



Standard Practice for Detecting Hot Spots and Buried Objects 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) and buried objects 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. Buried objects may include former surface impoundments, waste disposal pits, and utilities that have been covered by soil or paving materials. Hot spots may also include contaminant plumes in ground water or soil gas.

1.2 For purposes of calculating detection probabilities, hot spots or buried objects 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 assumed to be clear and distinct. Alternative approaches to hot spot detection using discrete sampling should also be considered where feasible, such as surface geophysical measurements (see Guide D 6429).

1.3 Search sampling would normally be conducted during preliminary investigations of hazardous waste sites or hazardous waste management facilities (see Guide D 5730). Sampling may be conducted via 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 D 6311.

1.4 *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

- D 5730 Guide for Site Characterization for Environmental Purposes with Emphasis on Soil, Rock, the Vadose Zone and Ground Water
- D 6051 Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities
- D 6311 Guide for Generation of Environmental Data Related to Waste Management Activities: Selection and Optimization of Sampling Design
- D 6429 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 elliptically shaped hot spots or targets are assumed for the purposes of calculating probabilities of detecting hot spots, hot spots are more likely to have variable sizes and shapes and not have clear and distinct boundaries. However, the concept of hot spots is consistent with known historical patterns of contaminant distributions.

3.1.2 *sampling density*—the number of 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 on Sampling and Monitoring.

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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.