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Time-dependent environmental transfer parameters of radionuclides released from Fukushima nuclear accident to the environment

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Due to the accident at Fukushima Daiichi Nuclear Power Station in 2011, a huge amount of radionuclides, e.g., I-131, Cs-134, Cs-137, were released to the environment.

Key radionuclides are similar to those from Chernobyl, BUT from a radioecological point of view, the accident consequences differed because:

- Climate and agricultural systems are different
- The marine environment was directly contaminated
Experience after Chernobyl needed to be considered to extract valuable, relevant environmental transfer parameters

- especially in the short-term after the accident to aid in determining the effect of the contamination on humans and the environment.

Were various assumptions that transfer parameters derived after the Chernobyl accident applicable to the Fukushima scenario correct?

Can we apply the environmental transfer parameters obtained after Chernobyl to the Fukushima case?
Aims and Objectives

- To collate time-dependent environmental parameters reported after the Fukushima accident
- Provide data in a transparent, readily available format to member states
  - Allowing obtained parameter values to be easily incorporated into predictive models
  - Greatly enhancing the reliability of assessments made in the emergency phase
- Enhance comparison of radioecological data within and outside of Japan
  - Contaminated area around the Fukushima Daiichi NPP varies from flat to mountainous areas with highly variable vegetation characteristics.
  - Data are needed which allow a comparison of the difference between sites within Japan
  - Data outside Japan can be compared and to be put into context with data from Japan.
Main working steps

- Focus on selected parameters in TRS 472 (terrestrial and freshwater environments), TRS 422 (marine environment) and TRS 479 (wildlife). These parameters should incorporate related factors such as soil type, age, etc. where available.

  - Soil to plant transfer
  - Interception of direct deposition and subsequent uptake into plants (foliar uptake)
  - Transfer to farm and game animals and wildlife (including marine)

Selected Parameters

Parameters from Fukushima
• Agricultural systems are an important concern for Japan especially rice paddy fields which occupy large areas in Japan.
• Rice is a staple food in Asian countries.
• Important to obtain well characterized parameter values which incorporate observed variability in transfer to rice.
• Freshwater ecosystems (river/pond) are an integral part of rice production as these are used for irrigation.
• Radionuclides are present in irrigation water; $K_d$ in freshwater is necessary.
Main working steps

- Other parameters such as
  - interception, soil-solution distribution, concentration ratio between soil and wild animals/plants, effective half-lives for plants and animals (terrestrial, freshwater and marine), will also be reviewed where possible.

- The focus will be prioritised after group discussion.

- To fully learn from the Fukushima accident we also need to discuss and document “what we did not know” in relation to the required radioecological parameters.
Expected results and benefits

• The reviewed data will be summarized as
  • paper(s) in international journals with associated data sets published with doi’s;
  • the original data sets will be provided as a TECDOC.

• Consequently, member states will have easy access to the data to be used as reference values for dose assessment after a nuclear accident.