

ABSTRACT

The MARSSIM provides information on planning, conducting, evaluating, and documenting building surface and surface soil final status radiological surveys for demonstrating compliance with dose or risk-based regulations or standards. The MARSSIM is a multi-agency consensus document that was developed collaboratively by four Federal agencies having authority and control over radioactive materials: Department of Defense (DOD), Department of Energy (DOE), Environmental Protection Agency (EPA), and Nuclear Regulatory Commission (NRC). The MARSSIM's objective is to describe a consistent approach for planning, performing, and assessing building surface and surface soil final status surveys to meet established dose or risk-based release criteria, while at the same time encouraging an effective use of resources.

DISCLAIMER

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ACKNOWLEDGMENTS

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) came about as a result of individuals—at the management level—within the Environmental Protection Agency (EPA), Nuclear Regulatory Commission (NRC), Department of Energy (DOE), and Department of Defense (DOD) who recognized the necessity for a standardized guidance document for investigating radioactively contaminated sites. The creation of the MARSSIM was facilitated by the cooperation of subject matter specialists from these agencies with management's support and a willingness to work smoothly together toward reaching the common goal of creating a workable and user-friendly guidance manual. Special appreciation is extended to Robert A. Meck of the NRC and Anthony Wolbarst of EPA for developing the concept of a multi-agency work group and bringing together representatives from the participating agencies.

The MARSSIM could not have been possible without the technical work group members who contributed their time, talent, and efforts to develop this consensus guidance document:

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Special mention is extended to the Federal agency contractors for their assistance in developing the MARSSIM:

EPA: Scott Hay (S. Cohen & Associates, Inc.)
Todd Peterson, Ph.D. (S. Cohen & Associates, Inc.)
Harry Chmelynski, Ph.D. (S. Cohen & Associates, Inc.)
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ACKNOWLEDGMENTS

DOE: Robert Coleman, CHP (Oak Ridge National Laboratory)
John Kirk Williams (Oak Ridge National Laboratory)
Romance Carrier (Oak Ridge National Laboratory)

A special thank you is extended to Emilio Braganza (EPA), Gregory Budd (EPA), Mary Clark, Ph.D. (EPA), Brian Littleton (EPA), John Karhnak (EPA), Sarah Seeley (EPA), Rett Sutton (EPA/SEE), Juanita Beeson (NRC), Stephen A. McGuire, Ph.D. (NRC), Walter Oliu (NRC), LT James Coleman (Navy), CDR David E. Farrand (U.S Navy), CAPT David George (Navy), CDR Garry Higgins (Navy), CAPT James Malinoski (Navy), Harlan Keaton (State of Florida), J. Michael Beck, J.D. (EMS), Tom McLaughlin, Ph.D. (SC&A), Kevin Miller, Ph.D. (DOE/EML), and the members of the EPA's Science Advisory Board (SAB) for their assistance in developing the manual.

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ACKNOWLEDGMENTS

The work group meetings were open to the public, and the following people attended meetings as technical experts at the request of the work group or as observers:

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L. Abramson	NRC	H. Larson	NRC
R. Abu-Eid	NRC	G. Lindsey	International Atomic Energy Agency
W. Beck	Oak Ridge Institute of Science and Education	J. Lux	Kerr-McGee Corporation
A. Boerner	Oak Ridge Institute of Science and Education	M. Mahoney	Army
Lt. E. Bonano	Air Force	J. Malaro	NRC
M. Boyd	EPA	H. Morton	Morton Associates
J. Buckley	NRC	H. Mukhoty	EPA
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W. Cottrell	Oak Ridge National Laboratory	D. Ottlieg	Westinghouse Hanford Company
D. Culberson	Nuclear Fuel Services, Inc.	V. Patania	Oak Ridge National Laboratory
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F. Galpin	RAE Corp.	P. Reed	NRC
R. Gilbert	Pacific Northwest Laboratory	R. Rodriguez	Oak Ridge National Laboratory
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J. Hacala	Booz, Allen & Hamilton	R. Schroeder	Army
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R. Hutchinson	National Institute of Standards and Technology	R. Story	Foster Wheeler
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		D. Thomas	Air Force
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		P. White	EPA
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ABBREVIATIONS

AEA	Atomic Energy Act
AEC	Atomic Energy Commission
AFI	Air Force Instructions
ALARA	as low as reasonably achievable
AMC	Army Material Command
ANSI	American National Standards Institute
AR	Army Regulations
ARA	Army Radiation Authorization
ASTM	American Society of Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
CAA	Clean Air Act
Capt.	Captain (Air Force)
CAPT	Captain (Navy)
CDR	Commander
CEDE	committed effective dose equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CHP	Certified Health Physicist
CPM	counts per minute
DCF	dose conversion factor
DCGL	derived concentration guideline level
DCGL _{EMC}	DCGL for small areas of elevated activity, used with the EMC
DCGL _w	DCGL for average concentrations over a wide area, used with statistical tests
DEFT	Decision Error Feasibility Trials
DLC	Data Life Cycle
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DQA	Data Quality Assessment
DQO	Data Quality Objectives
EERF	Eastern Environmental Radiation Facility
Ehf	human factors efficiency
EMC	elevated measurement comparison
EML	Environmental Measurements Laboratory
EMMI	Environmental Monitoring Methods Index
EPA	Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ERAMS	Environmental Radiation Ambient Monitoring System

ABBREVIATIONS

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FRDS	Federal Reporting Data System
FSP	Field Sampling Plan
FWPCA	Federal Water Pollution Control Act
FUSRAP	Formerly Utilized Sites Remedial Action Program
GEMS	Geographical Exposure Modeling System
GM	Geiger-Mueller
GPS	global positioning system
GRIDS	Geographic Resources Information Data System
GWSI	Ground Water Site Inventory
H_0	null hypothesis
H_a	alternative hypothesis
HSA	Historical Site Assessment
HSWA	Hazardous and Solid Waste Amendments
ISI	Information System Inventory
L_c	critical level
L_D	detection limit
LBGR	lower bound of the gray region
LCDR	Lieutenant Commander
LLRWPA	Low Level Radioactive Waste Policy Act as Amended
LT	Lieutenant
MARLAP	Multi-Agency Radiation Laboratory Analytical Protocols (Manual)
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCA	multichannel analyzer
MDC	minimum detectable concentration
MDCR	minimum detectable count rate
MED	Manhattan Engineering District
NARM	naturally occurring or accelerator produced radioactive material
NCAPS	National Corrective Action Prioritization System
NCRP	National Council on Radiation Protection and Measurements
NCP	National Contingency Plan
NIST	National Institute of Standards and Technology
NORM	naturally occurring radioactive material
NPDC	National Planning Data Corporation

ABBREVIATIONS

NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act
NWWA	National Water Well Association
ODES	Ocean Data Evaluation System
ORNL	Oak Ridge National Laboratory
ORISE	Oak Ridge Institute for Science and Education
PERALS	photon electron rejecting alpha liquid scintillator
PIC	pressurized ionization chamber
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QMP	Quality Management Plan
RASP	Radiological Affairs Support Program
RAGS/HHEM	Risk Assessment Guidance for Superfund/Human Health Evaluation Manual
RC	release criterion
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RODS	Records of Decision System
RSSI	Radiation Survey and Site Investigation
SARA	Superfund Amendments and Reauthorization Act
SAP	Sampling and Analysis Plan
SDWA	Safe Drinking Water Act
SFMP	Surplus Facilities Management Program
SOP	Standard Operating Procedures
STORET	Storage and Retrieval of U.S. Waterways Parametric Data
TEDE	total effective dose equivalent
TLD	thermoluminescence dosimeter
TRU	transuranic
TSCA	Toxic Substances Control Act

ABBREVIATIONS

UMTRCA	Uranium Mill Tailings Radiation Control Act
USGS	United States Geological Survey
USPHS	United States Public Health Service
USRADS	Ultrasonic Ranging and Data System
WATSTORE	National Water Data Storage and Retrieval System
WL	working level
WRS	Wilcoxon rank sum
WSR	Wilcoxon signed ranks
WT	Wilcoxon test

CONVERSION FACTORS

To Convert From	To	Multiply By	To Convert From	To	Multiply By	
acre	hectare	0.405	meter (m)	inch	39.4	
	sq. meter (m ²)	4,050		mile	0.000621	
	sq. feet (ft ²)	43,600	sq. meter (m ²)	acre	0.000247	
becquerel (Bq)	curie (Ci)	2.7x10 ⁻¹¹		hectare	0.0001	
	dps	1		sq. feet (ft ²)	10.8	
	pCi	27		sq. mile	3.86x10 ⁻⁷	
Bq/kg	pCi/g	0.027	m ³	liter	1,000	
Bq/m ²	dpm/100 cm ²	0.60	mrem	mSv	0.01	
Bq/m ³	Bq/L	0.001	mrem/y	mSv/y	0.01	
	pCi/L	0.027	mSv	mrem	100	
centimeter (cm)	inch	0.394	mSv/y	mrem/y	100	
Ci	Bq	3.70x10 ¹⁰	ounce (oz)	liter (L)	0.0296	
	pCi	1x10 ¹²	pCi	Bq	0.037	
dps	dpm	60		dpm	2.22	
		pCi	27	pCi/g	Bq/kg	37
dpm	dps	0.0167	pCi/L	Bq/m ³	37	
		pCi	0.451	rad	Gy	0.01
gray (Gy)	rad	100	rem		mrem	1,000
hectare	acre	2.47	mSv		10	
			Sv	0.01		
liter (L)	cm ³	1000	seivert (Sv)	mrem	100,000	
	m ³	0.001		mSv	1,000	
	ounce (fluid)	33.8		rem	100	

ERRATA AND ADDENDA

In response to comments received on the December 1997 Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), minor modifications were made to individual pages. Modifications to the manual that correct errors are listed as errata, while modifications made to clarify guidance or provide additional information are referred to as addenda. The pages affected by these modifications are listed here and have the date of the modification in the footer. A complete list of comments and resolutions is available on the MARSSIM web site at:

<http://www.epa.gov/radiation/marssim/>

August 2000

Pages Modified to Correct Errata

v, xv, xxvii, Roadmap-4, 1-3, 2-6, 2-11, 2-12, 4-33, 4-35, 4-36, 4-37, 4-38, 5-33, 6-4, 6-10, 6-23, 6-37, 7-20, 8-19, 9-3, 9-4, 9-7, Ref-3, Ref-4, A-2, A-5, A-7, A-11, A-14, A-19, E-2, H-7, H-8, H-10, H-12, H-14, H-16, H-32, I-30, N-2, N-6, N-8, N-11, N-13

Pages Modified to Provide Addenda

xiii, xxiii, xxviii, 5-30, 5-34, 7-8, C-20, C-21, D-23, I-5, L-2, L-3, L-4, L-5, L-8, , M-10

June 2001

Pages Modified to Correct Errata

v, xxiii, xxviii, Roadmap-8, 4-24, 5-12, 6-16 6-30, 6-37, 8-19, C-19

Pages Modified to Provide Addenda

8-23

August 2002

Pages Modified to Correct Errata

Ref-3, Ref-4, Ref-8, L-1, L-2, L-3, L-4, L-5, L-6, L-7

Pages Modified to Provide Addenda

2-4, 3-12, 4-11, GL-11