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Measurement of Iodine-129 concentration in environmental water samples around Fukushima area - Role of river system in the global iodine cycle

Hiroyuki Matsuzaki (1), Hironori Tokuyama (2), Yasuto Miyake (2), Maki Honda (3), Takeyasu Yamagata (4), and Yasuyuki Muramatsu (5)

(1) Department of Nuclear Engineering and Management, School of Engineering, The University of Tokyo, Tokyo, Japan (hmatsu@n.t.u-tokyo.ac.jp), (2) Department of Nuclear Engineering and Management, School of Engineering, The University of Tokyo, Tokyo, Japan, (3) Graduate School of Integrated Basic Sciences, Nihon University, Tokyo, Japan, (4) College of Humanities and Sciences, Nihon University, Tokyo, Japan, (5) Department of Chemistry, Gakushuin University, Tokyo, Japan

According to Fukushima Dai-ichi Nuclear Power Plant (FDNPP) accident, vast amount of radioactive nuclides including radioactive iodine were spilled out into the environment. There is no question about that detailed observation of distribution of radioactive nuclides and evaluation of the radiation exposure of residents is extremely important. On the other hand, from the view of an elemental dynamics in the environment, this event can be considered as a spike of the radioactive isotope. It is also the case for the iodine. A rare isotope Iodine-129 was widely distributed in a very short time by the FDNPP accident. Iodine-129 directly landing on the soil surface had been trapped in the upper layer of the soil and the depth profile should indicate the migration in and the interaction with the soil. If Iodine-129 was trapped in the woods, it seems to take rather longer time to landing on the ground. Either way, a certain portion of the Iodine-129 should be moving downward and finally washed out by the groundwater or river with a certain rate and transported into the sea. The concentration of Iodine-129 in environmental water samples taken from rivers and ponds are considered to reflect the iodine transportation process by the fluvial system. For the detailed discussion of the role of the fluvial system in the global iodine cycle, Iodine-129 concentration of various water samples collected from Fukushima area was measured by means of Accelerator Mass Spectrometry. The results ranged from 3E06 atoms/L to 3E09 atoms/L. Samples from Abukuma area (South West of FDNPP) showed lower concentration. On the other hand, samples collected from North West part (Iitate village and Minami Soma region) showed higher concentration (more than 1E8 atoms/L). Delayed enhancement of Iodine-129 concentration over a year in river systems surrounded by woods was also observed which is considered to correspond to the delayed release from the woods.