



Standard Practice for Detecting Hot Spots Using Point-Net (Grid) Search Patterns¹

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1. Scope

1.1 This practice provides equations and nomographs, and a reference to a computer program, for calculating probabilities of detecting hot spots (that is, localized areas of soil or groundwater contamination) using point-net (that is, grid) search patterns. Hot spots, more generally referred to as targets, are presumed to be invisible on the ground surface. Hot spots may include former surface impoundments and waste disposal pits, as well as contaminant plumes in ground water or the vadose zone.

1.2 For purposes of calculating detection probabilities, hot spots or buried contaminants are presumed to be elliptically shaped when projected vertically to the ground surface, and search patterns are square, rectangular, or rhombic. Assumptions about the size and shape of suspected hot spots are the primary limitations of this practice, and must be judged by historical information. A further limitation is that hot spot boundaries are usually not clear and distinct.

1.3 In general, this practice should not be used in lieu of surface geophysical methods for detecting buried objects, including underground utilities, where such buried objects can be detected by these methods (see Guide D6429).

1.4 Search sampling would normally be conducted during preliminary investigations of hazardous waste sites or hazardous waste management facilities (see Guide D5730). Sampling may be conducted by drilling or by direct-push methods. In contrast, guidance on sampling for the purpose of making statistical inferences about population characteristics (for example, contaminant concentrations) can be found in Guide D6311.

1.5 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D5730 Guide for Site Characterization for Environmental Purposes With Emphasis on Soil, Rock, the Vadose Zone and Groundwater (Withdrawn 2013)³

D6051 Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities

D6311 Guide for Generation of Environmental Data Related to Waste Management Activities: Selection and Optimization of Sampling Design

D6429 Guide for Selecting Surface Geophysical Methods

3. Terminology

3.1 Definitions:

3.1.1 *hot spot*—a localized area of soil or groundwater contamination.

3.1.1.1 *Discussion*—A hot spot may be considered as a discrete volume of buried waste or contaminated soil where the concentration of a contaminant of interest exceeds some prespecified threshold value. Although hot spots are more likely to have variable sizes and shapes and not have clear and distinct boundaries, elliptically shaped hot spots or targets with well defined edges are assumed for the purposes of calculating detection probabilities. The assumption that hot spots have elliptical shapes is not inconsistent with known historical patterns of contaminant distribution.

3.1.2 *sampling density*—the number of soil borings (that is, sampling points) per unit area.

3.1.3 *semi-major axis, a* —one-half the length of the long axis of an ellipse. For a circle, this distance is simply the radius.

3.1.4 *semi-minor axis, b* —one-half the length of the short axis of an ellipse.

3.1.5 *target*—the object or “hot spot” that is being searched for.

¹ This practice is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.01 on Planning for Sampling.

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² 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.

³ The last approved version of this historical standard is referenced on www.astm.org.