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Removal of radioactive iodine and cesium in water purification

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ABSTRACT

Radioactive iodine, one of the radionuclides released in the nuclear power plant accident on 11 March 2011, was detected in purified water at water purification plants (WPPs). However, information about removal of radioactive materials in actual water purification process was limited. Therefore, we investigated the removal of radioactive materials (iodine and cesium) immediately after the detection. It is found that non-radioactive iodine in water could be removed by the combined use of pre-chlorination and powdered activated carbon (PAC) treatment. The same result was also obtained in terms of radioactive iodine. Removal of non-radioactive iodine in WPPs was also investigated. Approximately, 60% of iodine was removed by combination of pre-chlorination (0.5–1.0 mg/L) and PAC (15–30 mg/L) in coagulation and sedimentation processes. In water purification process, cesium was mostly removed by coagulation and sedimentation; hence, radioactive cesium was not detected in purified water. It was confirmed that a thorough turbidity control is essential for the prevention of radioactive cesium contamination of purified water. Meanwhile, radioactive iodine in purified water has not been detected since 5 April 2011 and radioactive cesium since 22 March 2011, when the measurement was commenced. Moreover, dehydrated sludge including radioactive cesium has been treated in accordance with Japanese laws and regulations.

Keywords: Coagulation and sedimentation process; Pre-chlorination; Powdered activated carbon; Radioactive iodine; Radioactive cesium

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