WaQuAC-NET
Water Quality Asian Cooperation Network

Number 10 28 May, 2011
For Safe Water, Do Network.

Special Issue on the Great East Japan Earthquake

We are deeply grateful to your warm sympathy for severe damage
by the unprecedented disaster in the northeastern of Japan.
We will do our best to help the victims and to restore stricken areas

WaQuAC-NET URGENT MEETING

Damage of Water Supply Facilities by the Great Earthquake and Support for the Stricken Areas ～From the site～

The wide area of northeastern part of Japan was damaged by huge disaster of earthquake and tsunami on 11 March 2011. Infrastructure including water supply in the area had damage severely, so many persons of waterworks have been dispatched to support recovery in the area. WaQuAC-NET planned the round-table discussion urgently with the persons who worked at the disaster-stricken area for rescue operation and tentative repair works, in order to know the actual situation and activity of rehabilitation assistance. This report is supposed to be an answer to whom the people in the world worried about us, and how we have struggled to recover from the tragedy. It is also targeted to be information sharing of the Japanese disaster relief.

The round-table discussion was held in Tokyo for three hours on 14 April, it was almost a month later of the incident.
The attendants are following 15 members.
Yokohama City Waterworks Bureau (YWWB):
Mr. Chiaki Suzuki, Mr. Toshiyuki Ushikubo,
Mr. Shinichi Sasaki
Saitama City Waterworks Bureau (SWWB):
Masahiro Shimomura, Mr. Tsutomu Murota,
Mr. Masayuki Nagashima
Japan Water Works Association (JWWA):
Mr. Masahito Watanabe, Mr. Yukio Kudo
Water Supply Network News: Mr.Gensuke Arimura
Organizer and member of WaQuAC-NET:
Mr. Shigeru Sugawara, Mr. Toshiki Horie
Ms. Keiko Yamamoto, Ms. Yasuko Kamegai.

Facilitator (Ms. Kamegai): Firstly, I would like to introduce Mr. Suzuki who has experiences on the disaster restoration of the Great Hanshin-Awaji Earthquake (Japan) and Sumatra Earthquake Indonesia), from YWWB.

Mr. Suzuki: 17～23/March (Restoration support for Hitachi City, Ibaraki Pref.)

Immediately after the earthquake, we worked for the restoration of supply area in Yokohama City for three days. After that, we went to Hitachi City. It was six days after the

earthquake to reach there. Even at that time, percentage of restoration on water supply was 30%, very low. The main reason was that a power failure lasted for two days after the earthquake. And people had lined up by 1~2 km to get water at the temporary water supply point. Our group consisted of 7 persons from YWWB and 12 persons from two construction companies, total 19 members. We divided into two sub-groups, one worked for repairing big diameter pipes (D700~ D200) and another for distribution and service pipes in the residence area. There was a place amalgamated several municipalities. Pipe materials were different from standards. Therefore, our work was so difficult. Especially, we had to work hard for procurement of big diameter pipe materials for repairing on the site. We asked the stocks to water sectors and shops in Kanto area (Metropolitan area). This time was different from before for us. We had to go to stricken area although our supply area had damaged. However, we have to overcome these situations together. I am going to go to support some neighbor countries if they would have a disaster.

Mr. Ushikubo: 3~7/April (Restoration support for Iwaki-City, Fukushima Pref.)

YWWB sent staff to Sendai with JWWA for first researching on 12 March. Continuously two teams were sent to two cities in Fukushima Prefecture for researching, ten teams to four cities (Urayasu City in Chiba Prefecture and others) for emergent supply water and 5 teams to three cities (Iwaki City in Fukushima Prefecture and others) for temporary repairs of pipes by now.

When I went to Iwaki City on 3 April, the restoration rate of water supply was 82% there. And then it had been improved to more than 90%. But the big aftershock occurred on 11 April and restoration rate fell down to 45%. We worked for repairing pipes in the center of city and suburb-agricultural area. We repaired 22 damaged points of PVC pipes which were D200~ D13 diameter, and detected 3,300 leakage points for five days. Iwaki City has used PVC and asbestos cement pipes which YWWB does not use. Fortunately, the construction company staff in our team could repair such pipes mostly. Two out of eight members in our team had experienced the past big earthquake restoration support. This support work was first experience for remaining six members. I think they had a very valuable experience.

Coming in contact with people directly in the repairing work and emergent supply of water, I realized the importance of our mission as staff of water supply utility once more. The experience of disaster support work such as leakage survey will be very useful for improvement of our technical ability and better service for our customers. My awareness as a member of water supply family has become strong.

Repairing work by Yokohama team at HITACHI

Iwaki City is located 40km from Fukushima Nuclear Power Station. All teams took Geiger counters for working there. Before going there, I worried the effect of radioactive contamination. We checked radiation at site, the Geiger counter showed 0.25 micro sievert around. And we were relieved to see it. I have experienced the support work for disaster of the Great Hanshin Earthquake (1995) and Mid Niigata Earthquake (2004). This restoration support was the third for me. The problem of radioactive contamination as secondary disaster caused delay to restore the neighboring area of the Nuclear

Power Plant. YWWB has been sending more than 100 staff members in total to stricken areas. This restoration support is very long compared with before. “Lesson learnt” is as following.

(1) To make a manual for restoration process

(2) To bring car-navigation, Instant noodle, heavy winter clothing, Internet available PC, and so on.

Mr. Arimura : Most of PVC-TS joint pipelines which were pasted at joint and old type were broken in the area where I studied. How was the distribution pipe network in Iwaki city?

Mr. Ushikubo: Some private pipelines were so long and/or installed in the same road. And also some pipelines were in the private land. Water supply utility did not know it. There, several different kinds of pipe materials had been used.

Ms. Yamamoto: How was relief system set up in YWWB?

Mr. Ushikubo: The leader and sub-leader are always appointed and for instance, our boss say go today, we can go. The age of team members is from thirties to fifties. Construction companies’ staff were also same ages.

Mr. Suzuki: The reason why Hitachi City water supply had big damages is that they had no experience of the disaster and did not replace the old pipelines. In addition of inexperience of the disaster, the number of technical staff in charge of distribution pipe network was only 11 persons and they could not control and implement a lot of requests to repair. It was so difficult to deal such big damages. It is very important for us to have experience to support other areas in emergency.

Facilitator: Next, I would like to invite Mr. Shimomura from SWWB

Mr. Shimomura: (Logistical support)

For three days after occurring big earthquake, most of customers' calls were information of leakage. We had damages by the earthquake. 200 leakages occurred in distribution and service pipes and an underground storage tank for emergencies had surfaced. And then, the planned blackout had started, we received the customer complaints on turbid water and insufficient water supply because customers opened their taps in same time when the electricity service re-started. We were so busy to answer the customer complaints. When Tokyo Metropolitan Waterworks Bureau announced radioactive contamination in the served water, we received more than one thousand inquiries a day.

For the emergent supply water support, SWWB sent staff teams to Nasu Town twice, Koriyama City once, Yaita City four times by the end of March. We finished these support once. But as an big aftershock occurred on 11 April, we have been sending in haste 10 staff with 4 water trucks to Iwaki City.

Emergency repair support was started on 23 March for Ishinomaki District Water Supply Authority with which we had an agreement of disaster support until last year. After we offered them to support, we sent 6 staff and continued to send fourth team. JWWA Hokkaido branch had already sent staff of Sapporo City WWB, and other two Cities’ WWB, and they had been working. We shared works. We find leakage points and they repaired these points. These support works finished yesterday. From tomorrow (15 April), we and Saitama City Pipe Construction Association together will go to support for the emergency repair works for heavily damaged area by Tsunami in Ishinomaki City newly. We have been sending support team with staff of the Pipe Construction Association to Iwaki City from 4 April. Now third team is working there. Support activities are conducted based on the request. So unless we receive request from damaged cities and towns, we have to wait for in stand- by. Sometimes we needed patient.

I felt a difficulty in arrangement between supporter side and local construction companies which had priority in Ishinomaki City and Iwaki City too.

Emergency water supply by staff of SWWB (at NASU-Town)

Mr. Murota: Emergent supply water for Yaita City, Tochigi Pref.

SWWB sent clerical job staff to stricken area for emergent supply water. I joined in the third team and 6 staff members went to Yaita City by two 2-ton water trucks and one sedan car. SWWB Team and YWWB team went there with pressure water supply trucks. Teams from two municipalities in Tochigi Prefecture were sent to Yaita City. We went to Yaita City Water supply and Sewerage Office first and then moved to the point which Yaita staff member designated. When I entered into Yaita City, I have seen broken roof tiles only. But, in certain residence areas along the national road No. 4, a lot of houses were utterly destroyed. SWWB team worked for the east side of the road and YWWB team for west side.

At 7:30 am we started to fill up water to the water trucks from fire hydrant in the office and we moved to a point of emergent supply water. Emergent supply water to people lasted from 8am to 7pm. In addition, we supplied water to receiving tanks of some hospitals and some small reservoirs by Pressure. It was daily routine schedule.

Mr. Arimura: Water truck with pressure was very useful at site, isn't it? How many water trucks with pressure do your bureau has?

Mr. Shimomura: Ten water trucks all are pressure type in SWWB

Mr. Suzuki: All of 19 water trucks have pressure supply system in YWWB.

Mr. Murota: When we went there, the needs for the water supply have changed because time had passed from the disaster occurrence. Just after the disaster, people needed emergent drinking water. But when we entered there, people needed water for washing and bathing. Amount of water per person use had increased. People coming to supply point were mainly women and elder persons. I really felt the vulnerable people in the disaster.

We went there not only supplying water but also carrying and lifting water containers. It was really hard works. People took water in the plastic bottles or 10 littler- polyethylene containers. 10 litters are equal to 10kg. It is heavy for elderly people. It is said people need 3 litters -water per person per day. And I felt keeping this amount of water in the home was so difficult. Our staff member made an attachment device for pouring water into plastic bottle and it made our work easier. There was no electricity in the supply points due to tsunami, we put revolving light on the top of truck for people to access easily to points at night. It was very good for us to take a generator and we could take warm meals and drinks. Staff members of SWWB had experiences for supporting the stricken area and victims by big disaster in turn. These experiences would be effective for improvement of emergency measures in Saitama City.

Mr. Nagashima: 28/ March ～ 3/ April (emergent restoration for Ishinomaki City)

Second team consisted of 6 members and went to Ishinomaki City Hall branch office. We put a mat on the floor and slept in the office. Our works were to survey leakage point and to report the result to the

headquarters office. As characteristics of the pipes, materials of transmission pipe (D200~D300) and distribution main (D150~D200) were DIC. Secondary pipe (D50~D100) was PVC. Pressure was 0.7MPa at the exit of water treatment plant. Distribution main installed in the both side of Kitakami River and pipeline was not installed in loop. Mapping software of Ishinomaki was the same as SWWB, so we tried to use it. But software capacity was not big and we could not see the necessary map. After all, we used drawing papers which were made in 2001 bringing to the site. These drawing papers were useful. There were not so many sluice valves and some pipelines installed in the rice paddy and flood plain along the river. It made us trouble to find location of pipelines. For detecting and repairing leakage points, it was necessary to repair pipes from upstream. Water suspension in some downstream area lasted for three weeks because there was broken pipeline in mid-stream and it took 3 days to repair temporarily. After that, we started detecting leakage points in downstream area. Leakage points detected were two in D200mm distribution main, six in distribution pipes and three in D75 steel pipes. We repaired one leakage point and filled water in the pipelines, and then leakage started in another points one after another. As judging way of leak or not, we checked water pressure at the fire hydrants. The several flow meters (integrating and instant flow indicator) along the pipeline were installed and they were very useful. Considering a point to be improved, I think it is difficult to hand over the support works to new team smoothly. For smooth hand over, staff should be changed half of members in the team and half continued. Or leader stayed longer than staff members.

Checking valves by Staff of SWWB (Ishiunomaki City)

Ms. Yamamoto: How do SWWB set up relief teams or logistic team?

Mr. Shimomura: SWWB selects leaders of relief teams just after the disaster and set up teams. SWWB is not so big organization and we can set up it quickly.

Mr. Arimura: How did you get fuel for the vehicles? In my case, gas station had sold by 2000 yen once or by 20 litters in Kurihara City and Tome City. In some cases, we could get high-octane gas without limitation.

Mr. Murota: Emergency vehicles had gotten priority to fill up gas (unnecessary to line up). But sometimes and in some places, the amount of gas was limited.

Mr.Suzuki: Hitachi City office had secured some gas stations for registered emergency vehicles.

Mr. Murota: When we went to Yaita City, we filled up gas to our water trucks and cars in the high way. During the stay in Yaita City, we could have priority to use gas station of 50m from the office. There were some gas stations closed by power failure.

Facilitator: Next is Mr. Watanabe who is in charge of commanding the disaster support system of Japan Water Works Association (JWWA).

Mr. Watanabe: 14~18/March (to Sendai city for researching and making support system)

There are 1400 waterworks utilities in Japan. Members of the Japan Water Works Association are 1300. JWWA set up the headquarters of disaster relief on 11 March, just the day earthquake occurred. And JWWA sent an advance team immediately. We received some request of support from damaged utilities on the day occurred the earthquake. We asked all waterworks utilities in

Japan to support the emergent supply water and temporary repairing the facilities.

More than 300 water trucks in maximum went to stricken areas from whole country and now 120 to 140 water trucks have been working in the first of April. JWWA made the report on emergency measures against earthquake after occurrence of Great Hanshin-Awaji Earthquake in 1995. This report was very useful for the restoration from the damages by the Mid Niigata Earthquake in 2004 and The Niigata-ken Chuetsu-oki Earthquake in 2007. We added these experiences and knowledge based on the report and made a Manual on emergency measures against the earthquake in 2008. This time, we carried out support work for the stricken water works bureaus / department based on the manual.

By now, we supported only damage of one prefecture, but this time, more than three prefectures got heavy damages, wide area disaster, So we modified support system of the manual for meeting actual situation.

Supports by the WWBs are basically emergent supply water and temporally repairing the facilities. Permanent repairing is a responsibility of the water works bureaus or departments damaged. Water Works Bureau / Department received the support bears the support activities cost (overtime pay, travel expenses, etc.) basically. Firstly both receiving utility and supporting utility make an agreement and start supporting work. There are utilities have the agreement between different cities usually. Sendai City has an agreement among the big cities (more than million population) and received some supports from other big cities too.

Facilitator: I would like to invite Mr. Arimura who is a Journalist of water field and just came back from the damage survey at the stricken area.

Mr. Arimura: 7~9/April (Research to Minami-Sanriku-Town, Osaki City and Kurihara City)

When I entered stricken areas, the restoration of damages by the Great East Japan Earthquake had completed. But the biggest aftershock occurred on 7 April and Middle and small water supply utilities located inland had faced power failure and cut off of water in all served area. The mapping system was under development in the Kurihara City at that time. So, they had to use the old pipe legers which had been made before merger of cities. But this record was unclear and became a bottleneck of restoration. This city water supply area is 800km^2, and only 30 staff members have to maintain their wide scattered facilities. There is a word “vulnerable people of the disaster”. I really felt “vulnerable municipalities in the disaster”.

Office of protection against disaster in Minami-sanriku town (photo. By Mr. Arimura)

I think they have only possibility to restore the water supply system by getting the help from the big water supply utilities.

The evil of merging of municipalities was seen. After merger, the municipalities reduced numbers of staff. As the result, lack of technical staff became serious. The water supply utilities depended on the pipe construction association. We can see lack of management of pipeline drawings. Although they made mapping system in computer, they could not use it because of blackout. It is necessary to preserve the pipeline data by both paper and the computer. The restoration of entire city is greatly

later in the northern area from Sendai City

Ms. Yamamoto: By different age or the experiences, ability of disaster measures might be different.

Mr. Suzuki: Relief group system has to be a steady mandate system because they have to work to repair pipes under the aftershocks and securing foods and living environment by themselves. Number of group members is 20 persons in maximum, I think. Anyhow, basic survival information is necessary for staff members going to the stricken areas. At first, our conscious that we are staying in stricken areas is very weak. For example, we ride an elevator under the situation of power failure or we do not open the door when earthquake occurred, although we have to defend my body myself. This is same as working in developing countries.

Mr. Horie: Hearing your activities, I admire that you all did very great and hard job and Japanese helpful support system!

Mr. Sasaki: I impressed that the emergency teams supported the restoration and emergent supply works under the dangers of aftershock and radioactive contamination for stricken areas.

Mr. Kudo: Although the number of staff members is few even usually, a lot of water supply utilities which suffered damage from the earthquake and tsunami are making great efforts for restoration. But I heard real situations from people who went to the stricken area that water supply utilities have had big problems in pipe network installed and mapping. I was surprised that “Do such situations exist in Japan?” I think some educational supports for technical capacity building is necessary for small and weak water utilities usual base. And also, I think the countermeasures against a rumor is necessary.

Mr. Sugawara: I want to add “measures for disaster” in the education program for developing countries.

—Postscript by facilitator—

What I felt from hearing the voice from the person who went the disaster area was the extraordinariness of this incident. Before that, we had faced many big disasters but most of them were inside of one municipality. It was the first experience for us such widespread disaster. And the other particular conditions which delays the recovery were 1) Long time power supply failure, 2) Damage caused lasting big aftershocks, 3) Secondary disaster of power plant accident.

The water works persons said that the recovery assistance activities finally resulted in training for themselves, and it could strengthen the capacity. From this word, I felt the similarity with assistance to developing country.

I would like to show the special practice between Yokohama city and Nagoya city. They made a disaster support agreement and exchanged the drawings and keep each other. Once Yokohama city faced the disaster and lost the drawings, the Nagoya city personnel could come with the drawings of Yokohama and start immediate assistance. Not only that, the city corporation has prepared many types standardized procedures for the recovery from disaster. These procedures are reviewed and revised through the recovery assistant practice. These cities can be said a top runner. It was said on the discussion that these top runner organizations should lead and help the all organization in whole country including small and weak organizations even in normal time. It is same as the practice of capacity development in developing countries.

Most impressive thing for me was that I heard frequently the words ‘sense of responsibility’, ‘proud

as water works staff' and 'Family of water works'. The panelists of this discussion were all the person who were working at the forefront of supporting infrastructure. I would like to emphasize the discussion gave me deep impression by their sincere attitude.

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Damages of water supply facilities

(by announcement of Ministry of hearth, labor and welfare)

1. Situation of cut off in three prefectures in which water supply facilities were damaged heavily (as of 20 May, unit: house connection)

   Iwate Prefecture: 21 thousand

   Miyagi Prefecture: 37 thousand

   Fukushima Prefecture:6.1 thousand (excluded the area ordered evacuation by radioactive contamination)

2. Updated information following

http://www.mhlw.go.jp/english/topics/2011eq/index.html

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～Water Supply of Sendai City～ From suffering to rehabilitation

Mr. Watanabe Kazuhiko Sendai City Waterworks Bureau

Mr. Watanabe has worked in JICA water supply project in Egypt as a short term expert in 2000. We are pleased to share his contributed articles prepared in his hard working for rehabilitation.

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For the Great East Japan Earthquake and Disaster, since a number of sympathies and supports have been sent not only from other area of Japan, but from foreign countries, I have been really supported by network of people and appreciated it.

I live in Sendai, the largest cities in the disaster area, and work for Sendai Waterworks Bureau. I would like to report our suffered and rehabilitation situation on water supply system of Sendai. Though Sendai city has fortunately completed urgent rehabilitation, we have not been able to grasp detail data; therefore, I can use only temporary data here. Moreover, please note that other seriously damaged cities and towns should be quite unlike situation from us.

【Introduction of Sendai】

Sendai has a population of 1.05 million. It is surrounded by the Pacific Ocean in East, the Ohu Mountains in West, and has rich green and favorable foods from mountain and sea, where people can enjoy skiing and surfing in the same day. It is always one of the top listed in "the most favorite city to live"; with more than 400 years' history, good academic environment having many universities and institutes, and also active atmosphere; 3 professional sports team (baseball, football, basketball) are based here.

As to water supply, we have 4 main and 4 small water purification plants, and received treated water from Miyagi Prefectural Bulk Water Supply. Maximum daily distribution amount are 350,000 m3/d, totally.The earthquake occurred at 14:46 of March 11, and caused power failure in whole city, but our own 8 plants did not receive so serious damage to produce water, they could be operated by generators. In the other hand, Miyagi Prefectural Bulk Water Supply, whose water accounts for 1/3 of
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our total distribution volume, had damage on transmission line of D2,400mm. We could not receive treated water from then until March 22. Water supply was cut off not only because of it, but also because distribution network in city had a lot of leakages, and fuel for generators to operate pump could not be purchased on time; water supply was cut off in 230,000 connections, for 500,000 people at maximum.

Under these circumstances, we set up 24 water supply stations such as an emergency reservoir for drinking water. And also we supplied water to at maximum 71 evacuation shelters, medical institutes and nursing homes, as using water trucks and balloon-type tanks which are brought from more than 80 water supply utilities nation widely.

At the supply points, we feel really sorry for citizens to make them wait in long queue in cold snowy place. Conversely, we received many citizens' appreciation that they were comforted because waterworks' staff members come to help them from nation wide.

Though about 900 points of breaking pipelines (excluding service pipe) occurred, most of all have been recovered by March 29 with supports from Sapporo City Waterworks Bureau and Tokyo Metropolitan Waterworks Bureau except areas which it is difficult to live in due to Tsunami or landslides. 3 of 67 distribution reservoirs located in city were damaged by earthquake and have been stop to operate. We are dealing with such situation by utilizing multi-line distribution system, and block system for distribution, which Sendai City has been equipped until now.

From now, we have to take the 2nd phase measures for disaster such as restoration of the distribution reservoirs, repairing damaged buildings including offices, reinforcement of landslide slopes and retaining walls. Additionally, we need to monitor radioactive substances. And also we will support for rehabilitations in other stricken areas. Furthermore, it is necessary for us to promote for putting out information for improvement of disaster prevention.

Finally, Japanese water supply utilities are rather small in their business scale compared with other lifeline. But in this occasion, I strongly feel the mission of water supply that supports peoples' life and economical activities for 24 hours and 365 days and solidification among water supply utilities based on this mission. I am really proud to work for water supply, and we appreciate all supports we received. This time, Ms. Yamamoto introduced WaQuAC-NET and offered me to write article. I think this kind of international technical exchange is also motivated by the same. I wish this network continued success and growth.

Introduction of New Members

- Ms. Nirmala Hailinawati (Indonesia)
- Ms.KRY Sattya (Cambodia)
- Mr. CHOLNICHA Tongklib (Thailand)
- Mr. KUAKULTHAM Sorawat (Thailand)
- Mr. SHIMOMURA Masahiro (Japan)
- Mr. SAKAMOTO Daisuke (Japan)

We welcome new member any time.
Please contact us

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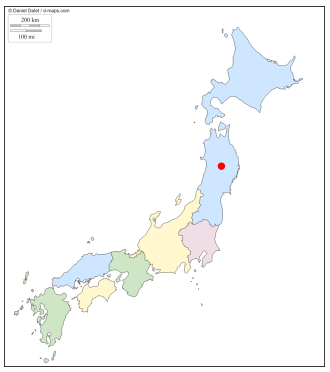
Next Activity

- Newsletter No.11
  "Water Supply &
  Radioactive Contamination"

Report on the Recent Situation of Damaged Areas

Odajima Akihiko (Water Supply Bureau Kitakami-city, Iwate Pref)

Mr. Odajima



Kitakami City suffered Intensity 5 Upper (6 Lower in the parts) at maximum, which were rather fewer damage compared with other areas in Iwate Pref. But the City Hall which was constructed in 1973 was seriously damaged; ceilings were partially broken and elevated tanks were clacked, water supply system and restrooms in more than 3rd floor are not available until now. Regarding to distribution network, we found about 20 leakage points including D250mm at maximum ductile iron pipe. As to water cut off caused by power cut, central area of the city is covered by Wide Area Water Supply System Authority, which could supply water continuously because they have equipped generator. In the other half of city area, however, water supply had been stopped until afternoon of May 13 (the following day of the day). Due to the biggest aftershock on April 7, water supply to city area was cut off again, but it was recovered around 15:00 of the following day. Our municipality supported to Odzuchi Town, which is located in costal area and one of the most seriously damaged area, for supplying water under coordination of the Iwate Prefecture. We took shifts with 5 teams to support them in April, and our burden was greatly reduced after receiving the support from Hachinohe City and Kansai Large Area Group. Our city has received 350 evacuators until April 13. Though I have not looked directly at the severe situation in coastal area, according to the persons visited there, recovery of water supply system can be done within just "temporary rehabilitation". Of course it is difficult to speak generally and situation of recovery differ from each other. The cities whose water resources were not damaged have been steadily rehabilitated in their distribution network. However, there are still many towns cannot rehabilitate water supply system, and rely on supplying by water trucks.

After rehabilitation of water supply system, issues would be moved to sewerage system. Sewage is stagnated in residential area, smells out and worsens sanitary situation because drainages were stuck by rubbles, and most of sewage treatment plants have not been functioned as located in costal area where was heavily damaged. Pollution of sea water is also concerned. Since some towns of which administration halls were swept out, they did not have even financial data for financial closing (Japanese fiscal year ends in the end of March). Therefore continuous supports for various aspects seem to be necessary.

We have received supports not only from Hachinohe city, but also others nation widely. Moreover, many foreign countries have supported us. We really appreciate for it.

(April 21, 2011)

Question & Answer Corner

We welcome any Opinions and questions to this Q&A corner!

Q: Would you know the breakdown of the different pipe materials used in Japan for potable water delivery (Polyethylene, poly vinyl chloride, ductile iron, steel) and how these materials performed during the most recent earthquake/tsunami? (Mr. G.S. U.S.A)

1. We interviewed Mr. ARIMURA Gensuke : Water Works Network News, who knows so much more about trends of the polyethylene pipe in the Japanese waterworks.

(1) The features of polyethylene pipes for waterworks

The Polyethylene pipe (PE) of D200mm is maximum pipe in Japan. Japan Waterworks Association (JWWA) certificates polyethylene pipe by D150mm as JWWA standard. There is a great demand for PE from D100mm to D 150mm. Because, the small and middle scale water supply utilities use from D150mm to D 200mm pipes as main conveyance pipe and distribution pipe. PE pipe develops into a dominant market instead of the asbestos cement pipe, PVC pipe and cast iron pipe because of high earthquake-resistance and production and transport efficiency. When waterworks utilities renew the old pipes, they want to install PE pipes.

i) Advantage

Because the advantages of the PE are lightness, elasticity, flexibility, PE pipe can roll-up for easy transport and reduce the number of pipe joints. Moreover, it is far easier to joint pipes, which is called electro fusion jointing. Even unskilled persons can connect pipes. It takes only 30minutes and the period of pipe laying become short. The strength of the connection part is stronger than that of the pipe body.

PE pipe is corrosion inhibiting, so it is suitable for installation in seaside district. The water supply utilities suffered from pipe corrosion long time have been using PE pipe for distribution network in part of the seaside.

ii) Disdisadvantage

PE pipe does not tolerate organic solvent, oil and sunlight. Therefore, some water supply utilities do not use PE pipe due to taking into account the risk of pollution accident.

(2) Type of PE pipe and installations

Mr. ARIMURA

High-density polyethylene (HDPE) has been used in water distribution pipe.

On the other hand, two layer Polyethylene pipe has been used in service pipe only. Over the D200mm of the water distribution PE pipe is not produced, because pipe thickness becomes thick and higher cost. Seventy percent of the cost for pipe installation is construction cost, which is mainly labor cost. The remaining thirty percent is material cost. As the construction period of PE pipe installation is shorter than other pipes. the construction cost is more economical than that of the DIP (ductile iron pipe) etc. The total length of PE distribution pipe is from 20,000km to 30,000km in Japan that have 650,000km distribution pipe totally. PE pipe is increasing rapidly. In Fukuyama City: Hiroshima prefecture, water pipe up to D150mm is all PE pipe.

In addition, they has installed PE pipe about 40km annually. Niigata City and other cities also are using PE distribution pipe.

(3) The PE pipe damage situation from the Great Hanshin Awaji Earthquake in 1995

PE pipe has been used in the distribution systems of gas utilities in Japan. PE gas pipe has proven earthquake resistance. At that time, two layer polyethylene pipe has been used only in water service pipe. Based on the result of gas PE pipe, HDPE was accepted the use for water distribution system after the earthquake.

* The demand for PE pipe has been increasing over the past fifteen years in Europe.

(4) Damage of pipelines from the Great East Japan Earthquake on March 11, 2011

It should be considered separately in 311-mega earthquake, because post-disaster situation is different between a maritime area and internal region. Most of the areas affected by the tsunami are maritime area. On the other hand, there has been seen damaged pipe in internal region. For example, old asbestos cement pipes, which installed about forty years ago, were broken, tapered solvent joint (TS-type) of PVC pipe was gone off and VP pipe was cracked.

Post-disaster situation of the pipe in Sendai City is as below. Dada is before the 7 April; A strong aftershocks was occurred on 7 April). Further breakdown of damaged pipe will become clear later

devastated area	number of broken case	
Wakamiya district	279	Total length 3,500km in Sendai City
Izumi district	164	
Taihaku district	121	
Miyagino district Wakabayashi district	111	
Total	675	

Water distributing pipe types are ductile cast iron pipe, steel pipe, PVC (Total length of the water distribution PVC pipe is about 800km. The half of pipe has tapered solvent joint. The rest is VPRR (rubber ring pipe).

- Data of PE pipe will become clear later.

(Interviewer: HORIE Toshiki, YAMAMOTO Keiko)

2. In case of Chiba Prefecture (Intensity 5 lower: The Japan Meteorological Agency criterion)

This information was sent by Mr. HORIE Yoshitsugu, Japan Water Research Center

Namekawa-Takaoka small scale water supply utility, Narita City uses HDPE pipes which are D150mm, D100mm and D75mm diameter and 29 km length. And also they use two layer PE pipes which are D50mm, D40mm, D30mm and D25mm diameter and 12km length. These PE pipes were no t damaged by the Great Earthquake and Tsunami.

3. In case of Yokohama city (Intensity 5 lower: The Japan Meteorological Agency)

This information was sent by Mr. NAKANOSONO kenji, Yokohama Water corporation.

Two layer PE pipe is installed in service pipe of Yokohama water waterworks bureau, which usesD50mm and less diameter for service pipe,and length is 32km. Other materials of service pipes are 41km of galvanized steel pipe, 25km of VP and 725km of PVC. The damages by the great earthquake occurred only in bend and screw part of old galvanized steel pipe (without lining). PE pipe and other materials had no damages. Now Yokohama city waterworks Bureau doesn't use galvanized steel pipe.