United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington, DC 20460

Publication 9285.7-09B
PB92 - 963362
May 1992

Superfund

EPA

Guidance for Data Useability in Risk Assessment (Part B)

Final

9285.7-09B
May 1992

Guidance for Data Useability in Risk Assessment (Part B)

Final

Notice: This is a supplement to Guidance for Data Useability in Risk Assessment - Part A

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

NOTICE

The policies and procedures set forth here are intended as guidance to U.S. Environmental Protection Agency and other government employees. They do not constitute rulemaking by the Agency, and may not be relied on to create a substantive or procedural right enforceable by any other person. The U.S. Environmental Protection Agency may take action that is at variance with the policies and procedures in this guidance and may change them at any time without public notice.

Copies of the guidance can be obtained from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 703-487-4650

Contents

CHAPTER 1 INTRODUCTION AND BACKGROUND 1

1.1 CRITICAL DATA QUALITY ISSUES IN RISK ASSESSMENT 1

1.2 FRAMEWORK AND ORGANIZATION OF THE GUIDANCE 1

CHAPTER 2 THE RISK ASSESSMENT PROCESS 3

2.1 DATA COLLECTION AND EVALUATION 3

2.2 EXPOSURE ASSESSMENT 3

2.2.1 Identifying Exposure Pathways 3

2.2.2 Exposure Quantification 4

2.3 TOXICITY ASSESSMENT 4

2.4 RISK CHARACTERIZATION 5

2.5 ROLES AND RESPONSIBILITIES OF KEY RISK ASSESSMENT PERSONNEL 5

CHAPTER 3 USEABILITY CRITERIA FOR BASELINE RISK ASSESSMENTS 7

3.1 DATA USEABILITY CRITERIA 7

3.1.1 Data Sources 7

3.1.2 Documentation 7

3.1.3 Analytical Methods and Detection Limits 7

3.1.4 Data Quality Indicators 7

3.1.5 Data Review 8

3.2 PRELIMINARY SAMPLING AND ANALYSIS ISSUES 8

3.2.1 Radionuclides of Potential Concern 8

3.2.2 Tentatively Identified Radionuclides 9

3.2.3 Detection and Quantitation Limits 9

3.2.4 The Estimated Lower Limit of Detection 9

3.2.5 The Estimated Minimum Detectable Concentration 11

3.2.6 Media Variability Versus Measurement Error 11

3.2.7 Sample Preparation and Sample Preservation 11

3.2.8 Fixed Laboratory Versus Field Analysis 13

CHAPTER 4 STEPS IN PLANNING FOR THE ACQUISITION OF USEABLE ENVIRONMENTAL DATA 17

4.1 STRATEGIES FOR DESIGNING SAMPLING PLANS 17

4.1.1 Determining the Number of Samples 17

4.2 STRATEGY FOR SELECTING ANALYTICAL METHODS 24

4.2.1 Selecting Analytical Laboratories 25

CHAPTER 5 ASSESSMENT OF ENVIRONMENTAL DATA FOR USEABILITY IN BASELINE RISK ASSESSMENTS 29

Contents
(Cont'd)

CHAPTER 6 APPLICATION OF DATA TO RISK ASSESSMENT **33**
6.1 RADIONUCLIDES OF CONCERN 33
6.2 DISCRIMINATION OF SITE CONTAMINATION FROM BACKGROUND 33
6.3 EXPOSURE PATHWAYS 33
6.4 DOCUMENTATION OF ANALYTICAL PROCEDURES AND RESULTS 34

APPENDICES **37**
I. GLOSSARY OF RADIATION CONCEPTS, TERMINOLOGY AND UNITS 39
II. RADIOACTIVE SUBSTANCES IN THE ENVIRONMENT 45
III. EPA RADIATION PROGRAM STAFF 65

REFERENCES **69**

INDEX **71**

Exhibits

1. Examples of Typical Minimum Detection Concentration (MDC) Values for Environmental Radioanalyses 10
2. Field Survey Instruments for Measuring Gamma Radiation 14
3. Survey Instruments for Measuring Alpha and Beta Radiation 15
4. Illustration of Bore-Hole Gamma Profiling 16
5. Hierarchical Structure of Sampling Design Selection Worksheet 18
6. Effect of Source Depth on Surface Gamma Radiation Measurements 23
7. Order of Priority for Selection of Analytical Methods 24
8. References for Radiochemical Procedures 25
9. Generalized Equations for Radioactivity Calculations 30
10. Generalized Equations for Radioactivity Decay and Ingrowth Correction Factors 31
11. Data Report Requirements for Typical Radiochemical Analysis 32
12. Radiochemical Quality Assurance Support Documentation 35

Tips*

- *A health physicist or radiochemist should work with the risk assessor from the beginning of the remedial investigation process. (page 1)*

- *Field measurements must be made using instruments sensitive to the type of radioactivity present. (page 13)*

- *The shipper of radioactive material is responsible for ensuring that the recipient is authorized to receive the shipped material and for compliance with all applicable shipping and labelling regulations. (page 25)*

* For further information, refer to the text. Page numbers are provided.

PREFACE

This document is the second part (Part B) of the two-part *Guidance for Data Useability in Risk Assessment*. Part A, developed by the EPA Data Useability Workgroup, provides guidance on the analytical data quality and useability requirements needed for the cleanup of hazardous waste sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Part B provides supplemental guidance to Part A on planning and assessing radioanalytical data needs for the baseline human health risk assessment conducted as part of the remedial investigation (RI) process at sites containing radioactive substances. Part B is not a stand-alone document, and at all times it must be used in conjunction with Part A.

This guidance is addressed primarily to the remedial project managers (RPMs) who have the principal responsibility for leading the data collection and assessment activities that support the human health risk assessment. It also should be of use to risk assessors who must effectively communicate their data needs to the RPMs and use the data provided to them. Because of the special hazards and unique sampling and analysis considerations associated with radioactive substances, RPMs and risk assessors are strongly encouraged to consult with a health physicist, radiochemist, or both, starting at the beginning of the RI planning process. For reference, a list of the EPA Headquarters, Regional and Laboratory radiation program staff is provided in the Appendices.

Comments on the guidance should be sent to:

Toxics Integration Branch
Office of Emergency and Remedial Response
401 M Street, SW (OS-230)
Washington, DC 20460
Phone: 202-260-9486

Or to:

Radiation Assessment Branch
Office of Radiation Programs
401 M Street, SW (ANR-461)
Washington, DC 20460
Phone: 202-260-9630

ACKNOWLEDGEMENTS

This document was prepared under the direction of Ruth Bleyler and Lisa Matthews of the Toxics Integration Branch (TIB), and Anthony Wolbarst and Michael Boyd of the Office of Radiation Programs (ORP), all of EPA Headquarters. Preparation of this document benefited greatly from the technical reviews and recommendations provided by the following individuals, to whom we wish to express our sincere appreciation:

Donna M. Ascenzi	USEPA Region VI
Tom D'Avanzo	USEPA Region I
Michael S. Bandrowsk	USEPA Region IX
William Bellinger	USEPA Region III
James Benetti	USEPA Region V
Jon Broadway	ORP National Air and Radiation Environmental Laboratory (NAREL)
James J. Cherniack	USEPA Region I
Gregg Dempsey	ORP Las Vegas Facility
Robert Dye	USEPA Region VII
Robert S. Dyer	ORP
Lewis K. Felleisen	USEPA Region III
Paul A. Giardina	USEPA Region II
Gary V. Gulezian	USEPA Region V
Scott Hay	SC&A Inc.
Gary Johnson	ORD/QAMS
Milton W. Lammering	USEPA Region VIII
Jerry Leitch	USEPA Region X
Phil Nyberg	USEPA Region VIII
Collen Petullo	ORP Las Vegas Facility
Lowell Ralston	SC&A Inc.
Angela Short	USEPA Region II
Pat Van Leeuwen	USEPA Region V
Chuck Wakamo	USEPA Region IV
Samuel T. Windham	ORP National Air and Radiation Environmental Laboratory (NAREL)
Gail Wright	USEPA Region VII

Chapter 1
Introduction and Background

This guidance provides supplemental information regarding the useability of analytical data for performing a baseline risk assessment at sites contaminated with radioactivity. The reader should be familiar with the guidance provided in *Guidance for Data Useability in Risk Assessment - Part A* before proceeding with this document. Although Part A focuses primarily on chemical contamination, much of the information presented also applies to the risk assessment process for radioactive contamination. The guidance offered in this document is intended as an overview of the key differences between chemical and radionuclide risk assessments, and not as a comprehensive, stand-alone document to assess the risks posed by radionuclide exposures. Part A of this guidance should be used side by side with this document because of the many references to information and exhibits found in Part A.

> ☛ *A health physicist or radiochemist should work with the risk assessor from the beginning of the remedial investigation process.*

There are special hazards and problems associated with radioactivity contamination. Accordingly, it is recommended that a professional experienced in radiation protection and measurement (health physicist or radiochemist) be involved in all aspects of the risk assessment process from the beginning of the remedial investigation/feasibility study.

Additional information on important aspects of radiation protection and measurement is provided in the appendices. These appendices are included to provide greater detail on topics presented in this guidance and to facilitate a comprehensive understanding for the interested reader. Appendix I is a glossary of terms that apply to radioactivity. Appendix II is a discussion on naturally occurring radionuclides and their presence in the environment. Appendix III provides a list of the names and addresses of the EPA Regional, Laboratory, and Headquarters Radiation Program staff for health physics and radioanalytical support.

1.1 CRITICAL DATA QUALITY ISSUES IN RISK ASSESSMENT

The five basic environmental quality issues discussed in Part A Section 1.1 also apply to radioactive contamination. Specifics for data sources, detection limits, qualified data, background samples, and consistency in sample collection will be discussed later in this guidance.

1.2 FRAMEWORK AND ORGANIZATION OF THE GUIDANCE

This document is organized the same as Part A. Part A, Exhibit 2 describes the organization of this document. The assessment of radioanalytical data as opposed to chemical data is emphasized.

This guidance discusses the data collection and evaluation issues that affect the quality and useability of radioanalytical data for baseline human health risk assessments. Part A, Exhibit 3 lists the four components of the risk assessment process and the information sought in each of the components.