



Designation: E1903 – 19

Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process¹

This standard is issued under the fixed designation E1903; 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 practice² covers a process for conducting a Phase II environmental site assessment (*ESA*) of a parcel of property with respect to the *presence* or the likely *presence* of *substances* including but not limited to those within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (*CERCLA*) (e.g., *hazardous substances*), pollutants, contaminants, petroleum and *petroleum products*, and controlled *substances* and constituents thereof. It specifies procedures based on *the scientific method* to characterize *property* conditions in an objective, representative, reproducible, and defensible manner. To promote clarity in defining *Phase II ESA* objectives and transparency in communicating and interpreting *Phase II ESA* results, this practice specifies adherence to requirements for documenting the scope of assessment and constraints on the conduct of the assessment process.

1.1.1 A *user's* interest in the *presence* or likely *presence* of *substances* in *environmental media* at a property may arise in a wide variety of legal, regulatory, and commercial contexts, and may involve diverse objectives including those listed in 1.2. This practice contemplates that the *user* and the *Phase II Assessor* will consult to define the scope and objectives of investigation in light of relevant factors, including without limitation the *substances* released or possibly released at the *property*, the nature of the concerns presented by their *presence* or likely *presence*, the *behavior*, *fate* and *transport characteristics* of *substances* released or possibly released, the portion of

the property to be investigated, the information already available, the degree of confidence needed or desired in the results, the degree of investigatory sampling and *chemical testing* needed to achieve such confidence, and any applicable time and resource constraints. This practice requires that Phase II activities be conducted so that the resulting scope of work is performed, and the stated objectives are achieved, in a scientifically sound manner.

1.1.2 A *Phase II ESA* in accordance with this practice may be conducted after site assessment activities in accordance with Practice E1527 for *Phase I Environmental Site Assessments: Phase I Environmental Site Assessment Process*, Practice E2247 for *Environmental Site Assessments: Phase I Environmental Site Assessment for Forestland or Rural Property*, EPA's *All Appropriate Inquiries (AAI) Rule*, 40 C.F.R. Part 312, or Practice E1528 for *Limited Environmental Due Diligence: Transaction Screen Process*. In defining the scope and purposes of a *Phase II ESA*, however, previous decisions to classify *property* conditions or areas as *RECs*, or to refrain from doing so, are not determinative as to whether investigation of the same conditions or areas is appropriate to meet the objectives of the *Phase II ESA*.

1.2 *Objectives*—This practice is intended for use where a *user* desires to obtain sound, scientifically valid data concerning actual property conditions, whether or not such data relate to property conditions previously identified as *RECs* or *data gaps* in *Phase I ESAs*. Without attempting to define all such situations, this practice contemplates that *users* may seek such data to inform their evaluations, conclusions, and choices of action in connection with objectives that may include, without limitation, one or more of the following:

1.2.1 *Objective 1*—Assess whether there has been a *release* of *hazardous substances* within the meaning of *CERCLA*, for purposes including *landowner liability protections* (i.e., *innocent landowner*, *bona fide prospective purchaser*, and *contiguous property owner*).

1.2.2 *Objective 2*—Provide information relevant to identifying, defining or implementing landowner “*continuing obligations*,” or the criteria established under *CERCLA* (e.g., exercising appropriate care by taking *reasonable steps* to

¹ This practice is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.02 on Real Estate Assessment and Management.

Current edition approved Nov. 15, 2019. Published January 2020. Originally approved in 1997. Last previous edition approved in 2011 as E1903 – 11. DOI: 10.1520/E1903-19.

² As used herein, a “standard” is a document that has been developed and established within the consensus principles of the Society and that meets the approval requirements of ASTM procedures and regulations. A “practice” is a definitive set of instructions for performing one or more specific operations that does not produce a test result. A “guide,” in contrast, is a compendium of information or a series of options that does not recommend a specific course of action. A guide increases the awareness of information and approaches in a given subject area. See Form and Style for ASTM Standards, http://www.astm.org/COMMIT/Blue_Book.pdf.

prevent or limit exposures to previously released *hazardous substances*) for maintaining the *CERCLA landowner liability protections*.

1.2.3 *Objective 3*—Develop threshold knowledge of the *presence of substances* on properties within the scope of the *CERCLA* definition of a “brownfield site” and as required for qualifying for brownfields *remediation* grants from the *EPA* Brownfields Program.

1.2.4 *Objective 4*—Provide information relevant to identifying, defining and evaluating property conditions associated with *target analytes* that may pose risk to human health or the environment, or risk of bodily injury to persons on the property and thereby give rise to potential liability in tort.

1.2.5 *Objective 5*—Provide information relevant to evaluating and allocating *business environmental risk* in transactional and contractual contexts, including transferring, financing and insuring properties, and due diligence relating thereto.

1.2.6 *Objective 6*—Provide information to support disclosure of liabilities and contingent liabilities in financial statements and securities reporting.

1.2.7 Additional information concerning these six objectives may be found in the Legal Appendix, **Appendix X1**.

1.3 *Scope of Assessment in Relation to Objectives*—The scope of a *Phase II ESA* is related to the objectives of the investigation. Both scope and objectives may require ongoing evaluation and refinement as the assessment progresses.

1.3.1 In developing the scope of work and in evaluating data and information concerning the property, the *Phase II Assessor* must determine whether the available information is sufficient to meet the objectives of the investigation. Even after conducting *Phase II* activities to generate additional data, the *Phase II Assessor* must independently evaluate the sufficiency of the data in relation to the objectives. As the investigation progresses, the objectives may be refined or redefined in consultation between the *user* and the *Phase II Assessor*.

1.3.2 A single round of sampling and *chemical testing* may not always provide data sufficient to meet the chosen objectives. If not, this practice contemplates additional sampling in an iterative sequence that concludes when the available data are sufficient. This practice also acknowledges, however, that the *user* may instead elect either to redefine the objectives so that they can be met with the data available, or to terminate the investigative process without meeting the stated objectives. The *Phase II Assessment* report must disclose any respect in which available data are insufficient to meet objectives.

1.3.3 This practice does not require full *site characterization* in every instance, but may be used to carry out an investigation sufficient for that purpose if desired to meet the *user’s* objectives.

1.4 *Needs of the User*—The *user* and *Phase II Assessor* must have a mutual understanding of the context in which the *Phase II ESA* is to be performed and the objectives to be met by the investigation, i.e. the specific questions to be answered or problems to be resolved by the *Phase II ESA*. The scope of *Phase II* activities must be defined in relation to those objectives.

1.4.1 The degree of confidence desired by the *user* influences the scope of the investigation and the evaluation of data.

More extensive testing and more iterations of sampling and analysis may be needed if the objectives require detailed conclusions with high confidence. Less testing and fewer iterations of sampling and analysis may be needed if the objectives of the assessment require only general conclusions.

1.5 *Limitations*—This practice is not intended to supersede applicable requirements imposed by regulatory authorities. This practice does not attempt to define a legal standard of care either for the performance of professional services with respect to matters within its scope, or for the performance of any individual *Phase II ESA*.

1.6 *Organization of This Practice*—This practice has nine sections and four appendices. Section **1** covers the Scope of the practice. Section **2**, Referenced Documents, lists ASTM and other organizations’ related standards and guidance that may be useful in conducting *Phase II ESAs* in accordance with this practice. Section **3**, Terminology, contains definitions of terms and acronyms used in this practice. Section **4** addresses the Significance and Use of this practice, including the legal context into which *Phase II ESAs* may fall. Section **5** discusses development and documentation of the scope of the *Phase II ESA*, including the Statement of Objectives for the assessment. Section **6** provides a *Phase II ESA* Overview, with purpose and goal descriptions. Section **7** comprises the main body of Performing the *Phase II ESA*, and includes initiating scientific inquiry by formulating the question to be answered (**7.1**), collecting and evaluating information (**7.2**), identifying areas for investigation (**7.3**), developing the *conceptual model* (**7.4**), developing a plan and rationale for sampling (**7.5**), conducting the sampling (**7.6**), and validating the *conceptual model* (**7.7**). Interpretation of results is covered in Section **8**. *Phase II Environmental Site Assessment* report preparation is addressed in Section **9**. **Appendix X1** supports Section **4**, and contains legal considerations pertaining to *Phase II Environmental Site Assessment*. **Appendix X2** contains contracting considerations between *Phase II assessor* and *user*. **Appendix X3** supports Section **9**, and describes two examples and a sample table of contents illustrating possible approaches to reporting the results of a *Phase II Environmental Site Assessment*. **Appendix X4** supplements Section **2** with a list of standards and references that may be relevant in conducting a *Phase II Environmental Site Assessment*.

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The standards listed below are referenced in this practice.

2.2 ASTM Standards:³

E1527 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

E1528 Practice for Limited Environmental Due Diligence: Transaction Screen Process

E2137 Guide for Estimating Monetary Costs and Liabilities for Environmental Matters

E2173 Guide for Disclosure of Environmental Liabilities

E2247 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property

E2790 Guide for Identifying and Complying With Continuing Obligations

E3123 Guide for Recognition and Derecognition of Environmental Liabilities

2.3 Environmental Protection Agency Documents:

Standards and Practices for All Appropriate Inquiries, Final Rule, Federal Register, Tuesday, November 1, 2005, Part III Environmental Protection Agency (codified at 40 CFR Part 312), as amended⁴

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846)

3. Terminology

3.1 Definitions:

3.1.1 *all appropriate inquiries (AAI)*—those inquiries constituting “all appropriate inquiries... into the previous ownership and uses of the facility in accordance with generally accepted good commercial or customary standards and practices” as defined in *CERCLA*, 42 U.S.C. § 9601(35)(B), and the *AAI Rule*, 40 CFR Part 312, that must be conducted to qualify for certain *landowner liability protections (LLPs)* under *CERCLA*, and to qualify for brownfields *remediation grants* awarded under *CERCLA* section 104(k)(3)(A)(ii).

3.1.2 *background concentration*—the concentration of a *target analyte* in groundwater, surface water, air, soil gas, sediment, or soil at a reference location near an area under investigation, which is not attributable to the area under investigation.

3.1.2.1 *Discussion*—Background samples may contain the *target analyte*, due to either naturally occurring or man-made sources, but not due to the *release(s)* in question.

3.1.3 *behavior, fate, and transport characteristics*—natural attributes of a *target analyte* that can be predicted based on the distinguishing physico-chemical characteristics of the *target analyte* and the properties of the media in which the *target analyte* occurs.

3.1.4 *bona fide prospective purchaser (BFPP)*—under *CERCLA*, a person who meets the criteria stated at 42 U.S.C. § 9601(40) and thereby becomes eligible for the *bona fide*

prospective purchaser LLP in accordance with 42 U.S.C. §9607(r). See Legal Appendix, **Appendix X1**.

3.1.5 *business environmental risk*—a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues investigated in accordance with this practice.

3.1.5.1 *Discussion*—To the extent the user wishes to evaluate such risks for purposes of quantification and disclosure of business environmental risk, further guidance can be found in Guides **E2137**, **E2173**, and **E3123**.

3.1.6 *CERCLA*—the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601, *et seq.*, as amended.

3.1.7 *CFR*—Code of Federal Regulations.

3.1.8 *chain of custody*—a written or printed form that documents information regarding sample possession, condition, and responsibility, including the time from sample container acquisition through transportation, sample collection, and laboratory analysis.

3.1.9 *chemical testing*—measurement of the *presence* and concentration of *target analytes* by analytical chemistry methods in a laboratory; also, for purposes of this practice, measurement of certain *target analytes* by physical methods (e.g., for asbestos or radioactive isotopes).

3.1.10 *conceptual model*—a representation of hypothesized current site conditions, which describes the physical setting characteristics of a site and the likely distribution of *target analytes* that might have resulted from a known or likely *release*, and which is based on all *reasonably ascertainable* information relevant to the objectives of the investigation and the professional judgment of the *Phase II Assessor*.

3.1.11 *contiguous property owner (CPO)* —under (*CERCLA*) a person who meets the criteria stated at 42 U.S.C. § 9607(q) and thereby becomes eligible for the *contiguous property owner LLP*. See Legal Appendix, **Appendix X1**.

3.1.12 *continuing obligations*—includes requirements contained in the definition of a *bona fide prospective purchaser* at *CERCLA* §101(40)(D) and (F), the requirements for maintaining the *innocent landowner LLP* at 101(35)(a), which include the “due care” provisions of §107(b)(3)(a), as well as those requirements established for maintaining the *contiguous property owner liability protection* at §107(q)(1)(A) (iii) and (iv). These requirements are collectively referenced as the “*continuing obligations*” and are necessary for a person to maintain qualification for *LLPs* after a property is acquired, including among others, the requirement to exercise appropriate care by taking *reasonable steps* to stop or prevent releases or to limit human, environmental, or natural resources exposure to any previously released *hazardous substance* (section 101(35)(B)(i)(II), 101(40)(D), 107(a)(1)(A)(iii)). See Guide **E2790**.

3.1.13 *data gap*— as defined in Practice **E1527** and Practice **E2247** and determined in accordance with the process prescribed by those standard practices, a lack of or inability to

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

⁴ Available from United States Environmental Protection Agency (EPA), Ariel Rios Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20004, <http://www.epa.gov>.

obtain information required by such practices despite good faith efforts to gather such information.

3.1.14 *de minimis condition*—a condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

3.1.15 *diffuse anthropogenic contamination*—the presence of *target analytes* that results from broad-scale activities that cannot be discriminated as readily as single, site-specific discharges or releases. The most obvious of these activities is agriculture, but urban land runoff, forestry, the urine of mammals, wastewater treatment plant effluent discharges, and atmospheric deposition can also be important general sources.

3.1.16 *environmental media*—soil, rock, groundwater, surface water, air, soil gas, sediment.

3.1.17 *EPA*—the United States Environmental Protection Agency.

3.1.18 *ESA*—environmental site assessment.

3.1.19 *exposure point*—a place at which a *receptor* comes into contact with a *target analyte*.

3.1.20 *field screening*—the measurement of physical properties or presence and approximate concentration of *target analytes* in *environmental media* by methods or techniques employed in the field during explorations and sampling. Measurements can be qualitative (positive/negative) or quantitative. Accuracy and precision of these methods generally are not equivalent to those achieved in a laboratory environment.

3.1.20.1 *Discussion*—Appropriate QA/QC measures must be followed for field screening equipment (e.g. calibration), for execution of field screening activities, and for interpretation of data obtained by field screening

3.1.20.2 *Discussion*—Calibrated field analytical equipment, such as field gas chromatographs, may provide levels of detection and accuracy comparable to those of a fixed laboratory.

3.1.21 *groundwater*—water below the land surface in a zone of saturation.

3.1.22 *groundwater flow*—the movement of water in the zone of saturation.

3.1.23 *groundwater flow direction*—the compass bearing of the horizontal component, and the vertical component, of water movement in the zone of saturation.

3.1.24 *hazardous substance*—any substance defined as a hazardous substance pursuant to CERCLA, 42 U.S.C. § 9601(14). See Legal Appendix, [Appendix X1](#).

3.1.25 *innocent landowner (ILO)*—under CERCLA, a person who is within one of the three categories defined by 42 U.S.C. § 9601(35) and thereby becomes eligible for the *innocent landowner LLP* in accordance with 42 U.S.C. § 9607(b)(3). See Legal Appendix, [Appendix X1](#).

3.1.26 *Landowner Liability Protections (LLPs)*—provisions that establish limitations of or defenses to potential CERCLA liability in favor of landowners who satisfy statutory conditions. See definitions in this section of *bona fide prospective*

purchaser, contiguous property owner and innocent landowner and corresponding *LLPs*; see also Legal Appendix, [Appendix X1](#).

3.1.27 *likely release area*—a place where a *Phase II Assessor* judges it likely that *target analytes* were first introduced into *environmental media* as a result of a release such that the *target analytes* may now be present in *environmental media* at the property. *Likely release areas* can include, but need not be limited to, *recognized environmental conditions* identified in a *Phase I ESA* conducted in accordance with Practice [E1527](#) or Practice [E2247](#).

3.1.28 *migration pathway*—a route through *environmental media* taken by a *target analyte*; the physical feature allowing movement of *target analytes*.

3.1.29 *obvious*—that which is plain or evident; a condition or fact that could not be ignored or overlooked by a reasonable observer while visually or physically observing the property, or that could be deduced by a *Phase II Assessor*.

3.1.30 *petroleum products*—those substances included within the petroleum exclusion to CERCLA, 42 U.S.C. § 9601(14), as interpreted by the courts and EPA; that is, petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under Subparagraphs (A) through (F) of 42 U.S.C. § 9601(14), natural gas, natural gas liquids, liquefied natural gas, and synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). (The word fraction refers to certain distillates of crude oil, including gasoline, kerosene, diesel oil, jet fuels, and fuel oil as defined in “Standard Definitions of Petroleum Statistics,” American Petroleum Institute).

3.1.31 *Phase I environmental site assessment (Phase I ESA)*—an assessment performed in accordance with the process described in Practice [E1527](#), Practice [E2247](#), or the EPA *all appropriate inquiries (AAI)* rule, 40 CFR Part 312.

3.1.32 *Phase II Assessor*—a person meeting the definition of an “Environmental Professional” as provided in Section 3.2.32 of Practice [E1527](#), and possessing sufficient education, professional training, and relevant experience to conduct or be in responsible charge of environmental investigations and other activities in accordance with this practice, and to interpret the resulting data to develop opinions and conclusions regarding the presence of *target analytes* in *environmental media* in connection with the property in question. An individual’s status as a *Phase II Assessor* may be limited to the type of assessment to be performed. Overall, a *Phase II Assessor* should understand and be experienced in pertinent aspects of the scientific method, hydrogeology, geochemistry, environmental investigation/exploration techniques, interpretation of chemical testing data, and commercial and industrial operations pertaining to the use and handling of site-specific *target analytes* and production and handling of associated wastes. The *Phase II Assessor* may be an independent contractor or an employee of the user. Some jurisdictions may have licensing requirements for individuals who perform certain environmental investigation activities included in a *Phase II ESA*.