

Seismic Countermeasures and the Public Relations Strategy of the Kobe City Waterworks Bureau

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Abstract

This paper describes the tangible and intangible seismic countermeasures developed by the Kobe City Waterworks Bureau in the past 20 years since the Great Hanshin-Awaji Earthquake and their states of progress, as well as the City's efforts to secure general service water other than drinking water in anticipation of prolonged water outages. This paper also describes the strategic public relations activities (basic public relations plan) we have been conducting to gain understanding of these countermeasures and efforts by the citizens.

Introduction

From afterthoughts and lessons from the Great Hanshin-Awaji Earthquake, we developed the "Kobe City Basic Plan for Earthquake-resistant Water Supply Facilities" in July 1995. This basic plan aims to construct an earthquake-resistant water supply system that can be restored to its original state within a short period of time. Based on this plan, we have implemented various seismic countermeasures over the 20 years since 1995.

In addition to its tangible measures, we have recently been implementing intangible measures in order to enhance its capability of responding to disasters in collaboration with local communities. The intangible measures include the creation of community environments in which local communities can take the initiative in emergency water supply and the execution of emergency water supply practices in collaboration with the residents. However, the results of a survey conducted by Kobe City showed that the citizens' awareness of our seismic countermeasures is low. We are facing a challenge in how to make the citizens familiar with its seismic countermeasures.

This paper describes the tangible and intangible seismic countermeasures developed by the Kobe City Waterworks Bureau during the past 20 years and the progress of the countermeasures, as well as the Bureau efforts toward securing general service water other than drinking water on the assumption of prolonged suspension of water supply. This paper also describes the strategic public relations activities (basic plan for public relations) we have been promoting to gain the understanding of the citizens of Kobe regarding these countermeasures and efforts.

Seismic Countermeasures and the State of their Progress

Tangible Countermeasures

Kobe City Waterworks Bureau's tangible seismic countermeasures consists mainly of the "construction of an emergency water storage system" for emergency water supply immediately after disasters, the "construction of Large-Capacity Transmission Main" for emergency water supply to urban areas and immediate recovery from water outage, and the "improvement of the earthquake resistance of distribution pipes" for the minimization of damage to the water supply system and immediate recovery from water outage. We have been implementing these seismic countermeasures while maintaining consistency with water supply facility renewal works.

For the "construction of an emergency water storage system," we have installed emergency stop valves in distribution reservoirs and large-capacity storage tanks in parks and on other grounds owned by Kobe City. These pieces of equipment will serve as the bases for water supply by tank trucks and emergency water supply to the citizens. We completed the

construction of the planned total number of 47 bases by the end of fiscal 2013. These bases can supply approximately 60,000 m³ of drinking water during an emergency.

For the “construction of Large-Capacity Transmission Main,” we are currently constructing a water main under the urban area along a route different from the existing water main passing through the Rokko Mountains. With a diameter of 2.4 m and an overall length of 12.8 km, the construction of the new water main will be completed within fiscal 2015. This large-capacity transmission main construction project was the first in Japan to be launched in compliance with the Law Concerning Deep Subterranean Utilization. Owing to the proactive use of the latest technologies and systems, such as Steel Pipe for Crossing Fault, this project won a Japan Society of Civil Engineers Prize for technology development.

For the “improvement of the earthquake resistance of distribution pipes,” we have been improving the earthquake resistance of not only the distribution mains and major pipeline networks, but also the pipelines reaching elementary schools, hospitals, and other disaster prevention bases, to facilitate emergency water supply activities in the event of disasters. Within a limited budget, the Bureau has been improving the earthquake resistance of existing distribution pipelines in order of priority. In practice, aged distribution pipes are replaced with earthquake-resistant pipes. The percentage of earthquake resistant distribution pipes has increased from 9% at the time of the Great Earthquake to 35% as of fiscal 2015.

We have also been improving the earthquake resistance of existing water purification plants and distribution reservoirs.

Intangible Measures

As intangible measures for improving the earthquake resistance of water supply system, Kobe City Waterworks Bureau has been promoting “emergency water supply bases reconstruction and emergency water supply practice” and “Itsudemo Jaguchi” (“the drinking fountain can be used for drinking water at ordinary times, while it is used for emergency water supply in the event of disasters”) projects. We have recently begun to make efforts toward securing general service water other than drinking water in anticipation of prolonged water outage.

For the “emergency water supply bases reconstruction and emergency water supply practice” projects, we have been working since 2008 to develop a culture that will encourage each local community to voluntarily begin emergency water supply as early as possible after disasters/accidents. In particular, we have been reconstructing material/tool storage warehouses for emergency water supply and emergency water supply ports so that local residents can access these pieces of equipment immediately after disasters. In the past, most of the emergency water supply bases were constructed in distribution reservoirs and were controlled so that a local resident alone could not access them for security reasons. The keys of material/tool storage warehouses for emergency water supply have been handed over to local disaster prevention organizations. Emergency water supply practice is conducted at regular intervals in collaboration between the Waterworks Bureau personnel and local communities.



Figure 1 Emergency water supply base after its reconstruction



Figure 2 Emergency water supply practice in collaboration with local voluntary disaster prevention organization

For the “Itsudemo Jaguchi” project, we installed drinking fountains in elementary schools and junior high schools which are directly connected with reservoirs by earthquake-resistant pipes. These drinking fountains serve as emergency water supply bases. The purpose is to make the citizens familiar with the progress of our earthquake resistance improvement program in an easy-to-understand manner. The drinking fountain can be used for drinking water at ordinary times, while it is used for emergency water supply in the event of disasters. Emergency water supply practice is conducted at regular intervals in collaboration between the Waterworks Bureau personnel and each local community. The number of Itsudemo Jaguchi reached 36 by the end of fiscal 2014.

Securing General Service Water other than Drinking Water for Use during Disasters

As described above, we have implemented various measures to ensure the supply of drinking water even after the occurrence of disasters. In addition to the above measures, we are trying to provide information on both drinking water and general service water that can be used for daily life during disasters to further minimize the inconvenience of the citizens attributable to water shortage during disasters.

We have been working to establish a cooperation/contact system that will enable the related departments to share information on the following pieces of equipment, and thereby check mutually the damage to these properties and collaboratively respond to the damage at the time of a disaster.

(1) Emergency water supply bases and Itsudemo Jaguchi controlled and maintained by the Waterworks Bureau

(2) Wells controlled by the department in charge of health and welfare and made available for the citizens in the event of disasters (wells owned by citizens, companies, plants, and other organizations that can be made available to the public in the event of disasters)

(3) Facilities where the citizens can use rainwater and well water controlled by the department in charge of parks

(4) Temporary lavatories that are connected directly to a public sewage line controlled by the department in charge of the sewage system

The above cooperation/contact system will make it possible for disaster victims facing difficulty in obtaining water as usual after a disaster to obtain “water for use at the time of a disaster,” a general term for drinking water, daily life water, and general service water, from a total of 463 stations until the original function of the waterworks system is restored. The above 463 stations consist of 103 emergency water supply bases and Itsudemo Jaguchi that can supply drinking water, and 360 water supply stations. The water supply stations include 303 wells that can be made available for the citizens in the event of a disaster and facilities where the citizens can use rainwater and well water installed in parks. The total number of water supply stations that can be made available for disaster victims increases to 524 when 61 temporary lavatories that can be made available to the public in the event of a disaster are included. We believe that centralizing the information about the locations of these water supply stations and disclosing the information will help the citizens increase their options for access to water supply stations.

As described above, we have been promoting tangible and intangible seismic countermeasures in a unified manner. However, the results of a survey conducted by us showed that these seismic countermeasures have not been fully recognized by the citizens. One of our future tasks is to make the citizens aware of these countermeasures. It is indispensable for us to make the intangible countermeasures more effective and to sustainably promote the tangible countermeasures within a limited budget after gaining the understanding of the citizens. In particular, we should strategically publicize its seismic countermeasures.

Public Relations Strategy

Until recently, we performed public relations activities unsystematically with unclear objectives. Therefore, the activities were sporadic and lacked coherence. The activities were focused only on “how to transmit,” and no attention was paid to “what should be transmitted and to whom.” To improve our historical public relations strategy and thus maintain our water supply system sustainably by creating friendly relationships with water consumers, we developed the “Kobe City Waterworks Bureau Basic Plan for Public Relations” in March 2013. We intend to increase the number of water consumers who support our water supply operation and to maintain friendly communications with them. It is particularly important for us to get the citizens to understand that the water charges they pay are reflected reasonably in our water supply operation. Strategic public relations activities are also important to effectively continue the improvement of the earthquake resistance of water supply facilities. To deploy the public relations strategy systematically, we have adopted “fresh public relations” as a key word for its activities. This key word aims to encourage all spokespersons belonging to us to contact water consumers hospitably, to put forward all ideas on public relations activities based on this key word by introducing the senses of “ fun,” “laugh, and ”humor,” and to participate in the activities joyfully.

We believe that the “Kobe City Waterworks Bureau Basic Plan for Public Relations” conforms to the following objective of the “Project for promotion of earthquake-resistant waterworks,” which was jointly launched by the Ministry of Health, Labour and Welfare and other organizations in Japan:

Objective: To achieve smooth operation of waterworks by building up trustful relationships with water consumers and stakeholders involved with waterworks and gaining their favorable responses to the necessity of renewing existing water supply facilities and improving their earthquake resistance. Increasing the number of the subjects of public relations from conventional water consumers to various stakeholders involved with waterworks and releasing information on waterworks including risk information to them are indispensable to achieving the above objective.

The succeeding sections of this paper describe a new public relations activity evaluation method developed by us, the results of public relations activity evaluation conducted by us in fiscal 2013, the citizens’ awareness of our seismic countermeasures, and the new public relations strategy developed by us.

Public Relations Activity Evaluation Method

To apply the PDCA cycle approach to public relations, we tried to evaluate its public relations activities in terms of the “Mizumizu index” (effect of public relations) and the “efficiency of public relations activity.”

The “Mizumizu index,” which is an evaluation indicator, is determined from equation 1. We tried to use this index to digitize the direct and indirect effects of public relations on the public.

The “efficiency of public relation activity” is an index that is represented by the numerical figure obtained from equation 2. This equation digitizes the efficiency of public relations by comparing the effect of public relations with its cost.

$$y = P \times T \times H \text{ (equation 1)}$$

where,

y: Mizumizu index (effect of public relations)

P: Number of subjects

T: Depth of understanding

H: Degree of spread

Depth of understanding: Extent of the information understood by the person who received the information

Degree of spread: Number of friends and acquaintances to whom the person who received the information intends to transmit the information

$$A = Y/C \text{ (equation 2)}$$

where,

A: Effect of public relations activity

Y: Mizumizu index

C: Cost

Evaluation of Public Relations Activity

To evaluate its public relations, we classified its activities into four primary categories according to characteristics and then further classified these primary categories into a total of 12 subcategories according to the measure.

“Event”	-----	Exhibition at event site (co-hosted event, etc.), event (hosted by us), waterworks week (event during waterworks week), hiking
“Visitingtalk A”	-----	Visiting talk, facility tour (upon request of the public), others
“Visitingtalk B”	-----	Facility tour (parent and child), facility tour (women’s society), waterworks advisor
“Emergency water supply practice”	-	Itsudemo Jaguchi, emergency water supply practice

We conducted a total of 97 public relations activities in fiscal 2013. These activities are divided into: (1) 20 events; (2) 29 visiting talks A; (3) 15 visiting talks B; and (4) 33 emergency water supply practices. The number of activities conducted on week days was 54, while the number of activities conducted on Saturdays and Sundays was 43. Excepting a few events, the Waterworks Bureau personnel talked about the improvement of the earthquake resistance of water supply system.

The measures in descending order of their average Mizumizu index scores (index per event) were “facility tour (parent and child),” “waterworks week,” “exhibition at event site,” and “hiking.” In other words, the effect of public relations per event was in the descending order indicated above. The probable reasons were that the number of participants in these events was large and these events were covered widely in the media.

The measures in descending order of efficiency of public relations were “visiting talk,” “Itsudemo Jaguchi,” “waterworks week,” and exhibition at event site.” The Mizumizu index for “visiting talk” was small due to the small number of participants. However, the efficiency of public relations of this measure was high since most of them were held on weekdays, thus reducing costs including staff costs. The efficiencies of public relations of “facility tour (women’s society)” and “waterworks advisor” were low because the cost of facility tours (women’s society) per participant was high, and the cost of “waterworks advisor” events, most of which were held on Saturdays or Sundays, was also high. However, women’s societies and waterworks advisors enhance the effect of our public relations strategy since they support and give advice on water supply operation. It may be necessary to increase the degree of dissemination of the above two measures.

Measure	Total for each measure			Numerical value per event (average)							
	Number of events held (media) (event)	Total number of participants (person)	Cost (× ¥1,000)	Number of participants P (person)	Mizumizu index Y	Cost C (× ¥1,000)	Efficiency of public relations A=Y/C ×1,000	Saturday or Sunday (%)	Media (%)	Depth of understanding T	Degree of spread H
(1)Exhibition at event site	7 (1)	3,645	769	521	7,881	110	71.7	100	14	0.81	18.3
(2)Event	4 (1)	599	1,210	150	3,583	303	11.8	75	25	0.95	30.5
(3)Waterworks week	7 (0)	3,438	1,051	491	13,517	150	90.1	0	0	0.79	35.0
(4)Hiking	2 (2)	107	562	54	5,350	281	19.1	100	100	1.00	100.0
(5)Visiting talk	12(2)	558	88	47	984	7	133.6	17	17	0.95	21.1
(6)Observation of facilities (upon request of the public)	10(0)	588	77	59	155	8	20.2	10	0	0.78	4.1
(7)Observation of facilities (parent and child)	1(1)	277	722	277	27,700	722	38.4	100	100	1.00	100.0
(8)Observation of facilities (women's society)	9(0)	330	933	37	159	104	1.5	0	0	0.96	4.6
(9)Waterworks advisor	5(1)	88	301	18	379	60	6.3	100	20	0.84	28.0
(10) Itsude mo Jaguchi	7(1)	1,181	256	169	4,853	37	132.7	29	14	0.79	19.4
(11) Emergency water supply practice	26(5)	2,427	515	93	1,149	20	58.0	73	19	0.84	24.2
(12) Others	7 (0)	100	3	14	52	400	120.3	0	0	0.87	3.7
Total	97 (14)	13,338	6,486	138	2,922	67	43.7	43	14	0.86	21.3

Table 1 Evaluation result for public relations

The evaluation results for public relations are summarized as follows:

(1) Measures effective for spreading information [Mizumizu index (“index” for short) is large, efficiency is large]]

The “exhibition at event site” and “waterworks week” events are effective for grasping the public’s awareness of waterworks and their needs. The reason is that we have a policy of conducting public relations without any limitation at these events in order to encourage

- even individuals with absolutely no interest in waterworks to participate in these events
- (2) Measures that attracts public attention (efficiency is high)
“Visiting talk,” “Itsudemo Jaguchi,” “emergency water supply practice,” and “facility tour (parent and child)” are highly efficient measures for our public relations. At the “visiting talk” events, the Waterworks Bureau personnel can talk about the topics requested by the citizens. “Itsudemo Jaguchi,” “emergency water supply practice,” and “facility tour (parent and child)” events give vivid impressions to the participants through practical experiences and observations.
 - (3) Increase in the number of waterworks supporters (index is small to medium, efficiency is low to medium)
“Hiking” provides many opportunities for us to hear the opinions of the citizens, since this event increases the number of repeat participants with whom the Waterworks Bureau personnel can communicate in a friendly manner. “Observation of facilities (women’s society)” and “waterworks advisor” provide benefits higher than those represented by the public relation evaluation index, since these events deepen the visitors’ understanding of water supply operation and they also support and give advice on our water supply operation.

Each measure (public relations means) has its own advantages and disadvantages. To enhance the effect of each public relations activity, it is important to hold the most appropriate event after considering the purpose and contents of the public relations, expected participants, and other factors. In other words, it is effective to combine an exhibition that inspires many people to participate with an unspectacular event, as in the past. The following section describes the citizens’ awareness of the seismic countermeasures and the public relations strategy of us.

Citizens’ Awareness of Seismic Countermeasures and the Public Relations Strategy of the Waterworks Bureau

To know the citizens’ awareness of the seismic countermeasures, we conducted a questionnaire survey on the following four items before we publicized the countermeasures.

- (1) We have been renewing or improving the earthquake resistance of aged water pipes.
- (2) Improvement of the earthquake resistance of water supply facilities
- (3) Large-Capacity Transmission Main
- (4) Locations of emergency water supply bases

The questionnaires were handed out to event participants. As an example of our questionnaire survey, this paper describes the surveys conducted at the following five event sites:

Analysis of the questionnaire survey results showed that, though there was a slight difference between the events, approximately 70% of event participants knew little about our earthquake resistance improvement works (zero or one item). Their awareness of our works other than earthquake resistance improvement before these works were publicized was also surveyed. It was found from the survey that less than 40% of event participants knew little about the items covering the whole range of Kobe City’s waterworks or such common items as tap water, while approximately 50% of them knew little about water quality improvement.

Compared with these percentages, their awareness of earthquake resistance improvement was substantially lower. A working group of the “Project for promotion of earthquake-resistant waterworks” conducted an Internet survey* asking 300 residents of Shizuoka Prefecture if they knew or heard of the ratio of earthquake-resistant facilities. The result showed that the percentage of the subjects who had been aware of the term before a

waterworks PR campaign was 12%, while the ratio after the campaign was 20.3%.

* Waterworks PR campaign WG activities report Project for promotion of earthquake-resistant waterworks March 2014

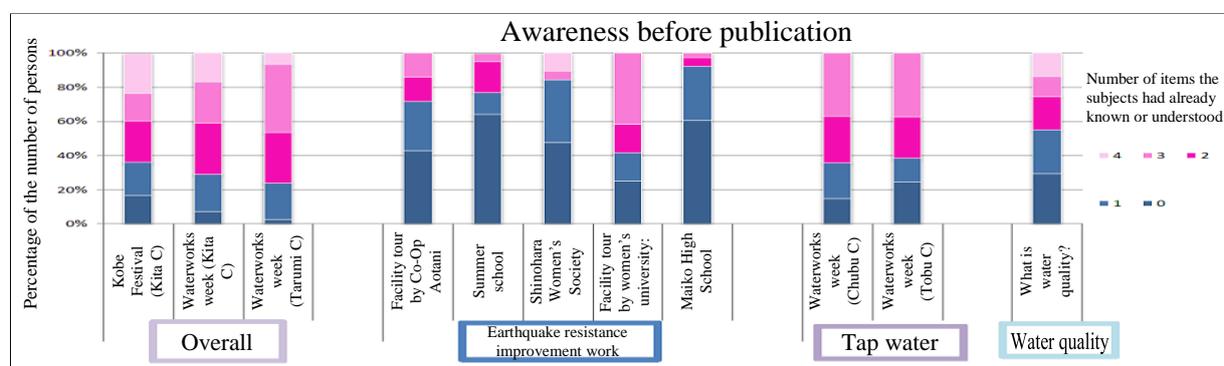


Figure 3 Subjects' awareness of earthquake resistance improvement work

The Waterworks Bureau further asked the event participants to answer the following questions to grasp their awareness of earthquake resistance improvement work by age. The result, which is shown in Figure 4, indicated that the event participants under the age of 40 were particularly poor in their awareness of “steadiness” (items 7 to 10), which is closely related to earthquake resistance improvement. Their awareness of the other items was also poor as a whole.

[Questions]

Questionnaire item	Theme	Question
7	Steadiness	In anticipation of earthquakes, earthquake resistance improvement has been promoted for water pipes and water purification plants.
8	Steadiness	The construction of Large-Capacity Transmission Main is a project launched on the basis of the lessons learned from the Great Hanshin-Awaji Earthquake.
9	Steadiness	In anticipation of earthquakes and other natural disasters, earthquake resistance improvement has been promoted for distribution pipes.
10	Steadiness	I know the location of the emergency water supply base nearest to my house.

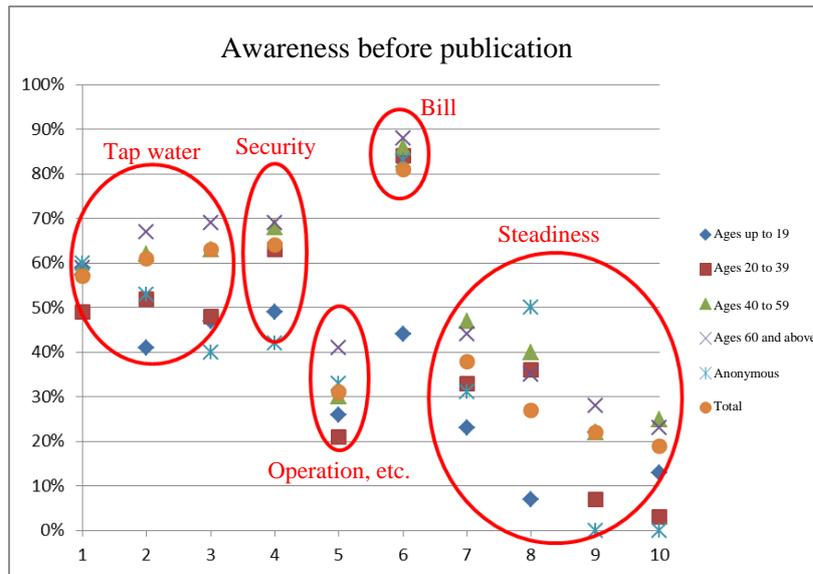


Figure 4 Analysis result of awareness by age

We analyzed the data obtained from a customer satisfaction survey on Kobe City waterworks that was conducted among 3,000 randomly selected ordinary citizens. The analysis results showed that the most important information they wanted to know or were interested in regardless of age was information on emergency water supply in the event of a disaster.

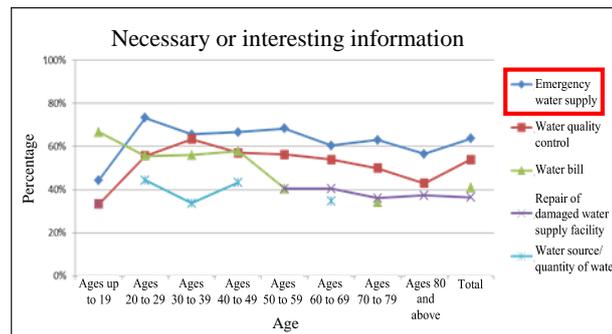


Figure 5 Necessary or interesting information

The analysis results are summarized as follows:

- Awareness of earthquake resistance improvement was lower than other topics.
- Awareness of earthquake resistance improvement (and other topics) by citizens of up to 39 years in age was lower than that of other age groups.
- Citizens of all age groups want to know the information on emergency water supply in the event of disasters.

Based on the above survey results, we studied the improvement of public relations on earthquake resistance improvement, the awareness of which was lower than the other topics. As a result, we concluded that it should improve the citizens' awareness of earthquake resistance improvement for water supply facilities by telling them about our actual experiences in helping the victims of the Great East Japan Earthquake and holding participatory events. More specifically, we should take the following measures:

- At "visiting talks" and other events, we will tell the participants about its earthquake resistance improvement efforts in combination with the real experiences gained in 2013 during its supportive activities following the Great Earthquake that hit the Tohoku Region.
 - ⇒ Improvement of the depth of understanding

- We will hold participatory events that will provide the participants with special experiences or actual feelings. At these events, we will permit the participants to enter and see special facilities that are usually kept off limits to the public. The participants will gain a strong impression from these events and are likely to talk their friends and acquaintances about their impression.

⇒ Improvement of the depth of understanding and the degree of spread

- We will plan events that can be enjoyed by small children.

These events are expected to encourage thirty-something parents of small children to participate in the events and raise their limited awareness of our activities. Planning quiz games and other programs that will arouse the participants' playful spirit regarding emergency water supply practices is one of the ideas for promoting positive dialogue with the participants. We should also plan further new experience-based events at which children can dabble with and draw water, since these events are effective in helping young parents understand our various efforts.

⇒ Events for people of a specific generation

According to the result of a survey* conducted as a part of the "Project for promotion of earthquake-resistant waterworks," approximately 50% of water consumers are likely to accept a slight increase in their water bills for expediting the improvement of the earthquake resistance of water supply system. The working group in charge has confirmed that it is possible to have risk communication with water consumers. The above survey result suggests that it is important for us to steadily continue holding the events described above, thereby increasing the number of people who understand the necessity of improving the earthquake resistance of water supply facilities. It is also important to maintain good communications with water consumers in order to have them understand that their water bills are reasonably reflected in our water supply operation.

* Waterworks PR campaign WG activities report Project for promotion of earthquake-resistant waterworks March 2014

Afterword

At this turning point 20 years after the Great Hanshin-Awaji Earthquake, this paper described the earthquake resistance improvement works the Kobe City Waterworks Bureau has been promoting by integrating tangible and intangible measures, as well as our new efforts toward ensuring a stable supply of daily life water and its new public relations strategy.

As a earthquake resistance improvement strategy, we have been integrally implementing tangible and intangible measures. To pursue this strategy more efficiently, we are required to further improve its intangible measures and to gain the citizens' acceptance in order to secure the financial resources necessary to successfully implement its tangible measures.

While steadily improving the earthquake resistance of the water supply system by integrating the tangible and intangible measures, we will conduct research to determine information that will provide the citizens with a sense of ease during ordinary times and disasters, as well as the optimal timing and method for transmitting the information to them.