Decontamination of the contaminated water by the Fukushima nuclear accident.

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[Introduction]
A lot of radioisotope was emitted by the accident of the first nuclear power plant in Fukushima in an East Japan great earthquake, and high-concentration contaminated water flowed into the sea. It aims at purifying the water polluted with the radioisotope emitted in the accident of the first nuclear power plant of Fukushima. And it aims at securing safe drinking water and life city water, and preventing contamination.

[Methods]
Water was extracted from the 25m swim pool of the first junior high school of Koriyama in Koriyama city, Fukushima Prefecture. The depth of a swim pool is 1.3 m at the maximum. The swim pool for comparison is a 50m swim pool of the Kaisei mountain park, and the depth is a maximum of 1.6 m. The activated carbon filter (stem 2 type) by Chisso Filter Co., Ltd., the ion-exchange resin (Amberlite MB-2) by ORGANO CORPORATION, RO (Reverse Osmosis) reverse osmosis membrane (ESPA-1812, ESPA-4021) made from Hydranautics Corporate was used as a water-purifying filter which verifies water disposal technology. The activated carbon filter was shown in Fig.1.

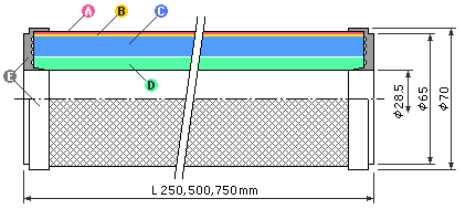

Fig.1 The activated carbon filter
(A) Outer layer protection net (B) Primary filter
(C) Adsorption layer (activated carbon particle size)
(D) Secondary filter (E) Gasket

Photo.1 The ion-exchange resin (ORGANO CORPORATION)

The third layer is secondary filtration and collects detailed particles with CP filter. The ion-exchange resin for tap water was shown in Photo.1. Basic structure is a styrene system and is the reproduced type mono-bed resin which set the rate of positive ion exchange resin and anion exchange resin to 2 to 1. Density is 705 g/liter. RO reverse osmosis membrane used the home small RO film and industrial RO film, as shown in Fig.2. Configuration is Spiral Wound and Membrane Polymer is Composite Polyamide. Maximum Feed Flow is 11litter per minute. In order to compare with what measured the activity concentration of raw water 500 ml by Becquerel-Monitor, measurement also with same water that let each filter pass was performed. The sediment is also contained in the extracted water and quantity of treated water was set to 50 liter.

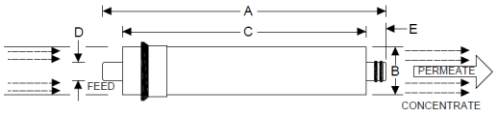

Fig.2 The home small RO reverse osmosis membrane
A, inches (mm) 11.74 (298) B, inches (mm) * 1.78 (45.2)
C, inches (mm) 10.0 (254) D, inches (mm) 0.68 (17.3)
Dry Weight, lbs. (kg) 0.5 (0.23)

[Results and Discussion]
The ratio in comparison with the radioactivity per water 1 liter and raw water which were purified by the all directions method is described in Table 1. The raw water of the first junior high school of Koriyama is 287.7 Bq/liter, and the activity concentration using an activated carbon filter decreased 13.3%. The activity concentration using an ion-exchange membrane was 79.1% reduction in the object for soft water 72.2% at the object for pure. However, with the Phil Tong stone, it became 3.8% of increase. The raw water of the Kaisei mountain park is 71.7 Bq/l and low concentration, and the activity concentration using an activated carbon filter decreased 41.1%.

Table1 The purification result of the swim pool of the first junior high school of Koriyama

	Raw water	The activated carbon filter	The industrial RO reverse osmosis membrane	The home small RO reverse osmosis membrane	The filton stones
Activity concentration	287.7 Bq/l	249.3 Bq/l	80.0 Bq/l	60.0 Bq/l	298.7 Bq/l
Ratio	100%	86.7%	27.8%	20.9%	103.8%

Table2 The purification result of the Kaisei mountain park swim pool

	Raw water	The activated carbon filter	The industrial RO reverse osmosis membrane	The home small RO reverse osmosis membrane	The filton stones
Activity concentration	71.7 Bq/l	42.3 Bq/l	0.0 Bq/l	0.0 Bq/l	39.0 Bq/l
Ratio	100%	41.0%	0%	0%	54.4%

As for the activity concentration using an ion-exchange membrane, the object for pure and the object for soft water decreased 100%. The Phil Tong stone was 45.6% of reduction.

[Conclusion]
Although it aimed at purifying radioactive contamination water using a purification filter, it suggested that it could purify efficiently by an ion-exchange membrane. It became clear that there is a purification system chosen by activity concentration.