WaQuAC-NET Newsletter

Water Quality Asian Cooperation Network

http://www.waquac.net/english/index.htmlt

Volume 17, issued on April 30, 2013

For Safe Water, Do Network.

Two years pass from East Japan Great Earthquake Disaster

-Cooperation from other municipalities to Otsuchi Town for the restoration of the town -

Mr. Ozaki is a member of WaQuAC-NET and staff of Sakai City Waterworks and Sewerage Bureau. He has been dispatched to Otsuchi Town which locates in Iwate Prefecture of Tohoku region as support staff for one year since April, 2012. Otsuchi town suffered severely from the East Japan Great Earthquake and Tsunami on March 11, 2011. Just before his returning to Sakai city, I have visited him in Otsuchi town for interview and observation of the suffered area on March 17 and 18, 2013.

Mr. OZAKI Noboru

Mr. Ozaki is a former JICA Expert of Nepal. He contributed a lot for improvement of water supply in Nepal from 2006 to 2008. Interview was done on 17 at his familiar restaurant in Kamaishi city near Otsuchi town. I enjoyed very delicious sea food of this region "Sannriku" during the interview.

(by Ms. Yamamoto, WaQuAC-NET Office)

・・・・・Information of Otsuchi-town・・・・・

Population (February, 2013): 12,987

Household (same as above): 5,437

Data of suffered people (March 2013):

Number of death: 797, Number of Missing: 437,

Total Number: 1,234 (by website of Otsuchi Town)

The number of temporary housing area: 48

The number of temporary housing: 2,146

(by website of Iwate Prefectural Government)

・・・・・・・・・ Interview ・・・・・・・・・・

(Y) Please tell me your post now.

(O) I am working in Urban Planning Section, Urban Development Division, Otsuchi Town. There are 35 staffs. 25 of 35 staffs come from other municipalities. We are working for the restoration of the town. Head of the section also come from Minami Satsuma city of Kagoshima prefecture, Kyushu region. He is fifties. Original municipalities of 25 supporting staff spread from northernmost island (Hokkaido) to southernmost island (Okinawa Prefecture).

(Y) They have come from very different regions, indeed!

(O) That's right. Our ages are mainly forties and fifties. Kobe city has sent retired persons.

(Y) It seems that persons who have enough experience and can work appropriately and soon were selected. Which ministry coordinated?

(O) Before, several ministries have coordinated respectively. But now, Ministry of Internal Affairs and Communications coordinates it. When the request of supporting staffs is sent to the ministry from the suffering municipalities, the ministry asks other municipalities to dispatch staff.

Now three staffs come from Sakai City including me. Otsuchi Town Office was attacked by the

tsunami and the Town mayor and all directors who gathered in the office of Town for discussing the countermeasures against heavy earthquake were killed by the tsunami. 40 of 139 staffs of the Town office were killed. Therefore, administrative function by the Town office has stopped. Particularly, 10 of 14 staffs in Area Development Division were killed by the tsunami. So after the big disaster, Engineer was short in the Town office severely. Therefore, It was necessary to send a lot of engineers from other municipalities for supporting the restoration project, because most of all areas in Otsuchi town were completely destroyed by the tsunami .

(Y) What kind of work are you doing?

(O) When I came to this town in April, 2012, a restoration master plan for the town had been formulated by Prof. Nakai of University of Tokyo with local people. The plan divides a residential area into a hill area and an area of raising the ground level.

The inundation area is used for the park and industrial area, where people will be not able to live any more. We are working for materializing the plan. For example, we are preparing to buy the land for people to move from the inundation area. It is based on the land readjustment project or the project plan for relocating to the hill area (moving by group for disaster prevention). I participated to a lot of meetings for explaining the project to people.

Destroyed central area by Tsunami

(Y) Did people agree the restoration master plan?

(O) Yes, people agreed it. But we cannot identify the border between lands which people owned, because the tsunami destroyed everything. And how do we decide a border and buy the land? (Government buys the damaged land.) It is so hard and takes time. It is also difficult to negotiate with the government. For instance, Huge inundation areas become parks or green land in the master plan. But the government does not agree because percentage of the park and green land in the area exceeds the existing criteria of urban plan.

(Y) On the other hand, you had many opportunities to talk to people. How do you care to talk to them?

(O) About 10 % of population was killed or missing by tsunami, so every family has some victims. So when I talk to them, I care about them very much. But they also care about me because I came to work for them. When I go to intention survey, people talk about the time they suffered. And I try to listen well.

It used to be the Otsuchi Station

(Y) What do you have an impression of the work which you have been doing for a year at Otsuchi Town?

(O) I keenly realized that existing laws or regulations on the restoration project cannot match the actual situations. Now, we use two laws. But the service which people receive is different by each law. I think that it is impossible to use existing laws for such a great disaster. The situation is beyond the existing laws or regulations. Exceptional law should be established.

(Y) Did you come here voluntarily?

(O) At first, my boss asked me. And I really wanted

to come here. I was interested in working for the restoration of damaged area. I could work in a nice atmosphere with local people and other municipal staff.

(Y) Thanks to a good restoration master plan. Otsuchi town can start the recovery works sooner, I think.

(O) Unfortunately, I don't think so. There are many issues which have to be solved such as law, height of dike, land acquisition, finance of reconstruction of houses and buildings and etc. I think it takes long time to complete the restoration.

(Y) Will your successor come from Sakai City?

(O) Yes, now three staffs are from Sakai City. And two of them will be taken over to the next and the remaining one wants to continue working here. Since I did not work for water supply and could not use my experiences, I had to study several laws. Therefore, I requested that my successor works at water supply office.

Even after going back to Sakai City, I hope to work for Otsuch town restoration.

(Y) Thank you for a valuable talk today.

Visit to Otsuchi Water Supply Office

On March 18, I visited Otsuch town water supply office with Mr. Ozaki and heard about water supply situation and the restoration from Manager, Mr. Yamada and Mr. Miura in charge. The outline is following. Water source is ground water (shallow well) and the capacity is 8,000m^3/d. We can supply water to 18,000 people. Quantity and quality of the groundwater is enough and rich. The groundwater was sent to reservoirs on the hill by pump. And then water was distributed by two systems. One was by gravity and another was by booster pump.

After the earthquake occurred, tsunami inundated three pump stations in low level areas. And also blackout happened in other areas for long time. Therefore, we couldn't supply water to most areas.

Transmission pipe which was installed in the bridge and the distribution mains underground were washed away by tsunami. There were a lot of houses and buildings which were washed away or collapsed everywhere in town. And many leakages occurred. Although we had to stop leakage, it was so difficult. We couldn't go there because debris were spread on the road and sidewalks. We spent enormous time for removing debris and looking for the stop valves and sluice valves.

The well which was main water source and locates 4 km distance from the sea, was saved by 80 cm bank but office building was flooded. We could supply water to all areas 10 weeks later from occurrence of the disaster.

We received many supports from water utilities. Especially, Kobe Waterworks Bureau helped us for formulating the Restoration Master Plan on Water Supply Facilities in Otuschi Town (September, 2012) based on their experiences. Concept of the master plan is;

1) Distribution reservoirs are installed on the hill areas and gravity is used for all area distribution.
2) Pump stations, transmission pipe and distribution main are not installed in inundation areas.
3) Shorten time for rehabilitation from disaster damage.
4) Strengthen risk management and succeed to disaster experiences to next generation.

The project cost is about 2.5 billion Yen. 89.3% of all cost will be given as the subsidy of special case for disaster restoration from the government. Completion of the project is 2018.

Symbol of Otsuchi town, "Gourd Island "

Participation Report of "the study and lecture tour of 'consideration of safety net for water supply'"

Ms. KAMEGAI Yasuko
(CTI Engineering Co. Ltd)

I participated the study and lecture tour of 'consideration of safety net for water supply' organized by Kanto branch of Japan Society on Water Environment on February 13, 2013. The contents of tour were (1) visit of Tone-Ozeki (diversion weir), (2) visit of Saitama Water Quality Management Center and Gyoda Water Treatment Plant (WTP), and (3) lecture and information exchange meeting. The meaning of safety net is the mechanism of preventing or minimizing damage caused by prospective danger and failure.

There was an incident of detection of high concentration formaldehyde at some WTPs using the Tone River water on May 18, 2012. Gyoda WTP in Saitama Pprefecture and other two WTPs in Ciba Prefecture stopped water intake.

May 15, 2012	High concentration (0.045mg/l) formaldehyde was detected at A WTP
18	Formaldehyde was detected at B WTP maximum 0.168mg/l.
	MLIT started emergency dam discharge at upstream
	WTPs in 1 City and 4 prefectures stopped taking water
22	CESS developed HMT analysis method and identified the source of pollution
24	Ministry of Health, Labour and Welfare announced the identification of HMT
June 7	Saitama Prefecture announced the result of the investigation of causes, provide an administrative directive to the company

Accordingly, large scale of water failure happened in Chiba Prefecture, which affected about 350,000 households. The program of the study tour provided us the detailed information of the incident and how the concerned parties worked for taking measures.

We went to the Tone-Ozeki which was operated by the Tone Water Conducting Office of Japan Water Agency and received the explanation of water system. The water intake is located on the southern side of the river and the water is delivered for agriculture, urban and drinking water use through Minuma Canal, Saitama Canal, Musasi Canal and Oura Canal. The Oura Canal is designed to cross the river and deliver water to the opposite side of the intake. This is very important water resource not only Saitama Prefecture but also Tokyo Metropolitan City and Gunma Prefecture. Then, we went to the Water Quality Management Center of Saitama. This institute was originally water quality management division of Gyoda WTP and still be in the premise of Gyoda WTP. Now it serves for the management and testing of water of other WTPs of Saitama as well. We also had a look at Gyoda WTP which is operated by Saitama Prefecture to sell bulk water to the cities and towns in north-east part of the prefecture not to distribute water to individual users. After seeing, we had the last program of lecture by Mr. Yaguchi of Water Quality Manegement Center and Mr. Takahashi of Center for Environmental Science of Saitama (CESS). After that the discussion time was held.

The progression of the incident is shown in the table from the detection of formaldehyde to the cause unfolding. It is just the 'safety net', that is the all concerning parties were working together beyond the gap between organizations and realized to take the best measures they could do at the time.

The observed formaldehyde was suspected to be generated by reaction between a recursor material included in raw water and clorine, which was not a direct discharge. The preserved sample was analyzed, and the precursor (that was Hexamethylenetertamine: HMT) presented at high level concentration. Finally, the fact was that a

chemical company transferred waste liquid to an industrial waste disposal company, and the waste contained high concentration of HMT exceeding the treatment capacity of the disposal facility. The causation was proved that untreated HMT had gone into the river and brought about the incident. However, the HMT was not a regulated substance so the Saitama Prefecture only provided administrative directive not a punishment. On the other hand, the water suppliers suffered by the incident claimed for damage to the chemical company. In this case, the waste disposal company was not claimed.

The many problems were identified and became apparent, e.g., (1) How we can manage and monitor the unregulated material. (2) How we can detect the presence of material immediately which is not measured frequently. (In case of formaldehyde it is 4 times a year). (3) How we can manage the latent threat such as the case of the Tone River which has a lot of potential pollution sources like factories and treatment plants. (4) Limitation of the water supplier who was not assigned to have the power of regulatory authority. (Water suppliers don't have the right of inspection) (5) Gap between drinking water standards and environmental standards.

The positive aspect appeared also. The Ministry of Land, Infrastructure and Transportation (MLIT) cooperated to dilute the pollutant in river water by increasing out flow rate from the dams located upstream. And as the other organizations were working together beyond the borders and the difference of organizations for solving problem and identifying the causation, the prompt measures were taken.

After the incident, following remedial measures were taken. WTPs at same river system arrange sampling date each other in order to increase the frequency of monitoring totally.

(1) The centralized monitoring system was reviewed because it disturbed the immediate action due to linger time of transferring sample to the central laboratory.

(2) There had been no regulation of HMT, but it was set as the designated substance under the Water Quality Pollution Control Act in October 2012 additionally.

＜Afterword＞

If we can increase the number of monitoring parameters and frequency, it will provide safer condition. But we cannot increase unlimitedly due to the limit of capacities such as manpower, time, budget, etc. There are many problems for safe water supply but actually there is no perfect answer. I was so impressed at the effort to be made by the concerning persons and organizations and the spirit of persons who didn't mind 24 hours work as well. It is seemed that the most important thing is personality of individual person at the real site. But I realize the importance of establishing concrete safety net such as cooperation system and preventive actions.

＜Reference＞

○The analysis of formaldehyde requires about 4 hours. Amid of the urgent period, it was ordered to measure formaldehyde every hour. It was difficult but they utilized a laboratory car at the site and did the pretreatment of analysis.

○ It was said that the formaldehyde could be removed by activated carbon but it was not observed the clear effect at the case.

○It was reported by the Bureau of Waterworks Tokyo Metropolitan Government that the HMT could be reduced about 1/10 by ozonation treatment. And additional biological activated carbon treatment reduced it undetectable level.

Training on Biological Problems for Young Staff of MWA in Yokohama

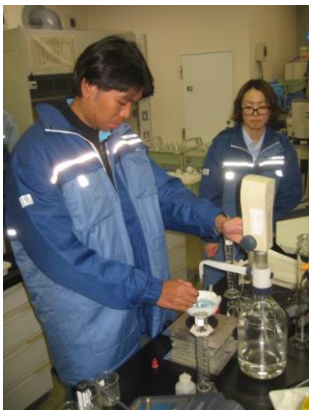
Mr. SASAKI Shinich

(Yokohama Waterworks Bureau)

The Chao Phraya River area of Thailand suffered a severe flood from Oct. to Nov. 2011, and in the following April, algae growth occurred rapidly in the raw water, especially *Aulacoseira* of *Bacilariophytes* caused filter clogging, which results in endangering supplying water. MWA considered this situation significant, planned to train staff on measures against biological problems, and requested Yokohama Waterworks Bureau (YWWB) to conduct a training by MWA own budget. The training was from Feb. 18 to Mar. 1. Trainees were two young staff of MWA; Mr. Anan SELANON and Mr. Kriangkrai WANAKHACHORNKRAI. The Training schedule was as below. It was designed to allocate as much time as possible for microscopic examination so that trainees can learn appearance and details of each organism for its identification. Through training session “Biology drawing (1) to (4)”, the trainees could realize their improvement of drawing skills. I hope they can acquire an eye for biology. They learnt a lot during the 10 days.

Schedule and items of training

Date	Items of training
Feb 18	Outline of YWWB, Orientation of training
19	Overview and problems of biology (causes and measures), method of identification and classification of organisms, ordinary test , microscope examination, biology drawing (1)
20	Water sampling at water source (5 points)
21	Cooperation among sections, reference and utilization of water treatment daily report
22	Making prepared slides, Acid treatment of Bacillariophyceae, blue-green algae enclosure method, microscope examination, biology drawing (2)
25	Maintenance of filter, evaluation of the filter function, microscope examination, biology drawing (3)
26	Jar-test, coagulation-sedimentation process, control of pH and alkalinity, measurement of turbidity, evaluation
27	Early stage warning of algae growth occurring, examination of and measures against organisms other than algae, microscope examination, biology drawing (4)
28	Measures of water treatment, odor-causing compound, analysis of geosmin
Mar 01	Observation of Bacillariophyceae by electronic microscope, taking photo, presentation of training outputs by trainees



Mr. Anan (Left)

Mr.Kriangkrai (Left)

Welcome party of the MWA scientists

Welcome party was held in Shinjuku at February 22, 2013. Mr. ANAN SELANON (Nan-san) and Mr. KRIANGKRAI WANAKHACHORNRAI (Eyick-san) came to Japan to get training of Yokohama Waterworks Bureau. They had stayed two weeks. And also our members, Mr. Biology; Mr. Sasaki lectured them.

Participants of the party are Ms. Yamamoto, Mr. Sasaki, Mr. Kudo and Horie. We talked about their former jobs and the problems of the MWA. Before they work at MWA, Nan-san was a researcher in hygiene sector and Eyick-san worked in agriculture industry. They have worked in MWA for 5 years and are hopes of MWA. Now MWA has algae problems, therefore they have to conduct countermeasures for raw water. Their first experiences in Japan were snow and earthquake.

Since Ms. Yamamoto explained history of WaQuAC-NET and our activities, they agreed to join as our member. I hope we can share ideas and discuss about water supply problem each other forever.

After the welcome party, I really wanted to invite Japanese stand bar, but they had to leave for Yokohama because of the last train. So, we guided around the entrance of KABUKICHO. On the way to the Shinjuku Station we went to a drug store. Nan-san bought cleansing cream for his wife. Eyick-san bought supplement. And also we stopped at a fruit shop. Mr.Kudo presented them dry persimmon (KAKI). And they got back to Yokohama in their favorite work-ware of Yokohama Waterworks Bureau by a train with Mr.Kudo.

Several days later of the welcome party I heard they went to Disney Land where they really wanted to go with Yokohama Waterworks Bureau persons. I hope they enjoyed staying in Japan.

(by Mr. Horie)

From left; Horie, Eyick, Nan, Yamamoto, Kudo, and Sasaki

Activity of *Let's Talk Algae (LETA)* group

LETA group was set up for exchanging information and discussion about biological problems in water supply facilities. We heard that MWA (Metropolitan Waterworks Authority, Thailand) prepares SOP for countermeasure against nuisance organisms. We hope LETA activity is useful for not only MWA members but also other members facing with algae problems. Now group members are 12 persons.

We, Japanese members, started to translate a handbook containing Japanese experiences to English. Title of the Handbook is "the Handbook for Preventive Water Treatment against Biological Problems." It was published by JWWA (Japan Waterworks Association) in March, 2006. At the moment, we finished translating Chapter Vll "Countermeasures against biological problems". Now we sent a letter for request for permission of the translation and the use to JWWA. After getting the permission, we want to use it effectively.

As the next step, we plan to hold a mini- meeting for discussing algae issue on 10 May, 2013

(by Ms. Yamamoto)

-Report -

JICA Seminar for Urban Water Service Management and Human Resource Development in Asian Region

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January 21 to February 2 , JICA seminar was held for two weeks in JICA Yokohama Center cooperated with Yokohama Waterworks Bureau and Yokohama Water Co. Objective of the seminar was to consider how achieve sound management in each participant's utility through sharing their experiences each other and learn some success cases. Top managements of 12 utilities from Bangladesh, India, Indonesia, Myanmar and Philippines participated in this seminar. Invited lecturers were Mr. Yongyuth, Deputy Governor of MWA, Thailand, and Dr. Visoth, Deputy General Director of PPWSA, Cambodia. Mr. Yongyuth gave participants and observers an open key note lecture on saving the waterworks facilities and water service from flood crisis as the mission of water utilities. Dr Visoth explained the success stories of PPWSA based on their practical experiences such as reduction of non revenue water and increase of tariff collection in his lecture. As special program, participants visited to the areas suffered by the East Japan Great Earthquake in Sendai City. They exchanged information and technology of the disaster and the countermeasures with staff of Sendai City Waterworks Bureau. The discussion was very active and useful. In addition, participants visited the heavily damaged area in Ishinomaki City.

At Ishinomaki City

Most of participants were deeply impressed by quick cooperation system with other waterworks bureaus, citizen, construction companies and students of universities. The Seminar closed on February 2 successfully by two-week-active discussions among the participants. Continuous holding of seminar is expected.

(by Ms.Yamamoto)

Introduction of our members

Dr. Chea Visoth

Dr. Chea Visoth, Deputy General Director of Phnom Penh Water Supply Authority (PPWSA), Cambodia, visited Japan as one of lecturers for Seminar for Urban Water Service Management and Human Resource Development in Asian Region from Jan. 28 to Feb. 1. Dr. Visoth has driven water supply business of PPWSA as its brain, and concurrently worked as an executive advisor of Siem Reap Water Supply Authority to improve the business. In the seminar, he made a lecture on "reduction of non-revenue-water (NRW) and sound management of PPWSA", which made the participants surprised at the achievement that PPWSA had successfully

Dr. Visoth in front of the Big Buddha in Kamakura

reduced NRW down to 1/10 in 10 years, and received many questions how to realize it. In between his busy schedule in Japan, he also enjoyed visiting Japanese historical sites such as temples and the Big Buddha in Kamakura and Asakusa. (by Ms. Yamamoto)

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WaQuAC-NET General Meeting 2013 in Osaka

General Meeting of WaQuAC-NET 2013 was held in Osaka on Feb.16 because members in Osaka area have increased recently. Attendants are 6 members; Mr. Fujitani (Osaka Water Supply Authority), Mr. Hayashi (same as on the left), Mr. Yokoyama (hy Concrete Technical Office co. ltd.), Mr. Sasaki (Yokohama Waterworks Bureau), Ms. Yamamoto (WaQuAC-Net), Ms. Yariuchi (same as on the left). Activities in 2012 and account report were presented, then discussed activity plan for 2013.

Major activities in 2012: Newsletters were published quarterly in Japanese and English. We invited two Thai members of WaQuAC-Net, officers of MWA (Metropolitan Waterworks Authority, Thailand) in April, for presentation on measures against the big flood in Bankok in 2011 and exchange of opinions on measures against disasters with Sendai City Waterworks Bureau. In August Mr. Sasaki was invited by MWA as a lecturer for measures against algae. On that occasion, WaQuAC-NET signed on MOU with MWA for future technical cooperation. We can deepen relationship with MWA in the last year.

Activity Plan for 2013: Other than publishing newsletter quarterly, we plan to have mini-meetings 2 or 3 times on certain specific technical subjects. The possible subjects were raised; biological troubles, report of capacity development project in Vietnam, and arsenic troubles.

Members exchanged their recent activities and opinions. Osaka Water Supply Authority has conducted three training courses in Japan since 2010 as a part of technical cooperation programs for MWA relating to a JICA loan project, and the activities will have finished at a seminar in Bangkok scheduled in Feb. 2013. After the termination, Osaka Water Supply Authority intends to continue technical cooperation with MWA directly based on MOU signed on Nov. 2012, and has received MWA's request for technical cooperation on advanced treatment process technology. Yokohama Waterworks Bureau plans to conduct training courses on measurement against algae troubles targeting young staff of MWA in Feb and June 2013, and dispatch two experts in April or May. We confirmed importance to share information closely among Japanese members.

In not only MWA but other water supply utilities with which JICA has conducted technical cooperation project, project personnel has promoted and became key and more important personnel in each organization, so we can expect our activities such as sharing information have larger impact to them. (by Ms. Yariuchi)

(from left) Hayashi, Yokoyama, Yamamoto, Fujitani, Yariuchi and Sasaki

New member Introduction

1. Mr. GOTO Shinya (Japan)
2. Mr. YAGI Masao (Japan)
3. Mr. Somsak PASSANANON(Thailand)
4. Mr. Anan SELANON (Thailand)
5. Mr. Kriangkrai WANAKNACHORNKRAI (Thailand)
6. Mr. N.M. Abdul Matheen (Sri Lanka)

◎ We welcome new member any time.

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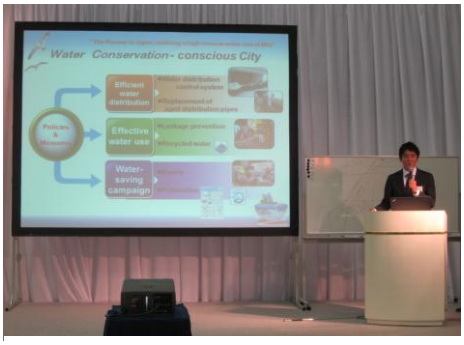
(Yariuchi)
URL: http://www.waquac.net
Next Activity:
May 2013: Mini-meeting on biological problems
July 2013: Newletter Vol. 18

Introduction of our new member
Mr. GOTO Shinya

With the certificate

My name is Shinya Goto, and I am a civil engineer for the Fukuoka Waterworks Bureau. I am currently working on designing and estimating water distribution pipe works at Water Distribution Department. In November 2012, I participated in a JICA enhancement training course (water course) as I am extremely driven regarding international cooperation. The training consisted of a mix of Japanese and overseas participants, which is quite a rare training style at JICA. In this training, 11 out of a total of 21 participants came from 6 countries across Asia, the Middle East and South America. The remaining 10 were staff engaged in water services in Japanese municipals. All participants learned a wide range of water supply management techniques and had good experiences training together over the two weeks. Participants were able to attend expert lectures and an international water symposium presentation, as well as participate in group work for planning improvement. In the group work, Japanese participants became advisers and supported overseas participants in overcoming their objectives such as “Non Revenue Water Prevention” and “improving precision of valve data”. This group work assisted all of the Japanese participants in becoming experts on international cooperation in the future. It also led to a deeper understanding of the requirements and other knowledge regarding water supply management, as well as the importance of language, communication and negotiation skills.



Presentation at the int’l symposium

Furthermore, the JICA training course also provided me with the wonderful opportunity to build an international network concerning water supply services both overseas and in Japan. I met a professional engineer, Mr. Saiki from the Matsuyama Waterworks Bureau, who is one of the Japanese participants and introduced me the WaQuAC-Net, and also fantastic lecturers such as our representative Ms. Yamamoto and Mr. Sugawara from the Yokohama Waterworks Bureau. I strongly believe that this network will be the foundation that will be able to support me regarding international cooperation in the future.

To be honest, I am quite ashamed of my limited work experience in this field, having only one year of experience. This group consists of a number of water professionals who specialize in the water quality field; As such, I am going to acquire a variety of water knowledge from the group members. Because of my residential location in Kyushu, I may not be able to regularly attend WaQuAC-Net’s activities, but I am going to try to join in as much as possible. I would like to thank you for allowing me this short introduction.

Shinya GOTO

Question & Answer Corner

We welcome any opinions, and questions to this Q & A Corner.
Please contact us.

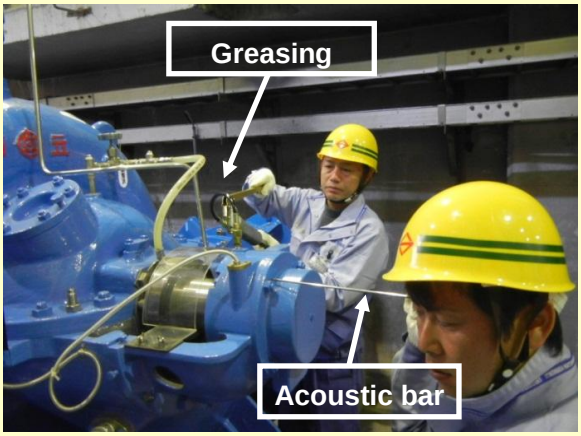
Q: Recently a pump has strange noise. Tell me what possibly cause the sound and how we can deal with them. (T.M. Vietnam)

A: Pump is the most used equipment in a water supply system, and malfunction of pump causes water suspension. Therefore proper maintenance of pumps is important. Strange noise of pump is possible to be caused by various reasons; abnormal noise from a bearing or cavitation occurring.

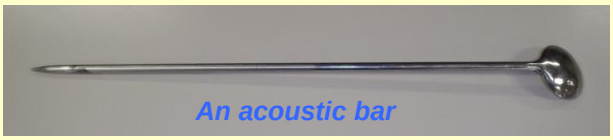
1. Noise from bearing

[Reasons] First of all, check if the noise comes from a bearing. There are many reasons for the noise such as lack of grease, something stuck inside, and unleveled-centering at a coupling.

[Measures] The small abnormal noise may be solved by greasing a little. It is advised that grease should be added little by little in several times so that the grease can fit properly, because too much grease can cause heat generation. When greasing, it is recommended to check change of the abnormal noise by using an acoustic bar. A screwdriver can be also used instead of an acoustic bar. If the abnormal noise is big and not solved by greasing, it is necessary to replace the bearing.



Noise check of bearing by an acoustic bar

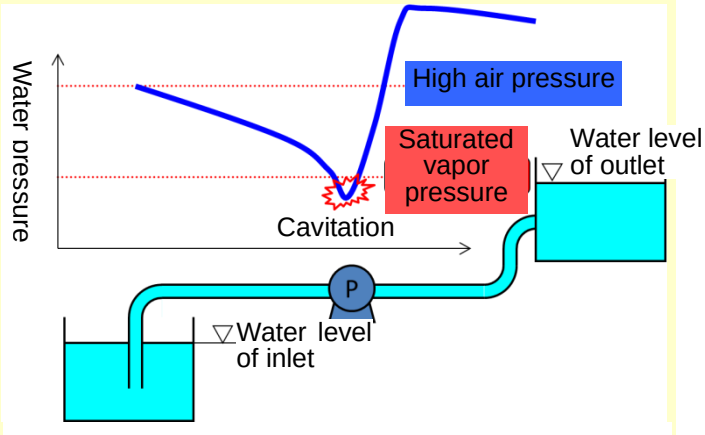


An acoustic bar

Unleveled-centering at coupling causes abnormal vibration of pump and results in shortening lifetime of the bearing extremely; therefore it is necessary to adjust centering of coupling surely. In both measures, the staff must work close to a rotating body, so it is necessary to work carefully to prevent an accident getting working clothes in.

2. Cavitation

[Reasons] "Cavitation" is "a phenomena that formation of vapor cavities in a liquid which is generated by reduction of pressure in a liquid flowing with high velocity", in other words, a kind of boiling phenomenon occurring locally at the point where pressure of the liquid falls below its saturated vapor pressure; such as surface of an impeller.



Concept: Generation of cavitation

The bubbles are repeatedly generated at the points where a liquid flows with high velocity and low pressure such as an inlet port of impeller, and crashed (vanished) when reached to the points

where a liquid flows with higher pressure. And the crashes of bubbles cause a big shock (abnormal noise or vibration). If the crash occurs near a solid surface, it incurs "erosion" on the solid surface that is a phenomenon which destroys a metal. The cavitation is mainly caused by pump operation exceeding flow volume of its capacity, which leads to cavities near impellers and damages and holes on the impellers; consequently it shorten the lifetime of the pump seriously.

I have an experience of cavitation. The cavitation occurred because the pumps were operated exceeding their capacity, because of increasing the intake volume due to expansion of a water treatment plant.

[Measures] The preventive measures against the cavitation are as follows:

1) Set water level of inlet (suction) of the pump as high as possible so as to reduce negative pressure at the suction point.

e.g.) Dam up a river to raise its water level (for intake pump). Raise a water level of a reservoir (for distribution pump).

2) Set head-loss of the suction pipe as small as possible so as to reduce negative pressure at the suction point.

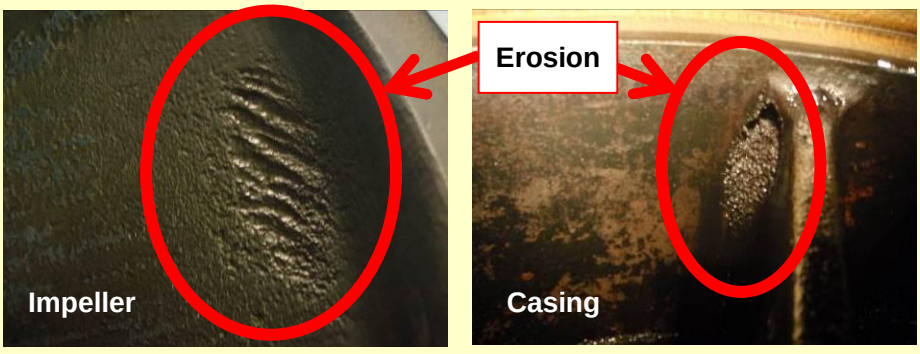
e.g.) Set a diameter of a suction pipe as large as possible. Avoid using a bend pipe for a suction pipe. Keep a valve at the suction point open fully.

e.g.)Reduce a revolving number of the pump. Control the outlet valve to close.

3) Cavitation occurs when a pump is operated exceeding its minimum or maximum flow capacity, therefore, operating flow range of the pump should be surely confirmed at the time of its design to install.

(Mr. ONO Yoshinori,
Yokohama Waterworks
Bureau)

Case 1: Erosion by cavitation (holes on pump casing)



Case 2: Erosion by cavitation