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Soil quality — Sampling —

Part 106: Quality control and quality assurance

Qualité du sol — Échantillonnage —

Partie 106: Contrôle de la qualité et assurance de la qualité

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html

This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 2, *Sampling*.

A list of all parts in the ISO 18400 series can be found on the ISO website.

Introduction

Quality assurance (QA) comprises all those measures taken to ensure that results of the investigation are “fit for purpose”, including documentation, procedures to be followed, the setting of data quality objectives (i.e. for type, quality, and quantity) and reporting.

The overall quality of soil and site investigations and assessments depends on the quality of each separate step of the overall process, i.e. planning, sampling, pretreatment, analysis and evaluation, and interpretation of all results. This document only applies to sampling. Sampling is a very critical step in the whole procedure because errors made can usually not be recognized nor corrected in the laboratory or in the office afterwards.

A prerequisite for fit for purpose and reproducible analytical and test results is QA for sampling, including assuring:

— representativeness of samples;

— avoiding cross-contamination and unwanted changes or alterations of the sample during sampling, on-site pretreatment, transport, and delivery;

— making, recording, and reporting appropriate field observations;

— fit for purpose field measurements;

— a defined chain of custody process.

In Figure 1, the different steps of an investigation programme are given. This document describes the QA in the first three steps.

This document is part of a series on sampling standards for soil. The role/position of the International Standards within the total investigation programme is also shown in Figure 1.

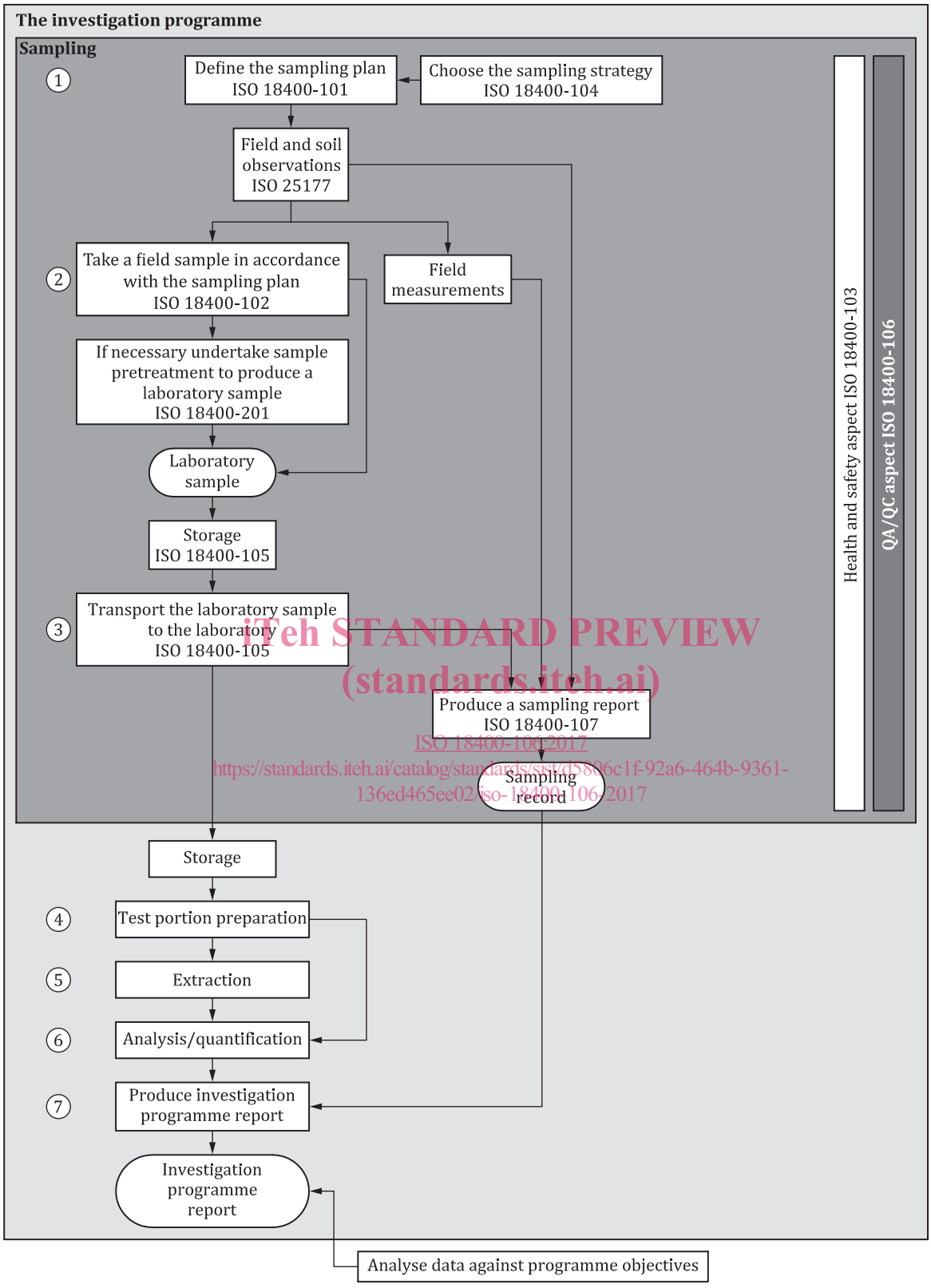

Figure 1 — Links between the essential elements of an investigation programme

NOTE 1 The numbers in circles in Figure 1 define the key elements (1 to 7) of the investigation programme.

NOTE 2 Figure 1 displays a generic process which can be amended when necessary.

Soil quality — Sampling —

Part 106:
Quality control and quality assurance

1 Scope

This document provides guidelines for quality assurance and quality control (QA/QC) for soil sampling. It identifies the steps which are subject to QA and QC in situations where QA and QC are required. It addresses aspects of QA and QC of the International Standards under the ISO 18400-100 umbrella (level 1, level 2) and gives guidance to methods on level 3.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11074, *Soil quality — Vocabulary*

ISO 18400-105, *Soil quality — Sampling — Part 105: Packaging, transport, storage and preservation of samples*

ISO 28258, *Soil quality — Digital exchange of soil-related data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11074 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Quality assurance

4.1 General

QA is applied in two situations:

— in an accredited quality system or certified quality system;

— on a voluntary base in the absence of an accredited quality system or certified quality system.

Because of the various reasons for and objectives of sampling, there can be no single set of QA procedures to be followed by all organizations offering sampling services under all circumstances. It is, consequently, more difficult to set out principles for field activities (e.g. taking samples) than it is for soil analysis procedures. However, it is strongly recommended that, as far as practicable, the guidelines

in ISO 9001 should be followed. Organizations offering analytical services should follow requirements in ISO/IEC 17020, ISO/IEC 17025, ISO/IEC 17011, ISO/IEC 17021, and ISO/IEC 17065.

NOTE For QA usually, accreditation or certification is used. Both use International Standards as mentioned above that can be applied for specific products, processes, organizations, or parts of organizations. An organization that holds an accreditation or certificate uses a quality system that describes the processes, products, and people under the scope of that accreditation or certificate.

If, for QA, a reference to an accreditation or certificate for soil sampling is made, the following aspects shall be checked:

— Are the experts or organizations involved in the project, working within the scope of the accreditation or certificate?

— Is the organization (department, team) in the scope of the accreditation or certificate?

— Are the specific experts working under the (organization) of the accreditation or certificate?

The initial assignment from the customer should always be kept in mind.

For certain cases, for example, governmental regulations, in which a great deal of the sampling plan and methods are given, the prescription of the plan/project can be simplified.

4.2 Sampling process

All steps in a sampling process as described in the parts of the ISO 18400 series should be subject to QA/QC.

To manage all the quality aspects, the sampling process shall be clear, as should be the role and responsibilities of each person.

Detailed actions for QA are described in individual parts of the ISO 18400 series.

NOTE 1 The quality of sampling is a product of the work of different people with different knowledge and different equipment, often working in different organizations.

NOTE 2 Sampling steps can include, for example, making a sampling plan, taking samples in the field, and transport.

NOTE 3 For an overview of the process, see Figure 1.

5 Procedures, documents and data

5.1 Procedures

For every project, the project manager shall determine the organizations, teams, and responsible people involved.

The project manager should define at least the steps in the soil evaluation chain for the project and prescribe the exchanges of information that are to be made between organizations, teams, and individuals, and how these are to be made. The project manager also describes how the required QA is to be achieved, especially for the planning, coordination, and interpretation.

The project manager should ensure that all written procedures are made known to organizations, teams, and individuals, especially key personnel, at the right time and that they are followed correctly. All QC and QA procedures should be integrated within the sampling plan covering:

— procedures to be followed in the field;

— use of standardized field reporting forms or software;

— selection of all available information to be used in the field;

— choice of equipment or instruments to be used in the field, including checking that they can be used in that particular situation;

— taking samples for QA purposes (if possible);

— chain of custody requirements, e.g. choice of laboratory, storage, transport;

— interpretation of the results obtained on samples taken for QA purposes.

The laboratory chosen to carry out the analysis should be independent and competent in the work required, and preferably have an appropriate accreditation or approval.

The last aspect of making a sampling plan is to check in the field that

— the historical information on the site is accurate,

— the site is accessible by samplers and their equipment, and

— proposed safety procedures are "fit for purpose".

These checks can also be carried out by the sampler, but the first check is always the responsibility of the person preparing the sampling plan (usually the project manager).

If during the fieldwork the circumstances change in a way that could influence the quality of the sampling or the safety at the location, and the project manager cannot be reached, a deputy project manager has to determine if the sampling plan has to be changed or how to proceed. If the deputy project manager cannot be reached also, the responsible fieldworker decides if the fieldwork has to be stopped or paused, or if it is clear how the sampling plan has to be changed. In that case, the change has to be discussed with the project manager after the fieldwork. In all cases, attempts to contact the project manager and the outcome (result for the sampling plan) have to be registered in the field report.

If changes occurred in the field, the project manager decides whether the samples are still fit for purpose.

NOTE Information about quality assurance of brownfield investigation is given in Reference [27].

5.2 Documents and data management

All procedures, documents, and data sets generated by the project should be archived. Unique numbers or codes shall be used to reference the documents and data sets which shall be "tracked" and every version of each document and data set retained.

It is recommended to use report forms in a standardized format, which itself is archived in the documentation system. Blank forms should be registered in the documentation system, usually the quality management system. On a project level, it shall be clear which data are needed and which data are optional.

NOTE 1 Reports can have all kinds of forms or layouts, e.g. paper form, digital forms, specific columns of fields in software or databases, SMS.

If the information is stored in a digital database, access should be controlled so that anyone accessing it is only permitted to access the specific data and other information to which they need to have access. Backups should be made frequently in order to secure the data.

Limit the number of persons who are allowed to change documents and procedures, and make sure that all people involved in the project are able to send comments or suggestions for improvement.

Confirmed and authorized information shall be stored. In Figure 2, the main steps of data exchange are given for a typical soil quality investigation project. The information exchanged at each step should

