# Radionuclides Contamination within 60 km from the Fukushima Daiichi Nuclear Power Complex after the Accident on March 11, 2011

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## 1. Introduction

A large area of the northern part of Japan has been contaminated by the FDNPC accident on March 11, 2011 and a dense deposition occurred at Fukushima area, especially from the FDNPC toward northwest direction due to the precipitation. The purpose is to make clear the radioactive contamination at Fukushima area.

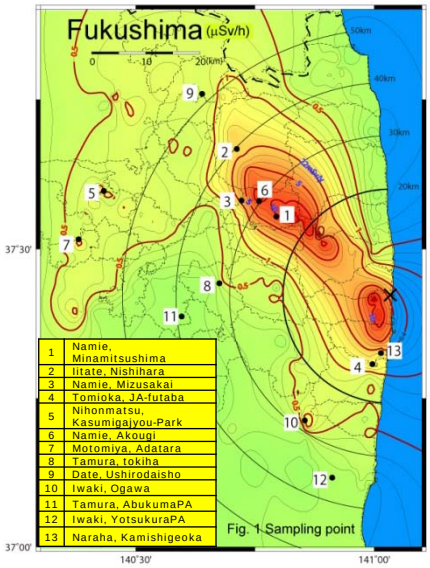
## 2. Experimental

Soil and vegetation samples were collected on April and June, 2011 at several points within 60 km from the FDNPC. Activity of the samples was determined by Ge detectors and decay corrected to the sampling date. The sampling points were shown in Fig. 1 with radiation dose rate on April, 2011.

## 3. Results and Discussion

### 3.1 Activity in soil

On April no green vegetation covered on soil surface. The soil core 0-5cm depth taken on April showed several kinds of radionuclide as shown in Fig. 2. The contamination level is distributed in a wide range depending on the sapling points. The radionuclide was observed mostly in 0-3 cm layer on April and at higher level in the surface litter (Fig.3). No clear down word movement was observed after 2 month (June) as shown in Fig. 4.



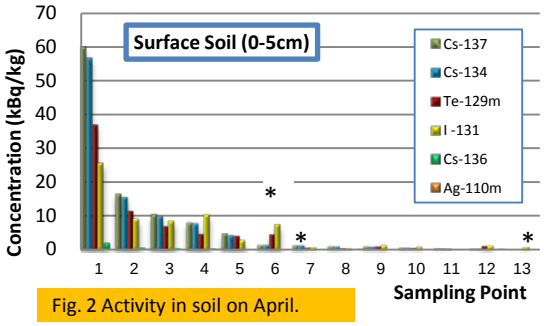




Fig. 2 Activity in soil on April.

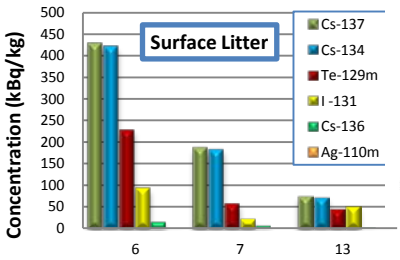



Fig. 3 Activity of Surface litter on April

### 3.2 Activity at sampling point (#6)

Vegetation covered soil surface on June as seen in pictures of the sampling point (#6) which is 24 km northwest from the FDNPC. This point has confirmed considerable deposition of radionuclide. Absorption of radionuclide by vegetation through root and leaf surface contamination was confirmed by imaging plate technique (Fig.5). The radionuclide of leaf, stem and surface litter is shown in Fig. 6 suggesting a large transfer of radionuclide to vegetation. The distribution estimated is shown in Fig. 7. Total inventory on June is 2300 kBq/m$^2$ for Cs-137 and 2100 kBq/m$^2$ for Cs-134.


Fig. 5 Activity Imaging of vegetation on June

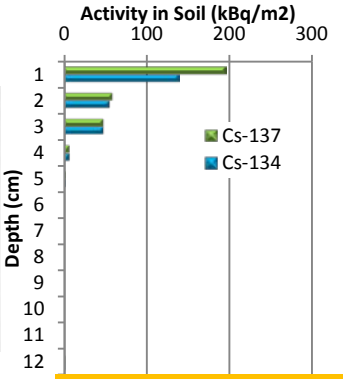



Fig. 4 Soil core (#6) in June

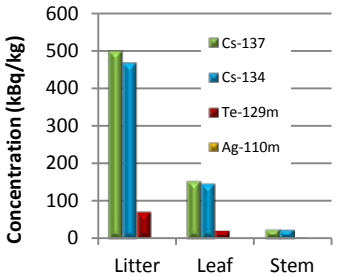



Fig. 6 Activity of vegetation and litter

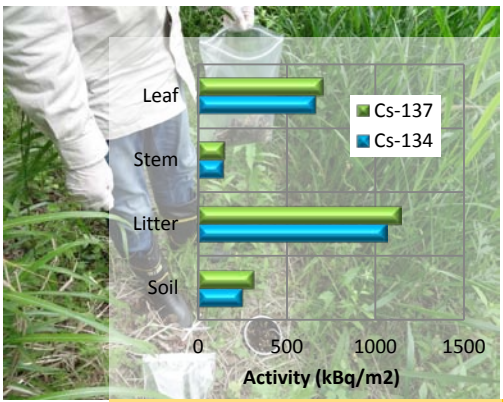



Fig. 7 Distribution of activity on June

## 4. Conclusions

i. Contamination of soil is wide within 60 km from the FDNPC. The highest difference on April was more than 500 times.
ii. Radionuclide distribution in soil is limited in 0-3 cm on April and 0-5 cm on June.
iii. Cs isotopes were absorbed by vegetation grown after the accident.
iv. The inventory distribution of Cs isotope is 50% in surface litter, 10% in soil and 40% in vegetation.