Designation: D8408/D8408M – 21

Standard Guide for Development of Long-Term Monitoring Plans for Vapor Mitigation Systems[1]

This standard is issued under the fixed designation D8408/D8408M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide presents factors to consider when developing Long-Term Monitoring (LTM) Plans for monitoring the performance of both active and passive vapor mitigation systems in buildings. This guide will also assist in developing appropriate performance standards to make sure that vapor mitigation systems remain protective of human health. Active and passive vapor mitigation systems have been used for a number of years on contaminated properties where residual volatile contaminants remain in the ground. This guide discusses a variety of vapor mitigations systems; however, its focus is on the development of long-term monitoring plans for vapor mitigation systems that are designed to remain in place for multiple years.

1.2 A LTM Plan provides clear performance goals for a vapor mitigation system which help to reduce potential confusion and ineffective project management. The LTM Plan also defines performance monitoring time frames to efficiently test the vapor mitigation systems' effectiveness without unnecessary and costly over-testing. This will also promote consistent monitoring. Vapor mitigation systems are often installed without adequate consideration of the long-term monitoring requirements necessary to make sure that they remain protective of human health for as long as the system remains in place. This guidance addresses the requirements of the LTM Plan to monitor a vapor mitigation system's continued effectiveness. Installation verification that the vapor mitigation system was installed correctly is typically addressed in the Remedial Design stage of a contaminated Property Management and is not covered in this document.

1.3 LTM Plan limitations, constraints and potential sources of error are discussed in this standard. This guide does not endorse a mitigation system vendor or testing of vapor mitigation systems. However, this guide does provide a reference for the common procedures for testing vapor mitigation systems and related terms, as appropriate.

1.4 *Units*—The values stated in either International System (SI) units or English units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard. The values given in parentheses are provided for informational purposes only and are not considered standard.

1.5 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026. For purposes of comparing a measured or calculated value(s) with specified limits, the measured or calculated value(s) shall be rounded to the nearest decimal of significant digits in the specified limit.

1.6 This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied with consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Groundwater and Vadose Zone Investigations.

Current edition approved Sept. 15, 2021. Published October 2021. DOI: 10.1520/D8408_D8408M–21

Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data

E1745 Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *active vapor mitigation system, n—as used in soil gas monitoring/sampling*, uses an electrically-powered fan or other device to induce a pressure differential which in turn causes air and/or vapors to move beyond the building envelope or to pass through a filtration system. (See Table 1 for details.)

3.2.2 *floor sealant, n—as used in soil gas monitoring/sampling*, material, typically liquid, that is spread on the floor that upon curing, inhibits or prevents the migration of vapors into the building.

3.2.3 *heat-exchange system, n—as used in soil gas monitoring/sampling*, an air handling system, which can act as an active vapor mitigation system, that relies on an electrically-powered fan to pass an incoming air stream through a heat exchanger to transfer heat to or from an outgoing air stream.

3.2.4 *indoor air treatment, v—as used in soil gas monitoring/sampling*, process by which indoor air is passed through activated carbon of other absorbent to trap or treat chemical vapors to make it safe for human occupancy.

3.2.5 *heating, ventilation and air conditioning (HVAC), n*—active mechanical systems within a building used to control heating, ventilation, and cooling of the indoor air space.

3.2.5.1 *Discussion*—These systems can change the pressure regime of the indoor space. As such, changes in their configuration and/or operation can have a profound effect on vapor mitigation systems.

3.2.6 *long-term monitoring plan (LTM Plan), n—as used in soil gas monitoring/sampling*, a written plan that establishes the procedures, processes, and benchmarks necessary to monitor and document the effectiveness of a vapor mitigation system designed to remain in place for multiple years so that it remains protective of human health.

3.2.7 *passive vapor mitigation system, n—as used in soil gas monitoring/sampling*, a passive vapor mitigation system relies on naturally induced pressure differentials to cause the movement of air beyond the building envelop, or on barriers that prevent the advective or diffusive transport of chemical vapors into the indoor air space.

3.2.8 *sub-membrane, n—as used in soil gas monitoring/sampling*, refers to the area under a concrete slab having an associated vapor barrier (membrane).

3.2.9 *sub-slab sample, n—as used in soil gas monitoring/sampling*, a soil-gas sample collected from beneath a building slab with or without an associated vapor barrier.

4. Summary of Guide

4.1 Development of an LTM Plan for a vapor mitigation system is a process which needs to be based on project-specific details. This guide, however, presents a generalized process, which can be used as a template for LTM Plan development.

5. Significance and Use

5.1 There are two primary types of vapor mitigation systems: Active and Passive (Table 1). Active vapor mitigation systems include: Sub-Slab Depressurization (SSD), Sub-Membrane Depressurization (SMD), Sub-Membrane Pressurization, Block-Wall Depressurization, Drain-tile Depressurization, Building Pressurization, Heat-Exchange Systems, and Indoor Air Treatment. Passive vapor mitigation systems include: Passive Venting, Floor Sealants, Vapor Barriers, and Increased Ventilation. Vapor mitigation systems may also consist of a combination of active and passive technologies.

5.2 Development and implementation of a LTM Plan is important for ensuring the long-term protectiveness of the mitigation systems.

5.3 The approach presented in this guide is a practical and streamlined process for establishing long-term monitoring requirements, monitoring time frames, and factors needed to determine when the use of a vapor mitigation system is no longer needed.

5.4 This guide is intended to be used by environmental professionals including: consultants, building managers, local or regional governing or regulatory agencies, that are installing vapor mitigation systems, conducting monitoring of the vapor barriers, or developing LTM Plans for vapor mitigation systems. Vapor mitigation system installation and LTM activities should only be carried out by environmental professionals who are trained in the proper application of vapor mitigation systems and experienced in the monitoring described in this guide, as applicable.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.