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福島第一原子力発電所の事故で発生した放射性廃棄物の処理・処分に内在する課題
Problematics in treatment and disposal of the radioactive waste produced by accident at Fukushima Daiichi NPP

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The Fukushima Daiichi nuclear disaster is a series of equipment failures, nuclear fuel meltdowns, and releases of the fission products and feasible neutron activated nuclides to the environment at the Fukushima Daiichi Nuclear Power Plant (NPP), following the 9.0 magnitude east-Japan earthquake and the ensuing tsunami on 11 March 2011. As the result of radionuclide releases, the soils, water, foods, building wall and road in Fukushima were widely contaminated with the radionuclides, especially ^{134}Cs and ^{137}Cs. Although it is urgent to figure out how radioactive materials were spread not only in the area close to the nuclear reactors but also over surrounding, rather wide district, decontamination methods of the radionuclides should be considered to reduce the public health impact and to regain their daily life. While the public health impact appears to have been low, the economic and nearby environmental consequences are severe. There is no doubt that land restoration will take over a decade and perhaps much longer. However, we have to work on the decontamination of radioactive cesium without further delay to take back daily life to the inhabitants in Fukushima. For the efficient decontamination, we have to understand the followings concerning the radioactive cesium in the environment: 1) distribution by environmental monitoring, 2) state (water extractable, cation exchangeable, passive states, and so on). During the operation of decontamination, huge amount of the waste with radioactivity will be produced. Therefore, the method of decontamination should be connect with how to disposal of the waste.

On the contrary, in the site of Fukushima Daiichi NPP, there is also huge volume of radioactive waste such as cutting down trees, debris produced at hydrogen explosion, adsorbents used in the decontamination system for water using in ”feed and bleed” cooling of the reactor core. For the cutting down trees and concrete debris, the reduction of their volume will be a required action. Development of technology therefore will be necessary for safety and reasonable combustion and surface decontamination. Various kinds of adsorbents such as synthetic zeolites and ferrocyanide compounds have been used in the Cs decontamination system for the cooling water. Multi-nuclide Removal Equipment (ALPS) will be operated so that the radioactivity of the 62 nuclides in the cooling water want to be reduced to below the limit specified by the reactor regulation. In the ALPS system, various kinds of adsorvents such as ferric hydroxides, carbonates, active carbon, titanate, and resin will be used. After using those materials, we have to hold huge volume of the waste contaminated with various kinds of radionuclides. These wastes are more complicated to treat and dispose than adsorbents from Cs decontamination system for the cooling water because more complicated radionuclides should be contained in the wastes. For the present, however, it is still ambiguous for the treatment and disposal because there is no information about the following; what radioactive nuclides are contained and how much their concentration are. Consequently, we have to go ahead for treatment and disposal of the waste without sufficient information about the contamination.

In this presentation, the present status of the actions and inherent issues in decontamination of the radionuclides and safety waste disposal during the decontamination would be informed and discussed.

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