

# Contents

<b>1 Status of the Problem . . . . .</b>	<b>1</b>
1.1 Radionuclides Transfer Mechanism in the Atmosphere . . . . .	1
1.1.1 Fission Products . . . . .	3
1.1.2 Atmospheric Natural Radioactivity . . . . .	5
1.1.3 Environmental and Food Radioactivity . . . . .	8
1.1.4 Dose from a “Radioactive Cloud” and from Inhalation . . . . .	9
1.1.5 Atmospheric Dispersion of Radioactivity . . . . .	11
1.2 Environmental Impact from Nuclear Accidents . . . . .	13
1.2.1 Information from the Fallout of a Thermonuclear Explosion . . . . .	13
1.2.2 The Accident of Chernobyl . . . . .	14
1.2.3 Worldwide Nuclear Power Status . . . . .	17
1.3 The Impact of the Atmospheric Pollution on the Food Chain–Soil, Plant, Food . . . . .	18
1.4 Formulation of Purpose and Tasks . . . . .	21
<b>2 Methods and Materials of Analysis . . . . .</b>	<b>23</b>
2.1 Methods for Analyses of Atmospheric Radioactivity . . . . .	23
2.1.1 Diffuse Radioactivity Measurements . . . . .	24
2.1.2 Radionuclides Detection and Identification . . . . .	25
2.1.3 Correlation with Meteorological Parameters . . . . .	25
2.2 Methods for Analysis of the Impact of Atmospheric Contamination on the Food Chain (Soil, Plants, Foods) . . . . .	26
2.2.1 Analysis of Soils and Plants . . . . .	26
2.2.2 Foods Analysis . . . . .	29
<b>3 Results and Discussions . . . . .</b>	<b>35</b>
3.1 Studies on the Atmospheric and Environmental Radioactivity . . . . .	35
3.1.1 Monitoring Airborne Radioactivity in the Industrial Area of Thessaloniki . . . . .	35

3.1.2	Identification of Airborne Radionuclides in the Environment of Northern Greece . . . . .	39
3.1.3	Measurements of the Atmospheric Radioactivity in Northern Greece . . . . .	45
3.1.4	Study on the Diffuse Radioactivity and Radionuclides Identification in the Major Area of Sindos: Thessaloniki Before and After the “Chernobyl Cloud” Appearance . . . . .	48
3.1.5	Radionuclide Diffusion in the Environment . . . . .	50
3.2	Transfer of Atmospheric Radioactivity in Soil and Plants. . . . .	52
3.2.1	Natural Radioactivity of the Soils in Northern Greece . . . . .	52
3.2.2	Concentration Level of $^{137}\text{Cs}$ in Greece One Decade After the Chernobyl Accident. . . . .	54
3.3	Transfer of Radioisotopes in Food Stuffs . . . . .	66
3.3.1	Mechanism of the Transfer of $^{121}\text{I}$ and $^{137}\text{Cs}$ from Cow Milk to Cheese and other By-Products. . . . .	66
3.3.2	Mechanism of $^{131}\text{I}$ Transfer from Feta Cheese After Immersion in Water and in Brine . . . . .	70
3.3.3	Study of $^{131}\text{I}$ Impact Over Lactic-Acid Micro-Flora of the Yogurt . . . . .	75
3.3.4	Decontamination of Milk from the Radioactive Isotopes $^{131}\text{I}$ and $^{134,137}\text{Cs}$ . . . . .	78
3.3.5	The Preservation and Maturing of Diary Products by using an Irradiation Process . . . . .	80
3.3.6	Investigation of Natural Radioactivity Concentration in Building Materials for Interior and Exterior Adornments in Modern Greek Style Constructions . . . . .	85
3.3.7	The Marine Radioactivity . . . . .	91
3.3.8	Comparative Studies Concerning $^{137}\text{Cs}$ Effect on the Biological Status of Carp ( <i>Cyprinus Carpio</i> ) and Eel ( <i>Anguilla Anguilla</i> ) . . . . .	94
4	<b>General Discussion on the Results</b> . . . . .	101
4.1	The Fukushima Case . . . . .	104
5	<b>Basic Conclusions</b> . . . . .	105
<b>Appendix A: Radioactive Concentrations in Geographic Peripherials of Greece</b> . . . . .		107

<b>Appendix B: Radioactive Concentrations in the Prefectures of Greece . . . . .</b>	115
<b>References . . . . .</b>	133
<b>Index . . . . .</b>	145