

Australian Standard™

**Guide to the investigation and sampling
of sites with potentially contaminated
soil**

**Part 1: Non-volatile and semi-volatile
compounds**



This Australian Standard was prepared by Committee EV-009, Sampling and Analysis of Soils and Biota. It was approved on behalf of the Council of Standards Australia on 14 October 2005.
This Standard was published on 2 November 2005.

The following are represented on Committee EV-009:

Australian Collaborative Land Evaluation Program (ACLEP)
Australian Contaminated Land Consultants Association, Vic.
Australian Institute of Medical Scientists
Australian Society of Soil Science Incorporated
CSIRO Minerals
Department of Natural Resources and Mines, Qld
Department of Primary Industries, Vic.
Environment Protection Authority, Vic.
National Measurement Institute
Queensland Health Scientific Services
The Royal Australian Chemical Institute
The University of Sydney

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Web Shop at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Global Standard*, has a full listing of revisions and amendments published each month.

Australian Standards™ and other products and services developed by Standards Australia are published and distributed under contract by SAI Global, which operates the Standards Web Shop.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to the Chief Executive, Standards Australia, GPO Box 476, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 04150.

Australian Standard™

**Guide to the investigation and sampling
of sites with potentially contaminated
soil**

**Part 1: Non-volatile and semi-volatile
compounds**

Originated as AS 4482.1—1997.
Second edition 2005.

COPYRIGHT

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia
ISBN 0 7337 6974 8

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EV-009, Sampling and Analysis of Soil and Biota as part of a series on the identification, analytical methods and investigation procedures for the assessment of soil. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

This Standard supersedes AS 4482.1—1997, *Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*.

The objective of this Standard is to derive the information which may be required to satisfy regulatory authorities, although additional detail may be required in some localities. The Standard does not prescribe levels of contaminants which are considered to pose a risk to human health or the environment. Such levels are prescribed in documents such as the criteria produced by EHC/NEPM on contaminated sites and various regulatory agencies.

The objective of this revision is to reconfirm the Standard with minor changes to clarify certain aspects, update referenced documents and bring the Standard in line with current editorial practices. For the purposes of this Standard, the term ‘soil’ is taken to also include other solid materials, such as fill, rubble and waste.

There is a widespread community perception of potential health risks associated with contaminated land. These perceived risks may or may not be appropriate, depending on the quality of the information upon which they are based. Unfounded fears may be difficult to dispel whereas ‘real’ risks associated with the exposure to hazardous materials may not be fully appreciated. Quantitative risk assessments are required in order to clarify these perceptions. Such risk assessments require a sampling strategy representative of the site.

The contamination of land and groundwater by chemicals has been well recognized and acted upon in Europe and North America. Because of the relatively short history and low intensity of industrialization in Australia, the number of contaminated sites is far fewer than for Europe or North America.

This Standard provides guidance for the sampling and investigation process to professionals engaged in these activities. The professionals should consider the relevance of the various components of this Standard to the particular site under investigation and apply them accordingly. Where site specific issues are raised which are beyond the scope of this Standard, for example where radioactive, unexploded ordnance or pathogenic contamination is suspected, then the relevant expertise should be sought and sampling and investigations targeted accordingly.

It is assumed that execution of the provisions of this Standard would be entrusted to appropriately qualified and experienced people. This Standard calls for the use of procedures that may be hazardous or injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Contaminated soils may also have an effect on the surrounding environment. Therefore, investigation of air, biota, surface water and groundwater should be performed where appropriate.

Procedures for sampling of soils for volatile analytes and potential acid sulfate soils are not included in this Standard.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	5
1.2 REFERENCED DOCUMENTS	5
1.3 DEFINITIONS	5
1.4 THE PRACTICE OF COMPOSITE SAMPLING.....	8
SECTION 2 SITE INVESTIGATION PROCESS.....	9
SECTION 3 PRELIMINARY SITE INVESTIGATION	
3.1 GENERAL	10
3.2 PRELIMINARY STUDY	10
3.3 SITE INSPECTION.....	12
3.4 PRELIMINARY SITE INVESTIGATION REPORT	13
SECTION 4 DETAILED SITE INVESTIGATION	
4.1 GENERAL	15
4.2 PROCEDURE	15
4.3 DETAILED SITE INVESTIGATION REPORT	16
SECTION 5 DATA QUALITY OBJECTIVES	
5.1 GENERAL	19
5.2 DQO PROCESS	19
SECTION 6 DESIGN OF THE SOIL SAMPLING STRATEGY	
6.1 GENERAL	20
6.2 SAMPLING OBJECTIVES.....	20
6.3 CONTAMINANT DISTRIBUTION.....	20
6.4 SAMPLING PATTERN SELECTION	21
6.5 UNCERTAINTY OF SAMPLING	22
6.6 SAMPLING PLAN FOR SITE CHARACTERIZATION AND VALIDATION	22
SECTION 7 SAMPLE COLLECTION	
7.1 SCOPE	23
7.2 SAMPLING PROGRAM.....	23
7.3 SAMPLING.....	24
7.4 HANDLING, CONTAINMENT AND TRANSPORT OF SAMPLES	27
7.5 DECONTAMINATION OF SAMPLING EQUIPMENT	29
7.6 FIELD SAMPLING FORMS.....	30
SECTION 8 QUALITY ASSURANCE	
8.1 GENERAL	31
8.2 QUALITY CONTROL SAMPLES	31
8.3 CHAIN-OF-CUSTODY	33
8.4 CALIBRATION OF FIELD INSTRUMENTS	33
APPENDICES	
A HEALTH AND SAFETY OF INVESTIGATORY PERSONNEL.....	34
B GUIDELINES FOR THE COMPOSITE SAMPLING OF SOILS	37
C EXAMPLE OF THE USE OF THE DQO PROCESS	40

D	NUMBER OF SAMPLE LOCATIONS REQUIRED FOR HOT SPOT DETECTION	42
E	SAMPLING PLAN FOR SITE CHARACTERIZATION AND VALIDATION	43
F	NUMBER OF SAMPLE LOCATIONS REQUIRED FOR DETERMINING THE DEGREE OF CONTAMINATION	46
G	SITE CHARACTERIZATION	48
H	EXAMPLE OF A STRATA LOG	53
I	EXAMPLE OF CHAIN-OF-CUSTODY FORM	54
J	CHEMICAL CONTAMINANTS LISTED BY INDUSTRY TYPE	55
K	EXAMPLES OF SAMPLING IMPLEMENTS.....	59

STANDARDS AUSTRALIA

Australian Standard

Guide to the investigation and sampling of sites with potentially contaminated soil

Part 1: Non-volatile and semi-volatile compounds

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard provides guidance for collecting sufficient and reliable information for the assessment of a site potentially contaminated by non-volatile and semi-volatile compounds. It includes the formulation of data quality objectives and design of a sampling plan to meet the objectives of the investigation.

This Standard is suitable for use in determining compliance with criteria such as those produced by Assessment of Contaminated Sites-National Environment Protection Measure (EHC-NEPM) and various regulatory agencies.

NOTES:

- 1 This Standard does not establish any regulatory limits, remediation requirements or make any recommendations about the proposed land use.
- 2 Appendix A gives information on health and safety aspects when collecting soil samples. This appendix is intended only as a general guide to the issues that should be considered in the development of a site specific occupational health and safety plan.
- 3 Statistical methods and tools other than those described in this Standard may be used if they can be proven at least equivalent. Guidance on other statistical approaches can be obtained from the references cited in Appendix D.
- 4 For the purposes of this Standard, the term 'soil' is taken to also include other solid materials, such as fill, rubble and waste material.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1726 Geotechnical site investigations

AS/NZS

5667 Water quality—Sampling

5667.1 Part 1: Guidance on the design of sampling program techniques and the preservation and handling of samples

ISO

3696 Water for analytical laboratory use—Specification and test methods

1.3 DEFINITIONS

For the purposes of this Standard, the definitions below apply.

1.3.1 Background concentrations

The naturally occurring, ambient concentration of substances in the local area of a site.



SAI GLOBAL

This is a free 7 page sample. Access the full version online.

The remainder of this document
is available for purchase online at

www.saiglobal.com/shop

SAI Global also carries a wide range of publications from a wide variety of Standards Publishers:



Click on the logos to search the database online.