

CONTENTS

1. INTRODUCTION	1
2. CONCEPTS OF DOSIMETRY AND CALIBRATION	2
3. TYPES OF CALIBRATION AND TEST MEASUREMENT	5
4. SOURCES, EQUIPMENT AND FACILITIES	7
4.1. Sources	7
4.1.1. General comments	7
4.1.2. Recommended sources	9
4.1.2.1. Californium-252	9
4.1.2.2. Heavy water moderated californium-252	13
4.1.2.3. Americium-beryllium and americium-boron	16
4.2. Equipment	19
4.2.1. Tools for remote source handling	21
4.2.2. Source storage, shielding and collimator	21
4.2.3. Moderator assemblies for albedo dosimeter performance test	21
4.2.4. Phantoms	21
4.2.5. Shadow cones	22
4.2.6. Reference instrumentation	23
4.2.6.1. Standard instrument	23
4.2.6.2. Transfer instrument	24
4.2.6.3. Monitoring instrument	25
4.3. Laboratory facilities	26
4.3.1. Physical facility	26
4.3.2. Shielding and radiation protection	26
4.3.3. Storage and movement of sources	28
5. PROCEDURES AND METHODS	30
5.1. Special source specifications	30
5.1.1. Source calibrations	30
5.1.2. Angular emission rate	30
5.1.3. Special requirements	31
5.1.4. Neutron emission rate	31
5.2. Distance law measurements	33
5.2.1. Effective calibration distance	33
5.2.2. Scattered neutrons and room return	33
5.2.3. Methods for estimating scatter correction	36

6. CALIBRATION OF BEAM DOSIMETERS	39
6.1. Introduction	39
6.2. Measurement of absorbed dose and kerma	40
6.3. Calibration	41
6.4. Uncertainty	43
7. REPORTS AND RECORDS	44
APPENDIX I: BASIC QUANTITIES AND UNITS	47
I.1. General quantities	47
I.2. Special dose quantities	50
I.3. Relations between dose quantities defined for charged and uncharged particles	53
APPENDIX II: GLOSSARY	55
APPENDIX III: NEUTRON SOURCES	58
III.1. Radioactive sources	58
III.2. Nuclear reactors	59
III.3. Van de Graaff and cyclotron beams	62
III.4. Thermal neutron flux standards	62
APPENDIX IV: FLUENCE TO DOSE EQUIVALENT CONVERSION FUNCTIONS	64
APPENDIX V: LIST OF SYMBOLS	68
REFERENCES	71

