

Radiation Protection (Wednesday, February 12, 2014 11:30)

Fukushima Update and Current Status

T. Suzuki

International Atomic Energy Agency, Vienna, Austria

On 2nd Apr. 2011, highly contaminated water which flowed into the cable trench of unit 2 brought ambient dose rate up to 1,000mSv/h at the cable pit near the sea water intake of the unit. This was the first sign of the leakage of contaminated water.

As for the alternative water injection by fire engines to the reactor pressure vessel (RPV), the majority of injection volume streamed into the steam condenser as a bypass flow through the water seal of the low-pressure condensation pump. Nevertheless, a large quantity of seawater was injected into RPV, which flowed into the basement of the turbine building (T/B) via gaps or cable penetrations. For example in unit 3, this highly contaminated water did not exist until 23rd Mar.2011, and “lukewarm water” which three workers felt around their ankle on the next day during their cable repair work in the basement floor was the very thing. From a measurement right after that, the surface dose rate of the water was found to be approximately 400mSv/h in unit 3 and above 1000mSv/h in unit 2.

The gross volume of the highly contaminated water stagnating in the basement of R/B, T/B, C/B, Rw/B of unit 1 to 4 by 29th Oct.2013 is 80,900 tons and 19,120 tons in process main building and high temperature incinerator building of centralized radioactive waste treatment facility.

Furthermore, stagnating water of the same concentration exists in the cable trench of unit 2.

On the other hand, the cooling of fuel debris is continuing by two water injection systems, core spray (CS) system and feed water (FDW) system, in RPV. The water which contributed to the cooling falls to primary containment vessel (PCV) through the damaged RPV bottom and cools the fuel debris which dropped into PCV. It makes the temperature keep less than 30°C-40°C at the RPV bottom and 35°C-45°C in the PCV. A circulation cooling system in which Cesium is adsorbed after oil separation process and Strontium is eliminated by reverse osmosis membrane and the distillation process is used for this injection.

As 1,000 tons of groundwater flows per day through the permeable layer from the mountain side to the sea side, 850 tons of water was drawn a day from sub-drain in order to control the groundwater level to keep lower than the foundation of buildings in Fukushima Daiichi Nuclear Power Station before the accident. However, with the loss of the sub-drain function, the groundwater level rose, and approximately 400 tons per day flows into the basement of buildings after the accident. Therefore, in a day, 770 tons in conjunction with 370 tons of fresh water to use for RPV cooling became targeted for the treatment of circulation cooling system. As a result, concentrated contaminated water (mainly Sr-Y) is produced 400 tons every day from the desalination process.

This groundwater inflow will be settled if the level is lowered by pumping-up but the present condition also prevents contaminated water stagnating inside the basement from draining into the groundwater.

Accordingly, a production of two storage tanks (1,000 tons ea.) per day in average may be indispensable for the time being. Leaks of Strontium contaminated water, the concentration of which was 20kBq/cm³ occurred from a flange type tank which was made in earlier period for this purpose.

The final solution for this is supposed to be full operation of sub-drain with complete repair of the PCV boundary. So various kinds of measures are in progressing towards the destination.