
**Soil quality — Guideline for the
screening of soil polluted with toxic
elements using soil magnetometry**

*Qualité du sol — Lignes directrices pour le criblage du sol pollué par
des éléments toxiques en utilisant la magnétométrie du sol*

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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	3
5 Fundamentals	3
5.1 Screening principle	3
5.2 Screening work processes	4
5.3 Field measurements and works	4
5.4 Laboratory measurements	4
5.5 Data mapping	4
5.6 Soil sampling for geochemical analysis	4
6 Apparatus	4
6.1 Field equipment	4
6.2 Laboratory equipment	5
6.3 Data mapping	5
7 Procedures	5
7.1 Measurement network	5
7.2 Measurements of magnetic susceptibility at the topsoil surface	5
7.3 Measurements of vertical magnetic susceptibility distribution	6
7.3.1 General	6
7.3.2 Topsoil core sampling	6
7.3.3 Field measurements	6
7.3.4 Laboratory measurements	6
7.3.5 Topsoil magnetic profile analysis	6
7.4 Magnetic susceptibility mapping and data analysis	7
7.4.1 Data processing	7
7.4.2 Magnetic susceptibility surface mapping	7
7.4.3 Data analysis	7
7.5 Soil sampling for geochemical analysis	7
8 Screening report	8
Annex A (informative) Relation between magnetic susceptibility and trace element contamination of topsoil	9
Annex B (informative) Measurement performance according to 7.1 and 7.2	16
Annex C (informative) Example of a screening report to record measurement results according to 9	18
Annex D (informative) Validation summary	22
Bibliography	26

Foreword

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Introduction

At the time of publishing this document, the mapping of soil pollution status is generally based on geochemical methods that, despite development of new, more sophisticated and precise equipment, have apparent disadvantages, among them uncertainty, as usually there is no satisfactory information on the extent and range of pollution in the area. This results in the need of a large number of samples to be collected, followed by expensive and time-consuming chemical analysis.

Among anthropogenic soil pollutants, trace elements [potentially toxic elements (PTEs)] are the most problematic, widespread and persistent group that has accumulated in soil since the beginning of industrial revolution, mostly due to dry and wet deposition of particulates originating from emissions to the atmosphere. Due to the historical and persistent character of pollution, determination of soil quality, sources, extent and range of pollution requires large-area dense environmental monitoring network. In addition, identification of sources, pathways and extent of long-range transboundary transport of airborne trace elements creates serious technical problems and uncertainties. This has resulted in the development and broad application of soil magnetometry as easy-to-use, quick, inexpensive but sensitive and reliable screening geophysical technique based on the measurements of magnetic susceptibility in topsoil.

The method has not yet been standardized. For this purpose, a standard procedure, protocols and guidelines for the using soil magnetometry as a screening method are developed primarily to support the implementation of the two-stage optimized geophysical/geochemical method of measuring the soil spatial anthropogenic pollution with airborne trace elements from the dry and wet deposition, for further delineation of polluted soil areas to be adequately managed. The method provides data on the volume-specific magnetic susceptibility, κ , which reflects cumulative anthropogenic pollution of soil with trace elements, expressed as a PLI. The method is intended to serve as a screening and early warning system to be applied at any scale, from local to large regional one, also for the investigation of a long-range airborne element transport.

The application of this screening method alone does not allow determining the kind and concentrations of specific trace elements in soils. To carry out a more precise survey of the anthropogenic soil pollution with airborne trace elements, soil magnetometry as the screening geophysical “in situ” measurement technique (the 1st stage) is to be integrated with the classical geochemical methods (the 2nd stage) of the optimized procedure. Specifically, on the basis of geophysical methods used for screening, a relevant dense geochemical monitoring network can be applied in the areas of diagnosed elevated risk, thus reducing the number of samples and chemical analyses required.