluations for mitigation measures to address CEPs. Options “B” provide inflexible financial bounds on what may or may not be a feasible mitigation measure. Even if all of MassDEP’s assumptions are documented and justified based on vendor data and operational experience, the cost thresholds give short shrift to Licensed Site Professionals’ (LSPs’) informed site-specific judgments about technological limitations and the costs and benefits of mitigation measures. We do not think bright dollar-based lines are workable for feasibility evaluations. Options “A” are more consistent with MassDEP’s other guidelines regarding feasibility analyses, and, after inclusion of the revisions we have proposed, with requirements for RAOs.

That said, both types of proposed options for feasibility evaluations of CEP remedial measures are problematic, for the reasons discussed above, and in our attached mark-up.

### 4. IRA Closure

With the exception of some excerpts from the MCP and a statement that CEP mitigation measures may “continue” as Phase IV activities (Draft Guidance §§ 4.4.8, 4.5.1), the Draft Guidance does not fully address the circumstances for closure of an IRA that is addressing a CEP.

The MCP makes clear that an IRA is exactly what it says – an interim response action to be undertaken immediately, pending completion of the comprehensive site assessment, risk characterization, and evaluation of available comprehensive response actions. An IRA can be closed, and actions undertaken as part of the IRA discontinued, through the submission of an IRA Completion Report. An IRA will be deemed complete when “the release, threat of release and/or site conditions which give rise to the need for that Immediate Response Action... have been..., where necessary, remediated in a manner and to a degree that will ensure, at a minimum... the elimination, prevention or mitigation of Critical Exposure Pathway(s) without the continued operation and maintenance of active remedial systems, *pending the completion of a risk assessment pursuant to 310 CMR 40.0900 and a feasibility study pursuant to 310 CMR 40.0860.*” (310 CMR 40.0427(1)(c) (emphasis added).) As MassDEP has previously concluded, “in cases where a remedial measure is taken to prevent, mitigate, or eliminate a CEP, the IRA cannot be closed out until such time as all active remedial measures (such as active venting, sub-slab depressurization, and/or point of use water treatment) have been terminated, *or until such time as such active measures are formally incorporated in a comprehensive response action (Phase IV, V, ROS, Class C RAO).*” (MCP Q&A (Jan. 2001), <http://www.mass.gov/dep/cleanup/>

laws/mastqa.htm#cri (citing 310 CMR 40.0427(1)(c)) (emphasis added)). Folding IRA activities into comprehensive response actions, where consistent with the remedial plan and necessary to address conditions of Significant Risk, is the most practical way to read the IRA provisions of the MCP consistently with the provisions addressing comprehensive response actions.

In the next draft of the Draft Guidance, MassDEP should reaffirm that ongoing measures to address CEPs undertaken as IRAs may be incorporated into comprehensive response actions and the IRA itself closed.

The Draft Guidance should also address circumstances when Phase II activities have concluded with an adequate characterization of the disposal site and the associated risk, but a CEP identified by indoor air sampling in the course of an IRA has not been eliminated or mitigated. With the Phase II complete, the characteristics of the disposal site (the source, the nature and extent of the release, and the mobility and stability of compounds of concern in groundwater) are known and its risks characterized. Mitigating the CEP, if it poses NSR, is no longer necessary to protect human health. This circumstance could arise for example, if a property owner did not provide access to a home for indoor air testing during the early phases of an investigation, but finally consented to the testing towards the end of the assessment process. If the Phase II activities have demonstrated that concentrations measured in an occupied residence, school or daycare center do not pose a Significant Risk, the CEP should not require mitigation, and the IRA should be closed. This would be consistent with MassDEP's past statement that response actions are *not required* to address CEPs encountered *after* NSR has been achieved at a disposal site (MCP Q&A (Jan. 2001), <http://www.mass.gov/dep/cleanup/laws/mastqa.htm#cri>: "actions to address any CEP would be required only if the recent monitoring information negates the basis for the Response Action Outcome, i.e., indicates a condition of No Significant Risk has not been achieved or maintained").

## **B. Lines of Evidence**

### **1. Lines of Evidence Approach to Assessment**

The Assessment section of the Draft Guidance employs a "Lines of Evidence" approach to determining whether available information establishes the presence or absence of a vapor intrusion pathway. We agree with this approach in principle, but are very concerned that, aside from certain defined screening criteria (discussed in our comments below), MassDEP is moving toward the view that indoor air sampling is the only valid "line of evidence" that can demonstrate the absence of a complete pathway if groundwater and/or soil concentrations exceed certain conservatively derived levels. This approach is inconsistent with the guidance and policy documents MassDEP has previously published, including the TV Policy and Indoor Air Standard Operating Procedure (SOP), and may be a product of the Draft Guidance's dim view of modeling, which we have proposed to moderate in our attached mark-up.

Rather than indoor air sampling being a final Line of Evidence, the Draft Guidance favors the use of indoor air sampling as the only reliable Line of Evidence, which is at odds with a cumulative, iterative approach. If the MassDEP continues to endorse the Lines of Evidence

approach, then the discussion of Lines of Evidence should clarify the objectives of that approach and how such objectives in fact can be achieved, without indoor air testing.

In its current form, the approach outlined in the Draft Guidance effectively *presumes* a complete vapor intrusion pathway, once concentrations in groundwater exceed GW-2 standards or any of the exceptions in the Regulatory Section have been identified. The Draft Guidance's focus is defining the extent of the burden to *disprove* that the vapor intrusion pathway is complete. The Lines of Evidence approach should be the converse: if some data, such as data indicating contaminated groundwater, suggests that the vapor intrusion pathway is a concern and there is a potential for it to be complete, Lines of Evidence are then investigated to evaluate the likelihood that the pathway is complete. A vapor intrusion investigation and the development of Lines of Evidence should be an iterative process that either negates or supports the likelihood of a complete vapor intrusion pathway. The Draft Guidance should present the factors of the Lines of Evidence in that manner and not presume indoor air testing is to be performed at every site and during each phase of the investigation.

A more stepwise approach was described in the MassDEP's draft SOP, dated August 2007, and the TV Policy, most recently published in June 2009. The SOP provides that, at any point in the investigation, an investigator may conclude "indoor air impacts unlikely or no significant risk, absent information or data to the contrary." Indoor air testing is not mandatory (SOP, page II.17). The TV Policy provides that "[n]ot all assessments of potential vapor intrusion pathways, for example, lead to indoor air sampling. An evaluation of groundwater concentrations and/or sub-slab soil gas concentrations may result in a conclusion that a vapor intrusion pathway is unlikely or not present, and therefore, indoor air samples are unnecessary" (TV Policy, page 2). We suggest that MassDEP look back to its own SOP and TV Policy and consider revisions to the Draft Guidance that would make the latter consistent with the former. The Draft Guidance should state that data regarding various site specific conditions may be compiled as Lines of Evidence, including groundwater and soil gas concentrations, depths to groundwater, soil types, building conditions and types of construction, among other things.

We also note that California Department of Toxic Substances Control (DTSC) guidance, which the Draft Guidance cites on other issues, recommends the Lines of Evidence approach for vapor intrusion investigations and describes it as a stepwise process and in similar terms as the SOP and the TV Policy (California DTSC, Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (December 2004) ("DTSC Guidance"), page iii).

In any event, the descriptions of the Lines of Evidence should be revised so that, in most investigations, collection of indoor air samples is one of the final investigatory techniques. Soil and groundwater data are typically collected prior to indoor air sampling, and they can obviate the need for indoor air sampling. Our mark-up suggests reordering the descriptions of the Lines of Evidence to be more consistent with actual site investigations.

## 2. Screening Criteria

As we have said in numerous Workgroup meetings, we support the concept of screening criteria that allow an investigator to conclude that the vapor intrusion pathway is not complete or does not require mitigation, without resort to an extensive assessment of Lines of Evidence. In this regard, we support the Draft Guidance's proposal for screening out sites in certain circumstances where groundwater meets GW-2 standards (Draft Guidance § 2.1.2). We do not agree, however, with the standard that MassDEP has proposed utilizing groundwater and soil gas and have recommended a number of changes in the mark-up. We also favor the use of TVs, consistent with the TV Policy, or NSR levels (taking into account the number of constituents that contribute significantly to total site risk), whichever is higher, as screening criteria for indoor air sampling results.

### a. Screening Criteria for Soil Gas

The Draft Guidance proposes a "Method 2" standard for ruling out vapor intrusion at a site based on groundwater concentrations not exceeding twice the GW-2 standard and soil gas concentrations of less than ten times the TVs specified in the TV Policy.<sup>2</sup> While we appreciate the concept of providing a simplified screening criterion that does not rely on indoor air data, the proposed standard is not technically sound. More specifically, we believe the screening criteria should be revised to rely solely on soil gas concentrations, and not groundwater concentrations, and to utilize a more realistic attenuation factor.

The core of our disagreement is the Draft Guidance's view of the utility of soil gas concentrations in assessing the vapor intrusion pathway. We believe that soil gas concentrations are an important line of evidence. Paired with an appropriate attenuation factor, soil gas data can effectively rule out vapor intrusion as a pathway of concern, and need not be paired with particular underlying groundwater concentrations. Indeed, based on our experience, correlating twice the GW-2 standard with specific soil gas concentrations is not a substantiated indicator of the vapor intrusion pathway. Even if the screening values proposed by MassDEP are properly considered a Method 2 standard, Method 2 does not restrict concentrations that may be compared to a Method 2 standard to concentrations less than twice the GW-2 standard. Establishing acceptable sub-slab soil gas concentrations based on TVs is also not consistent with the intent of Method 2 methodology, the endpoint of which is NSR, not a TV. As a result, and as reflected in our mark-up, the attenuation factor should be applied to NSR after taking into consideration the

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<sup>2</sup> We also note that describing the screening criteria as a Method 2 standard is not accurate under the MCP. Method 2 is used to develop Method 1 standards that do not exist or to modify Method 1 standards to site-specific conditions (310 CMR 40.0982). With appropriately documented modeling, the MCP expressly allows development of site-specific GW-2 standards that would serve as a site-specific substitute for an existing Method 1 standard. A generic screening criterion like the one proposed is more properly understood as MassDEP's determination that, when the criterion is met, the vapor intrusion pathway has been adequately characterized and ruled out under the MCP. In any event, the soil gas criteria should relate to NSR, as discussed below and in our attached mark-up.

number of carcinogenic constituents significantly affecting total site risk, the appropriate indoor air value for the Method 2 (and MCP) endpoint.

As to MassDEP's use of an attenuation factor of 10, the selected value is the 95<sup>th</sup> percentile of the attenuation factors in the most recent and comprehensive EPA database (EPA, Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors (2008)). Most of the attenuation factors included in the EPA database are 100 or more. This can be seen clearly in the cumulative percentile graph included in the EPA document, which shows that 10% to 75% of the attenuation factors are between 100 and 1000. The 75<sup>th</sup> percentile value is an attenuation factor of 102. It follows that a prudent attenuation factor for use in the Draft Guidance is 100, and not 10. MassDEP has stated recently in its TIAC guidance that it considers 75<sup>th</sup> and 90<sup>th</sup> percentile values appropriate values for comparison to measured indoor air concentrations, as one line of evidence in evaluating whether a building is affected by a vapor intrusion pathway from a disposal site. Statistically speaking, the choice of the 75<sup>th</sup> percentile in this context, that is, an attenuation factor of 100, would be entirely consistent with the TIAC guidance, from which MassDEP's TVs are derived.

We call MassDEP's attention to the approach outlined in the DTSC Guidance, which recommends using soil gas data and specified attenuation factors, consistent with EPA's data described above, for preliminary site evaluation (DTSC Guidance, pages 4, 14-15: "Soil gas data should be used to evaluate vapor intrusion to indoor air. Soil gas data are recommended over other data, such as soil matrix and groundwater data, because soil gas data represent a direct measurement of the contaminant that will migrate into indoor air.... DTSC recommends that the default attenuation factors in Table 2 be used along with the maximum detected soil gas concentration for preliminary screening evaluations."). The attenuation factors utilized by DTSC range from 0.01 for an existing residential building with a basement to 0.001 for a commercial building (DTSC Guidance, page 58). An attenuation factor of 0.01, rather than the current draft's factor of 0.1, would be consistent with the scientific data regarding appropriate values, and should be incorporated into the Draft Guidance's screening criteria for soil gas concentrations, as we propose in our mark-up.

#### b. Screening Criteria for Indoor Air Sampling Results

The Draft Guidance is inconsistent with the TV Policy, which we understood to be a ready means of screening out sites where indoor air sampling results showed concentrations of generally typical levels. Instead, in line with its general approach of presuming the presence of a vapor intrusion pathway, the Draft Guidance states that TIACs may be used as "*one of potentially several lines of evidence*" in evaluating potential vapor intrusion pathways and "are not meant to be stand-alone lines of evidence for determining the presence or absence of a vapor intrusion pathway." The only screening function the Draft Guidance assigns to TIACs and TVs is in the "Method 2" standard for soil gas concentrations discussed above, where the use of TVs is not consistent with the NSR endpoint that Method 2 standards are intended to reflect.

This is not the same position MassDEP adopted in the TV Policy: "[w]here the measured indoor air concentrations of chemicals associated with the disposal site are at or below a Threshold

Value, MassDEP considers *further investigation and lines of evidence unnecessary*” (TV Policy, page 4). Although we continue to believe the risk-based components of the TV Policy’s current draft should be withdrawn, the clear screening function that the TV Policy intends TIACs to serve should be written back into the Draft Guidance. We recommend that MassDEP add a provision to the Draft Guidance that the vapor intrusion pathway may be deemed incomplete if indoor air sampling demonstrates the presence of volatile constituents at levels below TIACs.

### 3. Application to Site Characterization

The Draft Guidance’s departure from the step-wise approach to evaluating Lines of Evidence outlined in the SOP can be remedied by putting the Assessment section of the Draft Guidance into its appropriate context within the MCP assessment process. More specifically, the Assessment section would benefit from an explanation, in the vapor intrusion context, of the performance standard and requirements applicable to a Phase II comprehensive site assessment, namely:

- Phase II Comprehensive Site Assessments “shall collect, develop, and evaluate *sufficient information to support conclusions and Opinions* regarding .... the source, nature, extent, and potential impacts of releases of [OHM]” (310 CMR 40.0833(1)(a) (emphasis added)).
- Phase II Reports must include information and findings regarding, among other things:
  - the “Environmental Fate and Transport of [OHM], including, as appropriate: (1) an evaluation of the environmental fate and transport characteristics of the [OHM] identified at the disposal site...; (2) identification and characterization of existing and potential migration pathways of the [OHM] at and from the disposal site, including as appropriate, air, soil, groundwater, surface water, and food chain pathways; and (3) an evaluation of the potential for groundwater to be a source of vapors of [OHM] to indoor air of occupied structures as described in 310 CMR 40.0900,” and
  - the “Nature and Extent of Contamination, including a characterization of the source(s), nature, and vertical and horizontal extent of contamination at the disposal site, presence, and distribution of any non-aqueous phase liquids, tabulation of analytical testing results, and where appropriate, a characterization of background concentrations of [OHM]” (310 CMR 40.0835(4)).
- Investigating potential vapor intrusion to define “all existing or potential Migration Pathways” is also a significant issue in preparing a risk characterization (310 CMR 40.0904).

The regulations *do not* prescribe indoor air sampling as the only means of meeting the Phase II performance standard, either to characterize site boundaries or define the applicable migration pathways. The Draft Guidance should recognize that site characterization may rely on groundwater, soil, and soil gas data for ruling out the vapor intrusion pathway where appropriate.

This is particularly true at well-investigated disposal sites with substantial soil, groundwater, and soil gas sampling data. Similarly, there will also be cases where indoor air sampling should not be necessary at buildings peripheral to a large disposal site, where substantial data has been collected, including indoor air data from buildings over the heart of the plume, and the plume itself has been well-characterized. In these and other appropriate circumstances, LSPs can utilize the Lines of Evidence approach, as originally intended and discussed above, to meet the Phase II requirements without the need for indoor air sampling.

### **C. Mitigation and Public Involvement Sections**

Both the Mitigation and Public Involvement sections of the Draft Guidance are at early stages of drafting, with several sections incomplete or yet to be drafted. In this context, it is not possible to provide the same level of comments or proposed revisions that we have offered on the other sections.

For example, much of the Mitigation section is devoted to the various types of source remediation, including an extensive list of various technologies. While source control is obviously an important consideration in any comprehensive site remedy under the MCP, much of the information provided in the current draft (including a laundry list of technologies with no direct relevance to mitigation of the vapor intrusion pathway, such as phytoremediation) is readily available in other sources and does not appreciably promote the Draft Guidance's objective of helping the regulated community understand how to mitigate vapor intrusion. Other parts of the Mitigation section appear to be drawn from other sources. A key focus of revisions to the Mitigation section should be the application of the MCP's performance standards to the available remedial technologies for mitigating the vapor intrusion pathway – whether during IRAs or as part of comprehensive response actions. We also have questioned certain views expressed by MassDEP on the effectiveness of various mitigation technologies in our mark-up.

In particular, we expect that later versions of the Draft Guidance will provide detailed information on the following important issues:

- Mitigation System Monitoring Standards and Frequency

The Draft Guidance states, on the one hand, that “it is generally not necessary” to institute a long-term indoor air monitoring program if passive or active mitigation system effectiveness has been demonstrated, but then “advises” exactly such a program, to involve indoor air sampling on an annual or bi-annual basis without a clear endpoint. Obviously, we believe the right view, and that which is consistent with the RAO provisions of the MCP, is that installation and testing of a remedial measure that demonstrates its effectiveness is a clear endpoint. The Draft Guidance also states that “monitoring and maintenance intervals may be determined based on the susceptibility of the mitigation system to failure and the effect of system failure on building occupants,” suggesting that such intervals must be determined on a case-by-case basis. It is entirely unclear what MassDEP will recommend in cases where a mitigation system is part of a permanent or temporary solution, or remedy operation status.

As stated in our mark-up, we believe these provisions of the Draft Guidance should be consistent with the Assessment section, which specifies that three seasons of indoor air sampling, one being winter, is adequate to rule out further consideration of the vapor intrusion pathway. We also point out that measurements of sub-slab soil gas concentrations are irrelevant to a passive system's effectiveness and that the Draft Guidance should be revised to focus on the physical integrity of the system.

Once a mitigation system, active or passive, has been shown to be effective with three seasons of indoor air sampling, the Draft Guidance should clearly state there should be no further requirement to conduct indoor air sampling at the site. A requirement to maintain the system as originally installed would be memorialized in an Activity and Use Limitation (AUL) as appropriate.

- AULs at Vapor Intrusion Sites

We understand that the use of AULs in the vapor intrusion context remains very much under discussion. We look forward to more detailed guidelines in a future draft of the Draft Guidance or in revisions to MassDEP's detailed AUL guidance issued in 1999.

Given this background, it makes sense that the discussion of AULs in the Draft Guidance remains very general. One aspect of the Draft Guidance goes somewhat further, and says that monitoring activities, including flow measurements, differential pressure measurements, sub-slab soil gas sampling "*and/or*" indoor air sampling should be required on a "semiannual, annual *or* biannual basis" in the Obligations and Conditions section of an AUL.

We disagree with this approach. AULs should not require "monitoring activities" at vapor intrusion sites. This concept is impractical, difficult to enforce perpetually, and will require separate open-ended agreements to be negotiated between parties performing response actions and the owners of affected buildings, a result that the Draft Guidance earlier says is "unreasonable" (Draft Guidance § 4.5.2). Moreover, perpetual monitoring will eventually become a nuisance and inconvenience to property owners, and monitoring results will inevitably capture variations in concentrations, within the range of background conditions that MassDEP has identified as TIACs, that may generate undue concern. To the extent that an RAO relies on an AUL and also requires appropriately limited post-closure monitoring, it should be the terms of the RAO that govern the performing parties' obligations. The AUL should be limited to the maintenance and non-tampering requirements, if any, on which the RAO relies.

The obligations and conditions in an AUL should be confined to requirements for owners of subject properties to provide reasonable access for system maintenance and inspections and, consistent with AULs in other contexts, to avoid tampering or damage to installed mitigation systems.

- Notice of Indoor Air Sampling to Affected Individuals

Gerard Martin  
Massachusetts Department of Environmental Protection  
July 23, 2009  
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While, as noted above, the Draft Guidance section on Public Involvement is in skeletal form, it alludes to a number of MCP provisions relating to notification of "Affected Individuals." As MassDEP develops the Public Involvement portion of the Draft Guidance, we ask that the Department think critically about the practical difficulties associated with requiring a party performing response actions that does not own a property to provide notification of sampling results to the property's tenants.

A party that must conduct indoor air sampling at a property it does not own must work cooperatively with the property owner to coordinate access. The cooperative approach required to gain access for sampling may be undermined by direct contact with the property owner's tenants. Based on our experience, landlords do not want parties performing response actions to communicate directly with their tenants. Moreover, the performing party typically will not have ready access to tenant names and contact information, especially for properties with a significant number of tenants. We suggest that, for those situations in which tenant notification is deemed to be necessary or appropriate, MassDEP place the onus of providing such notification on the property owner. It is the property owner, after all, that already has an established relationship and other reasons to communicate regularly with tenants. There may be circumstances in which the party performing response actions and the property owner decide cooperatively that it makes sense for the former to provide notice directly to tenants; the Draft Guidance should permit such an approach, but not mandate it.

\* \* \*

We hope that our comments will advance the Draft Guidance's goals of helping the regulated community understand how to meet regulatory requirements and providing useful information that will expedite and standardize the assessment and mitigation of vapor intrusion in Massachusetts. We look forward to reviewing the next draft of the Guidance in the fall. Please contact either of us with any questions you may have.

Sincerely,



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Enclosures