

“Disaster-resilient Waterworks Model” and the countermeasures against natural disasters examples

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On March 11th, 2011, the Great East Japan Earthquake occurred, and was the most powerful earthquake (Mw 9.0) ever recorded in the country. The huge quake and large tsunami hit the coastal area of the Tohoku and Kanto regions. The earthquake and tsunami caused extensive damage to a wide area. Many people lost their lives and there are people still missing, mainly in the coastal areas.

Four years after the Great East Japan Earthquake, the Third United Nations World Conference on Disaster Risk Reduction (WCDRR) was held in Sendai City in March, 2015. We held a Symposium for Water Disaster Risk Reduction as the official public forum of the 3rd WCDRR: Connecting all to the Water of Life, with participants from industry, government, academics, and citizens. At the symposium, we discussed about the “Disaster-resilient Waterworks Model” based on our disaster experience, and we proposed and published a model, the ‘Disaster-Resilient Waterworks Model for Connecting Citizens to the Water of Life’, which combines (A) Self-Help by individual citizens, (B) Mutual Help together with the local community, school and business, (C) Public Support from water suppliers, and (D) Cooperation with entire stakeholders including plumbing constructors and the national water network.

In this paper, we introduce The Model which we proposed at the 3rd WCDRR, and explain our measures against disasters which have been carried out at water purification plants, one of the most important facilities, and about emergency water supply. The following examples were chosen from some of the various disaster measure projects undertaken by the Sendai City Waterworks Bureau.

1. Countermeasure against disaster at water purification plants

Suspension of a water purification plant can cause large-scale water cut offs, so it is necessary to take countermeasures to maintain the water purification function even in times of a disaster.

1) Reinforcements for an earthquake-resilient water purification plant: we confirmed the divergence between the result of the “earthquake-resilient” assessment conducted before the Great East Japan Earthquake and the actual damage. In response to the result, we re-examined the assessment method and are proceeding with reinforcing earthquake-resilient facilities and systems. The assessment is based on a dynamic analysis method that was evaluated as having a high reproducibility of the actual damage situation.

2) Measures against long power blackouts: at the time of the disaster, it was difficult for us to obtain fuel for operating emergency power generators at the purification plant due to long term power outages (maximum time 98hours). Therefore, we have built more fuel tanks and so on to keep private power generators operating consecutively for 72 hours from the previous maximum duration of 24 hours.

2. Countermeasures against disasters on emergency water supply

Sendai City Waterworks Bureau conducts various projects as a countermeasure to immediately deliver water to citizens even when distribution facilities are damaged. Among them, two examples which have been carried out after the Great East Japan Earthquake are shown below.

1) Installation of emergency hydrants at the water purification plant to supply water to water supply trucks and utilizing them as a water supply hub : We have developed hydrants specially designed for water supply to water trucks, which enable us to supply water to various kinds of water trucks.

2) Emergency water taps: When the Great East Japan Earthquake, it was very difficult for us to open some water stations due to widespread water cut offs throughout the region and a limited number of available staff. Therefore, to prevent delay in taking action due to lack of human resources, in designated refuse areas, we installed “Emergency Water Taps” that can be opened and used by the citizens.