PART E
GUIDANCE SECTION 4: SOIL VAPOR INTRUSION MITIGATION

E.1 TOPIC: General comments on Section 4 of the guidance

Comment E.1.1:

The department provides a broad overview of the methods of mitigation and the installation and design of mitigation systems. Additionally, the guidance provides a thorough outline for the operation and maintenance and monitoring of mitigation systems and the annual certification and notification requirements.

Response E.1.1:

Comment noted.

E.2 TOPIC: Methods of mitigation for soil vapor intrusion

Comment E.2.1 (paraphrased, 1 commenter, 1 comment):

We support the use of sub-slab depressurization systems, equivalent to radon mitigation systems, to remove soil gas vapors from beneath a building's slab and into ambient air at brownfield and other remediation sites to address soil vapor buildup. We believe such radon-equivalent mitigation systems as opposed to remediation systems can be built and installed at reasonable cost and effectively reduce exposures where mitigation is warranted.

Response E.2.1:

Comment noted.

Comment E.2.2 (paraphrased, 5 commenters, 9 comments):

Mitigation methods required by the NYSDOH, as presented in Section 4.1, are not always technically or financially feasible, may not be the most appropriate means of control, and may create or amplify other vapor migration pathways. Other methods that are effective at mitigating exposures, such as crawl space venting and sealing (listed as secondary choices in the guidance), may be more easily implemented and may provide more consistent results.

The NYSDOH should

[a] allow the use of all available and useful mitigation methods, such as vapor barriers, moisture barriers (e.g., Liquid Boot), passive venting systems, or sealing alone; and

[b] provide other options that may be considered.

Response E.2.2:

The methods described in the guidance are strongly recommended due to their proven effectiveness. However, we acknowledge that in certain circumstances other technologies may be appropriate. To clarify this, the following text has been added to the opening paragraph of Section 4.1 of the guidance: "This section describes methods of mitigation that are expected to be the most reliable options under a wide range of circumstances. Occasionally, there are site-specific or building-specific conditions under which alternative methods (such as HVAC modification, sealing, room

pressurization, passive ventilation systems, or vapor barriers) may be more appropriate. Such mitigation proposals may be considered on a case-by-case basis."

In response to the specific issues above:

[a] Due to their effectiveness, energy-efficiency and ease in monitoring, the State prefers the installation of sub-slab depressurization (SSD) systems to prevent vapor intrusion and subsequent human exposures. However, the State acknowledges throughout Section 4.0, that the installation of a SSD systems may not be feasible or practical in all circumstances. Alternative mitigation methods, including HVAC modification, sealing, room pressurization, or vapor barriers, may be considered if they are installed and maintained in accordance with the EPA's radon guidance (where applicable) and if the effectiveness can be documented and maintained for as long as the potential for soil vapor intrusion exists at the structure. All proposed mitigation technologies will be reviewed on a case-by-case, site-by-site basis.

[b] More detailed information regarding alternative mitigation technologies can be found on the EPA's radon web site at http://www.epa.gov/iaq/radon/pubs/index.html.

Comment E.2.3:

The Guidance indicates that an active sub-slab depressurization system (SSD system) "must" be used in buildings with a basement slab or slab-on-grade. We suggest modifying this sentence to read "must be used in buildings with a basement slab or slab-on-grade, unless it can be demonstrated that an alternative engineering design, such as a positive pressure HVAC system, can be installed and operated to effectively mitigate vapor intrusion."

Response E.2.3:

The text in Section 4.1.1 of the guidance has been changed to read, "…an active *sub-slab depressurization system* (SSD system) is the preferred mitigation method for buildings with a basement slab or slab-on-grade foundation."

Comment E.2.4:

The Guidance indicates that a soil vapor retarder with sub-membrane depressurization (SMD) system must be used in buildings with a crawlspace foundation. We suggest modifying this sentence to read "must be used in buildings with a crawlspace foundation, unless it can be demonstrated that an alternative engineering design can be installed and operated to effectively mitigate vapor intrusion."

Response E.2.4:

The text in Section 4.1.2 of the guidance has been changed to read, "A *soil vapor retarder* with *sub-membrane depressurization (SMD) system* is the preferred mitigation method for buildings with a crawl space foundation."

Comment E.2.5:

We propose the following text change (shown in **bold**) to Section 4.1.1(b): *Soil vapor extraction (SVE) system* — a technique used to remediate contaminated subsurface soil vapor. SVE systems use high flow rates **or induced pressures or both** to collect and remove contamination, while SSD systems use a minimal flow rate to effect the minimum

pressure gradient (0.00**4** inch water) needed to reverse air flow across a building's foundation.

Response E.2.5:

The text in Section 4.1.1(b) has been revised to read "SVE systems use high flow rates, induced vacuum or both to collect and remove contamination…" With regard to the minimum pressure gradient, EPA's radon guidance (EPA 1993) recommends negative pressure of 0.025 to 0.035 inches of water for mild weather and no exhaust fans running to provide a cushion for building exhaust and weather challenges and negative pressure of 0.001 to 0.002 inches of water if weather is cold and exhaust fans are on during the system test. There is no basis for changing the guidance to 0.004.

Comment E.2.6 (paraphrased, 3 commenters, 2 comments):

Use of passive ventilation systems should be seriously considered since, under certain site conditions, they can be as or more effective than active systems. Furthermore, the guidance should be revised to state that sub-slab vapor control systems can remain passive until it is proven by indoor air sampling that activation of the system is needed to control soil vapor entry.

Response E.2.6:

Passive venting is not recommended due to the competing pressures from various sources and forces that can cause vapor flow one way or the other. Further, active sub-slab depressurization reduces the number of depressurization pits that might otherwise be necessary for a passive system. As such, the guidance continues to recommend the use of sub-slab depressurization systems. If sampling demonstrates that an alternate mitigation method may be appropriate given building-specific or site-specific conditions, the method will be considered. Section 4.1 has been revised to clarify this point.

Comment E.2.7 (2 commenters, 1 comment):

Recommended depressurization methods are expected to be less than effective. Section 4.1.1 describes methods for achieving depressurization beneath a slab. Included in this description are the use of drain tile, sump hole, and block wall suction. In contrast to recommendations by NYSDOH, it has been our experience that these points will have limited effectiveness, especially if they are not a conduit or path for infiltration. In particular, drain tiles and sump holes are not usually tightly sealed to the slab and by allowing water movement, would not usually be effective in generating a pressure field across even a short distance. Given that the effectiveness of these methods to generate a wide pressure field is doubtful, they should be given much lower prominence and priority as a potential mitigation method. If NYSDOH has examples where these types of holes have been used successfully, this information should be made publicly available.

Response E.2.7:

The EPA, in their "Consumer's Guide to Radon Reduction" (EPA 402-K-03-002; revised February 2003), lists these approaches as ways to reduce radon levels in a building, either in place of the more common sub-slab suction point method or in conjunction with that method. The depressurization approach, or combination of approaches, selected should be determined on a building-specific basis. For example, if the contaminants are entering the building through a block wall, block wall suction in conjunction with traditional sub-slab depressurization may be more effective at

minimizing exposures related to soil vapor intrusion rather than sub-slab depressurization alone. Reference to the EPA's document has been added to Section 4.1.1 of the guidance.

Comment E.2.8 (paraphrased, 1 commenter, 2 comments):

The guidance states that engineering controls are considered temporary measures until source removal permanently addresses the potential vapor intrusion pathway. However, source removal is not always necessary to address vapor intrusion concerns. Furthermore, in some situations, source removal may not be feasible due to ownership issues (i.e., a leased property) or other issues (e.g., access restrictions, financial considerations, etc.). Engineering controls that mitigate vapor intrusion should be acceptable in lieu of source removal.

Response E.2.8:

As building and environmental conditions may change over time, source removal is the most reliable method to minimize current and potential exposures associated with vapor intrusion. As with all environmental media, sources of vapor contamination should be removed or eliminated to the extent feasible. The guidance continues to state that implementation of a mitigation system is considered to be an interim measure to address exposures until the contaminated environmental media are remediated, or until the system is no longer needed to address exposures related to soil vapor intrusion.

Comment E.2.9 (paraphrased, 1 commenter, 1 comment):

We recommend that source removal be included in the discussion of soil vapor intrusion mitigation.

Response E.2.9:

Given that soil vapor is an environmental medium of concern, source removal is the ultimate remedial goal. Mitigation or other recommended actions are considered to be interim measures to address exposures until the source is remediated, or until such actions are no longer needed to address exposures related to soil vapor intrusion. Text has been added to the introduction of Section 4 in the guidance to reflect this concept.

Comment E.2.10:

Section 4.1.5 describes what to do when "…sampling results indicate a need to mitigate exposures in buildings that may be constructed…" Since there are no buildings, the samples cannot be indoor air or sub-slab. Thus it is assumed the samples would be soil vapor or groundwater. It is unreasonable to base a decision to mitigate buildings that do not yet exist based on sampling and modeling that may not be used to determine No Further Action.

Response E.2.10:

A decision to install mitigation systems in new construction can reasonably be made, because such a decision can readily be shown to be protective of human health. Developers, property owners, or other parties often choose to incorporate systems into new construction, particularly for a property at which subsurface vapor contamination has been detected or is suspected. The recommendations in Section 4.1.5 should be followed when mitigation systems are planned as a component of new construction.

Comment E.2.11 (paraphrased, 2 commenters, 2 comments):

The guidance should not restrict mitigation options for undeveloped parcels to SSD or SMD systems. While these systems are commonly the most cost-effective, it is premature to dictate designs when nothing is known about the use, construction, or operation of the future building. We suggest modifying Section 4.1.5 to state that these systems "must be used based upon the design of the proposed buildings, unless it can be demonstrated that an alternative engineering design can be installed and operated to effectively mitigate vapor intrusion." This allows for engineering judgment during the design process, yet recognizes the need to meet a rigorous performance standard, namely, effective mitigation of vapor intrusion.

Response E.2.11:

The guidance recommends active depressurization systems in this situation, although other mitigation methods that would prevent exposures to future occupants of the site can be considered. The text of Section 4.1.5 in the guidance has been modified to state that "…a SSD system with sealing, or a SMD system with a soil vapor retarder, or a combination of these methods is recommended, as appropriate to the design of the proposed buildings."

Comment E.2.12:

The slab-attenuation factor is highly site specific. Sufficient sub-slab and indoor air data have been collected by EPA (Truesdale et al. 2005) and NYDOH (McDonald and Wertz, 2005) to support high slab attenuation (>100) or even greater (>1000) at some sites, especially if sealing work has been performed. It is not clear whether additional measures beyond sealing work (e.g., active mitigation – sub-slab depressurization, HVAC pressurization) would be required at sites where indoor air concentrations are below human health risk-based levels, yet sub-slab concentrations are > 1000x human health risk-based levels. In these cases, active systems may not be needed.

Response E.2.12:

Data collected thus far in New York State do not support the development and use of default attenuation factors (as suggested) that would be generally applicable and protective at sites throughout the state [See also Comments A.8.1 and D.12.9 (default attenuation factors)]. Therefore, the guidance recommends that active systems be used in these situations. An active system, when combined with sealing work, is far more reliable than sealing alone and provides an added measure of protection against changing building and environmental conditions.

E.3 TOPIC: Design and installation of mitigation systems

Comment E.3.1:

Section 4, paragraph 2 — Substituting "as soon as reasonably possible" for "without delay" would allow for reasonable flexibility.

Response E.3.1:

Acknowledged. The guidance has been revised as follows: "Once it is determined that steps should to be taken to address exposures associated with soil vapor intrusion, they should be implemented with all due expediency."

Comment E.3.2 (paraphrased, 3 commenters, 6 comments):

There are too many references to the similarities between vapor intrusion mitigation systems and radon mitigation systems. Radon mitigation contractors are not necessarily qualified to design and install effective vapor-intrusion mitigation systems. Vapor intrusion systems must be designed by evaluating a number of property-specific parameters pertaining to building design and construction and geological conditions. The State should consider developing specific design protocols and a proficiency program for installers of vapor intrusion mitigation systems.

Response E.3.2:

The design standards for radon mitigation systems and vapor intrusion mitigation systems are essentially the same. Radon mitigation contractors have received the minimum training needed to address the basic system design and installation concepts. The State considers established EPA radon mitigation protocols to be sufficient for the design and construction of vapor intrusion mitigation systems. No additional design manuals are planned for development at this time. The State does not currently have a proficiency program for radon mitigators and has no plans for doing so for soil vapor intrusion mitigation or differentiating between the two.

Comment E.3.3 (2 commenters, 1 comment):

Specific recommendations are needed for sealing materials. Section 4.2.2 lists several sealing materials that can be used as part of a mitigation system. As currently presented, the list of recommendations is too vague to provide any useful information. The Vapor Intrusion Guidance should be revised to provide example sealing materials or specific references.

Response E.3.3:

The document provides examples of types of sealants, but it does not provide a list of specific sealants to be used. It would be outside the scope of this document to provide list of specific materials or products for use in sealing or other components of mitigation systems. The designer and installer of a mitigation system is responsible for specifying and using appropriate materials. A sentence has been added to Section 4.2.2(a) of the guidance advising that some effective sealants may contain volatile organic compounds, which may be a consideration in choosing an appropriate sealing material.

Comment E.3.4 (paraphrased, 1 commenter, 1 comment):

Section 4.2.2.b.2 — Seams in vapor-retarding membranes should be thermo-sealed rather than solvent- or mastic-sealed.

Response E.3.4:

The guidance does not recommend a specific sealing method. Seams should be sealed using manufacturer-approved materials and processes.

Comment E.3.5:

The following sentence should be added at the end of Section 4.2.2(c)(3): "Based on communication test results, multiple suction points may be required to achieve the required effectiveness of the vapor intrusion mitigation system."

Response E.3.5:

Acknowledged. Section 4.2.2(c)(3) of the guidance has been revised as follows: "Depending on test results, multiple suction points may be needed to achieve the desired effectiveness of the system."

Comment E.3.6:

We propose the following text change (shown in **bold**) to Section 4.2.2(c)(5): The vent fan and discharge piping must not be located in or below a livable or occupied area of the building to avoid entry of subsurface vapors into the building in the event of a fan **or pipe** leak.

Response E.3.6:

Agreed. Section 4.2.2(c)(5) of the guidance has been revised accordingly.

Comment E.3.7:

The guidance should permit conducting smoke or pressure tests at the time of system installation, rather than requiring such tests before hand. In many cases, it is more efficient to install a system using standard design configurations based on prior experience in an area, to test the system as installed, then to upgrade the system (by installing additional suction points or a larger fan) if required. From a practical standpoint, there are often few choices for locating the primary system due to house construction and finished areas, and no advantage is gained by making two trips to a building to install a system. When a large number of houses need to be mitigated in a short time frame, experience has shown this to be a very effective approach to design and installation of radon systems.

Response E.3.7:

Acknowledged. The mention of testing performed prior to system installation is as part of a discussion of the steps involved in system design and installation [Section 4.2.2.c.3 of the guidance]. We agree that these tests can be performed at the time of installation with the ultimate goal of having an adequate mitigation system.

Comment E.3.8 (2 commenters, 1 comment):

Smoke testing is not an effective method. Contrary to recommendations in the Vapor Intrusion Guidance, smoke testing is generally not the most effective means to identify small cracks or identify pressure changes. In most cases, the leak may be very small so placing a smoke source on the high pressure side and seeing it on the other side is highly unlikely. Any leak identified using this approach would be large enough to detect without smoke testing. Instead, we recommend using a hot-wire anemometer or tracer gas (Freon, SF6) to detect draft leaks. Overall, the best confirmation test is subsequent testing for exposure. If it is sufficiently low, the goal is achieved. Similarly, as identified in Section 4.3.1.c, a micro manometer is the only acceptable method for detecting pressure changes. Based on these recommendations, the text should be revised to eliminate discussion of smoke testing and provide other more quantitative methods for evaluating mitigation systems.

Response E.3.8:

Smoke testing, in addition to other methods, is effective for demonstrating a pressure field extension in test holes. Although it is advantageous to seal larger openings and others to the best extent practicable, small cracks are unlikely to adversely alter the

effectiveness of the system operation, especially if a pressure field extending under the entire slab is demonstrated. Therefore, the discussion of smoke testing has not been removed from the guidance. Other methods, such as those mentioned in the comment, may also be used to test a system.

Comment E.3.9 (2 commenters, 1 comment):

The discussion of crawlspace ventilation is unclear. Section 4.2.2.e.2 describes the requirements for crawlspace ventilation. However, as currently worded, the requirements are confusing and unclear. It appears that NYSDOH meant to say that air in the crawlspace should be prevented from entering into building spaces.

Response E.3.9:

The intent of the recommendation is actually to prevent conditioned indoor air from being drawn into the crawl space, as well as to prevent the reverse. While drawing indoor air into a crawl space is not likely to affect indoor air quality, it has the potential to impart a substantial increased heating/cooling cost and should be avoided. Section 4.2.2.e.2 has been revised as follows: "Openings and cracks in floors above the crawl space that would permit conditioned air to pass into or out of the occupied spaces of the building, should be identified, closed and sealed."

E.4 TOPIC: Emissions from mitigation systems

Comment E.4.1 (paraphrased, 5 commenters, 5 comments):

Comments regarding the need for permitting and emissions controls on mitigation systems were as follows:

- Emission controls on such systems would likely be neither warranted for the protection of public health or the environment nor cost-effective, and should not be required by the State;
- Chemicals are being removed from the ground and put into the outdoor air. We want to breathe clean air. It is our right. Protect us. Install state of the art filters on all the sub-slab depressurization systems; and
- Sub-slab depressurization systems result in a transfer of contaminants from one medium (soil vapor) to another (air), a practice typically not accepted by the NYSDEC. Clarification is needed on the NYSDEC's position on this issue, as well as whether permitting will be necessary.

Response E.4.1:

Mitigation systems related to sites in the State's Inactive Hazardous Waste Program, the Environmental Restoration Program, or Brownfield Cleanup Program would be exempt from obtaining permits in accordance with the laws and regulations governing these programs. Even outside of these programs, mitigation system exhausts would qualify as trivial activities under Part 201 and permits would not be required. However, air controls (such as vapor phase carbon) may be required if reduction in emissions is necessary to protect human health and the environment. Part 212 is the applicable air regulation that specifies when such controls are required.

To date, our evaluations of these exhausts have concluded that controls are not necessary. An ambient air quality study is currently being conducted to evaluate our assessment that these systems are not expected to cause unacceptable levels in the

outdoor environment. If the results of the study indicate otherwise, appropriate actions will be taken.

E.5 TOPIC: Post-mitigation or confirmation testing

Comment E.5.1 (paraphrased, 1 commenter, 2 comments):

Given the potential complicating factors associated with indoor air results (e.g., current use of products/materials and outdoor air influences), indoor air sampling should not necessarily be required as proof that a sub-slab depressurization system is effective, nor should it be required to demonstrate that the system is no longer necessary. More emphasis should be placed on demonstrating system performance through other means.

Response E.5.1:

The State acknowledges that there are several factors that demonstrate the effectiveness of a SSD system in preventing soil vapor intrusion. As discussed in Section 4.3.1 of the guidance, physical testing is relied upon in all cases and chemical testing in most cases. Where chemical testing is conducted, the sampling should include the completion of a thorough product inventory to assist in identifying products that may interfere with indoor air sampling as described in Section 2.11.2.

Comment E.5.2 (paraphrased, 3 commenters, 2 comments):

Should a mitigation system be installed, post-mitigation sampling should be discontinued once it is shown that the system is working properly.

Response E.5.2:

The extent of post mitigation sampling is determined on a site-by-site basis using the guidance provided in Section 4.

Comment E.5.3 (paraphrased, 2 commenters, 1 comment):

Additional information on post-mitigation testing is needed. Section 4.3 provides no guidance on the amount or duration of samples needed.

Response E.5.3:

As stated in Section 4.4.1 of the guidance, "generally air monitoring is not required if the system has been installed properly and is maintaining a vacuum beneath the slab." However, since the design and installation of each system is different, there is no pre-established number of post-mitigation sampling events necessary. This is determined on a site-by-site or building-specific basis. Post-mitigation sampling protocols should be consistent with the guidance provided in Section 2.7.

Comment E.5.4 (paraphrased, 2 commenters, 5 comments):

Section 4.3.1(e): The text that reads "at a minimum, post-mitigation indoor and outdoor air sampling must be conducted in buildings where pre-mitigation samples were collected…" should be changed. The phrase "must be conducted" should be changed to "may be conducted, if required by the State." Alternatively, the phrase "at a minimum" should be replaced with "except as indicated below," to call the reader's attention to the fact that, depending upon the extent of the vapor intrusion mitigation, it may not be necessary to sample indoor air at every location where a mitigation system is installed.

Similar text changes should be made to Sections 4.3.2 (SMD Systems with Soil Vapor Retarder), 4.3.3 (HVAC Modifications), and 4.3.4 (Crawl space Ventilation with Sealing).

Response E.5.4:

Acknowledged. The phrase "at a minimum" in Section 4.3.1 of the guidance has been changed to "except as indicated below." Text in Sections 4.3.2, Section 4.3.3 and 4.3.4 refers to Section 4.3.1. When HVAC modifications have been made, post-mitigation air sampling is recommended at each affected structure, as HVAC modification is not considered a "blanket mitigation" approach.

Comment E.5.5 (2 commenters, 1 comment):

Performance of a soil vapor extraction (SVE) system should be based on vapor sampling results. Section 4.2.2.f.3 indicates that performance of an SVE system will be judged based on the system radius of influence. Certainly, the radius of influence is one measure that is useful in evaluating the effectiveness of the SVE system; however, decisions should not be based only on this information. More importantly, the SVE system should be judged based on its ability to remove the vapor intrusion pathway and prevent the volatilization of VOCs into indoor air. This may be confirmed with post-mitigation sampling.

Response E.5.5:

There are several ways to assess the effectiveness of an SVE system in mitigating vapor intrusion, one of which is post-mitigation indoor air sampling. However, it is generally recommended that the radius of influence of an SVE system be measured to ensure that the system is addressing the building(s) in need of mitigation. As the discussed in Section 4.2.2.f.3 of the guidance, if a system's radius of influence does not completely extend beneath a building, a complementary air monitoring program may be the appropriate way to confirm that exposures are being addressed adequately.

Comment E.5.6:

…So if you find TCE levels in a home above .38 micrograms [per cubic meter], the guidance number the EPA is using here at my site [Hopewell Precision site], please install the mitigation system! Then test the air 1 year later.

Response E.5.6:

Risk management decisions are made on a site-specific basis. In some cases, blanket mitigation may make sense, in others it may not. The decisions to mitigate and monitor are not only based on the results from individual structures, but also on the overall context of the site (including nature and extent of soil gas and groundwater contamination).

As discussed in Section 4.3.1.e of the guidance, we recommend that post-mitigation sampling be conducted no sooner than 30 days after installing a sub-slab depressurization system.

Comment E.5.7:

It may not be practicable to seal all leaks in a finished room. This should not be required if other tests (e.g., indoor air tests) indicate that performance is satisfactory.

Response E.5.7:

Acknowledged. Sections 4.3.1, 4.3.2 and 4.3.4 of the guidance have been revised as follows: "Reasonable and practical actions should be taken to identify and fix leaks." However, the presence of identified, inaccessible leaks may indicate a need for a more substantial post-mitigation indoor air-monitoring program.

Comment E.5.8 (paraphrased, 1 commenter, 2 comments):

We propose the following text change (shown in **bold**) to section 4.3.1(b): Therefore, in buildings with natural draft combustion appliances, the building must be tested for backdrafting of the appliances. **Delete "If necessary," T**he backdrafting condition must be corrected before the depressurization system is placed in operation. Similar changes are recommended for Sections 4.3.2(b), 4.3.3(b), 4.3.4(b), and 4.3.5(a).

Response E.5.8:

Agreed. The guidance has been revised accordingly.

E.6 TOPIC: Operation, maintenance and monitoring of mitigation systems

Comment E.6.1:

Section 4.4.1 states "If significant changes are made to the system or when the system's performance is unacceptable, the system may need to be redesigned and restarted. Many, if not all, of the post-mitigation testing activities, as described in Sections 4.3.1 and/or 4.3.2, may need to be performed." The document should indicate how it is determined that a system's performance is "unacceptable."

Response E.6.1:

Measures of system performance are described in Section 4.3 of the guidance.

Comment E.6.2:

Section 4.4.2 states "For other mitigation systems (e.g., HVAC modifications, crawlspace ventilation, etc.), routine maintenance activities are generally comparable to post-mitigation testing activities [Section 4.3]. Activities typically include a visual inspection of the complete system, and identification and repair of leaks. System performance checks, such as vacuum of suction points, also should be performed." The State should require similar quantitative performance measurements for sub-slab depressurization systems to verify the continued effective operation of the systems. These measurements would be "generally comparable to post-mitigation testing activities" i.e., sub-slab communication testing.

Response E.6.2:

The maintenance activities for SSD and SMD systems (described in Section 4.4.1) do include visual inspection and repair of leaks. The other component is an inspection of the warning device or indicator. The device or indicator is intended to warn building occupants if the system stops functioning properly (that is, it is no longer maintaining an adequate pressure gradient across the slab). Ensuring proper functioning of the device or indicator is considered to be a check on the system's performance.

Comment E.6.3:

The guidance should also recommend procedures to identify changes made to buildings (such as building additions, heating systems, etc.) that can affect mitigation system performance.

Response E.6.3:

Section 4.4.3 of the guidance describes some of these changes. A reference to Table 1.2 (building factors that may affect vapor intrusion) has been added to this section because significant changes to any of these factors may affect system performance.

E.7 TOPIC: Termination of mitigation system operations

Comment E.7.1 (paraphrased, 1 commenter, 1 comment):

The NYSDOH should allow discontinuation of operating a mitigation system once it is established (via a risk-based evaluation of soil vapor or sub-slab concentrations) that public health will be protected in the absence of the mitigation system.

Response E.7.1:

The appropriate time to discontinue operating a mitigation system is determined by following the guidance provided in Section 4.5 and by using the guidance provided in Section 3 to evaluate data and information supporting the proposal to discontinue a mitigation system.

Comment E.7.2 (paraphrased, 1 commenter, 1 comment):

The NYSDOH (or NYSDEC) should define: After a building is occupied and future sub-slab monitoring is no longer possible, when can this non-permitted, unregulated [sub-slab depressurization] system be shut off?

Response E.7.2:

Section 4.5 provides guidance as to the termination of mitigation systems. Sub-slab monitoring of occupied buildings is routinely conducted and does not present a significant interference to occupants.

Comment E.7.3:

The draft guidance states that operation of mitigation systems (p. 60 to 61) can be terminated if there is no "significant" impact on indoor air after the system is turned off, or if residual contamination in subsurface vapor "is not affecting indoor air quality." These vague criteria provide no clear guidance to either the state, the PRP, or the property owner. They should be replaced with specific criteria, such as the achievement and maintenance of the higher of AVGs or background levels.

Response E.7.3:

Section 4.5 states that a number of factors are considered in deciding whether to terminate operation of a system. One of these factors is whether any residual contamination is affecting indoor air quality with the system turned off; however, there are many other considerations, as well. There are no specific criteria that can be applied generically to all sites. The appropriate time to discontinue operating a mitigation system is determined by following the guidance provided in Section 4.5 and

by using the guidance provided in Section 3 to evaluate data and information supporting the proposal to discontinue a mitigation system.

Comment E.7.4 (2 commenters, 1 comment):

NYSDOH must provide additional clarification on discontinuing mitigation systems. Section 4.5 discusses the factors that will be considered prior to discontinuing a vapor mitigation system. Although the Vapor Intrusion Guidance lists the factors that must be considered, these factors are sufficiently vague as not to provide any clear guidance. For example, NYSDOH does not specify how the determination that "subsurface vapors have been remediated" will be made. Will this require indoor air sampling and a comparison to background concentrations? Or will it be sufficient to collect soil vapor or sub-slab data? NYSDOH should base the decision to turn off a mitigation system on a risk-based evaluation of soil vapor or sub-slab concentrations. The ultimate goal of the mitigation system is to protect public health. As a result, turning off the system should be based on whether public health will continue to be protected in the absence of the mitigation system.

Response E.7.4:

As stated in Section 4.5, "Systems should remain in place and operational until they are no longer needed to address current or potential exposures related to soil vapor intrusion." This approach is protective of public health. The type and amount of sampling needed to make this determination is made based on the conditions at each individual site. Data and information gathered in support of a proposal to terminate the operation of a system are evaluated by using the guidance provided in Section 3.

Comment E.7.5:

In Paragraph d at page 60 of this subsection [Section 4.5], the Guidance indicates that the decision to terminate mitigation system operation depends in part upon indoor air, outdoor air and sub-slab vapor sampling from the building over a time period, which will depend upon site-specific conditions. We suggest changing the words "will depend on site-specific conditions" to "may be required depending upon site-specific conditions." This allows flexibility in determining whether or not vapor intrusion-related indoor air sampling is necessary at a given location to support termination of mitigation system operation.

Response E.7.5:

The paragraph referred to in the comment says that one criterion for termination is that "there is no 'rebound' effect that requires additional mitigation efforts observed when the mitigation system is turned off for prolonged periods of time." Samples of indoor air, outdoor air, and/or sub-slab vapor would be necessary to verify this. The length of time needed to determine that there is no rebound may depend on site-specific conditions. Therefore, the text in Section 4.5.d of the guidance has been revised as follows: "This determination should be based upon indoor air, outdoor air and/or sub-slab vapor sampling from the building over a time period, determined by site-specific conditions."

Comment E.7.6:

We propose the following text change (shown in *italics*) to Section 4.5: Given the prevalence of radon throughout the State of New York, consideration should be given to leaving the system in place and operating to address exposures related to radon intrusion *if radon testing indicates radon concentrations above regulatory standards*. After concurrence

is reached that the system is no longer needed to mitigate exposures related to soil vapor intrusion.

Response E.7.6:

Neither the State nor the federal government has a regulatory standard for radon, but the State generally follows EPA guidance for radon. People may wish to have the protection of a system regardless of current radon levels. The discussion on leaving the system in place with the owner's permission at the end of Section 4.5 remains unchanged.

E.8 TOPIC: Annual certification and notification

Comment E.8.1 (2 commenters, 1 comment):

After first refusal, property owners should be responsible for requesting mitigation. The Vapor Intrusion Guidance (Section 4.6) currently requires responsible parties to re-offer mitigation systems to property owners on an annual basis, if they initially refuse such a system. We disagree with this approach. If an owner refuses to have a system installed, it should be the owner's responsibility to request the system in the future. The offer should be valid until environmental conditions change and mitigation is no longer warranted.

Response E.8.1:

The State agrees that the offer to mitigate should continue until environmental conditions change and mitigation is no longer necessary. However, the State does not agree that it should be the property owner's responsibility to contact a responsible party, etc. in the future if a system is desired. Change in property use and ownership may leave a property owner uninformed; therefore, the responsible party should contact the property owners on a yearly basis until such time as a system is no longer needed to address exposures related to soil vapor intrusion.