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TEPCO's post-mortem shows No. 2 reactor main source of radiation

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Tokyo Electric Power Co. has come up with a new mind-boggling figure to explain the amount of radiation that spewed in the three weeks following the Fukushima nuclear disaster last year.

It is 900 quadrillion becquerels: That's 17 zeros (a quadrillion is one thousand trillion).

The latest figure, announced May 24, reflects findings by TEPCO a little more than a year after the crisis triggered by the Great East Japan Earthquake.

It is also about 1.2 times the estimate of 770 quadrillion becquerels made last June by the Nuclear and Industrial Safety Agency and represents about 17 percent of the volume released in the 1986 Chernobyl nuclear disaster.

The radiation was primarily released by the stricken No. 2 reactor of the Fukushima No. 1 nuclear power plant. This would explain the high levels of contamination found in an area to the northwest of the Fukushima No. 1 plant on March 15, 2011, four days after the Great East Japan Earthquake that triggered the disaster.

TEPCO also said a large volume of radioactive materials was released in the direction of the Pacific Ocean the following day. Although it is unable to pinpoint the source, it said the No. 3 reactor was the most likely culprit.

The volume of radioactive materials released between March 12 and March 31, 2011, was calculated on the basis of figures for airborne radiation levels detected in the vicinity of the Fukushima No. 1 plant.

A breakdown by source of the contamination showed that 130 quadrillion becquerels were released from the No. 1 reactor, 360 quadrillion becquerels from the No. 2 reactor and 320 quadrillion becquerels from the No. 3 reactor. While no radioactive materials are believed to have been emitted from the No. 4 reactor, TEPCO was uncertain of the source for 110 quadrillion becquerels.

Around 9 a.m. on March 15, 2011, a monitoring post by the main gate of the plant recorded the highest radiation level of 11,930 microsieverts per hour.

TEPCO officials said the high radiation level detected must have come from the No. 2 reactor because the pressure within the containment vessel, where a meltdown had occurred, fell sharply.

That would imply that around 40 percent of the radioactive materials from the No. 2 reactor was released March 15.

TEPCO officials suspect the radioactive materials leaked from cracks in the containment vessel.

Because venting at the No. 2 reactor did not pass through water as in the No. 1 and No. 3 reactors, radioactive materials from the No. 2 reactor spewed directly into the atmosphere from the cracks in the containment vessel.

A wind was blowing from the southeast at the time, sending radioactive materials in a northwesterly direction from the plant.

Radioactive materials contaminated the soil as rain fell on the evening of March 15.

TEPCO officials also believe a large volume of radioactive materials was released from the No. 3 reactor on March 16. They said pressure within the containment vessel also fell at that time, but so far no one knows precisely what happened within the No. 3 reactor.

This could be important because an estimated 180 quadrillion becquerels in terms of radioactive iodine spewed out between 10 a.m. and 1 p.m. on March 16, making it the largest amount released.

The wind was blowing out to sea and there was no rain, so the radioactive materials likely did not contaminate the soil.

TEPCO officials also analyzed the release of radioactive materials into the ocean between March 26 and Sept. 30 of last year. The estimated amount was 11 quadrillion becquerels of iodine and 7.1 quadrillion becquerels of cesium. No data exists for the period between March 11 and March 25 because TEPCO did not begin collecting data for radiation levels in the ocean until March 26.

The estimates made by TEPCO also indicate that venting to lower pressure within the containment vessels played a key role in determining the level of radioactive materials released.

While venting was carried out at the No. 1 and No. 3 reactors before hydrogen explosions at the two reactor buildings on March 12 and March 14, respectively, venting was not done at the No. 2 reactor, which discharged the largest volume of radioactive materials.

Although the emergency core cooling mechanism was in operation the longest at the No. 2 reactor, among the No. 1 to No. 3 reactors where meltdowns occurred, officials as of noon March 14 could not confirm that cooling water continued to be pumped into the No. 2 reactor.

From the evening of March 14, pressure within the No. 2 reactor containment vessel rose sharply. Due to concerns about an explosion and massive leaks of radioactive materials, TEPCO began to consider whether to evacuate its workers.

An explosion at the No. 4 reactor building around 6 a.m. on March 15 made it much more difficult to determine what was happening inside the No. 2 reactor.

At about 8:30 a.m. on March 15, white smoke was detected from the upper wall of the No. 2 reactor building. Pressure within the containment vessel also dropped sharply.

However, venting of the gases through the water of the suppression chamber did not work. The valve itself was not working properly, partly due to insufficient air pressure to open the valve. While an attempt was made to directly vent gases from the containment vessel into the atmosphere, officials were unable to determine if the effort was successful.

TEPCO officials have no explanation for the failure of the venting.