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Standard Practice for Minimum Set of Data Elements to Identify a Soil Sampling Site[1]

This standard is issued under the fixed designation D 5911; 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.

ε[1] NOTE—Editorial changes were made throughout in September 2002.

1. Scope

1.1 This practice covers what information should be obtained to uniquely identify any soil sampling or examination site where an absolute and recoverable location is necessary for quality control of the study, such as a waste disposal project. The minimum set of data elements for sampling site identification (DEFFSI) was developed considering the needs for informational data bases, such as geographic information systems (GIS). Other distinguishing details, such as individual site characteristics help in singularly cataloging the site. For studies that are not environmentally regulated, such as for an agricultural or preconstruction survey, the data specifications established an agency or company may be different from that of the minimum set (see Guide D420 and Practice D5254).

1.2 As used in this practice, a soil sampling site is meant to be a single point, not a geographic area or property, located by an *X*, *Y*, and *Z* coordinate position at land surface or a fixed datum. All soil data collected for the site are directly related to the coordinate position, for example, sample from *x* feet (or metres) or sample from interval x^1 to x^2 ft (or metres) below the *X*, *Y*, and *Z* coordinate position. A soil sampling site can include a test well, augered or bored hole, excavation, grab sample, test pit, sidewall sample, stream bed, or any other site where samples of the soil can be collected or examined for the purpose intended.

1.3 The collection of soil samples is a disruptive procedure as the material is usually extracted from its natural environment and then transported from the site to a laboratory for analysis. Normally, in this highly variable type of material, the adjacent soil profile will not be precisely the same as the sampled soil. For these reasons, when soil samples are removed the same material cannot be collected from the site later. Therefore, it is essential that the minimum set of DEFSSI be thoroughly documented and identified especially with an accurate location.

1.4 Samples of soil (sediment) filtered from the water of streams, rivers, or lakes are not in the scope of this practice.

NOTE 1—There are many additional data elements that may be necessary to identify and to describe a soil sampling site, but are not included in the minimum set of data elements. An agency or company may require additional data elements as a part of their minimum set for a specific project or program.

1.5 This practice includes those data elements that will distinguish a site's geographical location on Earth, its location by political regimes, its source identifiers, and its individual site characteristics. These elements apply to all soil and geotechnical sampling sites involved in environmental assessment studies. Each category of site, such as a bore hole or excavation, may require additional data elements to be complete.

1.6 Some suggested components and representative codes for coded DEFSSI, for example, "setting", are those established by Ref **(1)**,[2] by Practice D2487, by the Water Resources Division of the U.S. Geological Survey in Ref **(3)**, and by Boulding in Ref **(4)** and **(5)**.

NOTE 2—The data elements presented in this practice do not uniquely imply a computer data base, but the minimum set of soil data elements that should be collected for entry into any type of permanent file.

1.7 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice 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 without 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] This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Ground Water and Vadose Zone Investigations.

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[2] The boldface numbers given in parentheses refer to a list of references at the end of the text.

2. Referenced Documents

2.1 *ASTM Standards:*

D 420 Guide to Site Characterization for Engineering, Design, and Construction Purposes[3]

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[3]

D 2487 Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)[3]

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)[3]

D 3740 Practice Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction[3]

D 5254 Practice for Minimum Set of Data Elements to Identify a Ground-Water Site[4]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 "Soils" are sediments or other unconsolidated solid particles of rock produced by the physical and chemical disintegration of rock, and which may or may not contain organic matter (see Terminology D 653).

3.1.2 *Discussion*—Soil consists of any individual or combination of gravel (passes a 3-in. or 75-mm screen), sand, clay, silt, organic clay, organic silt, and peat as categorized in the Unified Soil Classification System (1, 2, 4, 5) (see Practices D 2487 and D 2488). Materials larger than gravel, including cobbles (between 3 and 12 in. or 75 and 300 mm) and boulders (more than 12 in. or 300 mm), are not included in the definition of soil. Soil is found above the consolidated rocks and can be unsaturated (vadose zone) or saturated (capillary fringe and water table) with water or other liquids.

NOTE 3—Soil, as defined by geotechnical engineers, is all unconsolidated material above bedrock **(6)**; or the natural medium for growth of land plants **(7)**. The pedologic definition is, the unconsolidated mineral or organic matter on the surface of the earth subjected to and influenced by genic and environmental factors of: parent material, climate (including water and effects), macro- and micro-organisms, and topography, all acting over a period of time and producing a product-soil-that differs from material from which it is derived in many physical, chemical, biological, and morphological properties and characteristics **(8)**.

3.2 "Sediment" (for geology) is a mass of organic or inorganic solid fragmented material, or the solid fragment itself, which comes from weathering of rock and is carried by, suspended in, or dropped by air, water, or ice; or a mass accumulated by any other natural agent and that forms in layers on the Earth's surface such as sand, gravel, silt, mud, till, or loess **(6,9)**. These materials are" soils" for the purpose of this practice.

3.3 "Soil Sampling Site" is meant to be a single point, not a geographic area or property, located by an X, Y, and Z coordinate position at land surface or a fixed datum (see 1.2 for additional explanation).

3.4 "Date of First Record for Soil Sampling Site" is the date that the first valid transaction occured for any element of the specified site. This could be the date of a permit application or start of construction. This element is important to facilitate the proper identification of the record.

4. Summary of Practice

4.1 This practice includes the following DEFSSI to identify a subsurface soil site:

4.1.1 *Geographic Location*:

4.1.1.1 Latitude,

4.1.1.2 Longitude,

4.1.1.3 Coordinate precision,

4.1.1.4 Altitude, and

4.1.1.5 Altitude precision.

4.1.2 *Political Regime Location*:

4.1.2.1 State or country identification, and

4.1.2.2 County or county equivalent.

4.1.3 *Source Identifiers*:

4.1.3.1 Project identification,

4.1.3.2 Owner's name,

4.1.3.3 Source agency or company and address,

4.1.3.4 Unique identification, and

4.1.3.5 Date of first record for the soil sampling site.

4.1.4 *Individual Site Characteristics*:

4.1.4.1 Setting,

4.1.4.2 Type of soil sampling site,

4.1.4.3 Use of site, and

4.1.4.4 Reason for data collection or examination.

5. Significance and Use

5.1 Normally, the basic soil data are gathered by trained personnel during the field investigation phase of a study. Each agency or company has its own methods of obtaining, recording, and storing the information. Usually, these data are recorded onto forms that serve both in organizing the information in the field and the office, and often as entry forms for a computer data base. For soil data to be of maximum value to the current project and any future studies, especially those involved in the assessment of the environment, it is essential that a minimum set of key identification data elements be recorded for each sampling site.

5.2 When obtaining basic data concerning a subsurface soil sampling site, it is necessary to thoroughly identify that sampling site so that it may be readily located again with minimal uncertainty and may be accurately plotted and interpreted for data parameters in relationship to other sampling sites. For example, information can be presented on maps and in summary tables (see Practice D3740).

6. Documentation

6.1 *Geographic Location*:

6.1.1 *Introduction*—The universally accepted coordinates defining the absolute two-dimensional location of a site on the Earth's surface are latitude and longitude. The coordinates are determined by careful measurement from an accurate map, by survey, for example, Geographical Positioning System (GPS) or by conversion from another coordinate system, for example, Universal Transverse Mercator (UTM) System or State Plane Coordinate System (SPCS). The third-dimension of the location is established by determining the altitude at the site,

[3] *Annual Book of ASTM Standards*, Vol 04.08.

[4] *Annual Book of ASTM Standards*, Vol 04.09.

usually from topographic maps or by surveying techniques. The U.S. Environmental Protection Agency (EPA) has guidance documents concerning their policy for locating data points or sites **(10–13)**. In addition, the publication **(14)** can be obtained by the address given in Footnote 5[5].

NOTE 4—If sites are located by property, local, State, or Federal boundaries or by soil sampling grid lines, other grid coordinates, plane coordinates, plant location grids, referenced to recoverable benchmarks, their locations should be readily convertible to absolute latitude/longitude coordinates by an acceptable method.

6.1.2 *Latitude*—Latitude is a coordinate representation that indicates locations on the surface of the Earth using the Earth's equator as the respective latitudinal origin. Record the best available value for the latitude of the site in degrees, minutes, seconds and fractions of a second (DDMMSSss). If latitude of the site is south of the Equator, precede the numbers with a minus sign (−). The use of N or S is also appropriate **(3,13–15)**.

6.1.3 *Longitude*—Longitude is a coordinate representation that indicates locations on the surface of the Earth using the prime meridian (Greenwich, England) as the longitudinal origin. Record the best available value for the longitude of the site, in degrees, minutes, seconds, and fractions of a second (DDDMMSSss). If longitude of the site is measured east of the Greenwich Meridian, precede the numbers with a minus sign (−). The use of E or W is also appropriate **(3,13–15)**.

6.1.4 *Coordinate Precision*—Record the precision of the coordinate values. The precision values may be measured in linear distance (feet or metres) or in coordinate degree values (stated as decimal values or as minutes and seconds). The method specified by EPA is the coordinate degree values **(13)**.

NOTE 5—For most soil surveys the precision of the coordinate values is dependent upon the size of the sample. In most subsurface drilling operations, the highest level of attainable precision is about ±0.05 ft (0.015 m), therefore surveys of greater precision should not be required.

6.1.5 *Altitude*—Record the altitude of land surface or measuring point. Altitude of the land surface is the vertical distance in feet (or metres) either above or below a reference datum surface. The reference datum surface must be noted **(3,13,15)**.

NOTE 6—In the United States, this reference surface should be the North American Vertical Datum (NAVD) of 1988 or National Geodetic Vertical Datum (NGVD) of 1929. If another vertical reference datum is used to determine the altitude, describe the system.

NOTE 7—The measuring point is usually a carefully surveyed and permanently fixed object near a soil sampling site used for determining the altitude of the collected or examined material at the site.

6.1.6 *Altitude Precision*—Record the precision of the altitude. As an example, record 1.0, for an accuracy of ±1m or 0.1 for ±0.1m to denote the judged error of the measurement **(3)**.

6.2 *Location Identification by Political Regimes*:

6.2.1 *Introduction*—The description of the soil sampling site in some political jurisdictions helps in the proper identification of the site.

6.2.2 *State or Country* —Record the state or country in which the site is physically located. The common systems for identifying States and countries are the Federal Information Processing Standard code (FIPS), a two-digit numeric code or the American National Standard Abbreviation two-letter code. The country codes are a two-character and a set of three-character alphabetic codes **(3,13–16–18)**.

NOTE 8—The publications (FIPS PUB 5-2, FIPS PUB 6-4 and FIPS PUB 104-1) containing the codes for countries, states, and counties are available from the address in Footnote 5.

6.2.3 *County and County Equivalent*—Record the county or county equivalent in which the site is physically located. The common code system for identifying counties is the FIPS code, a three-digit numeric code. The documentation of political subdivisions will depend on the system used in each individual country **(3,13,15,18)**.

6.2.4 Local Government Subdivisions- In many cases it is necessary to record a subdivision of the local government to further identify the area where the soil sampling site is located. Some local subdivisions are a city, town, village, municipality, township, or borough. Identify the local subdivision, for example "City of Rockville", to clearly denote the unit.

6.3 *Source Identifiers*:

6.3.1 *Introduction*—The soil sampling site must be identified as to the project, owner, the agency or company that recorded data, and its distinctive identification.

6.3.2 *Project Identification*—Record the name of the project that includes the soil sampling site, for example, Coralville Dam, Johnson County Soil Survey, or Cedar Low-level Waste Disposal **(3–5)**.

6.3.3 *Owner's Name*—Record the name of the property owner of the soil sampling site. The recommended format for an individual's name is: last name, first name, middle initial. If a company's name is lengthy, use meaningful abbreviations. The owner's address can be included for further identification **(3,15)**.

6.3.4 *Source Agency or Company and Address*—Record the name and address of the agency or company that collected the data for the soil sampling site. This data element is necessary to determine the original source of the data for the site **(19)**.

6.3.5 *Unique Identification*—Record the unique naming that the agency or company uses to identify the soil sampling site. This identification is called by several terms such as "local site number", "site identification", and "well number" (if the site was finished as a well), etc. The description is commonly a combination of letters and numbers that could represent a land-net location or a sequential assignment for a site in a county, city, company, or project. This identification is important to precisely differentiate a site in the records of an agency or company **(2–5,15)**.

6.3.6 *Date of First Record for the Soil Sampling Site*—Record the date that the first valid transaction occurred for any element of the specified site. This could be the date of a permit application or start of construction. This element is important to facilitate the proper identification of the record **(2–5,15)**.

6.4 *Individual Characteristics of the Site*:

6.4.1 *Introduction*—Each soil sampling site has specific features that, in combination, uniquely identify that site. These characteristics should be recorded for further defining the site.

[5] Available from National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

6.4.2 *Setting*—Record the information that best describes the setting in which the site is located. Setting refers to the topographic, landform, or geomorphic features near the site. Suggested setting components and representative codes are **(2–5,15)**:

6.4.2.1 A—Alluvial fan,
6.4.2.2 B—Playa,
6.4.2.3 C—Stream channel,
6.4.2.4 D—Local depression,
6.4.2.5 E—Dunes,
6.4.2.6 F—Flat surface,
6.4.2.7 G—Flood plain,
6.4.2.8 H—Hilltop,
6.4.2.9 I—Inland wetlands,
6.4.2.10 J—River delta,
6.4.2.11 K—Sinkhole,
6.4.2.12 L—Lake,
6.4.2.13 M—Mangrove swamp or coastal wetlands,
6.4.2.14 N—Estuary,
6.4.2.15 P—Pediment,
6.4.2.16 S—Hillside (slope),
6.4.2.17 T—Alluvial or marine terrace,
6.4.2.18 U—Undulating,
6.4.2.19 V—Valley flat (valleys of all sizes),
6.4.2.20 W—Upland draw,
6.4.2.21 X—Unknown,
6.4.2.22 Y—Wetlands, and
6.4.2.23 Z—Other—describe.

NOTE 9—Components and codes given for "setting", "type of soil sampling site", "use of site", and "reason for data collection or examination" are only suggestions and are not considered absolute or complete lists. The agency or company that uses the Standard may want to alter these lists by deleting, adding, or fully explaining each individual component. The use of codes for the components may not be desirable for the purposes intended by the agency or company, as shown in Fig. 1. The important factor is that the information is included as a part of the data set.

6.4.3 *Method of Soil Sampling*—This data element helps to identify the physical type of soil sampling site. Record the method to which these data apply. Suggested components and representative codes are **(3–5)** (see Note 9):

6.4.3.1 A—Augered hole, hand, specify method,
6.4.3.2 B—Bored hole, mechanical, specify method,
6.4.3.3 C—Cone penetration,
6.4.3.4 D—Trench,
6.4.3.5 E—Excavated hole, for example, construction location,
6.4.3.6 F—Test pit,
6.4.3.7 G—Geophysical test hole,
6.4.3.8 O—Outcrop, natural slopes and embankments,
6.4.3.9 P—Push tube, hand, specify method,
6.4.3.10 Q—Push tube, mechanical, specify method,
6.4.3.11 R—Road cut,
6.4.3.12 S—Surface, sampled with shovel, scoop, spoon, pick, etc.,
6.4.3.13 T—Tunnel, shaft, or mine,
6.4.3.14 W—Test hole, drilled, completed as well,
6.4.3.15 X—Test hole, drilled, not completed as a well, and
6.4.3.16 Z—Other—describe.

6.4.4 *Use of Site*—Record the use of the site or the purpose for which the site was constructed (the former always holds precedence over the latter). If site is used for more than one purpose, also record the subordinate uses. Suggested site use components and representative codes are **(1,2,4,5)** (see Note 9):

6.4.4.1 C—Cut for road construction,
6.4.4.2 F—Dam construction,
6.4.4.3 M—Mine or road tunnel or shaft,
6.4.4.4 Q—Quarry or mine embankment,
6.4.4.5 B—Soil sampling—boring,
6.4.4.6 E—Soil sampling—excavation,
6.4.4.7 S—Soil sampling—surface extraction,
6.4.4.8 T—Test hole for water,
6.4.4.9 G—Test hole for oil and gas,
6.4.4.10 H—Test hole for exploration of minerals,
6.4.4.11 L—Test hole for liquid contaminate extraction,
6.4.4.12 D—Test boring for contaminate detection,
6.4.4.13 A—Test boring for construction,
6.4.4.14 W—Hazardous and non-hazardous release site excavation,
6.4.4.15 U—Unknown, and
6.4.4.16 Z—Other—describe.

6.4.5 *Reason for Data Collection or Examination*—Record the reason for which soil samples were removed from or examined at the site. If the data were collected or examined for more than one purpose, record the subordinate reasons. Suggested data components and representative codes are (see Note 9):

6.4.5.1 A—Agricultural survey,
6.4.5.2 G—Construction design,
6.4.5.3 B—Research,
6.4.5.4 C—Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), amended by Superfund Amendments Reauthorization Act (SARA),
6.4.5.5 R—Resource Conservation and Recovery Act (RCRA),
6.4.5.6 D—Drinking water regulations,
6.4.5.7 E—Exploration (water),
6.4.5.8 L—Local ordinance,
6.4.5.9 S—State regulations, other than CERCLA/SARA or RCRA,
6.4.5.10 F—Federal regulations, other than CERCLA/SARA or RCRA,
6.4.5.11 I—Environmental issues,
6.4.5.12 J—Judicial/litigation,
6.4.5.13 M—Mining regulations,
6.4.5.14 N—Natural resources exploration,
6.4.5.15 P—Property transfer,
6.4.5.16 V—Reconnaissance,
6.4.5.17 U—Unknown, and
6.4.5.18 Z—Other—describe.

7. Sample Form

7.1 An example of a generalized form for recording a minimum set of data elements for a soil sampling site is shown in Fig. 2. An example of a filled-out form is shown in Fig. 1. These are example forms and are therefore non-mandatory as a part of the practice.

ASTM STANDARD PRACTICE

MINIMUM SET OF DATA ELEMENTS TO IDENTIFY A SOIL SAMPLING SITE

Site Identification 391826074370901 Date Prepared Sept.4.1991
Sampled by Roger J.Henning
Prepared by Roger J.Henning
Map or Topo Quad and Series Jobs Point Quad, 7.5-minute

Geographic Location:
Latitude 39 18 26 Latitude Precision +/- 1 sec.
Longitude 74 37 09 Longitude Precision +/- 1 sec.
Altitude of Measuring Point--
Land Surface 10.00 metres/feet feet
Other _____ metres/feet _____
Altitude Precision 0.01 feet Datum Reference NAVD - 1929

Political Regimes:
State or Country Identification New Jersey
County or County Equivalent Identification Atlantic County
Additional Identification Garden Township

Source Identifiers:
Project Identification Jobs Point Dam
Owner's Name State of New Jersey
Address of Owner Trenton, NJ
Source Agency or Company U.S. Geological Survey
Address of Source Agency 810 Bear Tavern Road, Suite 206
West Trenton, NJ 08628
Unique Identification of Site Jobs Point Construction Project
Test Hole #3
Date of First Record for Site October, 1959

Individual Characteristics of the Site:
Setting Unknown; Near Exit 29 - Garden State Prkwy.
Type of Soil Sampling Site Bored Hole
Use of Site Dam Construction
Reason for Data Collection Construction Design

FIG. 1 Example of Filled-Out Minimum Set of Data Elements Form

8. Keywords

8.1 key data elements; sediment; site coordinates; site identification; site location; soils; soil sample collection

ASTM STANDARD PRACTICE

MINIMUM SET OF DATA ELEMENTS TO IDENTIFY A SOIL SAMPLING SITE

Site Identification _____ Date Prepared _____
Sampled by _____
Prepared by _____
Map or Topo Quad and Series _____

Geographic Location:
Latitude _____ Latitude Precision _____
Longitude _____ Longitude Precision _____
Altitude of Measuring Point--
Land Surface _____ metres/feet _____
Other _____ metres/feet _____
Altitude Precision _____ Datum Reference _____

Political Regimes:
State or Country Identification _____
County or County Equivalent Identification _____
Additional Identification _____

Source Identifiers:
Project Identification _____
Owner's Name _____
Address of Owner _____
Source Agency or Company _____
Address of Source Agency _____
_____
Unique Identification of Site _____
_____
Date of First Record for Site _____

Individual Characteristics of the Site:
Setting _____
Type of Soil Sampling Site _____
Use of Site _____
Reason for Data Collection _____

FIG. 2 Example of Minimum Set of Data Elements Form

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(**11**) U.S. Environmental Protection Agency (EPA), *Locational Data Policy Implementation Guidance: Guide to Selecting Latitude/*

Longitude Collection Methods, EPA/220/B-92-008, U.S. EPA Office of Administrative and Resources Management (PMD-211D), Washington, DC, 1992.

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(**14**) U.S. Department of Commerce, "Representation of Geographic Point Locations for Information Interchange," *Federal Information Standards (FIPS) Publication 70-1*, National Institute for Standards and Technology, Washington, DC, June 23, 1986.

(**15**) Texas Natural Resources Information System, *Ground-Water Data INTERFACE, Users Reference Manual*, Texas Natural Resources Information System, November 20, 1986.

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(**19**) Edwards, M. D., and Josefson, B. M., *Identification Codes for Organizations Listed in Computerized Data Systems of the U.S. Geological Survey*, U.S. Geological Survey, Open-File Report 82-921, 1982.