



Standard Practice for Minimum Set of Data Elements to Identify a Ground-Water Site¹

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1. Scope

1.1 This practice specifies what information should be obtained for any individual ground-water 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 ground-water 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 ground water, 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 ground-water 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).²

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

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

¹ This practice is under the jurisdiction of ASTM Committee D-18 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.

1.4 *This standard does not purport to address all of the safety problems, 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:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids³

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms applicable to this practice refer to Terminology D 653.

4. Summary of Practice

4.1 This practice includes the following data elements to identify a ground-water 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 ground-water site.

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

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

5. Significance and Use

5.1 Normally, the basic ground-water 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 ground-water 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 ground-water data elements that should be collected for entry into any type of permanent file.

5.2 When obtaining basic data concerning a ground-water 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).⁴

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:

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, 2, 3, 4, 5, 6, 7, 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, 2, 3, 4, 5, 6, 7, 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 ± 0.01 s.
- U — The measurement is accurate to ± 0.1 s.
- S — The measurement is accurate to ± 1 s.
- F — The measurement is accurate to ± 5 s.
- T — The measurement is accurate to ± 10 s.
- M — The measurement is accurate to ± 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 ground-water 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 ground-water 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 ground-water 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 ± 1 m or 0.1 for ± 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 ground-water 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 address given in Footnote 4.

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 ground-water 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:

⁴ Available from National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

6.3.1 *Introduction*—The ground-water 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 ground-water 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 ground-water 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);⁵ the list has over 1200 organizations that actively collect and store water data throughout the United States (**1, 3, 4, 5, 6, 12**).

6.3.2.3 *Unique Identification*—Record the unique naming that the agency or company uses to identify the ground-water 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, 6, 7, 8**).

6.3.2.4 *Date of First Record for the Ground-Water 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 ground-water site has very specific features that, in combination, uniquely identify that site, that is, water from a ground-water sustained pond used for aquaculture. These characteristics should be recorded as a means of further defining the site.

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 available⁶ (see Ref (**13**)).⁴

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 Ground-Water Site*—This data element helps to identify the physical type of ground-water 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 ground-water 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
- S — Spring
- T — Tunnel, shaft, or mine from which ground water is obtained
- W — Well, for single wells other than wells of the collector (radial collector) type
- X — Test hole, not completed as a well
- Z — Other (describe)

6.4.2.4 *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 as follows (**1, 4, 7, 8**):

- A — Electrical anode
- C — Standby emergency supply
- D — Drain or dry well
- E — Geothermal—for geothermal extraction or injection
- G — Seismic exploration
- H — Heat reservoir—fluid circulated in closed system
- M — Mine—primary use for extraction of minerals

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

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

- O — Observation/monitoring
- P — Oil or gas well
- R — Recharge
- S — Repressurize—to increase pressure in aquifer
- T — Test—for hydrologic testing
- U — Unused
- W — Withdrawal of water
- X — Waste disposal
- Y — Other (describe)
- Z — Destroyed

- M — Mining regulations
- N — Natural resources exploration
- U — Unknown
- Z — Other (describe)

7. Sample Form

7.1 An example of a generalized form for recording a minimum set of data elements for a ground-water site is shown in Fig. 1. An example of a filled-out form is shown in Fig. 2.

8. Keywords

8.1 ground water; ground-water sampling site; hydrologic unit; key data elements; site identification; site location; setting; monitoring location; site coordinates

6.4.2.5 *Use of Water from Site*—Record the use of the water from the site. If water from the site is used for more than one purpose, also record the subordinate uses. Suggested water use components and representative codes are as follows (1):

- A — Air conditioning
- B — Bottling
- C — Commercial
- D — Dewater
- E — Power
- F — Fire
- G — Hydrogeologic interpretation
- H — Domestic
- I — Irrigation
- J — Industrial (cooling)
- K — Mining
- L — Chemical screening for contaminants
- M — Medicinal
- N — Industrial (manufacturing)
- P — Public supply
- Q — Aquaculture
- R — Recreation
- S — Stock
- T — Institutional
- U — Unused
- Y — Desalination
- Z — Other (describe)

6.4.2.6 *Reason for Data Collection*—Record the reason for which data were collected from the site. If the data were collected for more than one purpose, record the subordinate reasons. Suggested data collection components and representative codes are as follows:

- A — Construction/dewatering
- B — Research
- C — CERCLA
- R — RCRA
- D — Drinking water regulations
- E — Exploration (water)
- L — Local ordinance
- S — State regulations, other than CERCLA or RCRA
- F — Federal regulations, other than CERCLA or RCRA
- G — Geothermal
- H — Hydrologic benchmark
- I — Environmental issues
- J — Judicial/litigation

Ground-Water Site Minimum Set of Data Elements		Date prepared:
GEOGRAPHIC LOCATION		
Latitude:		Accuracy:
Longitude:		Accuracy:
ALTITUDE		
Land Surface:	(meters/feet)	Accuracy:
Other (Specify):	(meters/feet)	Accuracy:
Altitude Reference Datum:		
POLITICAL REGIMES		
State (or Country) Identification:		
County (or County Equivalent) Identification:		
SOURCE IDENTIFIERS		
Owner's Name:		
Source Agency (or Company):		
Address of Source Agency:		
Unique Identification of Site:		
Date of First Record for Site:		
INDIVIDUAL CHARACTERISTICS OF THE SITE		
Hydrologic Unit:		
Setting:		
Type of Ground-Water Site:		
Use of Site:		
Use of Water from Site:		
Reason for Data Collection:		

FIG. 1 Example of Minimum Set of Data Elements Form

Ground-Water Site Minimum Set of Data Elements		Date prepared: SEPT 4, 1991
GEOGRAPHIC LOCATION (5.1)		
Latitude: 39° 13' 26"		Accuracy: ± 1 SEC
Longitude: 74° 37' 09"		Accuracy: ± 1 SEC
ALTITUDE (5.1.2.4)		
Land Surface: 10.00 FT (meters/feet)		Accuracy: 0.01 FT
Other (Specify): 9.34 FT (meters/feet) RECORDED SHELF		Accuracy: 0.01 FT
Altitude Reference Datum: NGVD (1929)		
POLITICAL REGIMES (5.2)		
State (or Country) Identification: NEW JERSEY		
County (or County Equivalent) Identification: ATLANTIC COUNTY		
SOURCE IDENTIFIERS (5.3)		
Owner's Name: U.S. GEOLOGICAL SURVEY		
Source Agency (or Company): U.S. GEOLOGICAL SURVEY		
Address of Source Agency: 810 BEAR TAVERN ROAD, SUITE 206 WEST BENTON, N.J. 08628		
Unique Identification of Site: JOBS POINT OBS. N.J. WPD WELL #01-0518		
Date of First Record for Site: OCTOBER, 1959		
INDIVIDUAL CHARACTERISTICS OF THE SITE (5.4)		
Hydrologic Unit: 02040302		
Setting: UNKNOWN; NEAR EXIT 29 - GARDEN STATE FRKY		
Type of Ground-Water Site: WELL		
Use of Site: OBSERVATION/MONITORING		
Use of Water from Site: HYDROGEOLOGIC INTERPRETATION		
Reason for Data Collection: HYDROLOGIC BENCHMARK/RESEARCH		

FIG. 2 Example of Filled-Out Minimum Set of Data Elements Form

REFERENCES

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- (3) Perry, R. A., and Williams, O. O., *Data Index Maintained by the National Water Data Exchange*, U.S. Geological Survey, Open-File Report 82-327.
- (4) Texas Natural Resources Information System, *Ground-Water Data INTERFACE, Users Reference Manual*, Texas Natural Resources Information System, November 20, 1986.
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- (6) U.S. Environmental Protection Agency, *Ground-Water Data Management With STORET*, Office of Ground-Water Protection, U.S. EPA, Washington, DC, March 1986.
- (7) U.S. Environmental Protection Agency, *Definitions for the Minimum Set of Data Elements for Ground Water Quality*, U.S. Environmental Protection Agency (Draft), July 22, 1991.
- (8) U.S. Geological Survey, *National Handbook of Recommended Methods for Water-Data Acquisition*, Chapter 2, "Ground Water," Office of Data Coordination, Reston, VA, 1980.
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- (10) U.S. Department of Commerce, "Codes for the Identification of the States, the District of Columbia and Outlying Areas of the United States, and Associated Areas," *Federal Information Standards (FIPS) Publication 5-2*, National Institute for Standards and Technology, Washington, DC, May 28, 1987.
- (11) U.S. Department of Commerce, "Counties and Equivalent Entities the United States, Its Possessions, and Associated Areas," *Federal Information Standards (FIPS) Publication 6-4*, National Institute for Standards and Technology, Washington, DC, August 31, 1990.
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- (13) U.S. Geological Survey, "Codes for the Identification of Hydrologic Units in the United States and the Caribbean Outlying Areas," U.S. Geological Survey, Circular 878-A, Reston, VA, (also *FIPS PUB 103*), 1982.
- (14) Seaber, P. R., Kapinos, F. P., and Knapp, G. L., State Hydrologic Unit Maps, U.S. Geological Survey, Open-File Report 84-708, Reston, VA, 1984.

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