

## Q&A

**11Q5:** What's kind of water contaminations inside distribution pipes and the countermeasures are there in Japan? (From Ms. C.K, Thailand)

**A:** For the question above, six answers were collected from the members who currently work or used to work for water utilities in Japan. Those answers were summarized and shown in the form of a roundtable discussion here. This discussion was held anonymously as per interviewee's request. (Editorial responsibility is on Yamamoto, WaQuAC-Net Office)

**Ms. Chair (Yamamoto):** I appreciate these six water experts participated today, and all of you have experience especially for maintenance of distribution pipes. Let's start a discussion. Nowadays the risk of water contamination from leakage points of pipe is rare in Japan because the water pressure is controlled appropriately high and water is distributed for 24 hours. Then what is the cause of contamination these days? Please share your experience including past instances.

**Mr. A:** At Z Waterworks Bureau, Cast iron pipes, ductile iron pipes without mortar lining and steel pipes (SGP) are still used as distribution pipes. Rusty water and turbid water by corrosion of pipe have been common issues even today. Normally it occurred sporadically by changing flow direction or water velocity inside pipes and sometimes, by shaking from a big earthquake, widely.

**Mr. F:** U Waterworks Bureau whose main source is surface water has added deep well water secondarily in expectation of increasing supplied water quantities. Only after few years, black and red water and rusty water occurred in distribution pipelines near the wells. The water contaminations were caused by iron bacteria and adhesion of manganese oxide inside pipes or corrosion of pipes.

**Mr. B:** I have experienced a cross connection between water supply pipe and groundwater at a construction site at R Waterworks Bureau.

**Mr. A:** I had an experience that small alien substances flew out from taps when it took long interval between pipe laying and supplying water due to a large-scale land rezoning. That was caused by hardened joint lubricant of ductile iron pipes (DIP).

**Mr. D:** In case that steel pipes were used for water main pipe, coal tar was painted as waterproof coating on joints after welding. We had a case that pieces of coal tar flowed out from taps when pipes were washed before use. It was for the adhesive effect between steel and coal tar had been not enough because of cold season.

**Mr. C:** At H Waterworks Bureau, when pipes were washed out from fire hydrant after water suspension for the construction, sometimes, white particles which broke easily by hand were flew out. And they remained inside pipe even after rust was washed out completely by valve operation. It mostly occurred only in some specific areas, where DIP had been laid at the same period. We think that small fragments of "seal coat" which separated from the inner surface of pipes were precipitated at

the bottom of the pipe, and they flowed out due to change of the flow velocity.

**Mr. B:** DIP has been used 100% for main distribution pipe since 1970's at our waterworks bureau. In 2000's, peeling of deteriorated "seal coat" became obvious.

**Mr. E:** Peeling of "seal coat" was also a cause of water contaminations inside water pipes in our waterworks bureau.

**Ms. Chair:** What is the "seal coat"?

**Mr. E:** Seal coat protects the mortar lining, which is usual lining method of DIP. The material is acrylic resin or vinyl chloride resin.

**Ms. Chair:** Does it mean DIP is coated double?

**Mr. E:** Yes, mortar lining enables preventing DIP from rusting. And sufficient quantity of water could be supplied permanently. However, after mortar lining, cracks occurred on mortar lining and PH rose quickly in the water supplied firstly. To solve these problems, seal coat was introduced as a coating of mortar lining. However, as Mr. B said, peeling of seal coat occurred because of aged deterioration. When white turbid water was supplied from the tap, there were many complaints from customers. Actually, it was not harmful but still, it was obviously a contamination. So, we needed to solve the problem.

**Ms. Chair:** As 4 of 6 participants said, I understand the seal coat is the cause of water contaminations inside distribution pipes in Japan nowadays. It is quite different from those in developing countries.

**Mr. D:** In India, PVC pipes and AC pipes were used as main distribution pipes and water leakage occurred often from the crack and joint of pipes. In case that sewer pipes were buried near the water pipes, if the sewer pipe was broken, and water supply was intermittent, sewage would flow into distribution pipes easily. In Indonesia, pipe broken by construction accident was not informed to water utility and sometimes sewage flowed into distribution pipes. Water utility could know only after the customer complained.

**Ms. Chair:** Let's go back to the case in Japan. Please discuss the measures against water contaminations.

**Mr. A:** In our waterworks bureau, rusty water was washed out from fire-hydrant as an emergency response. And then pipes were replaced as a permanent measures. In the case of the joint lubricant problem, I told before, AQUAPIG (<http://aquapig.jp/>) method were used for cleaning.

**Mr. B:** In R Waterworks Bureau, cleaning inside pipe was done by using sludge drainage pipe thoroughly. At the same time, we identified the location of the pipeline with a seal coat, using piping drawings. And then, we found some pipes which have seal coat peeling and the precipitation at bottoms of pipes by inside pipe investigation using a camera. There, we carried out the inside pipe cleaning, even without complaints from customers.

**Mr. C:** At our waterworks bureau, it's difficult to clean enough to wash all seal coat out. So, I think that only way to solve seal coat problem is pipe replacement. However, practically it is difficult to prioritize the seal coated pipes for replacement. Even if some pieces of seal coat flow out during pipe cleaning, we drain out most of the rust and then make slow down water velocity. After velocity gets constant,

we finish the pipe cleaning. In the past, I remember, the measures using trap was done but it's found out not effective.

**Mr. F:** We gathered information from customers and investigated pipes. Then problematic area was identified. We carried out pipe replacement, pipe cleaning and introducing equipment to remove iron and manganese. We also cleaned the pipes using a machine.

**Mr. E:** In H Waterworks Bureau, pipe cleaning was done at night time using fire-hydrant or sludge drainage valves. Cleaning has been still continued at the area where old DIPs remain. The seal coat has improved to permeable acrylic resin which does not peel easily. The problem has not occurred on newer pipes.

**Mr. D:** For a reference, epoxy resin is used for waterproofing the steel pipe welded joint. Therefore, such peeling problem has not occurred.

**Ms. Chair:** It seems to take a long time to solve distribution pipe water contamination problem completely

despite the efforts to solve it. How do you manage complaints from customers?

**Mr. A:** The staff of pipe maintenance manages case by case. When customer request, water quality is checked, and the result is explained by the staff of water quality. Water tariff is reduced in case that water for washing pipe was used after the customer meter.

**Mr. B:** We apologized customers and explained the cause of the problem. And then we clean the pipes.

**Mr. E:** We explain it's not harmful and we clean the pipes at night, especially around and upstream area of the pipes of the complaint as soon as possible.

**Mr. F:** We gather and analyze the information and questions from customers on water qualities (black water, rusty water) and water pressure problem. The data is used as basic information to conduct measures. Furthermore, we conduct "accountability" (explanation on the investigation progress, the countermeasure and so on) thoroughly.

**Ms. Chair:** I summarize today's discussion. We focused on water contaminations inside distribution pipes in Japan, especially for rusty water or oxidized manganese and fragments of peeled seal coat. Their causes are very different from ones of developing countries. The measures for the issues in Japan are mainly pipe cleaning or pipe replacement. For customer's complaints, there are lots of information based on the experience. I hope this discussion is useful for the questioner. Finally, I would like to express my appreciation to the people who are working at night to keep safe water. Thank you for your cooperation. (end)