Radioactivity Transfer in Environment and Food

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Preface

"***Every falling raindrop and snowflake carries some radioactive matter to the earth, while every leaf and blade of gross is covered with an invisible film of radioactive material***". These words, which were written by Rutherford in 1905, give a fairly realistic description of the environment from the point of view of ionizing radiation.

Several years after the Three Mile Island accident in the United States, the Chernobyl accident completely changed the public's perception of nuclear risk. While the first accident provided the impetus to develop new research programs on nuclear safety, the second, with its human death toll and the dispersion of a large part of the reactor core into the environment, raised a large number of problems of management not only for the treatment of severely exposed persons, but also for the decisions that had to be taken affecting the population. Clearly, the national authorities were not ready to manage an accident whose consequences were not confined to their territory.

During the Chernobyl accident large areas of semi-natural ecosystems were affected by radionuclide deposition. Meadows and forests are typical semi-natural ecosystems. Meadows are used extensively in many countries as pastures for cattle, sheep and goats, while forests are important to man since they provide wood, paper, wild berries, mushrooms, game and recreational areas. Post-Chernobyl investigations have shown that dose to man from semi-natural ecosystems are relatively greater than from agricultural systems and that this dose risk persist for the long-term.

Fifteen years later, many improvements in radiation protection and emergency preparedness have been made possible by the Chernobyl experience and we are also to arrive at a more accurate assessment of the impact of this accident. The fact remains that the future consequences in terms of health effects remain imprecise for simple technical reasons and because of this, lend themselves to a competition between those who want to minimize the consequences of the accident and those who which to promote a catastrophic assessment.

Studies carried out since the Chernobyl accident has increased the understanding of radionuclide behavior in semi-natural ecosystems, especially for boreal forests and middle European meadow systems, which have been extensively investigated. Data sets have been obtained which describe the distribution and the cycling of radionuclides (especially ^{137}Cs and ^{90}Sr) within these systems.

A considerable amount of knowledge on the behavior of radionuclides in the environment and many different models describing such behavior were available of the time of the Chernobyl accident. Undoubtedly, in the post-Chernobyl situation radioecology is in a better position because the description of the environment is presently much closed to reality and its conclusions much more reliable.

Therefore, the subject of environment radioactivity has aspects of vast dimensions and the task of bringing together the pertinent information in so many diverse disciplines proved to be not without its difficulties. The text should be concerned primarily with the behavior of radioactive. The important and elaborate technology by which passage of radioactive materials to the environment may be prevented and the equally important field of health physics that is concerned with protecting the atomic energy worker were thus placed beyond the bounds of this work.

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