## Recent Research Activities about the Chernobyl NPP Accident in Belarus, Ukraine and Russia

## **Preface**

Sixteen years have already passed since the Chernobyl accident, the worst accident in the history of nuclear energy development occurred in the former USSR on April 26, 1986. During these years a large amount of reports, papers and materials have been published about this accident. There remain, however, many questions that were not yet answered and should be answered by future researches.

Our group, Nuclear Safety Research Group of Research Reactor Institute, Kyoto University has been involved in the task to assess the radiological consequences in case of large nuclear accidents in Japan from 1970s. So our efforts to study the consequences by the Chernobyl accident began from the next days after the accident.

During the first years after the accident, the information on Chernobyl was very limited. The detailed situation about the radioactive contamination within the USSR territory at first appeared in 1989 with growing democratic movement in USSR. The break of USSR at the end of 1991 drastically changed the situation around Chernobyl problems. In 1993 our group had a chance to collaborate with Belarusian scientists under a support from the Toyota foundation. This collaboration was extended to a larger one in 1995-1997, getting cooperation with Ukrainian and Russian scientists. Our former Chernobyl report, "Research Activities about the Radiological Consequences of the Chernobyl NPS Accident and Social Activities to Assist the Sufferers by the Accident" (KURRI-KR-21, March 1998) was produced as a result of these programs.

Under the title, "Investigation of Research Activities about the Chernobyl NPP Accident in Belarus, Ukraine and Russia", we succeeded to get a new financial support for 2000 – 2002 from Grant-in-Aid for Scientific Research of Japan Society for Promotion of Science (1.7, 2.0 and 1.9 million yen in 2000, 2001 and 2002, respectively). Compilation of a new Chernobyl report is one of the main tasks in the new program. This report contains 22 articles by Belarusian, Ukrainian and Russian scientists and one article by Imanaka.

The editor is sure that the contents of this report are useful not only to specialists, but also to all persons who have concern for the problem of Chernobyl. He is grateful to colleagues of Nuclear Safety Research Group for their continuous encouragements and to staffs of Research Reactor Institute, Kyoto University for various conveniences during the course of the present study.

Imanaka T. Research Reactor Institute, Kyoto University

July 2002

	CONTENTS	page
1.	Current Topics about the Radiological Consequences by the Chernobyl Accident Tetsuji IMANAKA	1
2.	The Chernobyl Reactor: Design Features and Reasons for Accident  Mikhail V. MALKO	11
3.	The Causes and Scenario of the Chernobyl Accident, and Radioactive Release on the CHNPP Unit-4 Site Boris I. GORBACHEV	28
4.	Nuclear Fuel in the Destroyed 4th Unit of Chernobyl NPP Volodymyr M. PAVLOVYCH	45
5.	Analysis of Radioactive Contamination in the Near Zone of Chornobyl NPP  Alexander Gaydar and Oleg Nasvit	59
6.	Radioecological Situation in the Cooling Pond of Chornobyl NPP Oleg NASVIT	74
7.	<b>Iodine-131 Contamination, Thyroid Doses and Thyroid Cancer in the Contaminated Areas of Russia</b>	86
	Valery F. Stepanenko, Evgeny M. Parshkov, Viktor A. Sokolov, Mark Yu. Orlov, Alexander I. Ivannikov, Valery G. Skvortsov, Elena K. Iaskova, Timofey V. Kolizshenkov, Irina G. Kryukova and Anatoly F. Tsyb	
8.	Radioactive Contamination of Food in Stepanivka Village, Zhytomyr Region, Ukraine: in 1992 and in 2001  Volodymyr TYKHYY	2 97
9.	Content of Radionuclides of Chernobyl Origin in Food Products for the Belarusian Population Vladimir P. MATSKO and Tetsuji IMANAKA	103
10.	<b>Long-Term Observation of Radioactivity Contamination in Fish around Chernobyl</b> <i>Igor N. RYABOV</i>	112
11.	EPR Dosimetry of Chernobyl Liquidators  Vadim CHUMAK	123
12.	Retrospective Dose Assessment of Inhabitants in the Contaminated Areas of Russia by EPR  Measurement of Tooth Enamel  Alexandre I. IVANNIKOV, Valeri G. SKVORTSOV and Valeri F. STEPANENKO	142
13.	Estimations of Radiation Risk for the Population of Contaminated Territory of Belarus Vladimir A. KNATKO, Mikhail M. KOMOCHKOV and Alla E. YANUSH	152
14.	Estimation of Thyroid Doses from Inhalation of <sup>131</sup> I for Population of Contaminated Regions of Belarus  Vladimin A. KNATKO and Inag N. Donoznov	f 160
15.	Vladimir A. KNATKO and Inga N. DOROZHOK  Radiation Epidemiological Studies in Russian National Medical and Dosimetric Registry: Estimation of Cancer and Non-cancer Consequences Observed among Chernobyl Liquidators Marat M. MAKSIOUTOV	168

16.	Review of Epidemiological Finding in Study of Medical Consequences of the Chernobyl Accident in Ukrainian Population  Anatoly Ye. Prysyazhnyuk, Volodymir G. Grishtshenko, Zoya P. Fedorenko, Ludmila O. Gulak and Mykola. M. Fuzik	188
17.	Intelligence and Brain Damage in Children Acutely Irradiated in Utero As a Result of the Chernobyl Accident  Angelina I. Nyagu, Konstantin N. Loganovsky, Tatiana K. Loganovskaya, Viktor S. Repin and Stanislav Yu. Nechaev	202
18.	Health State of Belarusian Children Suffering from the Chernobyl Accident: Sixteen Years after the Catastrophe  Alexander N. ARYNCHYN, Tatiana V. AVHACHEVA, Nika A. GRES and Ekaterina I. SLOBOZHANINA	231
19.	Chernobyl Radiation-induced Thyroid Cancers in Belarus Mikhail V. MALKO	240
20.	Analysis of Chromosome Aberrations in Human Lymphocytes after Accidental Exposure to Ionizing Radiation  Galina Snigiryova and Vladimir Shevchenko	256
21.	The Follow-up Study of Chromosomal aberrations in Chernobyl Clean-up Workers Natalia M. Slozina and Elizaveta G. Neronova	268
22.	Chromosomal Aberrations in Blood Lymphocytes of the Residents of 30-km Chornobyl NPP Exclusion Zone  Larysa BEZDROBNA, Tetyana TSYGANOK, Olena ROMANOVA, Larysa TARASENKO,  Volodymyr TRYSHYN and Ludmila KLIMKINA	277
23.	Cytogenetic Effects of Radiation on Agricultural Plants Observed in the Chernobyl region during the First Years after the Accident  Stanislav A. GERASKIN, Vladimir G. DIKAREV, Yevgenia Ya. ZYABLITSKAYA, Alla A. OUDALOVA and Yevgeniy V. SPIRIN	287
24.	Abstracts (in Japanese)	297