USING SOIL-TO-PLANT TRANSFER TO IDENTIFY AREAS VULNERABLE TO RADIOCAESIUM DEPOSITION IN WESTERN EUROPE

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Following the deposition of radionuclides from a nuclear accident some geographical areas may be more vulnerable to radioactive contamination than others. Differences in soil type and agricultural practice across Europe will influence the importance of such areas as sources of contaminated foodstuffs. This poster will introduce the concept of applying the critical load methodology within radiation protection for the rapid identification of areas, which may be vulnerable to the deposition of ^{137}Cs following an accident. This vulnerability can be defined in terms of elevated levels in food products or elevated fluxes.

It has frequently been reported that the rates of uptake of radiocaesium from soils with a high clay content is lower than from soils with a coarser textural composition and a high organic matter content. It is therefore important to be able to quantify the rates of transfer of radiocaesium from different types of soil. Tag values have therefore been collated from the literature into a database and allocated to one of four soil groups reflecting differences in radiocaesium soil-to-plant transfer. The collated Tag values have been used to estimate representative transfer values for each of the four soil groups.

The critical load methodology is based upon the principle that if the sensitivity of an ecosystem to a pollutant is known, it is possible to determine the *critical load* - the maximum pollutant load that will not cause long-term damage. The spatial variation in critical load across an area can be compared to pollutant deposition data to identify areas where the deposition load exceeds the critical load. Adopting this approach within radiation protection could provide rapid assessment of the potential effects of deposition resulting from nuclear releases.

The potential of such an approach is illustrated using the example of ^{137}Cs contamination of cow milk in Western Europe following a hypothetical nuclear accident. A Geographical Information System (GIS) is used to integrate the spatial variation in deposition, transfer and production. Critical loads are developed in terms of the ^{137}Cs activity concentration in cow milk and the ^{137}Cs flux from an area. These highlight the relative simplicity of the methodology for the rapid identification of vulnerable areas, which could also be adopted as a useful modelling tool allowing a consideration of different contamination and response scenarios.