WaQuAC-NET Newsletter
Water Quality Asian Cooperation Network
http://www.waquac.net/english/

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For Safe Water, Do Network.

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Happy New Year 2017

1. Cooperation with MWA

The 89th JWWA Conference
Ms. Chaweepan gave a presentation in Kyoto

In November 11, 10:35, Ms. Chaweepan (Nickname is Uan-san) who was a scientist in MWA (Metropolitan Waterworks Authority) in Thailand, gave a presentation at JWWA Conference in Kyoto, Japan. It was the result of experiment which was carried out by water quality staffs of MWA and expert of WaQuAC-NET. For MWA, it was the second time followed Ms. Sivilai's presentation last year.

She could present well in front of around 50 audience. And she responded to several questions from audiences very clearly and properly. Ms. Jantima who was a co-researcher watched at the floor.

Ms. Jantima

Audience

Theme was "Measures against Algae Bloom in Bangken WTP -Optimum chemical dosing rate for Aulacoseira removal-". Since 2012, MWA and WaQuAC-NET have surveyed biological issues in Thailand. As part of that, MWA experimented effect of chemical dosing against clogging of filter by Jar-test. Abstract is following. * *Presentation PPT is put in WaQAC-NET Home Page, Data, "Study with MWA,* Measure against Algae Bloom in BangkhenWTP -Optimum chemical dosing rate for Aulacoseiraspp. removal - (2016)".

Abstract * * * * * * * * * * * * * * * * *

Measures against Algae Bloom in Bangkhen WTP - Optimum Chemical Dosing Rate for *Aulacoseira* Removal-

1. Introduction

Since the heavy flood crisis occurred in late 2011 and followed with long dry years since 2012, *Aulacoseira* which is one of the diatoms has been blooming at Chao Praya River in the end of dry season. Bangkhen Water Treatment Plant (main WTP) has faced the problem of filter clogging because it has taken water from Chao Praya River. May, 2015, Bangkhen WTP was severely attacked by *Aulacoseira* and Metropolitan Waterworks Authority (MWA) couldn't supply enough water to the public. In 2016, *Aulacoseira* started to bloom in the beginning of May again. MWA had countermeasures for avoiding filter clogging as follows; putting copper sulfate (0.3mg/L) in the water conveyance channel and increasing pre-chlorine (5mg/L) and aluminum sulfate (25mg/L) in Bangkhen WTP.

1.Purpose of the examination

(1) To verify the effect of countermeasures against filter clogging by *Aulacoseira*.

(2) To find the optimum dosing rate of chemicals for getting the effect of water treatment process.

2. Examination method and the result

(1) Evaluation of MWA countermeasures.

Water samples were taken at receiving tank, clarifier and filter for counting *Aulacoseira* by microscope. The result is shown in table below.

Process Line 1	Aulacoseira sp (Cell/100 ml)	Turbidity (NTU)	%removal
RW	114,000	10	-
CW	10,580	1.1	91
FW	0	0.35	100

*RW: Raw Water, CW: Clarifier (Settled) Water
FW: Filtered Water

(2) Jar test

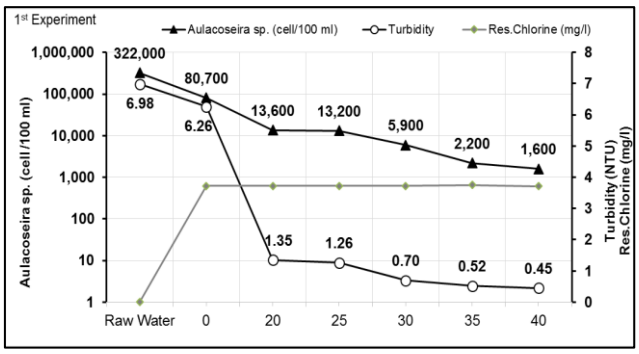
Sampling water was collected at 17 km upstream from the raw water intake point because there were high amounts of *Aulacoseira* without the influence of copper sulfate. Jar test were carried out in the same criteria as WTP; Condition of Jar-tester is;

100 rpm x1minute, 50 rpm x 5minutes, 20 rpm x 5 minutes+ settle x 5 minutes.

The condition of each experiment and the results were shown in following tables and graphs.

Experiment 1: Finding for effective dosing rate of aluminum sulfate.

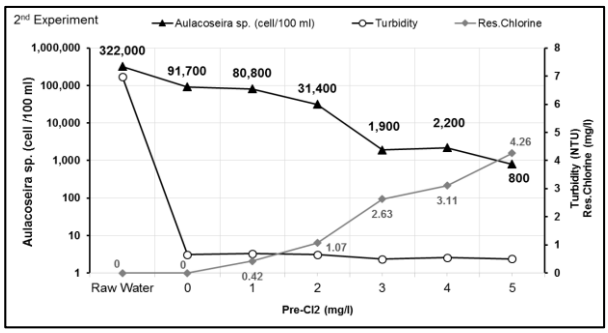
	Raw Water	Jar 1	Jar 2	Jar 3	Jar 4	Jar 5	Jar 6
Chlorine (mg/l)		5	5	5	5	5	5
Alum (mg/l)		0	20	25	30	35	40
Turbidity	6.98	6.26	1.35	1.26	0.70	0.52	0.45
Alkalinity (mg/l)	94	93	87	85	83	80	79
pH	7.98	7.93	7.67	7.65	7.56	7.48	7.46
Res.Chlorine (mg/l)	-	3.72	3.72	3.72	3.72	3.75	3.71
Aulacoseira sp.	322,000	80,700	13,600	13,200	5,900	2,200	1,600
% Aulacoseira Removal	-	75	96	96	98	99	99.5



As the result, 25mg/L dosing of aluminum sulfate was selected based on turbidity.

Experiment 2: Finding for optimum dosing rate of chlorine.

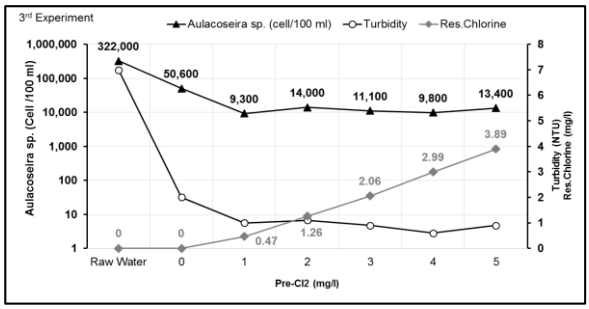
	Raw Water	Jar 1	Jar 2	Jar 3	Jar 4	Jar 5	Jar 6
Chlorine (mg/l)		0	1	2	3	4	5
Alum (mg/l)		25	25	25	25	25	25
Turbidity	6.98	0.65	0.69	0.65	0.49	0.55	0.50
Alkalinity (mg/l)	94	85	85	85	85	85	85
pH	7.98	7.89	7.88	7.81	7.85	7.85	7.94
Res.Chlorine	-	0	0.42	1.07	2.63	3.11	4.26
Aulacoseira sp.	322,000	91,700	80,800	31,400	1,900	2,200	800
% Aulacoseira Removal	-	72	75	90	99	99	99.8
Chlorine Demand (mg/l)	-	0	0.58	0.93	0.37	0.89	0.74



As the result, 3mg/L of chlorine was enough to kill *Aulacoseira*.

Experiment 3: It was checked the effect of copper sulfate with chlorine.

	Raw Water	Jar 1	Jar 2	Jar 3	Jar 4	Jar 5	Jar 6
CuSO4.5H2O (mg/l)*		0.3	0.3	0.3	0.3	0.3	0.3
Chlorine (mg/l)		0	1	2	3	4	5
Alum (mg/l)		25	25	25	25	25	25
Turbidity	6.98	2.00	1.00	1.10	0.90	0.60	0.90
Alkalinity (mg/l)	94	86	87	87	87	88	88
pH	7.98	7.54	7.71	7.72	7.6	7.65	7.68
Res.Chlorine	-	0	0.47	1.26	2.06	2.99	3.89
Res.Cu (mg/l as Cu)	-	0.05	0.05	0.04	-	-	-
Aulacoseira sp.	322,000	50,600	9,300	14,000	11,100	9,800	13,400
% Aulacoseira Removal	-	84	97	96	97	97	96
Chlorine Demand (mg/l)	-	0	0.53	0.74	0.94	1.01	1.11



4. Conclusion

Actual treatment method performed very well. Especially, most of *Aulacoseria* was removed in the clarifier tank by enhancing coagulation capacity. Chlorine dosing is very effective for *Aulacoseira* removing. The optimum dosing rate of pre-chlorine is around 3 mg/L. We couldn't find the clear synergistic effect by dosing both chlorine and copper sulfate in jar test. So, more experiments are necessary for selecting more effective and economic method. To cope with *Aulacoseira* problem, chemical dosing rate should be decided by counting *Aulacoseira* in jar test. * * * * * * * * * * * * * * * * * *

Impression of Jantima-san and Uan-san

Ms. Jantima: I would like to say thank you again for taking care of us in Japan.

In JWWA conference, it makes me know that JWWA is an association that has many members and a lot of people are interested in attending. The conference is a meeting for people working in the same field. The conference discussion topic was not only water technology but also human resource development and case study from many countries. For the presentation, I would like to thank you to Yamamoto san and Sasaki san for helping us.

Ms. Uan: It is the second time that I attain JWWA International Conference but it is the first time for me to have a presentation. I have worked with Sasaki-san and Yamamoto-san for several years. They are the first impression for me. We had nice rehearsal of the PPT in the hotel and prepared Q&A in lovely restaurant beside Biwa Lake. So, it made me feel confident and not much nervous during presentation time.

My topic is "Measure against Algae Bloom in Bangkhen WTP- Optimum chemical dosing rate for Aulacoseira spp. Removal", it is the experiment to find out the optimum use of chorine, alum and copper sulfate to remove filter clogging algae which cause problem to water supply in Bangkok. I felt impress with very well organized by WaQuAC-NET. And I also hope that JWWA will prepare the English translator for foreigner because there were a lot of interesting and useful topics in Japanese session. Totally, everything was great especially meeting new and old friends. I felt so happy.

Schedule in Japan

11/7	Ms. Jantima , Ms. Uan arrived at Kanku
11/8	Check and rehearsal of Presentation Welcome Party at Ponto Cho, Kyoto (Mr. Fujitani, Mr. Hayashi, Mr. Koseki, Mr.Sasaki, Ms.Yamamoto)
 	
11/9	Registration, Confirmation of places Reception by JWWA (Maiko-san welcome guests)
 	
11/10	Participating International Forum (10 countries water supply associations +IWA presented each situation), WaQuAC-NET Friendship Party (Mr. Ozaki, Ms. Yariuchi, Ms. Trang, Mr. Matsumoto, Ms.Yamamoto)
 	
11/11	Presentation by Uan-san at English session), Visiting Exhibition.
11/12	Observation of Kyoto
11/13	Observation of Osaka, Farewell Party with staffs of Osaka Water Supply Authority
11/14	Leaving for Bangkok

At the JWWA Conference, several WaQuAC-NET Members gave presentations. Counterparts of Mr. Shimomura presented the result of the Laos Project. Counterparts of Mr. Sugawara also presented about Indonesian Project. Ms. Trang explained the siphon type back wash filtration system at KOBELCO booth. A lot of WaQuAC-NET members participated actively at JWWA Conference in beautiful autumn leaves of Kyoto.

（Yamamoto, WaQuAC-NET Office）

2.Information of Africa

Impression of the first Sudan

Katsutoshi KAGATA
(JICA Expert of Sudan Project)

Mr. KAGATA was former JICA Cambodian expert and supported the human resources development in Cambodian water supply from 2003 to 2016.

He wrote his experience in the article "Thoughts on Human Resources Development" on Newsletter vol.21,p7. From August, 2016,

Mr.KAGATA

He joined "Project for Strengthening Capacity of Institutional Management, Operation and Maintenance in State Water Corporations" (See Newsletter vol.30,p2) in Sudan. (Ms. Yariuchi)

I left Narita on August 19. and arrived at Khartoum airport on the afternoon of 20th, after a long connecting time at Abu Dhabi in the United Arab Emirates. I felt it was a long travel because I was used to traveling to Cambodia. The first day passed while I was impressed with the procedures by Mr. Shichijo a member of the Earth System Science company who has a lot of experience in Sudan. I thought that the first day finished safely, However, around 11pm, telephone rang and woke me up from a sleep after long trip "Please contact the driver, and move your car parked in front of the entrance to other place". At that time, I thought that it was faster to move by myself than to contact the driver, because I kept the key of the car. I moved the car by myself and finally could go to bed after ten minutes. Another trouble happened at this hotel. In some other day, water stopped. When I asked to repair it, they said finishing it in 20 to 30 minutes. But after all, it took 24 hours to recover.

As for the road situation in Sudan, even the road in front of the DWSU (Drinking Water & Sanitation Unit) central office in the capital Khartoum is unpaved. The office of SWC (State Water Corporation) which are our activity place and the water treatment plants are also the same road situation, the four-wheel drive car is really necessary. It took 10 hours to move from Khartoum to Kassala State which was one of our activity places with four-wheel drive vehicle. Most of the way were very flat landscape and continuation of the horizon. I was used to see a flat landscape in Cambodia, but Sudan was more flat and there were no palm trees, and sometimes a hill mountain appeared in a few hours. In such a landscape, Kassala has a rocky mountain called Taka Mountain which is one of the few sightseeing points. Although the height is about 300 m, the altitude of the rocky mountain is about 800 to 1000 m, because Kassala itself has a high altitude. While watching the sunset, we could enjoy Sudanese style coffee with ginger. This rocky mountain is also the mecca of honeymoon. A lot of new married couples came when we visited. There was a trading market of livestock at the back side of this rocky mountain, and the market also had fresh sheep's grilled meat restaurant. Meat was grilled with stone on charcoal fire. This style restaurant was everywhere, but the stone grilled meat that we ate here was the best.

There were few restaurants and the sorts were few too. Meat dishes were main in menu. So, for daily meal, we cooked by ourselves at the hotel kitchen and took vegetables. I was a poor cook, so the project members always helped me with their delicious dishes. Ms. Yuri Sato who has long experience in Africa, cooked idea dishes using the local ingredients. It was the best.

Regarding the project, I would like to briefly explain the water supply situation of SWC (State Water Corporation) in Kassala State and in White Nile State. At Hatmia and Mahata water treatment plant in Kassala State, groundwater was only disinfected by chlorine and distributed. Although there was no problem about water quality, there was the issue that the volume of pumped water was decreasing year by year. And, because there was no water meter installed in

each customer, they could not know the leakage rate at all. A quite a lot of leakage was predicted from the result of pressure measurement in the distribution pipe network.

At Kosti water treatment plant in White Nile state, a clarifier and a filter basin were not functioning at all and the raw water of the Nile was distributed without treatment. Coagulant (PAC) was not dosed and chlorine (powder chlorine) was dosed just a little.

Most of the staff do not have experience of basic water treatment work. So, we plan to do OJT for the operation of the new water treatment plant which is scheduled to be completed in three years.

Regarding the water distribution pipe network, leakage rate was not known at all, because no water meter installed as same as in Kassala. Water pressure was also low, and quite a lot of water leakage was predicted.

Both of Kassala SWC and White Nile SWC have a prospect of water treatment, but have a lot of issues in the distribution pipe network. The biggest challenge is the installation of water meter. After that, they can find the water leakage rate. And a long time is necessary to find and repair the leakage for keeping pressure at network.

Lastly, I would like to mention about characteristic of the Sudanese people. They were very friendly not only at water treatment plants but also towns. I could spend pleasantly in daily life and work. However, I hope that SWC staff has more willing to improve their work.

3.Activity of Myanmar Project

From Yangon to MWA for training! ~ As opportunity of networking ~

Ms. Yariuchi

I have worked for a technical cooperation project supported by JICA at the Yangon City Development Committee (YCDC), which is responsible for the water supply of Yangon, Myanmar (see Newsletter Vol.30, 4p). As a part of this project activities, training courses were conducted at MWA (Bangkok, Thailand) from November 20, 2016. This training course consisted of a general course focusing on water utility management for first 4 days, and then training courses on specific subjects such as planning, finance etc. at each office for 2 to 5 days respectively, which covered the various aspects of water supply utility management, targeting 10 people of YCDC including deputy director level. The purpose of the training is to learn the practices and experiences of MWA known as a successful business entity, and to make improvement proposal to apply and utilize the outcomes in water supply services of Yangon which is expected to rapidly expand business in the near future.

Thailand has launched an initiative to play a leadership role of ASEAN as a national policy. Through this training course, the MWA Training Center (MWAIT) also showed the quite positive response for support to Myanmar. Each trainer was very friendly and enthusiastic to teach; some trainers said "We can learn each other as a neighboring big city, not a one-way lecture from us". How nice! I thought it could work as a very good chance to get to know each other, and hope the relationship continue between MWA

and YCDC even after this training.

Present MWAIT, also known as the National Waterworks Technology Training Institute (NWTTI) before, has been provided its buildings and facilities by Japanese grant aid in the 1980s as well as supported to strengthen its training center functions through technical cooperation. It is a training center deeply related to Japan since then. Through the activities of WaQuAC-NET, I have also personally had contacts with members of MWA, but this time, at the training opportunity of the project involved in Yangon, I had luckily joined trainings at the MWAIT, when I was deeply moved by being able to do. Mr. Matsui (PUC Co., Ltd.), a member of the same project, was accompanied as well. Mr. Matsui had a career dispatched for 7 months as JICA Expert from the Waterworks Bureau of Tokyo Metropolitan Government to the project at NWTTI. He was very pleased with the current situation that MWAIT is now established well to carry out training as a contribution to neighboring countries.

During free time, we had dinner together with WaQuAC-NET members of MWA; Ms. Sivilai, Ms. Uan, Ms. Jantima (both have just visited Japan as explained in an article in this newsletter), Ms. Rachanaan. Ms. Uan also contributed to YCDC's training as a lecturer on "business continuity and risk management".

I am impressed that it is the exact strength of network that we can deepen relationship through various opportunities with everyone we met through WaQuAC-NET. So, everyone, please do not hesitate to contact me whenever you stop by Myanmar!

Training participants and trainers in front of MWAIT

(from left) Rachanaa, Matsui, Yariuchi, Uan, Sivilai

4.Activity in Japan

The 3rd Osaka Meeting

International Cooperation of Water Utilities.

Reported by Manabu SUGINO

Mr. SUGINO

Outline

The 3rd Osaka meeting was held in the evening of September 16th on the topic of “International Cooperation of Water Utilities,” taking over the topic of the 2nd meeting last year.

Mr. Miyauchi and Mr. Sasayama gave presentation on experience of Osaka City and Yokohama City, respectively.

The participants were Mr. Miyauchi, Mr. Koseki, Mr. Ozaki, Mr. Kitagawa, Ms. Trang Nguyen, Mr. Hayashi and Sugino from the Kansai region, Mr. Sasayama and Ms. Yamamoto from Tokyo.

The total number of participants was 25 including 16 non-members. On the opening speech, the representative, Ms. Yamamoto introduced “WaQuAC-NET” and talked about the topic of the meeting. Then new exciting idea named “WaQuAAC-NET” was also introduced. (“AA” stands for Asia Africa). After the meeting, friendship party was held. Ms. Trang Nguyen, new member who was introduced on No.30 Newsletter, also joined the party.

Comment

Support system employed by Osaka Municipal Waterworks was a remarkable method. In this method, trainers give trainees *advice memo* as outcome at the end of the training course, so trainers have responsibility to leave final result, and this system has produced a good effect. Osaka Municipal Waterworks shares the result of the training with local JICA office of trainee’s country, and this outcome is expected to be developed to future training needs. I consider that we can learn a lot from this active method.

Mr. Sasayama mentioned that international Mr. Sasayama mentioned that international cooperation activities are also effective to train Japanese staff. Because wide knowledge is required to perform their jobs overseas; jobs are normally more specific in Japan, in contrast.

Wide area training system in Kansai region, which was suggested by Mr. Miyauchi, is expected to be set up. It will give more chances for water utilities to participate international activities.

WaQuAC-NET is a valuable network, because the members can participate irrespective of the kind of organization they belong to. As Ms. Yamamoto mentioned, topic of the next meeting will be “How does private sectors consider PPP? “

Mr. Miyauchi Presentation

Mr. Sasayama Presentation

5.List of Technical Q&A

List of Technical Q&A

We compiled all technical questions and answers posted in our newsletters by technical field for your easy reference. Each question is linked to each website page.

I. Water Treatment	
Questions	Related keywords
Q10. Row Water contains high concentration lime. Can lime removed by Bio-filtration method?	slow sand filtration, softening
Q13. Small black particles came out from tap in some supplied areas. Why did quality of tap water change?	Passing filter, Iron and Manganese
Q17. I want to know about Jar-test	jar test, coagulant, pH control agent, coagulant aid agent
Q18. Is EM (Effective Microorganisms) effective for reducing the water pollution of the river?	Water source/ water quality, EM (Effective Microorganisms)
Q24: Head loss of our rapid sand filters has increased in a short time and the filters have clogged soon. We have often lost filter media from the filters.	filter clogging, filter media, back wash, flow out of filter media
Q3. Advantage to change the coagulant from aluminum sulfate to PACl?	PCA
Q20. What kind of condition reduces the effectiveness of PAC in the coagulation process?	PAC, jar test, rapid mixing
Q22: Comparing to powder PAC, how is the specification, life time, storage and advantage and disadvantage of liquid PAC?	PAC, coagulation efficiency, cost, usability

II. Measures against algae	
Questions	Related keywords
Q1. Nematoda from tap water!?	Passing filter, water quality standard, residual chlorine
Q11. 1) Control of weed in raw water channel and 2) chemical use for removing of Duck lettuce (Ottelia alismoides).	Raw water, weed
Q14. Any sample case of standard operating procedure (SOP) of countermeasure against algae obstacles?	Algae, water treatment, SOP
Q16. Influence of eutrophication to water supply system and its countermeasures	Eutrophication, water treatment, water resource management, advanced treatment method

III. Safety of water	
Questions	Related keywords
Q21. Arsenic concentration in the well is 0.013mg/L while water quality standard value is 0.01mg/L. The concentration value can be 0.01mg/L by rounding. Then it can ensure the standard. Is such way right?	Arsenic, Health effect, Water quality standard
Q2. Arsenic pollution in the water supply using surface water?	raw water quality, water treatment, water quality standard, coagulation and sedimentation
Q9. Advantage and applicability of chlorine dioxide for disinfection?	disinfection agent, chlorine dioxide, water treatment, operation safety
Q12. Advantage and disadvantage by comparing Cl2 gas with NaClO as a disinfectant. How many grams of commercial NaClO correspond to the Cl2 gas 1g?	disinfection agent, water treatment, cost, safety
Q12-2 Compare the commercial NaClO with produced one by the house generation system of electrolysis method. And how many Watt of electric power are necessary for producing 1g NaClO?	disinfection agency, cost, water treatment

IV. Pipelines and pump	
Questions	Related keywords
Q8. For supplying safe water, show an example to keep cleanness at pipe construction site.	Piping, water safety, construction method
Q19. I heard that “Block Distribution System” is effective for measures of leakage reduction and water pressure control.	Measures against leakage, distribution system, water pressure management, stable supply, DMA (District metered area), NRW ratio
Q23: NRW ratio is 50% around in our water supply. I want to know a method of NRW reduction.	NRW, water balance analysis, DMA, water meter, illegal connection, equipment and materials, human resource development
Q15. Recently a pump has strange noise. Tell me what possibly cause the sound and how we can deal with them.	Maintenance, cavitation

WaQuAC-NET has set occasions for our members to learn each other as series of Mini-talks and lectures, and introduced those outlines in newsletter, and shared referential documents via our website (http://www.waquac.net/english/data.html). Here, we made a list of these technical talks and lectures according to technical field for your reference. You can click each topick to open the article of newsletter. We plan to rearrange our website including Q&A so that you can access to what you search easily

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Water safety		Date of event	Newsletter
Mini-talk No.1	How is Arsenic Problem going on?	01/12/2009	Vol. 5
Mini-talk No.5	Water Supply & Radioactive Contamination	24/05/2011	Vol. 11
Workshop	Arsenic Contamination and Removal from Groundwater	05/09/2014	Vol. 23

Measures against algae		Date	Newsletter
Mini-talk No. 3	Cryptosporidium in Southeast Asia	11/11/2010	Vol. 8
Mini-talk No.7	The water source survey and workshop on the problem of the algae in MWA	10/05/2013	Vol. 18

Pipelines and pump		Date	Newsletter
Mini-talk No. 4	Leakage control and safe water supply	17/11/2010	Vol. 9
Mini-lecture	Proper operation and power consumption reduction of the pump	15/10/2014	Vol. 23

Disaster management		Date	Newsletter
Special Talk	Damage of Water Supply Facilities by the Great Earthquake and Support for the Stricken Areas ～From the site～	14/04/2011	Vol. 10
International cooperation and businesses in water sector		**Date**	**Newsletter**
2nd Osaka Meeting	International Cooperation of Japanese Water Utilities	11/09/2015	Vol. 27
Mini-talk No. 2	Advantage of Grass-roots Activities	08/03/2010	Vol. 6
Seminar	Information Sharing Seminar for "Water" SMEs for Expanding into Southeast Asia	30/11/2010	Vol. 8

Others		Date	Newsletter
Mini-talk No. 8	Water in Africa	24/06/2016	Vol. 30
Technical Discussion	Procurement & Maintenance for Materials and Equipment	17/04/2015	Vol. 25

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Next Activity: March 10 WaQAC-NET General meeting
March 15 Newsletter vol.32 (Japanese version)
April 10 Newsletter vol.32 (English version)