



Designation: D4025 – 18

# Standard Practice for Reporting Results of Examination and Analysis of Deposits Formed from Water for Subsurface Injection<sup>1</sup>

This standard is issued under the fixed designation D4025; 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.

## 1. Scope\*

1.1 This practice covers the manner in which the various results of examination and analysis to determine the composition of deposits formed from water for subsurface injection are to be reported.

1.2 All analyses shall be made in accordance with the test methods of ASTM, unless otherwise specified.

NOTE 1—While reporting of inorganic constituents in water-formed deposits as specified in Practice D933 is sufficient for certain industries, this practice provides for the reporting of organic and biological materials as well as inorganic constituents.

NOTE 2—Consistent with practices in industries where subsurface injection of water is practiced, reporting includes specifying of inorganic constituents as probable molecular combinations of the species for which analyses are performed.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

D887 Practices for Sampling Water-Formed Deposits

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.05 on Inorganic Constituents in Water.

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<sup>2</sup> 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.

D932 Practice for Filamentous Iron Bacteria in Water and Water-Formed Deposits

D933 Practice for Reporting Results of Examination and Analysis of Water-Formed Deposits

D1129 Terminology Relating to Water

D4412 Test Methods for Sulfate-Reducing Bacteria in Water and Water-Formed Deposits

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

## 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this standard, refer to Terminology D1129 and Practices D887.

## 4. History of Sample

4.1 Information regarding the source and history of the sample shall be included in the report of the analysis. This information should be that supplied by the individual submitting the sample as follows:

- 4.1.1 Name of company supplying the sample,
- 4.1.2 Name of location of plant, facility, and well,
- 4.1.3 Date and time of sampling,
- 4.1.4 Number of sample,
- 4.1.5 Name and other designation of equipment from which sample was removed,
- 4.1.6 Precise location from which sample was removed,
- 4.1.7 Operating temperature and pressure of water or brine at location of deposit,
- 4.1.8 Type of treatment applied to the water that formed the deposit,
- 4.1.9 An account of system operating conditions that may have contributed to deposition (for example, filter channeling, chemical pump outage, or increased system temperature),
- 4.1.10 Appearance and extent of deposit prior to removal,
- 4.1.11 Exact method that was used in removing the sample and notes concerning any contamination that might have occurred during the process,
- 4.1.12 Specific methods used for preservation of sample prior to and subsequent to removal,
- 4.1.13 Results of field tests made on the sample or related equipment,

\*A Summary of Changes section appears at the end of this standard

**TABLE 1 Major Headings for Determinations to Be Reported**

Microbiological examination
Moisture and volatile material
Solvent-extractable components:
Fluorocarbon-extractables
Water-solubles
Acid-solubles
Solvent-insolubles
Loss at 900°C
Ash
Inorganic components

4.1.14 An analysis of the water from which the deposit was formed, and

4.1.15 Identity of sampler.

## 5. Significance and Use

5.1 This practice sets down the manner in which data obtained from other test methods should be reported. This is done in an effort to standardize the report form used.

## 6. Physical Characteristics

6.1 The macroscopic characteristics of the sample, as ascertained by the analyst, including any peculiarities that may be pertinent to the results of the examination, shall be included in the report.

NOTE 3—Characteristics such as the following may be recorded: color, form (scaly, slimy, etc.), texture (oily, smooth, friable, gritty, etc.), magnetic properties (as determined by test with magnet), and apparent structure (amorphous, crystalline, columnar crystals).

NOTE 4—Any discrepancies between the physical characteristics observed by the analyst and those reported by the sampler should be noted.

6.2 Characteristics observed during microscopic examination shall be reported and include a description of the gross characteristics and homogeneity or heterogeneity of the sample.

6.3 Any distinct observable crystal morphology such as monoclinic, rhombic, etc., shall be reported.

NOTE 5—Specific note of the presence of any biological material in the sample should be made.

## 7. Determinations to Be Reported

7.1 The major headings for which determinations shall be reported in a complete analysis are as indicated in Table 1. Specific determinations which shall be reported under some of the major headings are listed in Tables 2-4. In certain instances, knowledge of the operating practices and water chemistry will have suggested the need to perform additional analyses or indicated the need for a less complete analysis; consequently, results from determinations may not be reported for each individual item.

## 8. Reporting of Biological Components

8.1 The results of examinations conducted to determine the presence of microorganisms in the sample, such as those delineated by Practice D932 and Test Methods D4412, shall be reported. The organisms present should be identified by phyla with the relative abundance noted.

**TABLE 2 Acid-Soluble Portion Ions to Be Reported**

Inorganic materials:	
calcium	carbonate
magnesium	sulfide
barium	sulfate
iron	phosphate
sodium	hydroxide <sup>A</sup>
	oxide <sup>A</sup>
Organic materials	

<sup>A</sup> These ions are determined by difference. The specific ion reported is determined by direct evidence or in absence of such evidence as hydroxide.

**TABLE 3 Ash—Common Constituents to Be Reported**

calcium	zinc
magnesium	sodium
barium	potassium
strontium	phosphorus
iron	sulfate
aluminum	chloride
silicon	
manganese	

**TABLE 4 Common Inorganic Components Found in Water-Formed Deposits and Their  $K_{sp}$  Values**

Inorganic Material	$K_{sp}$	Temperature, °C	Reference
Al(OH) <sub>3</sub>	$1.3 \times 10^{-33}$	18—25	A
BaCO <sub>3</sub>	$2.6 \times 10^{-9}$	25	B
Ba <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	$3.4 \times 10^{-23}$	18—25	A
BaSO <sub>4</sub>	$1.1 \times 10^{-10}$	25	B
CaCO <sub>3</sub>	$4.9 \times 10^{-9}$	25	B
Ca(OH) <sub>2</sub>	$4.7 \times 10^{-6}$	25	B
Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	$2.1 \times 10^{-33}$	25	B
CaSO <sub>4</sub>	$7.1 \times 10^{-5}$	25	B
FeCO <sub>3</sub>	$3.1 \times 10^{-11}$	25	B
Fe <sub>2</sub> O <sub>3</sub>	$1.1 \times 10^{-36}$	18	B
Fe(OH) <sub>3</sub>	$2.6 \times 10^{-39}$	25	B
FePO <sub>4</sub> ·2H <sub>2</sub> O	$9.9 \times 10^{-29}$	25	B
SrCO <sub>3</sub>	$5.6 \times 10^{-10}$	25	B
Sr <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	$4.0 \times 10^{-28}$	18—25	A
SrSO <sub>4</sub>	$3.4 \times 10^{-7}$	25	B
ZnCO <sub>3</sub>	$1.2 \times 10^{-10}$	25	B
Zn(OH) <sub>2</sub>	$6.8 \times 10^{-17}$	25	B
ZnS	$2.2 \times 10^{-25}$	25	B
Na <sub>2</sub> CO <sub>3</sub>			
NaCl			
Na <sub>2</sub> SO <sub>4</sub>			
S			
SiO <sub>2</sub>			
Other siliceous material			

<sup>A</sup> *Lange's Handbook of Chemistry*, Dean, J. A., Ed., McGraw-Hill Book Co., 13th Edition, pp. 5-7 to 5-12.

<sup>B</sup> *Handbook of Chemistry and Physics*, Weast, R. C., Ed., Chemical Rubber Co., 1991, pp. 8-39.

NOTE 6—In the absence of quantitative measurements, the microbiological constituents may be grouped as major, minor, and trace. In categorizing the constituents, the qualitative nature of the examination and the subjective appraisal of its proportion must be considered.

NOTE 7—The results of the examination should be qualified on the basis of any known or suspected effects related to sample handling prior to or during analysis likely to influence the validity.

## 9. Reporting of Chemical Analyses

9.1 The major headings under which chemical analysis determination shall be reported are moisture and volatile