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HORIZONTAL - ORG

HORIZONTAL STANDARDS ON ORGANIC MICRO-POLLUTANTS FOR IMPLEMENTATION OF EU DIRECTIVES ON SLUDGE, SOIL AND TREATED BIO-WASTE

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Introductory element — Main element — Complementary element

Introductory element - Sampling of sewage sludge, treated biowastes and soils in the landscape – Framework for the preparation and application of a Sampling Plan

Einführendes Element — Haupt-Element — Ergänzendes Element

Élément introductif — Élément central — Élément complémentaire

ICS:

Descriptors:

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Foreword

This document TC 151 WI 151 has been prepared by Technical Committee CEN/TC 151 “Horizontal”, the secretariat of which is held by DS.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, B, C or D, which is an integral part of this document.

The following TCs have been involved in the preparation of the standard:

This standard is applicable and validated for several types of matrices. The table below indicates which ones.

[table to be filled and amended by the standards writer]

Material	Validated	Document
Waste	☐	[reference]
Sludge	☐	
Soil	☐	
Soil improvers	Not validated yet	

Introduction

Provided certain quality requirements are met, sewage sludge and treated biowaste may be applied to land for the purpose of beneficial land use. The testing of sewage sludge, treated biowastes and soil allows informed decisions to be made on whether land application is appropriate (or not). In order to undertake valid tests a (number of) representative sample(s) of the sewage sludge, treated biowaste or land will be required.

The potential scope of the overall testing programme can be complex, as illustrated in Figure 1. At the outset, all involved parties should discuss and agree the objectives and boundaries of the programme, although in some cases pre-conditions set by national legislation may define these objectives. In turn the objectives will help define the level of testing required e.g. basic characterisation, compliance or verification testing, in addition to the desired reliability of the testing / assessment and frequency of testing. In designing the sampling exercise attention must then be given to other factors which include: the type of material to be sampled, the accessibility of the material and the parameters to be determined. Collectively, these activities allow the scope of the testing programme to emerge.

To reach the objectives of a testing programme, methods of sampling need to be selected or designed that ensure availability of appropriate samples representative for the purpose of the tests to be performed. The overall test programme design often involves iterative discussion between the involved parties.

A Sampling Plan is defined by the specific objectives of the testing programme and how those objectives can be practically achieved with reference specifically to the sampling activities for the situation and material under investigation. The principles outlined in this European Standard provide a framework that can be used to design and develop a Sampling Plan: the first step in the testing programme (see Figure 1). Additionally, this standard deals with the actual sampling in accordance with the Sampling Plan and the development of the sampling report. More than one Sampling Plan may be required to fulfil all the objectives of the testing programme.

Three different types of Sampling Plans can be distinguished, all of which can be based on this standard. These types are:

- for the production of standardised sampling plans for use in more routine circumstances;
- to meet the specific requirements of national legislation;
- in the design and development of a Sampling Plan for use on a case by case basis.

A Sampling Plan should detail all the information pertinent to a particular sampling exercise. Further information on the relationship between the production of a Sampling Plan and the overall testing programme objectives can be found in TR xxxx-5 (sewage sludge and treated biowastes) and TR xxxx-6 (soils in the landscape).

This draft European Standard should be read in conjunction with the other Standards developed by TC 151 which provide detailed instructions on how to complete the remaining key steps of any testing programme, (see Figure 1). All information is provided in accordance with the requirements specified in these standards.

Information related to this draft European Standard can be found in the following six Technical Reports:

TR xxxx-1: Introductory element - Sampling of sewage sludge and treated biowastes: Guidance on selection and application of criteria for sampling under various conditions.

TR xxxx-2: Introductory element - Sampling of sewage sludge and treated biowastes: Guidance on sampling techniques

TR xxxx-3: Introductory element - Sampling of sewage sludge and treated biowastes: Guidance on sub-sampling in the field

TR xxxx-4: Introductory element - Sampling of sewage sludge and treated biowastes: Guidance on procedures for sample packaging, storage, preservation, transport and delivery

TR xxxx-5: Introductory element - Sampling of sewage sludge and treated biowastes: Guidance on the process of defining the sampling plan

TR xxxx-6: Introductory element - Sampling of soils in the landscape: Guidance on the process of defining the sampling plan

Although this standard refers in most cases to the taking of one sample or increment or the preparation of one laboratory sample, it should be noted that in many cases this will be more than one. For simplicity the standard adopts the use of singular terms, plural terms will however be possible or likely.

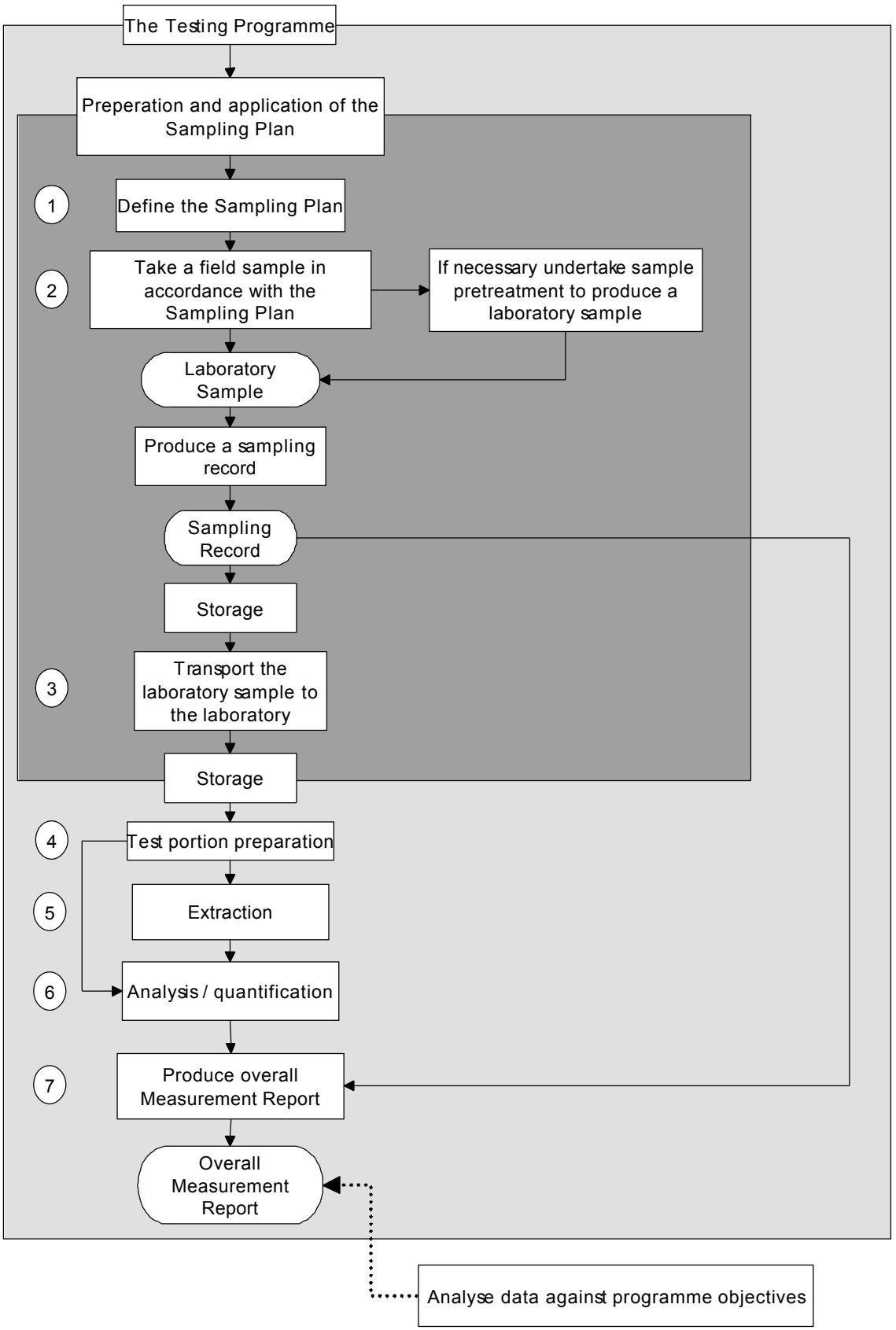

Figure 1 – Links between the essential elements of a testing programme

1 Scope

This European Standard specifies the procedural steps to be taken in the preparation and application of a Sampling Plan. The Sampling Plan describes the method of collection of the laboratory sample necessary for meeting the objective of the testing programme. The principles or basic rules outlined in this European Standard provide a framework that can be used by the project manager:

- for the production of standardised sampling plans for use in more routine circumstances;
- to meet the specific requirements of national legislation;
- in the design and development of a Sampling Plan for use on a case by case basis.

There may be a need for more than one Sampling Plan to meet all the requirements of the testing programme. Ultimately the Sampling Plan provides the Sampler with detailed instructions on how sampling should be carried out.

NOTE Although this standard in most cases refers to the taking of one sample or increment or the preparation of one laboratory sample, it should be noted that often this should be more than one. For simplicity reasons the standard uses singular terms, while plural terms are also possible or even likely.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 3534-1, Statistics – Vocabulary and symbols – Probability and general statistical terms

ISO 11074-2:1998, Soil Quality – Part 1: Terminology and classification – Section 1.2: Terms and definitions relating to sampling

EN 13965-1:2004, Characterization of waste – Terminology – Part 2: Management related terms and definitions.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13965-1 and the following apply.

NOTE This European Standard avoids the use of the terms ‘sampling protocol’ and ‘sampling strategy’ as they are both known to represent conflicting concepts in a number of countries.

3.1
batch
Quantity of material which is known or assumed to be produced under uniform conditions.

[IUPAC, definition 2.2.3]

3.2
beneficial land use
The improvement of soil conditions for crop growth whilst ensuring the protection of the environmental quality in the broadest sense ad required by Article 4 of Directive 75/442/EEC as amended when treated or untreated biowaste is applied to land.

3.3
biowaste (biodegradable waste)
Any waste that is derived from a biological source material.

3.4
biodegradable waste
Any waste which can be denatured as a result of biological action (usually microbiological).

3.5
composite sample
Two or more increments/sub-samples mixed together in appropriate proportions, either discretely or continuously (blended composite sample), from which the average value of a desired characteristic may be obtained.

[ISO 11074-2:1998, definition 3.10]

3.6
constituent
A property or attribute of a material that is measured, compared or noted.

3.7
field sample
The quantity (mass or volume) of material obtained through sampling without any sub-sampling.

3.8
heterogeneity
Degree to which a constituent (3.6) is not uniformly distributed throughout a quantity of material.

NOTE 1 A material may be homogeneous with respect to one constituent or property but heterogeneous with respect to another.

NOTE 2 The degree of heterogeneity is the determining factor in sampling uncertainty.

3.9
homogeneity
Degree to which a constituent (3.6) is uniformly distributed throughout a quantity of material.

3.10
increment
Individual portion of material collected by a single operation of a sampling device which will not be analysed / investigated as a single entity, but will be mixed with other increments in a composite sample.

NOTE 1 Whenever the portion of material collected by a single operation of a sampling device is analysed individually, the obtained material is called a sample. In such a situation the quantity of material has to fulfil both the criteria for the size of an increment as well as for a sample.

NOTE 2 In some languages the term 'increment' is used without the condition that an increment will never be analysed on its own. For this standard this is however an essential condition in the definition of the term ‘increment’.

3.11
involved parties
Individuals involved in the (iterative) process relating to the exchange of information regarding the material to be sampled.

NOTE Such parties include, for instance, the sampler, the analyst, the client, the regulator and the producer of the material.

3.12
judgemental sampling
Samples collected using at best a partially-probabilistic procedure and at worst a non-probabilistic approach. Usually these samples are taken from a sub-population which is substantially more restrictive than the overall population.

3.13
laboratory sample
The sample(s) or sub-sample(s) sent to or received by the laboratory.

[IUPAC, definition 2.5.5]

NOTE 1 When the laboratory sample is further prepared (reduced) by subdividing, mixing, grinding, or by combinations of these operations, the result is the test sample. When no preparation of the laboratory sample is required, the laboratory sample is the test sample.

NOTE 2 The laboratory sample is the final sample from the point of view of sample collection but it is the initial sample from the point of view of the laboratory.

NOTE 3 Several laboratory samples may be prepared and sent to different laboratories or to the same laboratory for different purposes.

3.14
land use unit
An area of land which is managed for a specific purpose.

3.15
probabilistic sampling
Sampling conducted according to the statistical principles of sampling.

NOTE 1 The essential principle of probabilistic sampling is that every individual particle or item in the population has an equal chance of being sampled.

NOTE 2 Probabilistic sampling results in boundary conditions for the type of sampling equipment used, the method of sampling (where, when, how) and the minimum size of increments and (composite) samples.

3.16
project manager
Individual responsible for the development of the Sampling Plan and the testing programme.

3.17
population
The totality of items under consideration.

[ISO 3534-1:1993, definition 2.3]

3.18
representative sample
Sample in which the characteristic(s) of interest is (are) present with an uncertainty appropriate for the purposes of the testing programme.

3.19
sample
Portion of material selected from a larger quantity of material.

[ISO 11074-2:1998, definition 1.5]

NOTE 1 The manner of selection of the sample should be described in a sampling plan.

NOTE 2 the use of the term ‘sample’ should be supported with a preface as far as possible as it does not indicate to which step of the total sampling procedure it is related when used alone e.g. field sample, laboratory sample.

3.20
sampler
Person carrying out the sampling procedures at the sampling locality.

[ISO 11074-2:1998, definition 1.3]

NOTE 1 Tools and other devices to obtain samples are sometimes also designated ‘samplers’. In this case write ‘sampling devices’ or ‘sampling equipment’.

NOTE 2 The sampler should have specific knowledge and experience in sampling the materials to be tested. The Sampling Plan may state that the sampler shall be independent of the producer of the sewage sludge or treated biowaste or the land owner.

3.21
sample size
Number of items or the quantity of material constituting a sample.

[ISO 11074-2:1998, definition 4.26]

3.22
sampling
Process of drawing or constituting a sample.

[ISO 3534-1:1993, definition 4.4]

3.23
sampling plan
All the information pertinent to a particular sampling activity.

NOTE Predetermined procedure for the selection, withdrawal, preservation, transportation and preparation of the portions to be removed from a population as a sample.

[After ISO 11074-2:1998, definition 4.3]

3.24
sampling record
Report which serves as a check list and provides the investigator with all necessary information about the sampling techniques applied at the site and any additional important information.

[ISO 11074-2:1998, definition 4.32]

3.25
sampling techniques
All appropriate procedures and sampling devices used to obtain and describe samples of material, either in the field or during transportation and in the laboratory.

NOTE The manner of selection of the sampling techniques should be described in a sampling plan.

[After ISO 11074-2:1998, definition 4.2]

3.26
sewage sludge
Sludge from urban waste water treatment plants.

3.27
sub-sample
The quantity (mass or volume) of material obtained by procedures in which the characteristics of interest are randomly distributed in parts of equal or unequal size.

NOTE 1 A sub-sample may be:

a) a portion of the sample obtained by selection or division; or

b) an individual unit of the batch taken as part of the sample; or

c) the final unit of multi-stage sampling.

NOTE 2 The term 'sub-sample' is used either in the sense of a 'sample of a sample' or as a synonym for 'unit'. In practice, the meaning is usually apparent from the context or is defined.

3.28
sub-sampling
Process of selecting one or more sub-samples from a sample of a population.

[ISO 11074-2:1998, definition 6.3]

3.29
testing programme
Total sampling operation, from the first step in which the objectives of sampling are defined to the last step in which data is analysed against these objectives.

3.30
treated biowaste
Biological waste that has been subjected to biological treatment by composting or anaerobic digestion.

3.31
treated sludge
Sludge which has undergone a treatment process or a combination of treatment processes, so as to significantly reduce its biodegradability and its potential to cause nuisance as well as the health and environmental hazards when it is used on land.

4 Preparation of a Sampling Plan

4.1 Principle

A Sampling Plan shall be completed prior to undertaking any sampling.

The principles laid out in this European Standard can be used to produce a Sampling Plan for any testing programme.

In the process of defining a Sampling Plan the key elements of the testing programme (Figure 2) shall be addressed. This standardised process will produce a Sampling Plan that can either be used for:

- the production of standardised sampling plans for use in more routine circumstances;
- to meet the specific requirements of national legislation;
- in the design and development of a Sampling Plan for use on a case by case basis.

By providing specific and practical instructions to the sampler, the Sampling Plan defines the boundaries and logistics of the sampling element of the testing programme in an unambiguous way.

The main considerations in defining a Sampling Plan are:

a) the identification and agreement of the proposed sampling design through consultation with involved parties, see 4.2.1;

b) those actions that record the mechanics of when, where, by whom and how the samples are taken and collected;

c) the precautions that are to be taken to protect the sampler;

d) the precautions that are to be taken to ensure the reliability of any samples during sampling and subsequent sub-sampling and handling (until the “laboratory samples” are received in the laboratory); and

e) the Sampling Plan shall recognise the requirements arising from other key steps in the testing programme (e.g. quantity of sample required, cleanliness of sample containers).

NOTE 1 The specific details contained within any Sampling Plan will differ according to the objectives of the overall testing programme.

NOTE 2 In the process of defining a Sampling Plan the specific objectives of the sampling programme are translated into practical instructions to the sampler. The Sampling Plan therefore details all the information pertinent to a particular sampling exercise and instructs the sampler how the sampling is to be carried out. Basically, the Sampling Plan specifies how the objectives of the testing program can be achieved for the situation and material type under investigation. However, as the objectives themselves are in most cases only remotely related to the practical instructions that are essential to the sampler, the Sampling Plan normally does not list the objectives of the testing programme.

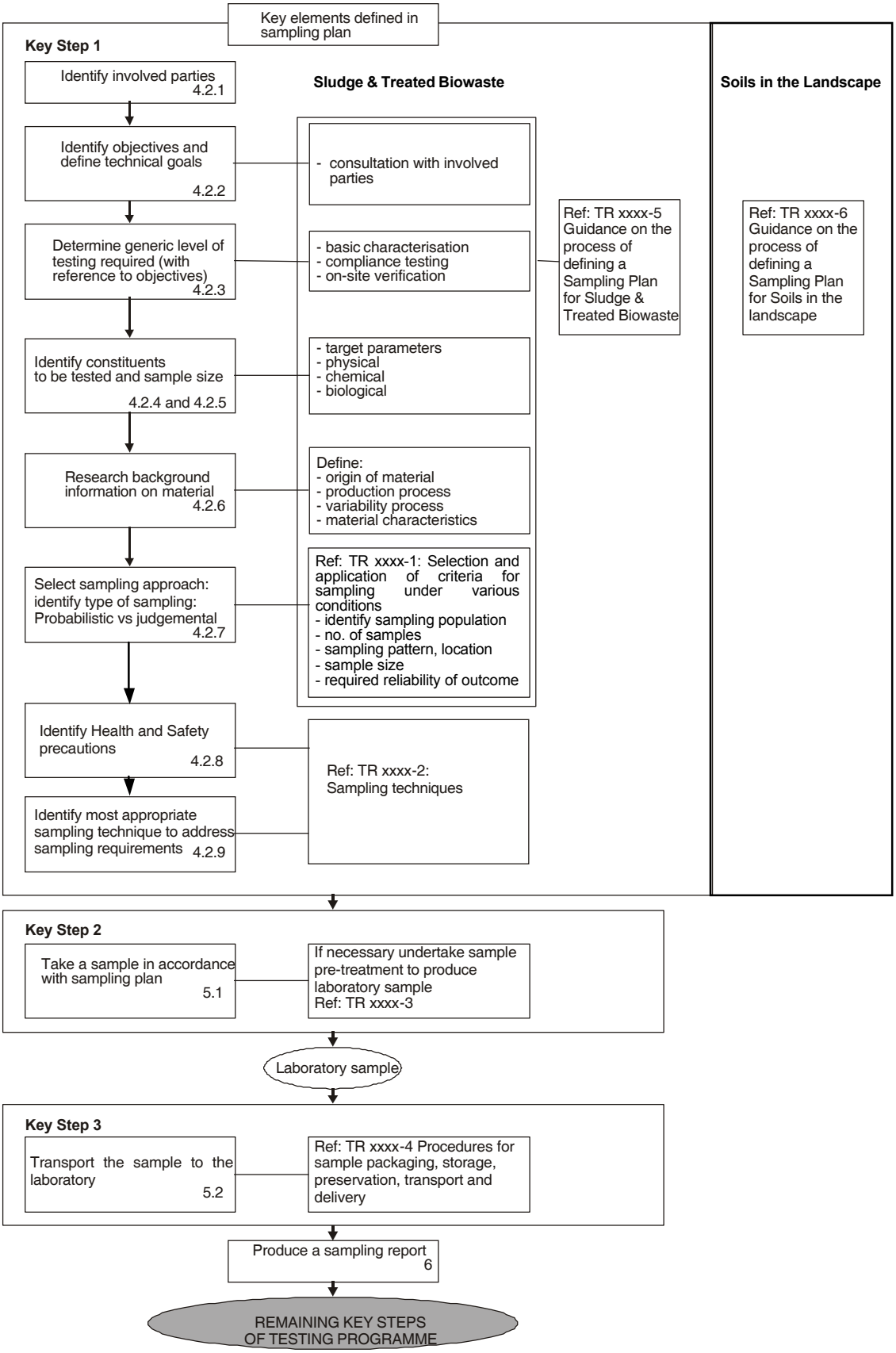

Figure 2 – Key elements of a Sampling Plan

4.2 Key elements of a Sampling Plan

4.2.1 Involved parties

The Sampling Plan shall be prepared under the direction of a project manager in consultation with all appropriate involved parties. Such parties include, for example: the sampler; the analyst; the client; the regulator and the producer of the material.

NOTE 1 The materials to be tested dictate pertinent involved parties.

NOTE 2 In cases where the level of complexity is low, a number or all of these roles can be the responsibility of one individual, although responsibilities may still differ. For example the Project Manager may be from the facility undertaking the testing, and may act as the sampler.

4.2.2 Objectives of the Testing Programme

In the process of developing the Sampling Plan the objective of the testing programme shall be identified through consultation with all involved parties, see 4.2.1. The definition of the objective is an essential step towards defining the type and quality of information that is to be obtained through sampling. A separate Sampling Plan shall be defined for each objective.

NOTE The objectives of the Testing Programme may include:

- The necessity to compare the quality of the test material with quality levels defined in (inter)national legislation;
- A change in ownership of the material and as a consequence the need to characterise the material;
- To determine the (re)usability of the material;
- To determine the leachability of the material;
- To assess the human health and / or environmental risks posed by the material.

The Sampling Plan shall translate and document the objective of the testing programme into practical and achievable technical goals that take into account the physical state, accessibility and size of the material to be sampled. These technical goals can be linked to specific data analysis requirements and a select number of statistical analytical tools that provide a consistent means of assessing and interpreting testing data. Such tools ultimately provide the means to verify whether the testing objective(s) have been met or not.

NOTE This diversity of technical goals affects the location and minimum requirements for the sampling exercise as well as the number and volume of the samples and it is therefore important that both the objective and derived technical goals of the testing programme are clearly identified to ensure that the collected samples meet the objective.

The Sampling Plan shall identify any anticipated restrictions or limitations on the reliability of the testing data which relate to the sampling steps as identified in Figure 2.

4.2.3 Testing level

The Sampling Plan shall identify the level of testing required to meet the technical goals of the Testing Programme. These will dictate the different types and frequency of investigation to be performed. It may specify a quantified level of uncertainty for the contribution of the sampling steps to the overall uncertainty of the Testing Programme.

NOTE Examples of testing levels could include:

- Basic (comprehensive) characterisation, consisting of a thorough determination of the behaviour and properties of interest of the material.
- Compliance testing, consisting of (periodic) testing to determine compliance with specific conditions or reference conditions e.g. legislation or contract.

- On-site verification, consisting of ‘quick check’ methods to establish consistency with other tests or other formulated documentation.

4.2.4 Identify constituents to be tested

The Sampling Plan shall, within the boundary conditions of the appropriate test level, identify the characteristics or constituents to be investigated, based when applicable on:

- the origin of the material and therefore relevant target constituents;
- intended end-use of the material;
- total volume of material (the population) to be assessed;
- the requirement to conform to local and national regulations;
- information and requirements specified in contract;
- information ascertained from knowledge of process or material involved;
- information agreed between involved parties.

The target constituents shall be specified in the Sampling Plan.

4.2.5 Sample size

The size of the sample submitted to the laboratory “the laboratory sample” is dependent on the requirements specified in the standards covering other steps of the overall Testing Programme. Where several target constituents are identified it is vital to design the sampling operation so that the constituents most affected by the adopted sampling have the largest influence. If this is not possible e.g. the required precision for each constituent cannot be achieved, the identification of separate sampling operations for each group of constituents is recommended.

NOTE Individual sample size is dictated by the grain size, heterogeneity and the volume of material to be sampled; see TR XXXX-1 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape). The relative importance of these factors depends on the type of material being sampled.

4.2.6 Background information on material

4.2.6.1 Site details

The Sampling Plan shall identify details of the site location and restrictions to access. Any additional access problems encountered during sampling shall be recorded in the Sampling Record in order that any impacts on the quality of the collected samples can be evaluated.

4.2.6.2 Production process or origins of material

The Sampling Plan shall contain a general description of the circumstances in which the material occurs, based on either:

- direct knowledge of the primary process to which the material is related, or where the material originated or

- inspection of the process to which the material is related, or where the material originated.

4.2.6.3 Material type and dimensions

The Sampling Plan shall identify all known information relating to the type of material and dimensions of the batch or land area to be sampled, e.g.

For solids:

- stream or batch;

- if static, contained or in heaps;
- if static, type of container : drum, silo, etc;
- quantity, i.e. kilos, tonnes etc;
- number of containers.

For liquids:

- stream or static batch;
- if static, type of container: bottle, drum, tank, lagoon etc.;
- size, i.e. litres or cubic metres;
- physical and chemical characteristics.

For soils in the landscape:

- land use unit;
- area, i.e. hectares;
- depth, i.e. cm
- land use phase, for example ploughed, fallow, or standing crop

The Sampling Plan shall list the physical and outline chemical characteristics of the material, including all known potential hazards. The Sampling Plan shall identify operational procedures that could affect the chemical, biological or physical properties of the material, with due consideration of requirements specified in other standards for the overall Testing Programme.

NOTE 1 In the absence of sufficient information, a 'preliminary investigation' should be instigated.

NOTE 2 The commissioning company (client - see 4.2.1), may supply general information on material and batch data. This information includes details on whether the material is granular, monolithic, shaped; liquids etc. is available in stream or static batch form, etc. Some indication of the liquid content/ physical condition of the material, e.g. sludge, can be helpful in the development of a Sampling Plan.

4.2.7 Select sampling approach

4.2.7.1 General

The Sampling Plan shall take into account the variability within the batch and, when specified, the acceptable degree of uncertainty in the results when specifying a sampling approach. If the acceptable degree of uncertainty in the results is not pre-specified, this should be agreed with the involved parties. The selected approach will dictate, how, when and where the samples shall be taken to obtain where possible a representative and manageable quantity of sample that meets all testing requirements.

The sampling approach shall address, as a minimum:

- increment size;
- sample size;
- use of individual samples or composite samples;
- number of samples;
- sampling locations;
- sampling frequency (when valid) (with dates clearly specified).

The Sampling Plan shall specify either ‘probabilistic’ sampling or ‘judgemental’ sampling”, depending on the sampling objective.

NOTE Further information and worked examples using the decision making process are provided in TR XXXX-1 and TR xxxx-5 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

4.2.7.2 Probabilistic sampling

The basis of probabilistic sampling is that each element within the population to be assessed has an equal chance of being selected by the sampling process.

Where the selections are made independently, this approach is known as ‘simple random sampling’. Another common type of probabilistic sampling, whereby the intervals between the samples are regularly spaced once the first sample has been selected at random, is known as ‘systematic sampling’.

Probabilistic sampling is necessary to obtain a quantifiable level of reliability of the results for the population being tested. Therefore the use of probabilistic sampling is preferred.

NOTE Probabilistic sampling may be performed stepwise: if the results exhibit too high an uncertainty, it is possible to take additional random samples that will result in an improved measure of uncertainty, at an additional testing cost.

4.2.7.3 Judgemental sampling

In contrast with probabilistic sampling, ‘judgemental’ sampling is where samples are collected using at best a partially-probabilistic procedure and at worst a non-probabilistic approach. The most common reason for selecting judgemental sampling is that representative sampling (i.e. with an appropriate uncertainty for the purpose of the Testing Programme) from the whole population is practically impossible, given the available resources in time and/or money.

When probabilistic sampling has not been selected, judgemental sampling shall be as close to probabilistic sampling as is reasonable for the situation under consideration.

NOTE For specific sampling situations there might be a preference to judgemental sampling deviating basically from probabilistic sampling, for example in spot sampling.

The use of judgemental sampling will nearly always result in samples being taken from a sub-population which is substantially more restrictive than the whole population. But within that sub-population it might be feasible that the sampling could be probabilistic. This means that provided that the sampling is indeed probabilistic for that sub-population, the results will still be representative for the part of the population sampled (within which the conditions for probabilistic sampling are met), though it still runs the risk of exhibiting a larger uncertainty for the whole population.

NOTE For example, samples might be taken at random from the top 50 cm of a stockpile, or from the fringe of a lagoon within 1 m of the banks. The advantage of doing this is that it allows statistically sound information to be generated for at least the sub-population sampled. This makes it easier to assess the possible errors involved in extrapolating to the whole population (i.e. stockpile, or lagoon), whilst also making explicit the way in which the sampling is unrepresentative. Errors should also be assessed in the light of available knowledge for the methodology adopted.

In contrast when sampling from the sub-population is undertaken on the basis of accessibility, expediency, cost, efficiency, or for other reason not directly concerned with sampling parameters, there is no way of assessing the uncertainty in any subsequent data that results from the sampling steps.

NOTE 1 The adoption of judgemental sampling at this level therefore may have severe financial and/or environmental consequences.

NOTE 2 The term “convenience or ad hoc sampling” is sometimes applied to this type of sampling.

The uncertainty resulting from judgemental sampling is highly dependent on the quality of the background information, on which any expert judgement and ultimately the Sampling Plan, is based. This will be especially sensitive for new sampling scenarios where there is an absence of suitable information or validation results.

4.2.7.4 Defining the approach

The Sampling Plan shall identify when, where, by whom and how samples shall be taken and collected to ensure that the sample is appropriate to meet the sampling objectives. The quantity of material sampled should be sufficient to meet the requirements as specified in the remaining standards for the Testing Programme (see 4.1 (e)). If required, the Sampling Plan shall specify provision for replicate samples.

NOTE Information on the determination of the increment and sample size, and the number of samples linked to a specified level of uncertainty is given in TR xxxx-1 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

4.2.8 Health and safety

The Sampling Plan shall identify all safety precautions that must be adhered to by the sampler. Further information on general health and safety aspects of sampling is given in TR xxxx-2 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

All sampling activities are potentially hazardous. A risk assessment shall be carried out prior to undertaking the work and safety precautions identified to protect the sampler and minimise risks. (Inter)national legislation and site specific systems for controlling the exposure of workers to substances hazardous to health should be complied with.

Any organisation involved in sampling should have a safety policy that sets out the requirements for safe working. Adherence to the policy should be a part of the conditions of employment of all personnel.

The policy should be supported by standard procedures setting out the requirements for safe working in general, and in specific locations, such as confined spaces. These standard procedures should include the provision and use of protective clothing and equipment and the minimum number of personnel that may be involved in site work. The standard procedures should also identify the requirements for advising local emergency services and the methods of communications and methods of washing and decontamination.

NOTE Compliance with this European Standard does not in itself confer immunity from (inter)national heath and safety regulations and site specific regulations.

4.2.9 Identify sampling technique

4.2.9.1 General

The Sampling Plan shall identify the technique(s) selected to collect the sample, and shall identify the consequences of deviation from the designated sampling technique or equipment.

NOTE Information on the type and use of sampling techniques is given in TR xxxx-2 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

4.2.9.2 Procedures for sub-sampling in the field

The Sampling Plan shall identify any requirements for the production of composite samples from incremental samples and for sub-sampling in the field. The methods required to complete these procedures to produce the laboratory sample(s) should be stated in the Sampling Plan.

NOTE Information on methods to reduce the sample size for presentation to the laboratory is given in TR xxxx-3 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

4.2.9.3 Procedures for packaging, preservation, storage, transport and delivery

The Sampling Plan shall identify the procedure(s) selected for packaging, preservation, storage, and transport of the laboratory sample, taking into account the requirements specified in the remaining standards for the Testing Programme (see 4.1 (e)).

NOTE Information on methods for sample packaging, preservation, storage, transport and delivery is given in TR xxxx-4 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

5 Sampling

5.1 Taking the sample

Before sampling begins all elements of the Sampling Plan shall be checked and a visual description of the material to be sampled shall be made by the sampler and checked against any information in the Sampling Plan.

A record shall be made of the location and status of the material to be sampled. The most appropriate method may be to photograph the sampling location.

The sample(s) shall then be taken and collected in accordance with all instructions provided in the Sampling Plan.

NOTE All identified safety requirements should be adhered to during the sampling exercise.

Having obtained the sample, it should be either directly stored in a suitable sample container (see 4.2.7.4) or stored after appropriate sub-sampling in the field (see 4.2.7.3).

On completion of sampling a Sampling Record and chain of Custody Form shall be completed by the Sampler (see 6.2).

5.2 Delivery

The sample(s) shall be delivered to the testing laboratory at the address as stated in the Sampling Plan and shall be accompanied by the Chain of Custody Form and a copy of the Sampling Record.

NOTE Information on procedures for sample delivery is given in TR xxxx-4 (sewage sludge and treated biowaste) and TR xxxx-6 (soils in the landscape).

6 Reporting

6.1 Document Sampling Plan

The Project Manager shall document the final specification for the Testing Programme in a Sampling Plan.

NOTE The complexity of the Plan will vary with the testing programme but as a minimum should record the information that will allow any results to be interpreted in an appropriate context and at which a comparable programme could be repeated, if required, in the future.

An example Sampling Plan is provided in Annex A.1.

6.2 Documentation of variations

Any changes to the agreed final Sampling Plan shall be recorded in the Sampling Record.

NOTE 1 Sampling should not be undertaken in the absence of a Sampling Plan detailing the intended Testing programme.

NOTE 2 Alterations to the Sampling Plan can be categorised in two ways:

a) Firstly changes which do not affect the objective of the Testing Programme in that the required samples are obtained and remain representative at the pre-defined level. The sampler in the field may carry out this level of change.

b) Secondly, changes which (could) affect the objective of the Testing Programme (e.g. resulting in a different quality of samples / results). This level of alteration to the Sampling Plan should only be carried out with written prior agreement, see 4.2.1. If, due to unforeseen circumstances, changes are required to the Sampling Plan at the time of sampling, verbal confirmation of any changes should be written on the sampling record and authorised on return from the field see 4.2.1.

NOTE 3 Unforeseen practical considerations can make it necessary to change the Sampling Plan in order to carry out the sampling activity. It is therefore important that the person undertaking sampling is in a position to know what changes are possible without affecting the Testing Programme.

6.3 Sampling Record

On completion of sampling a Sampling Record shall be completed by the Sampler, an example is provided in Annex B. The Sampling Record shall document all procedures and observations from the sampling exercise. It shall include a copy of the initial Sampling Plan and should identify any variations from the intended Sampling Plan.

NOTE A sampling record is used to record all procedures and results from the sampling exercise. The sampling record will reiterate much of the Sampling Plan but contains space for recording visual observations made in the field and any deviations from those procedures identified in the Sampling Plan.

The Sampling Plan shall identify that the following information which should be recorded in the Sampling Record:

- A unique sampling number (e.g. reflect site location, material and date);
- Date and time of sampling;
- Place and point of sampling;
- Persons present (if witnesses are present, including name and address);
- Difficulty of access (obstacles), including information on those areas or volumes of the material that sampled or not sampled;
- Condition of material:
  - colour;
  - consistency/homogeneity/grain size (uniform or diverse);
  - observations during sampling;
- Details of on-site determinations;
- Identify sample amount (estimate volume and mass);
- Sub-sampling methodology (recording which samples are mixed, in what volumes, time and date) (if undertaken);
- Name of sampling personnel;
- Place, date and signature.

NOTE An example of a Sampling Record is given in Annex A.2.

The Sampling Plan shall specify that any measurements carried out on the sample in the field shall be recorded in the Field Data and appended to the Sampling Record.

NOTE 1 It is good practice that the Sampling Plan specifies the completion of a Chain of Custody Form for each sampling exercise, at the time of sampling. An example of a Chain of Custody Form is given in Annex A.3.

NOTE 2 It is good practice that the Sampling Plan specifies that a copy of the completed Sampling Record and Chain of Custody Form be made available with each sample.

NOTE 3 It is good practice that the Sampling Plan specifies that an Analytical Request Form be completed and accompany each set of samples submitted to the facility to undertake the testing if required by the testing programme. An example of an Analytical Request Form is given in Annex A.4.

Annex A
(informative)

Table A.1 – Example of a Sampling Plan

SAMPLING PLAN	
GENERAL INFORMATION	
Sampling Plan completed by:	On behalf of:
Client (Company): Contact:	Material producer: Contact:
Other involved parties:	
Sampling to be carried out by (Company):	Specify name of sampler:
SAMPLING OBJECTIVE	
MATERIAL	
Type of material:	Location: (address)
Form and nature of material:	
Detailed specification:	
Identify access problems that may affect sampling programme:	
Identify sampling approach and identify type of sampling:	
SAMPLING METHODOLOGY	
Specify detailed sampling location: (e.g. a specific chute or conveyor or pile)	
Define batch or consignment to be sampled:	
Define place and point of sampling:	
Specify date and time(s) of sampling:	
Specify persons to be present (record name and address):	
Identify sampling technique:	
Identify equipment:	
Specify no. of increments/samples to be collected:	
Specify increment size/sample size:	
Detail requirements for on-site determinations:	
Identify sample coding methodology:	
Identify safety precautions:	
SUB-SAMPLING	
Detail procedure:	
PACKAGING, PRESERVATION, STORAGE AND TRANSPORT REQUIREMENTS	
Packaging:	
Preservation:	
Storage:	
Transport:	
ANALYTICAL LABORATORY	
Company details: Contact:	Delivery Date:
Analysis required:	

Table A.2 – Example of a Sampling Record

SAMPLING RECORD	
Sample code: (Reflect site location, material type and date of collection)	
Date of sampling:	
Signature of sampler:	
GENERAL INFORMATION	
Producer: Contact:	Client (Company): Contact:
Location of sampling:	Carried out by (Company): Sampler:
SAMPLING OBJECTIVE	
MATERIAL	
Type of Material:	Estimated moisture content:
Description:(colour, odour, consistency/homogeneity/grain size – uniform or diverse)	
SAMPLING METHODOLOGY	
Describe/define batch or consignment sampled:	
Place and point of sampling:	
Access problems that affected areas or volumes of material sampled:	
Date and time of sampling:	
Persons present (record name and address of witnesses present where appropriate):	
Procedure (describe procedure adopted):	
Equipment used:	
Number of increments/samples collected:*	
Increment size/sample size:*	
Observations during sampling:	
Details of on-site determinations: (if undertaken complete field record sheet and append to Sampling Record, see Table A.2)	
Safety measures taken:	
SUB-SAMPLING & PRE-TREATMENT	
Identify location: e.g. on-site or fixed laboratory facility (describe whether open air or enclosed)	
Procedure:	
PACKAGING, PRESERVATION, STORAGE AND TRANSPORT DETAILS	
Packaging:	
Preservation:	
Storage:	
Transport:	
DEVIATIONS FROM SAMPLING PLAN	
Detail:	
DELIVERY TO ANALYTICAL LABORATORY	
Company: Delivery Date:	
Received by:	Signature:

Table A.3 – An Example Chain of Custody Form

Title: Sample Custody Form	
Issued by:	
Contact name & number:	

External laboratories: Please attach a copy of this form with reported results

Site visited: Site owner:	Site address: Tel no. Contact name:
Analysis subcontracted to: Laboratory name: Quotation ref. No.	Address: Tel: Contact name:
Carrier:	Address: Tel. No:
Sample collected by: Name: Signature: Sampling protocol used:	Date: Location:
Samples delivered by: Name: Signature: Date: Time:	Samples accepted at laboratory by: Name: Signature: Date: Time:
Sample description:	Sample hazard rating: (Use relevant national standard)
Additional comments/instructions:	

External laboratory sample job no:
Date sample received:
Sample storage time:
Date analysis undertaken:

Table A.4 – An Example Sample Analysis Request Form

Protocol Ref. No.
Title: Sample Analysis Record
Issued by:

Analysis required by: [Client name]		Date:	

Location:	

Sample Codes	Determinands	Minimum detection limit required (Specify units)	Bottle type G = Glass P = Polyethylene	Pre-treatment undertaken e.g. filtering or preservation Y = Yes N = No	Comments

Completed by: Reported detection limits and measurement uncertainty:

Annex B
(informative)

The modular horizontal system

Annex C
(informative)

Information on WP 2 Sampling and the project HORIZONTAL

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