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Standard Guide for Set of Data Elements to Describe a Ground-Water Site; Part Three—Usage Descriptors¹

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1. Scope

1.1 This guide is Part Three of three guides to be used in conjunction with Practice D 5254 that delineates the data desirable to describe a ground-water data collection or sampling site. This guide identifies usage descriptors, such as monitoring, for an individual ground-water site. Guide D 5408 describes additional information beyond the minimum set of data elements that may be specified to identify a ground-water site, while Guide D 5409 identifies physical descriptors, such as construction, for a site.

NOTE 1—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, boreholes, ponds, lakes, and sinkholes, that can be shown to be hydraulically connected to the ground water, are appropriate for the use intended.

NOTE 2—Guide D 5408 includes data confidence classification descriptor (1 element), geographic location descriptors (4 elements), political regime descriptor (1 element), source identifier descriptors (4 elements), legal descriptors (9 elements), owner descriptors (2 elements), site visit descriptors (3 elements), other identification descriptors (2 elements), other data descriptors (3 elements), and remarks descriptors (3 elements). Guide D 5409 includes individual site characteristics (7 data elements), construction descriptors (56 data elements), lift descriptors (16 data elements), geologic descriptors (26 data elements), hydraulic descriptors (20 data elements), and spring descriptors (11 data elements). For a list of descriptors in this guide, see Section 3.

1.2 These data elements are described in terms used by ground-water hydrologists. Standard references, such as Ref (1)² and various hydrogeologic professional publications, are used to determine these definitions. Many of the suggested elements and their representative codes are those established by the Water Resources Division of the U.S. Geological Survey

and used in the National Water Information Systems computerized data base³ (1-21).

NOTE 3—The purpose of this guide is to suggest data elements that can be collected for ground-water sites. This does not uniquely imply a computer data base, but rather data elements for entry into any type of permanent file.

NOTE 4—Component and code lists given with some of the data elements, for example “method of discharge measurement,” are only suggestions. These lists can be modified, expanded, or reduced for the purpose intended by the company or agency maintaining the ground-water data file.

NOTE 5—Use of trade names in this guide is for identification purposes only and does not constitute endorsement by ASTM.

1.3 This guide includes the data elements desirable to document a ground-water site beyond those given in the minimum set of data elements. Some examples of the data elements are water level, discharge, and water-quality sample collection date. No single site will need every data element, for example, a monitoring site may not need a long-term water use record. Each record (group of data elements) for a site has mandatory data elements, such as the date for the water level record. However, these elements are considered necessary only when that specific record is gathered for the site.

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

1.5 *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.*

1.6 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide 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*

¹ This guide 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 the list of references at the end of the text.

³ Guide for the Decommissioning of Ground-Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities (draft); ASTM Subcommittee D18.21.06 on Well Maintenance, Rehabilitation, and Abandonment Section, August 1991.

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 Fluids⁴
- D 5254 Practice for the Minimum Set of Data Elements to Identify a Ground-Water Site⁵
- D 5408 Guide for Set of Data Elements to Describe a Ground-Water Site, Part One—Additional Identification Descriptors⁵
- D 5409 Guide for Set of Data Elements to Describe a Ground-Water Site, Part Two—Physical Descriptors⁵

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms applicable to this guide, see Terminology D 653.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *code*—a suggested abbreviation for a component, for example, "T" is the code suggested for the "electric tape" component of data element method of measurement.

3.2.2 *component*—a subdivision of a data element, for example, "electric tape" is one of 14 components suggested for data element method of measurement.

3.2.3 *data element*—an individual segment of information about a ground-water site, for example, "method of measurement." The data element is in the water-level record record.

3.2.4 *record*—denotes a set of related data elements that may need to be repeated to fully describe a ground-water site. For example, a ground-water monitoring site where water levels are measured periodically will need more than one water-level record record (the record includes data elements date of measurement, date accuracy, water level, water-level accuracy, status, method of measurement, instrumentation, and statistics method) to fully document the water-level history of the site. However, if only a single water level was measured for the site, the record is utilized once.

3.2.5 *record group*—a set of related records. For example the "monitoring record group" includes the measuring point record, network record, water level record, discharge record, water use record, water quality record, and field water quality record. Some record groups consist of only one record, for example, the "irrigation record group" includes only the irrigation record.

4. Summary of Guide

4.1 This guide includes the following usage descriptor data elements to describe a ground-water site. This guide includes only repeated elements that commonly require several records to fully describe the conditions and history of the site:

Monitoring Record Group:

Network Record:

- Data Type
- Date Interval of Network Utilization
- Source Agency for Network Data
- Frequency of Data Collection
- Method of Data Acquisition
- Power Type of Instruments
- Network

Measuring-Point Record:

- Date Interval of Measuring-Point Utilization
- Height in Reference to Datum
- Description

Water-Level Record:

- Measurement Date and Time
- Water Level
- Water-Level Accuracy
- Status
- Method of Measurement and Instrumentation
- Instrumentation
- Source of Data
- Statistics Method

Discharge Record:

- Measurement Date and Time
- Discharge
- Type of Discharge
- Source of Data
- Method of Discharge Measurement
- Instrumentation
- Production or Pumping Level
- Static Level
- Method of Water-Level Measurement
- Pumping Period
- Specific Capacity
- Drawdown
- Source of Water-Level Data

Water-Use Record:

- Date Range of Water-Use Record
- Data Collection Interval
- Long-Term Water Use
- Method Used to Determine Long-Term Water Use

Water-Quality Record:

- Sample Date and Time
- Agency That Analyzes Samples
- Type of Analyses
- Parameters Requested for Analysis
- Sample Depth/Interval
- Water-Quality File Containing Analysis
- Laboratory Number
- Laboratory Name
- Replicate Sequence Number
- Collecting Agency or Company
- Agency or Company Code
- Chain of Custody
- Sampling Purpose
- Site Condition
- Sample Appearance
- Sample Odor
- Presence of Immiscible Stratum
- Thickness of Immiscible Stratum
- Sensors
- Sample Preservation Method
- Sample Filtration Material
- Pumped Period
- Casing Volume
- Amount of Water Purged
- Sampling Method or Sampler Type
- Sampler Material
- Aquifer Sampled
- Regulating Agency

Field Water-Quality Record:

- Field Sample Date and Time
- Parameter Code
- Value of Parameter
- Unit for Parameter
- Instrumentation or Method of Determination

Monitoring Site at Waste-Facility Record:

⁴ Annual Book of ASTM Standards, Vol 04.08.

⁵ Annual Book of ASTM Standards, Vol 04.09.



Date Interval in Service
 State Regulatory Agency
 State Registration Identification
 EPA Registration Identification
 Responsible Company
 Company's Site Identification
 Site Location in Relationship to Waste Facility
 Status of Site
 Sampled Interval

Irrigation Record Group:

Irrigation Record:

Irrigated Land Area
 Allowance for Irrigating
 Date Legal Irrigation Begins
 Date Legal Irrigation Ends

Decommissioning Record Group:

Decommissioning Record:

Date Decommissioned
 Method Used for Decommissioning
 Reason for Decommissioning
 Plugging Material
 Name and Address of Decommissioner
 Step-by-Step Procedures
 Availability of Decommissioning Report
 Regulations Followed, Federal, State, Local

5. Significance and Use

5.1 Data at ground-water sites are gathered for many purposes. Each of these purposes generally requires a specific set of data elements. For example, when the ground-water quality is of concern not only are the minimum set of data elements required for the site, but information concerning the sample collection depth interval, method of collection, and date and time of collection are needed to fully qualify the data. Another group of elements are recommended for each use of the data, such as aquifer characteristics or water-level records. Normally the more information that is gathered about a site by field personnel, the easier it is to understand the ground-water conditions and to reach valid conclusions and interpretations regarding the site.

5.2 The data elements listed in this guide and Guides D 5408 and D 5409 should assist in planning what information can be gathered for a ground-water site and how to document these data.

NOTE 6—Some important data elements may change during the existence of a site. For example, the elevation of the measuring point used for the measurement of water levels may be modified because of repair or replacement of equipment. This frequently occurs when the measuring point is an opening in the pump and the pump is modified or replaced. Because changes cannot always be anticipated. It is preferable to reference the height of the measuring point to a nearby, permanent altitude datum. The measuring point is referenced by being the same altitude (zero correction) or above (negative correction) or below (plus correction) the altitude datum. All appropriate measurements should be corrected in reference to the altitude datum before entry into the permanent file. Care must be exercised to keep the relationship of these data elements consistent throughout the duration of the site.

5.3 Some data elements have an extensive list of components or possible entries. For example the aquifer identification list described in Guide D 5409 has over 5000 entries. Lengthy lists of possible entries are not included in this guide, however, information on where to obtain these components is included with the specific data element.

NOTE 7—This guide identifies sources, lists, etc. of information required to completely document information about any ground-water site.

6. Documentation

6.1 Introduction:

6.1.1 Many of the ground-water data elements require multiple records or entries to completely describe a site. Time-related elements, such as water levels, discharge measurements, and water chemistry, may present hundreds or thousands of records for a period of many years that document measurements at a single site. These time-related data help to determine historical trends and serve to establish bench-mark facts for the site.

6.1.2 Other data elements that are not time related, such as casing lengths, spring openings, and an array of geophysical logs, require a sequence of records to thoroughly describe the site. These data are extremely valuable in site characterization, for example, wells for which the construction components are required to understand the source of the water.

6.2 Monitoring Record Group:

6.2.1 *Introduction*—The monitoring record group includes records for documenting data elements relating to any type of information gathered at a ground-water site for the purpose of monitoring hydrologic, usage, and water-quality trends.

6.2.2 *Network Record*—The network record includes the data elements that describes a ground-water site as it relates to a node in a hydrologic, usage, or water-quality network (10).

NOTE 8—An example of a form (see Fig. 1) for documenting the data elements as described for two records of the monitoring record group is illustrated to show a method of design for this tool. These forms are commonly known as “field forms” or as “coding forms” (for computer entry). This type of form is routinely used for transcribing field data while at the ground-water site and entering nonfield information at the agency's or company's office. It should be noted that each form has the site identification (primary identification as used by the agency or company), date of field visit, and person that recorded the data as the first entries. These three data items are mandatory to ensure correct filing of the information, either in cabinets or in a computer data base, and for quality control.

6.2.2.1 *Data Type*—If applicable, document the type of monitoring conducted or information collected at the ground-water network site. The information identified as continuous are from automatic recording devices, such as water-level recorders. Suggested network data type components and representative codes are as follows:

A—Water quality, analyzed in the laboratory
 B—Water quality, analyzed in the field
 C—Water levels, continuous
 D—Water levels, intermittent
 E—Water discharge, continuous
 F—Water discharge, intermittent
 G—Prediction and detection of earthquakes
 H—Land compaction for subsidence
 I—Vadose-zone water pressure
 Z—Other (describe)

NOTE 9—A ground-water site can be used as a node in a network for monitoring phenomenon other than the common water-quality, water-level, and discharge parameters. For example, in some areas of the country, wells are used indirectly as part of programs to monitor the subsidence of the land surface as a result of collapse or compaction resulting from extraction of liquid from the underground material. Wells and springs have been used in past research as monitoring sites to predict and detect earthquakes by chemical changes in the water and by water-level fluctuations.





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GROUND-WATER SITE

MONITORING RECORD

Site Identification _____ Date Prepared _____

Prepared by _____ (Name)

Network Record:

Data Type _____ (See List in Manual)

Date Interval of Network Utilization _____ (Begin) _____ (End)

Source Agency to Network Data _____ (Name)

_____ (Address)

Frequency of Data Collection _____ (See List in Manual)

Method of Data Acquisition _____ (See List in Manual)

Power Type of Instruments _____ (See List in Manual)

Network _____ (See List in Manual)

Measuring-Point Record:

Date Interval of Measuring-Point Utilization _____ (Begin) _____ (End)

Height in Reference to Datum _____ (feet/metre)

Description _____

FIG. 1 Sample Form

6.2.2.2 Date Interval of Network Utilization—If applicable, document the date interval, in year, month, and day (YYYYM-MDD), that the ground-water site was used for network monitoring. If still in use, document the date that the site was put into service.

6.2.2.3 Source Agency for Network Data— If applicable, document the name and address of the agency responsible for the collection of the ground-water data at the network monitoring site.

6.2.2.4 Frequency of Data Collection—If applicable, document the frequency of data collection at the network monitoring site. Suggested frequency of data collection components and representative codes are as follows:

C—Continuously (analog recorder)
 J—Fixed interval (digital recorder) give interval
 K—Variable interval (digital recorder) give interval
 H—Hourly
 D—Daily
 W—Weekly
 F—Semimonthly (twice a month)
 M—Monthly
 B—Bimonthly (every two months)
 Q—Quarterly
 S—Semiannually
 A—Annually
 2—Biennially (every two years)
 3—Every three years
 4—Every four years
 5—Every five years
 X—Every ten years
 O—One time only
 I—Intermittently or variable time scale
 Z—Other (describe)

6.2.2.5 Method of Data Acquisition—If applicable, document the method of data collection at the network monitoring site. Suggested method of data collection components and representative codes are as follows:

A—Automated instruments accessed by field personnel
 B—Automated instruments accessed by direct line
 D—Automated instruments accessed by radio
 G—Automated instruments accessed by remote data transmission
 F—Periodic field visits by agency or company personnel
 C—Calculated from records of owner
 E—Estimated from other records
 U—Unknown
 Z—Other (describe)

6.2.2.6 Power Type of Instruments—If applicable, document the power type of permanently mounted data collection instruments at the ground-water monitoring site in the network. A detailed description of the instruments should be included with each specific type of monitoring (for example, digital recorder with water levels). Suggested power type of instrument components and representative codes are as follows:

M—Mechanical
 B—Battery operated
 S—Spring driven
 E—Electrical
 R—Solar batteries
 Z—Other (describe)

6.2.2.7 Network—If applicable, document the areal extent or management level of the network that includes the ground-water monitoring site. Document any additional networks that may include the site. Suggested network data components and representative codes are as follows:

N—National
 S—State or Province
 R—Regional, multiple state or county
 C—County
 D—Drainage basin
 P—Project
 Z—Other (describe)

6.2.3 Measuring-Point Record—The measuring point represents a convenient position at a ground-water facility to reference repeated measurements, such as water levels. For some ground-water sites the measuring point is at the same location as the altitude datum (10).

NOTE 10—The altitude of the datum is described as one of the geographic locational data elements in the “Standard Practice for the Minimum Set of Data Elements to Identify a Ground-Water Site.” This record describes the relationship between the measuring point and the datum, thereby linking measurements made at the site to the third dimension, the altitude. The datum normally remains the same for the life of the site; the measuring point can change as the water-withdrawal facilities are modified.