WaQuAC-NET Newsletter
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For Safe Water, Do Network.

Termination of Technical Cooperation Project in Vietnam

Mina Yariuchi

The Project on Capacity Development for Urban Water Supply Utilities in the Central Region of Vietnam supported by JICA terminated in June 2013 after 3 years' implementation. The Project aimed at setting human resource development mechanisms for 18 water supply utilities in Central Vietnam.

We focused not only on supporting in technical aspects but also on strengthening networks among related organizations so that they can cooperate each other. This Project involved three key organizations; Ministry of Construction worked for raising awareness of top management of water supply utilities, the Training Center for Water Sector in the Central Region worked for strengthening their training capacity and effectiveness, the Thua Thien Hue Water Supply Company worked for supporting other water supply utilities to set up their own operational handbooks (manuals).

In order to establish such a cooperative relationship, we made our best effort to provide occasions to exchange their experiences and opinions. For instance, when we conduct a training course, we arranged to encourage training participants to share their experiences as much as possible. In conventional training courses in Vietnam, we found lecturers made explanations to the participants in one-sided style. Actually, trainees who participated in the Project's training courses are staff of water supply utilities, and most of them have lot of experiences in working at sites. Therefore, we applied participatory method in training courses: the lecturers encourage participants to answer and/or raise questions, share experiences among participants, which can help participants to understand the contents deeply and evoke their feeling of satisfaction. Lecturers play a role not only of a lecturer but of a facilitator of discussion.

Group discussions during training course

Many water supply companies in Vietnam have still difficulties in technical aspect and management. While at the same time, I believe that Vietnam has many experienced and professional persons. Therefore, it is quire important to bridge between these resource persons and water supply utilities which face many difficulties to solve. Once this bridge is established, Vietnam can develop and improve their situation in a sustainable way. And I feel many Vietnamese people have recognized it through implementation of the Project.

Drinking and singing together helps smooth communication very much!

Special Training: Pressure Control

Kenji Nakanosono,
(Yokohama Water Co. Ltd.)

Yokohama Water Co. Ltd. has implemented training courses for trainees from African nations since TICAD IV Conference was held in Yokohama. During implememntation of the training course for African countries where people speak French, participants of another training program by Japan Water Works Association requested to know cases of pressure control in the area which has highlands and lowlands. Then I had an extra lecture about case of Yokohama on 13 July. Participants are from Ethiopia, India, Malawi, Nepal, Nigeria, Rwanda, East Timor and Burundi.

In the first half of my lecture, I showed “Why Yokohama implemented block system?”, “What is block system?” and “Operation and maintenance of block system” with my experience. Participants asked me some questions while they only listened at the beginning.

Difficulties of pressure control each participants faces are as follows:

1 Rwanda: Famous as country with thousands of hill. Kigali, the capital city, has more than 10 hills in the city. Many houses are built on the hills. Water is pumped up from a treatment plant to a reservoir on a hill. Furthermore, the water is send from there to other reservoirs on other hills by pump. Water supply utility cannot control pressure well because service pipes are connected to trunk main and many leakages happen along trunk main. Water is distributed by gravity from a reservoir and some areas have not enough pressure and cannot receive enough water.


Mr. Nakanosono

2 Burundi: People of Bujumbura city live on Northeastern hill side of the Tanganyika Lake. Distribution system of them is nearly same as Rwanda.

3 India: Raw water is taken at the lowest point of a river in Mizoram province. Water is treated at the same place and pumped up to a reservoir 500m higher than the plant. Because water pressure is low in some areas, elevated tower is used to supply water. In some areas, water pressure is too high and many pipes are broken. When much water is used in lowland, water cannot be supplied well to highland. Distribution pipelines are not networked but tree shape. It is not good.

4 Nepal: Water is taken at the middle of a mountain and supplied to villages over one or two mountains though maintenance of the pipelines is not good. Pump cannot be used because of no power. GI pipe is used in low area while PVC pipe is used in other area. Some area has tanks to reduce pressure. When a pipe is broken, staff have to walk to reach there for repair. They has to bring pipe material for repair by themselves.

Conditions of participants seem very

similar. I have ever been in Rwanda and Burundi. I advised them with my experience in such countries as follows:

Any country has difference of altitude in distribution area. Then water supply utility has to install distribution system considering pressure control. 3 to 4 zones should be established and each zone has a reservoir. Distribution network is formed in each zone as much as possible to control pressure. Pipe material should be changed from PVC or GI to ductile iron where pressure is rather high. It seems easy to purchase DIP in India because it is produced in the country. Transmission and distribution pipes should be installed separately while connecting pipes between them should be considered.. Minimum hydraulic gradient is also considered to install trunk main.

Participants gave some advice each other such as “extra pipes should be stocked in branch offices for urgent repairing”, “supplying area in a village should be divided to DMA or zone”, etc. Participants said gladly that my lecture with my rich experience of many foreign countries was very useful to them.

Technical assistance for emergency water supply in Laos

Toshiki HORIE

From May to August in 2013, I joined technical assistance for emergency water supply in Laos. Recently, the flood occurred frequently in Laos. That's why Japanese government provided emergency water treatment plant, a drain pump, boat etc.

Our mission is to provide operation training and management of truck mounting water treatment plant (Sand filtration system) which can treat water 3.0m^3/hr. We carried out explanation on sand filtration mechanism, chemical preparation, water quality analysis and emergency water supply, coordination with relevant organizations for the disaster, and operation of truck mounting water treatment plant. At first, we implemented training of trainer, and then the trainer implemented training in three provinces.

This truck mounting water treatment is composed by water intake pump, raw water tank, water feed pump, and water treatment units. This system takes raw water directly from the water source such as river or lake. And then coagulants and chlorine are injected by chemical pumps. The raw water is treated by filter media which is anthracite and sand. Finally water tanker distributes treated water for disaster area.

Participants of trainings are from water supply authorities, Ministry of Public Works and Transport, Lao Red Cross, Ministry of Health, military, and police and so on. They work for emergency water supply in each province. The

number of participants was from 10 to 15. The contents of training was composed by so many matters as described above. Since the backgrounds of training participants are various, some people had never seen aluminum sulfate and chlorine. I made the manual of operation and chemical preparation training. It was very tough work for me because every person should understand this program. But I could do that.

Through this work, I really appreciated network of WaQuAC-Net. Mr.Shimomura, who is JICA expert of water supply project, invited me to his home and took me for drinking. Thanks to him for everything. When we requested water quality analysis for Chinaiomo Laboratory, the person in charge was Ms. Noi, who was a counterpart of WaQuAC-Net member Ms. Ookoshi. When I visited water treatment plants in Luang Namtha Province, the director of water supply authority had participated in a training course held in Saitama City Waterworks Bureau. Then he knows Mr. Kawashima who is also WaQuAC-Net member. I could work smoothly thanks to WaQuAC-Net.

In this project, water treatment plant mounted on a truck is Japanese product, which applies pressure sand filtration system. The operation can be done by the control panel. This operation is very familiar with Japanese operator. If there is no water in raw water tank, the pump stops automatically because of sequential control. However, it is slightly difficult to understand for trainees, because it is not familiar with them. Unless some conditions are met, the operation cannot be started with automatic mode. It is very difficult for me to explain sequential control.

Recently, JICA started new ODA scheme as assistance of Japanese small and middle scale enterprises, for example business formulation survey or demonstration project. If Japanese company promotes Japanese standards' equipment or system for foreign country, I think it is hard to promote, because it is complicated and difficult to procure spare parts for foreigners. If the Japanese companies expect to promote their own equipment, they should develop technologies for matching to the users. I think it is necessary to think about more simple system and operation.

Welcome! Our New Members:

- Mr. Satoshi Hamano (Japan)
- Mr. Daiki Shindo (Japan)

◎ We welcome new members anytime ◎
Please contact us

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Next Activity

January 2014	Newsletter 20 (in JPN)
February 2014	Newsletter 20 (in ENG)

[Report] General Meeting of Kyushu Branch

The Fifth General meeting of Kyushu Branch of WaQuAC-Net was held at 13:30 on July 28th in Fukuoka city. In this time, Ms. Soursday, staff of Phnom Penh Water Supply Authority, currently studying in Graduate School of Hiroshima University, attended as a special guest. Other participants were, from left on the following photograph, Mr. Goto, Mr. Kagata, Mr. Nakajima (front), Mr. Akaishi, Ms. Soursday 、Ms.Yamamoto, Mr. Shindo, Ms Yariuchi, 8 persons in total.

Firstly, Activity report and financial report of WaQuAC-NET 2012 was explained and activity plan of 2013 was suggested from the secretariat. After this, each participant made reports of their recent activity and/or works as follows. Mr. Daiki SHINDO, a fellow worker with Mr. Nakajima, runs a company for installation of thermal insulation, cold insulation and insulation and so on. He has become a member of WaQuAC-NET as one of chances to expand his business to abroad in the future. Mr. Nakajima has started water-related business in Cambodia. However, he would work for making domestic (Japan) network up for a while because of unclear political situation of Cambodia under just finished general election in July in this year. Mr. Kagata has retired from Kitakyushu-city Water and Sewerage Association, and this year he would go Cambodia and Vietnam as a short term expert for the grass root projects. Mr. Akaishi has established Akaishi Water Consultant Office, and he is joining JICA private enterprise cooperation project (the survey of extension of rural water supply in Cambodia).

Mr. Goto was interested in technical cooperation for developing countries after 2 years' study in the graduate school in Australia by self-development leave system in Fukuoka City. He would make a survey trip to abroad under the International Training Program of Japan Water Works Association in this fiscal year. Ms.Soursday had decided a master's thesis theme as "Arsenic pollution of Cambodia", then she would go back to Cambodia for a study of the thesis about two months from September. Ms. Yariuchi has been working in Global Environment Department, JICA in this year after completion of three years' project of technical cooperation in Vietnam (refer to page 1). At the end of meeting, Mr. Nakajima suggested to continue information exchange and to promote friendship among the members of Kyushu Branch of WaQuAC-Net.

Incidentally, Ms. Soursday and others three members arrived Hakata on the day before the general meeting, and visited Dazaifu Tenman-gu Shrine by a guidance of Mr. Nakajima and prayed successful accomplishment for Ms Sourday's study (by Yamamoto)

at Dazai-fu Shrine

Question & Answer Corner

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

Q : I am an official who is in charge of water supply in rural. I want to know about Jar-test (necessity, examination process and suggestion) (Mr. T.H., Laos.)

A: 1) Introduction

In case of coagulation and sedimentation treatment process, the feeding ratio of coagulant in water purification plants should be decided depending on the quality of raw water (turbidity, pH, temperature and alkalinity). To decide the appropriate feeding ratio, the jar test should be regularly conducted to treat raw water. Jar-test is conducted when the quality of raw water changes rapidly as well. A feeding ratio which can generate flocs most and lower turbidity of treated water to the lowest is appropriate feeding ratio. In addition, as coagulant chemicals, there are pH control agents (acid and alkaline) and coagulant aid agents as well. They are used as needed and the feeding ratio is also determined by jar test. Operator in water purification plant should decide the proper feeding ratio of chemicals in reference to the result of jar test. Furthermore, they have to adjust the ratio by checking the result of coagulation and sedimentation in the plant.

2) Coagulant chemicals

(1) Coagulant

Aluminum sulfate : $Al_2(SO_4)_3$,

Polyaluminum chloride: (PAC):$[Al_2(OH)_nCl_{6-n}]_m$,

Ferric Chloride : $FeCl_3$, Ferric sulfate : $Fe_2(SO_4)_3$ and so on. Aluminum sulfate and PAC are used mostly in Japan. PAC is an inorganic polymer coagulant developed in Japan. Compared with aluminum sulfate, PAC has advantages as follows; pH range for optimum coagulation is wide, allowable range of optimum feeding ratio is wide too, result of coagulation in high turbidity or in low temperature is good, alkali consumption is fewer and settling velocity is fast. When PAC is fed, pH and Alkalinity decrease as following figures

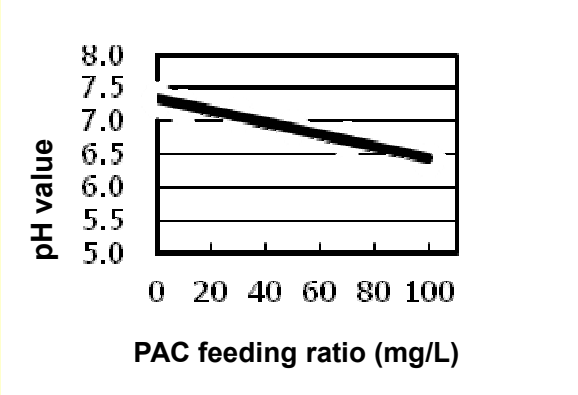


Fig. 1 Decrease in pH value

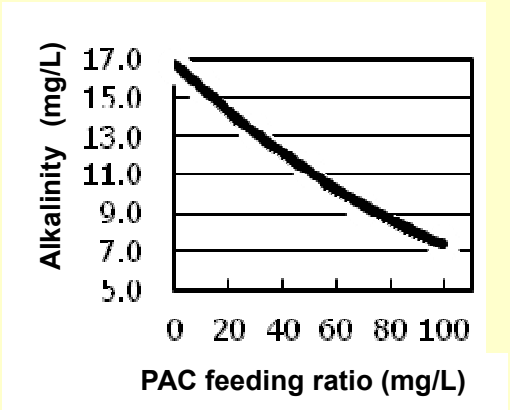


Fig.2 Decrease in alkalinity

Excess feeding of PAC beyond the optimum feeding ratio may cause increase of turbidity, which makes effect of coagulation worse as following Figure..

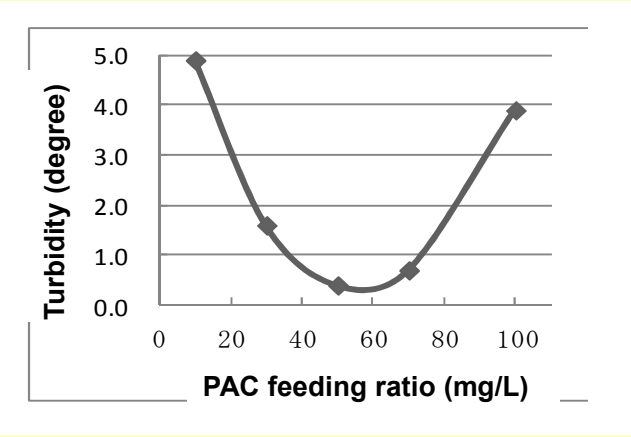


Fig.3 Influence of PAC dose to turbidity

(2) pH control agent

For keeping pH value in optimum range, pH is controlled. In case of high pH, acid agent is used. In case of low pH or low alkalinity, alkali agent is used. There are sulfuric acid, hydrochloric acid, carbon dioxide and etc. as acid agents. Calcium hydroxide, sodium carbonic acid, liquid sodium hydroxide and etc. are alkali agents.

(3) coagulant aid agent

When raw water has high turbidity or low temperature, good floc can not be generated even though coagulant agent and pH control agent are used. In this case, coagulant aid agent is used sometimes. There are activated silica, sodium alginate for water supply and polymer coagulant agent (polyacrylamide).

3) Preparation of jar test (case of PAC as coagulant

◆ **Preparation of chemicals**

(1) 1% Polyaluminum Chloride (PAC) Solution

Dissolve 5.0g poly-aluminum chloride with purified water and dilute to 500ml in a volumetric flask.

If 1ml of this 1% PAC solution is fed into 1L of the raw water, the concentration of PAC in this raw water will be 10mg/L.

(2) 1/50N（1/100mol）Sulfuric Acid

(3) MR-BCG indicator

◆ **Apparatus and instrument**

[For jar test]

Jar tester,

Volumetric flask (500ml),

Beaker (1000ml),

Graduated cylinder (1000ml),

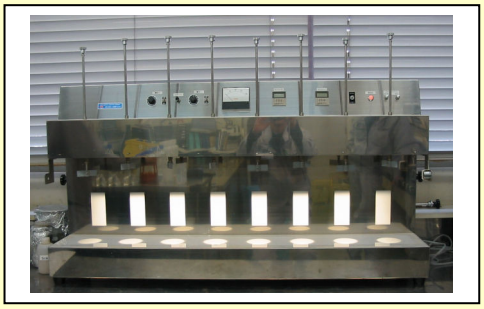
Transfer pipette (10 or 20ml),

[For turbidity] Turbidimeter,

[For pH] pH meter,

[For alkalinity] Erlenmeyer flask (200ml), Burette,

[For temperature] Thermometer,



4) Procedures

(1) Examine raw water quality.

(2) Pour 1L of raw water into each beaker.

(3) Set the paddles of jar tester in each beaker.

(4) Add coagulant (PAC) to each beaker by the pipette.

(5) Flash mixing in *140* rpm for *1* minute.

(6) Slow mixing in *50* rpm for *10* minutes.

Observe the floc forming condition.

(7) Leave the water quiet for *10* minutes.

(8) After 10 minutes, observe the sedimentability of floc at settling and measure the temperature, turbidity, pH, alkalinity of clear water.

Be careful not to disperse the settled flocs.

(9) Optimum feeding ratio is determined by all results.

※ Revolving number and time in (5), (6), (7) are set optionally by water quality of raw water, chemicals used and characteristic of flocculation equipment.

(Example)

Results of examination are recorded in Jar Test Data Sheet.

Jar Test Data Sheet

Date : July 27 , 2010

Raw Water Quality			
Temperature (℃)	pH value	Alkalinity (mg/L)	Turbidity (degree)
23.4	7.3	16.6	36.4

Feeding Ratio	PAC (mg/L)	10	30	50	70	100
	Alkali (mg/L)	0	0	0	0	0
Floc Forming Condition	Floc Size	**poor**	**Good**	**Good**	**Good**	**poor**
	Sedimentability	poor	Good	Good	Good	poor
pH value		7.2	7.1	6.9	6.7	6.4
Alkalinity (mg/L)		15.6	13.2	11.2	9.2	7.4
Turbidity (degree)		4.9	1.6	0.4	0.7	3.9
Judgment				**Good**		

50mg/L will be optimum feeding ratio from above data sheet.

Furthermore, jar test should carried out by changing the feeding ratio more finely around 50mg/L. And optimum feeding ratio is determined.

Second jar test data sheet

(Only show the feeding ratio as example)

Raw Water Quality			
Temperature (℃)	pH	Alkalinity (mg/L)	Turbidity (degree)

Feeding Ratio	PAC (mg/L)	40	45	50	55	60
	Alkali (mg/L)					
Floc Forming Condition	Floc Size					
	Sedimentability					
pH value						
Alkalinity (mg/L)						
Turbidity (degree)						
Judgment						

When optimum feeding ratio cannot be determined, jar-test is repeated by changing feeding ratio or/and adding pH control agent or/and adding coagulant aid agent.

(Above answer is extracted from the textbooks and PPTs for overseas training course of Sendai Waterworks Bureau and arranged by Yamamoto)