COLLECTIVE DOSE COMMITMENT IN SWEDEN AFTER THE CHERNOBYL ACCIDENT CALCULATION FOR INHALATION AN EXTERNAL IRRADIATION

Robert Finck, Kay Edvarson, Lars-Erik De Geer,
Björn Bjurman, Ingemar Vintersved, Rune Arntsing and Siv Jacobsson
National Defence Research Institute,
FOA 215 Nuclear Detection,
P.O. Box 27322, S-102 54 Stockholm, Sweden

ABSTRACT

The collective committed dose to the Swedish population from the Chernobyl accident has been estimated from a large number of measurements of radionuclides in air and on the ground. The calculation is, besides a number of teoretical assumptions, based on three types of measurements carried out during the first year after the accident.

1. Particulate air activity from six high volume air filter sampling stations.

2. In situ high resolution gamma spectrometry at selected sites representing the different fallout compositions.

3. Gamma spectrometry of total Sweden by aircraft carried sodium-iodide spectrometer.

The collective committed dose to the Swedish population has been estimated between 4000 and 6000 manSv, foodstuffs excluded. Around 20 % of the collective dose is received during the first year. The contribution to the collective dose commitment from inhalation and external cloud radiation is small.

The collective dose commitment is dominated by the ground deposited cesium-134 and cesium-137 isotopes. In wet deposition areas up to 80 % of the dose equivalent during the first year is due to cesium isotopes. In dry deposition areas the relative composition of radionuclides is different from the wet deposition areas and the cesium contribution is lower.

The average dose commitment to the Swedish population is around 0.1 - 0.5 mSv during the first year and 0.7 - 4 mSv during the first 50 years.

The dose commitment from Chernobyl can be compared with the dose commitment from ground deposited cesium-fallout from nuclear atmospheric tests during the next 50-year period. The fallout dose is 0.26 mSv, which corresponds to a collective dose of 2170 manSv in Sweden.