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# Standard Practice for Minimum Set of Data Elements to Identify a Groundwater Site<sup>1</sup>

This standard is issued under the fixed designation D5254/D5254M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—The units statement in 1.3 and the designation were revised editorially in August 2010.

## 1. Scope

1.1 This practice covers what information should be obtained for any individual groundwater site, also known as monitoring location or sampling station. As used in this practice, a site is meant to be a single point, not a geographic area or property. A groundwater site is defined as any source, location, or sampling station capable of producing water or hydrologic data from a natural stratum from below the surface of the earth. A source or facility can include a well, spring or seep, and drain or tunnel (nearly horizontal in orientation). Other sources, such as excavations, driven devices, bore holes, ponds, lakes, and sinkholes, that can be shown to be hydraulically connected to the groundwater, are appropriate for the use intended (see 6.4.2.3).

NOTE 1—There are many additional data elements that may be necessary to identify a 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.

1.2 This practice includes those data elements that will distinguish a site as to its geographical location on the surface of the earth, political regimes, source identifiers, and individual site characteristics. These elements apply to all groundwater sites. Each category of site, such as a well or spring, may individually require additional data elements to be complete. Many of the suggested components and representative codes for coded data elements are those established by the Water Resources Division of the U.S. Geological Survey and used in the National Water Information Systems computerized data base (1).<sup>2</sup>

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

<sup>1</sup> This practice 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.

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<sup>2</sup> The boldface numbers given in parentheses refer to a list of references at the end of the text.

1.3 The values stated in either SI units or inch-pound units [presented in brackets] 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 non-conformance with the standard.

1.3.1 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs. The rationalized slug unit is not given, unless dynamic ( $F = ma$ ) calculations are involved.

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.*

1.5 *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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>3</sup>

D653 Terminology Relating to Soil, Rock, and Contained Fluids

## 3. Terminology

3.1 *Definitions:*

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.1.1 For definitions of terms applicable to this practice refer to Terminology **D653**.

## 4. Summary of Practice

4.1 This practice includes the following data elements to identify a groundwater site:

4.1.1 *Geographic Location*—Including latitude, longitude, latitude-longitude coordinate accuracy, altitude, and altitude accuracy.

4.1.2 *Political Regimes*—Including state or country identification, and county or county equivalent.

4.1.3 *Source Identifiers*—Including owner’s name, source agency or company and address, unique identification, and date of first record for the groundwater site.

4.1.4 *Individual Site Characteristics*—Including hydrologic unit, setting, type of groundwater site, use of site, use of water from site, and reason for data collection.

## 5. Significance and Use

5.1 Normally, the basic groundwater 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 many times as entry forms for a computer data base. For groundwater data to be of maximum value to the current project and any future studies, it is essential that a minimum set of key data elements be recorded for each site. The data elements presented in this practice do not uniquely imply a computer data base, but rather the minimum set of groundwater data elements that should be collected for entry into any type of permanent file.

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

## 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 or by survey. The third-dimension of the location is established by determining the altitude at the site, usually from topographic maps or by surveying techniques **(2)**.<sup>4</sup>

NOTE 3—If sites are located by plane coordinates, plant location grids, or referenced to recoverable benchmarks, they may be recorded if the position is converted to absolute location coordinates by an acceptable method.

### 6.1.2 *Documentation Procedures:*

<sup>4</sup> Available from National Technical Information Service (NTIS), 5285 Port Royal Rd., Springfield, VA 22161, <http://www.ntis.gov>.

6.1.2.1 *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 **(1-8)**.

6.1.2.2 *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 (DDMMSSss). 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 **(1-8)**.

6.1.2.3 *Latitude-Longitude Coordinate Accuracy*—Record the accuracy of the latitude and longitude values. Suggested coordinate accuracy components and representative codes are as follows **(1, 6, 7, 8)**:

- H — The measurement is accurate to  $\pm 0.01$  s.
- U — The measurement is accurate to  $\pm 0.1$  s.
- S — The measurement is accurate to  $\pm 1$  s.
- F — The measurement is accurate to  $\pm 5$  s.
- T — The measurement is accurate to  $\pm 10$  s.
- M — The measurement is accurate to  $\pm 1$  min.

NOTE 4—Components and corresponding codes listed under data elements, such as latitude-longitude coordinate accuracy and setting, are only suggestions. An agency or company may require additional components to fully describe their groundwater sites. Also, having the data element components written out, for example, “accurate to within 1 s” for the latitude-longitude accuracy, may be preferred to the use of codes. The important factor is that each data element in the “minimum set of data elements” be included with every groundwater site.

6.1.2.4 *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.

NOTE 5—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. Altitudes below the reference datum must be preceded by a minus sign (–) **(1, 2, 4, 7, 8)**.

NOTE 6—The measuring point is usually a clearly defined mark or permanently fixed object at a groundwater site that is used for conducting repeated evaluations, such as water levels in a monitoring well.

6.1.2.5 *Altitude Accuracy*—Record the accuracy of the altitude. As an example, record 1.0 for an accuracy of  $\pm 1$  m or 0.1 for  $\pm 0.1$  “th” m to denote the judged error of the measurement **(1, 3)**.

### 6.2 *Political Regimes:*

6.2.1 *Introduction*—The placement of the groundwater site into a political jurisdiction assists in the proper identification of the site.

### 6.2.2 *Documentation Procedures:*

6.2.2.1 *State or Country Identification*—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 (**1, 3, 9, 10, 11**).

NOTE 7—The publications (**9, 10, 12**) containing the codes for countries, states, and counties are available from the National Technical Information Service.<sup>4</sup>

6.2.2.2 *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 (**1, 3, 7, 11**).

NOTE 8—In many cases, it is necessary to record a subdivision of the local government to further identify the area where the groundwater site is located. Some of the 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 groundwater site must be identified as to the owner, the agency or company that recorded data, and its distinctive classification.

#### 6.3.2 Documentation Procedures:

6.3.2.1 *Owner’s Name*—Record the name of the property owner of the groundwater 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 (**1, 8**).

6.3.2.2 *Source Agency or Company and Address*—Record the name and address of the agency or company that collected the data for the groundwater site. This data element is necessary to determine the original source of the data for the site. A coded list of agency and company names is available through National Water Data Exchange (NAWDEX);<sup>5</sup> the list has over 1200 organizations that actively collect and store water data throughout the United States (**1, 3-6, 12**).

6.3.2.3 *Unique Identification*—Record the unique naming that the agency or company uses to identify the groundwater site. This identification is called by several terms such as “local site number,” “site identification,” “well number,” 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, or company. This identification is very important to precisely differentiate a site in the records of an agency or company (**1, 5-8**).

6.3.2.4 *Date of First Record for the Groundwater Site*—Record the date that the first valid transaction occurred for any element of the specified site. This could be the date of permit application, start of construction, or first used as a monitoring site. This element is important to facilitate in the proper identification of the record (**1, 3, 12**).

### 6.4 Individual Characteristics of the Site:

6.4.1 *Introduction*—Each groundwater site has very specific features that, in combination, uniquely identify that site, that is, water from a groundwater sustained pond used for aquaculture. These characteristics should be recorded as a means of further defining the site.

<sup>5</sup> Available from National Water Data Exchange, U.S. Geological Survey, 421 National Center, Reston, VA 22092.

### 6.4.2 Documentation Procedures:

6.4.2.1 *Hydrologic Unit*—Record the hydrologic unit code for the Office of Water Data Coordination (OWDC) cataloging unit in which the site is located. This eight-digit code consists of four 2-digit parts (**1, 4, 5, 6, 13, 14**): hydrographic region code, subregion code designated by the Water Resources Council, accounting unit within the National Water Data Network, and cataloging unit of the USGS’s “Catalog of Information on Water Data.”

NOTE 9—An explanation of a hydrologic unit code, for example Code 07080107, is the following; Region Code “07” is the Upper Mississippi River Basin above the confluence with the Ohio River; Subregion Code “08” is the Mississippi River Basin below Lock and Dam 13 to the confluence with the Des Moines River Basin, excluding the Rock River Basins; Accounting Unit Code “01” is the Mississippi River Basin below Lock and Dam 13 to the confluence with the Des Moines River Basin, excluding the Iowa and Rock River Basins; and Catalog Unit Code “07” is the Skunk River Basin of Iowa.

NOTE 10—State hydrologic unit maps delineating the hydrographic boundaries of these units are available<sup>6</sup> (see Ref (**13**)).<sup>4</sup>

6.4.2.2 *Setting*—Record the information that best describes the setting in which the site is located. Setting refers to the topographic or geomorphic features in the vicinity of the site. Suggested setting components and representative codes are as follows (**1, 8**):

- A — Alluvial fan
- B — Playa
- C — Stream channel
- D — Local depression
- E — Dunes
- F — Flat surface
- G — Flood plain
- H — Hilltop
- I — Inland wetlands
- J — River delta
- K — Sinkhole
- L — Lake
- M — Mangrove swamp or coastal wetlands
- O — Offshore (estuary)
- P — Pediment
- S — Hillside (slope)
- T — Alluvial or marine terrace
- U — Undulating
- V — Valley flat (valleys of all sizes)
- W — Upland draw
- X — Unknown
- Y — Wetlands
- Z — Other (describe)

6.4.2.3 *Type of Groundwater Site*—This data element helps to identify the physical type of groundwater site. Record the type of site to which these data apply. Suggested site type components and representative codes are as follows (**1, 8**):

- C — Collector (radial-collector) well
- D — Drain dug to intercept the water table or potentiometric surface to either lower the groundwater level or serve as a water supply
- E — Excavation
- H — Sinkhole
- I — Interconnected wells, also called connector or drainage wells; that is, a well interconnected via an underground lateral
- M — Multiple wells—Use only for well field consisting of a group of wells that are pumped through a single header and for which little or no data about the individual wells are available
- O — Outcrop
- P — Pond that intercepts the water table or potentiometric surface

<sup>6</sup> Available from USGS Books and Reports Sales Federal Center, P.O. Box 25425, Denver, CO, 80225.