A METHOD FOR THE EVALUATION OF THE CS-137 INGESTION FOLLOWING THE CHERNOBYL ACCIDENT

*G. INGRAO, *F. BREUER, **G.P. SANTARONI
*ENEA (Italian Committee for Research and Development of Nuclear and Alternative Energies) C.P.
2400, 00100 Roma, Italy
**Instituto Nazionale della Nutrizione, via Ardeatina 546, 00179 Roma, Italy

(Received July 4, 1989)

This paper gives the average ingestion levels of $^{137}$Cs, released during the Chernobyl accident, for three population groups living in different regions of Italy. The ingestions were determined experimentally by measuring reconstructed total diets that were collected in the three areas.

A comparison between this data and the ingestion levels, estimated by using the $^{137}$Cs concentration levels measured in single food products and the national food consumption data, shows that the last method over-estimates the ingestion.

Finally, it is shown that the ingestion levels of $^{137}$Cs, as determined by measuring the reconstructed total diets, the internal body burden as measured directly by whole body counting, and urinary excretion are consistent.

INTRODUCTION

During the first phase of a serious accident at a nuclear facility resulting in a substantial release of radioactive material in the atmosphere, inhalation is the main source of internal contamination to the population. Over time, when the radioactive contaminants have been transferred from the atmosphere to the soil, due to the wet and dry deposition, the food chain becomes the primary route of intake of radioactive elements into the human body.

A reliable estimate of the body burden and, consequently, of the committed dose depends on the availability of accurate data on the ingestion levels of radioactive elements contained in the diet consumed by the population. To obtain an estimate of these levels, one can use data on the average national consumption of the various single food items composing the diet and the available concentration levels of radioactive elements measured in those foods. This method, although useful for giving a rough estimate of the ingestion, may not be very accurate because it does not take into account the different local dietary habits and the various washing and cooking treatments that single food items undergo before consumption. Measuring the concentration of the radioactive elements in the actual total diets consumed by the population group under consideration is a more effective method.
The release of radionuclides from Unit 4 of the Chernobyl nuclear power station did not occur in a single massive event during the first day of the accident. About 75% of the total release occurred as a protracted process during the following nine days. Due to the meteorological conditions in Europe during that period, the radioactive contamination of the Italian territory was caused primarily by the releases from the Chernobyl reactor on 28 and 29 April. The radioactive cloud, caused by these releases, reached Northern Italy on 30 April and, during the following days, affected the remaining Italian regions (Figure 1).