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The nuclear power plant disaster accompanying a great earthquake and the plan to avoid the disaster

Kozo Takahashi[1*]

[1]None

Nuclear disaster: Luckily or unluckily, we have already experienced nuclear accidents which suggest enough the nuclear disaster.{cr/}

On March 28, 1979, at nuclear reactor No.2 of Three Mile Island, the core meltdown started six minutes after the fault of the main pump, because the outlet of the backup pump was closed. The evacuation in wide area carried out, because it was feared that both pressure vessel and reactor vessel would explore, and that radioactive dust would fall there, though the radiation was limited as the emergency core cooling system (ECCS) was intermittently operated.{cr/}

This accident shows that the nuclear disaster may happen, even if the reactor is not operating.{cr/}

On April 26, 1986, at the reactor No.4 of Chernobyl small nuclear explosion occurred when it started to insert all reactor control rods after the experimental operation at extremely low output power. {cr/}

This disaster shows that the nuclear explosion may happen when a serious fault occurs or maloperation is carried, during the reactor is operating.{cr/}

A standard 1Gw nuclear power plant (NPP) of Chubu Electric Power Co. at Hamaoka Japan, for example, when the acceleration of more than 0.15g is sensed, automatically inserts all control rods in 1.5 secs and stops the reaction before a S wave arrives.{cr/}

Hamaoka plants can resist the shock of up to 2g. But we have experienced more than 2g. In S. Iwate Pref. Eq. (2008/06/13, M: 7.2, Depth: 8km), Tsubakidai St., which is located at the epicentral distance of 19km and at the hypocentral distance of 20.6km, observed the maximum acceleration of 4.1g. The distance between Hamaoka and the top surface of Philippine Sea Plate (PSP), where a great earthquake may occur, measures 15 - 20km. So, it is possible that Hamaoka plants experience more than 2g, and then main pipes are broken, and the loss of cooling water starts, though an ECCS is equipped to avoid the loss, because both probabilities of the break and the failure of ECCS are nearly the same. When cooling water leaks in large quantities, the core meltdown starts in a few minutes, even if the reaction has been stopped then, both pressure vessel and reactor vessel explore, like the reactor of Chernobyl did, and it might happen that the half of our population needs to evacuate, depending on wind direction.{cr/}

In the case where main pipes are broken and the loss of cooling water starts, during the reactor is operating in full power, both pressure vessel and reactor vessel explore, which will be similar to a uranium bomb, and the magnitude of the disaster will be about 1000 times of that at Chernobyl. This is inferred from that at Chernobyl only one cell of 1661 cells explored.{cr/}

A plan to avoid the disaster: To avoid these disasters, it is necessary to predict great earthquakes. Before great earthquakes usually extraordinary electric fields have been observed. Before and after S. Suruga Bay Eq. (2009/08/11, M: 6.5, Depth: 23km), anomalous electric pulses were also found. In the case the prediction system that monitor the precursory pulses is established, which can use a lightning location system in common, when a great earthquake of more than magnitude 8 occurs, not only the disaster is prevented by stopping NPP following to the precursor, but also NPP can continue to operate without stopping the plant wastefully for long time when it is clear that the distance to the predicted source region is 100km or more, which is measured as the pulses are located at the accuracy of 10km, and that the magnitude, which is estimated from the quantity of the pulses, is less than 8.

Keywords: neuclear power plant disaster, great earthquake, earthquake directly under the plant