

International Hydrological Programme

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GUIDELINE FOR EVALUATION PROCEDURE ON SEAL OF EXCELLENCE FOR URBAN WATER MANAGEMENT

SUMMARY

This document contains background information on the following item:

4.1 Implementation of IHP-VIII

- Guideline for evaluation procedure with tool-kit on “Seal of Excellence for Urban Water Management

Seal of Excellence for Urban Water Management

Guideline for evaluation procedure

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1. Purpose

The project will seek to support Member States in achieving their SDG 6.1 target on universal and equitable access to safe and affordable drinking water for all. The project will thus not only promote the provision of safe tap water and increase the tap water consumption but will also advance responsible water resources consumption, increase public awareness and eventually enhance the management of the water system. The project, by reducing the number of plastic bottles used and discarded per year, will contribute to the mitigation of climate change and minimization of waste being landfilled or finding its way to the water bodies and aquatic life.

Furthermore, the evaluated city will have to identify another city in a developing country to twin and support technically, in order for the latter to improve its capacity and pursue the award process. This action will promote international cooperation and technology transfer, contributing to Member States efforts in achieving SDG target 17.6.

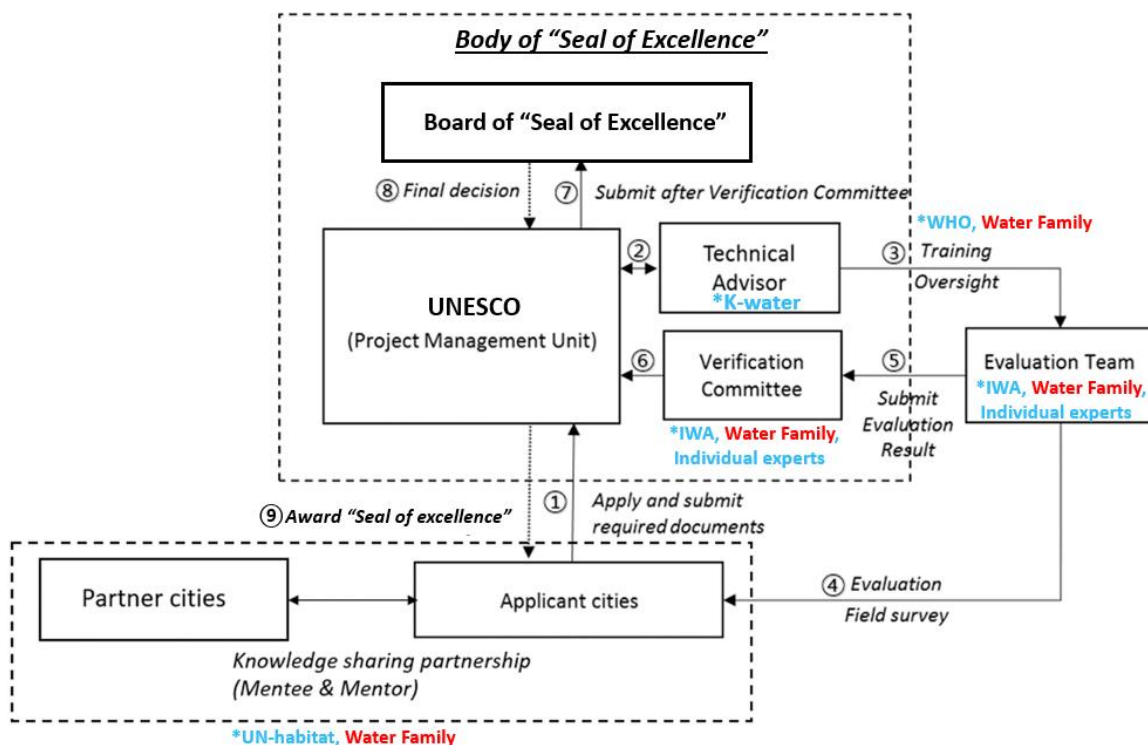
The purpose of this guideline is to present the procedure for the evaluation of the drinking water quality (quantitative evaluation) and the water supply system (qualitative evaluation) of an applicant city for the UNESCO Seal of Excellence for Urban Water Management.

2. Scope of Project

- 2.1 This guideline is prepared mainly based on the Guidelines for Drinking-water Quality and the Water Safety Plan (WSP) by the World Health Organization (WHO) and the International Water Association (IWA), which may be applied to the applicant cities.
- 2.2 The first is to evaluate the water quality for drinking water of water treatment plant, water supply area and tap in an applicant city.
- 2.3 The second is to evaluate the water supply system of an applicant city including water resources, water treatment process and the water supply network.

3. Roles and Responsibilities

Figure. Governance Setting



Project Organization Structure

Organization	Main role	Responsibilities
UNESCO-IHP	Scheme owner	<ul style="list-style-type: none"> - Compose and manage the Working Group, PMU (Project Management Unit) - Mobilize the Evaluation Team, Advisory Board, and Board of Seal of Excellence - Lead the implementation of the project - Award to the city through the final decision of Board of Board of Seal of Excellence - Develop and manage a knowledge/technology sharing cooperation platform
Board of Seal of Excellence	Final Decision Maker	<ul style="list-style-type: none"> - Review evaluation results with the help from Advisory Board and makes the final decision for applicant city - Report activities and results on the UNESCO Seal of Excellence for Urban Water Management to Intergovernmental Council.
Working Group	Advisory Board	<ul style="list-style-type: none"> - Review the concept of the seal and the procedure, result of a pilot project - Provide political, legal, technical advice - Help enlist cities for joining the seal programme - Define and promote the interactions between the future Platform and UNESCO, UN-organizations and their traditional partners - Identify and develop synergies with UNESCO-IHP activities - Propose a governance model for the Platform - Formulate, in consultation with the IHP Bureau and the IHP Intergovernmental Council, a Strategic Plan for the establishment and development of the future relations between UNESCO-IHP and the Platform
K-water	Technical Advisor	<ul style="list-style-type: none"> - Develop an evaluation tool-kit - Oversight, train and produce material for Evaluation Team members <ul style="list-style-type: none"> *maintain consistency and competence on evaluation - Review the design and operation of the water treatment plant and the water supply system in line with the drinking water quality report - Report to the Board of Seal of Excellence - Evaluate as Evaluation Team member
UNESCO Water Family (C2Cs, Chairs)	Evaluator	<ul style="list-style-type: none"> - Evaluate as Evaluation Team member - Support to confirm ISO certified laboratories in applicant city - Supervise sampling in applicant city
WHO	Standard or Guideline owner, Evaluator or Verifier	<ul style="list-style-type: none"> - Advise to revise or update evaluation tool-kit - Train and produce material for Evaluation Team members - Evaluate as Evaluation team member (if necessary) - Verify evaluation result of Evaluation Team and report to the Board of Seal of Excellence (if necessary) <p>* A member can have either role of evaluator or verifier. In other words, a member cannot have both roles simultaneously in the same evaluation procedure.</p>
IWA	Evaluator or Verifier	<ul style="list-style-type: none"> - Evaluate as Evaluation Team member (if necessary) - Verify evaluation result of Evaluation Team and report to the Board of Seal of Excellence (if necessary) <p>* A member can have either role of evaluator or verifier. In other words, a member cannot have both roles simultaneously in the same evaluation procedure.</p>

UN-HABITAT (GWOPA)	Advisor, Evaluator or Verifier	<ul style="list-style-type: none"> - Advise on implementation of twinning program - Evaluate as Evaluation Team member (if necessary) - Verify evaluation result of Evaluation Team and report to the Board of Seal of Excellence (if necessary) * A member can have either role of evaluator or verifier. In other words, a member cannot have both roles simultaneously in the same evaluation procedure.
ISO		- Advise to confirm ISO certified laboratories in applicant city
IHP National Committees		<ul style="list-style-type: none"> - Support to confirm ISO certified laboratories in applicant city - Supervise sampling in applicant city
IT specialist		- Develop and manage of knowledge/technology sharing cooperation platform
Applicant city		<ul style="list-style-type: none"> - Request water quality analysis to ISO certified laboratories on its own cost, and submit the results. - Pay the application fee and the cost for site visit from UNESCO, Technical advisor, and Evaluation team - Make a report for evaluation and submit evidence to Evaluation Team
Sealed city	Membership owner	<ul style="list-style-type: none"> - Pay the membership fee yearly - Share and transfer its knowledge/technology in twinning program

4. Procedures for the Seal

4.1 Seal Criteria

An applicant city is sealed by drinking water quality evaluation (50%), water supply system evaluation (50%), which would be further described in chapter 5 (Evaluation of Drinking Water Quality), chapter 6 (Evaluation of Water Supply System).

4.2 Seal Process

4.2.1 Step 1. Application

- (1) Applicant city prepares the application form and submits to UNESCO. (Annex 2)
- (2) UNESCO reviews the form and approves or not to proceed.

4.2.2 Step 2. Documentation and application fee payment

- (1) UNESCO requests documents of related to the system to be assessed, information and application fee. (Annex 3)
- (2) Applicant city prepares the documents and submits with the application fee.

4.2.3 Step 3. Documents review and discussion for sampling

- (1) UNESCO requests the technical advisor to review the documents, and recommend the sampling points/dates if the documents are all right.
- (2) UNESCO selects an ISO certified laboratory in country of applicant city and discusses with technical advisor and applicant city to decide how, when, and where to sample for the water quality analysis with the ISO certified laboratory.

4.2.4 Step 4. Water resource and supply system performance evaluation

- (1) Technical advisor requests self-assessment document of the water supply system performance to applicant city (Annex 4, 4-1, 4-2, 4-3)
- (2) Technical advisor reviews the document, and then discusses how to evaluate water supply system

with evaluation team.

- (3) UNESCO, along with evaluation team and technical advisor, implements the evaluation of water supply system including field survey during the one-year evaluation period.
- (4) Applicant city requests for an ISO certified laboratory to undertake the analysis of the drinking water quality of sampling points and officially submits the result to UNESCO.

4.2.5 Step 5. Verify evaluation results and submit to the Board

- (1) UNESCO verifies evaluation results (quantitative and qualitative) with support of verification committee and submits to the Board of Seal of Excellence.
- (2) The Board of Seal of Excellence reviews the evaluation results and makes the final decision. If applicant city doesn't agree the final decision, it can ask for coordination/clarification. (Annex 9)

4.2.6 Step 6. A Seal and membership payment

- (1) UNESCO awards Seal of Excellence to the applicant city depending on the final decision of Board of Seal of Excellence.
- (2) Applicant city pays the membership fee and joins the cooperation platform activities.

4.2.7 step 7. Publication and dissemination

- (1) UNESCO will upload information of the successful evaluation on the dedicated website of the project. (No information related to the application will be shared nor unsuccessful evaluation)
- (2) UNESCO will cooperate with city officials to publicize successful results at local regional or international levels.

4.3 Rating system

Rating is decided by the sum of both the qualitative and quantitative evaluation results. The evaluation of the water resource, treatment and distribution systems will comprise 70% of overall evaluation results. The evaluation of drinking water quality analysis will comprise 30%. If the sum of both results exceeds 98% and turbidity statements that are evaluated by quantitative evaluation meet the criteria, it can be graded A+++ rate. (Annex 5.5.4)

Rating	A+++	A++	A+	A	Fail
Score	≥ 98% & Satisfying water supply area turbidity parameter (Less than 0.2 NTU)	≥ 98%	94 ≤ x < 98%	90 ≤ x < 94%	< 90%

** In any case where the quantitative score is less than 27% out of 30%, it is fail.*

** Seen in 5.5.7 and 6.7.3 for more detail on calculation of score*

4.4 Application and Membership Fee

The applicant city for this seal shall pay the application fee and membership fee after sealed as follows.

Population	Application fee	Membership fee (Annual)
Below 100,000	2,000 USD	3,000 USD
100,000 ~ 300,000		10,000 USD
300,000 ~ 500,000		20,000 USD
Above 500,000		30,000 USD

4.5 Validity period of Seal of Excellence

Validity period is one year. After the first seal, evaluation is performed every year as shown in the guideline.

5 Evaluation of Drinking Water Quality (Quantitative Evaluation)

5.1 Evaluation Overview

5.1.1 Validity period

This guideline is maintained unless indicated on the changes in validity period.

5.1.2 Frequency of evaluation

Evaluation of drinking water is performed annually.

5.2 Documents and Records Management

5.2.1 Final confirmed evaluation report of drinking water is submitted to the Board of Seal of Excellence.

5.2.2 Evaluation report of drinking water shall be preserved for at least three years with at least one copy by UNESCO, applicant city, and technical advisor.

5.3 Preparation of Evaluation

5.3.1 UNESCO shall send document form of drinking water analysis information to applicant city just after approval of UNESCO. Applicant city creates the document and submits to UNESCO. (Annex 3)

5.3.2 If all documents are all right, UNESCO will select an ISO certified laboratory. The applicant city shall request tests of the drinking water quality from the UNESCO designated ISO certified laboratory.

5.3.3 UNESCO selects sampling observation organization including UNESCO water family.

5.4 Evaluation Scope

5.4.1 Evaluation scope is a whole water supply system from source to tap in applicant city.

5.4.2 When selecting major points for evaluation of drinking water (water treatment plants, water supply area and tap water in house), UNESCO shall discuss with technical advisor and applicant city and provide material on water safety to technical advisors for reviewing water supply system performance in line with drinking water safety assessment results.

5.5 Evaluation Procedures

5.5.1 Determination of sampling points for analysis

Sampling points for analysis shall be the water treatment plants, water supply area and taps in houses in applicant city.

- (1) Sampling points for water treatment plants shall be associated with water supply performance evaluation scope.
- (2) Sampling points for drinking water in water supply area and taps in houses shall be decided by water supply population of applicant city, and criteria of calculation are as follows in the table.
- (3) The number of sampling points is determined considering the sampling conditions in applicant city.

Population	Total number of samples per one quarter	Baseline	# of sampling
<5,000	3	2,500	3
5,000 ~ 100,000	3 per 5000 population	50,000	30
>100,000 ~ 500,000	3 per 10,000 population plus an additional 30 samples	300,000	120
>500,000	3 per 50,000 population plus an additional 150 samples * Total number of samples cannot exceed 200 samples	850,000	200

- (4) Technical advisor shall discuss with UNESCO for visiting applicant city including the selection of sampling points in water treatment plants, water supply area and tap water in house

5.5.2 Selection of drinking water quality analysis sampling points

Regarding sampling points for analysis including the water treatment plants, water supply area and tap water in house, it is required for applicant city to recommend sampling points and to discuss with UNESCO and technical advisor before making a final decision.

5.5.3 Sampling

Sampling for water quality analysis will be performed by an ISO certified laboratory of the applicant city and observed by UNESCO water family. Evaluation team and technical advisors might attend if needed.

5.5.4 Analysis parameters

Drinking water quality parameters are decided by sum of required analysis parameters (Category I), national standard parameters (Category II) and local issue parameters (Category III). [More details in Annex 5]

Category	Title	Explain
I	Required analysis parameters	Essential analysis parameters for drinking water safety. They can be modified by considering water environment, water treatment process, pipeline materials, etc.
II	Local national standard parameters	Established by national standards of applicant city.
III	Local water quality issues	UNESCO and the technical advisor are eligible to suggest additional parameters for analysis in consideration of local drinking water quality and water quality issues

- (1) Required analysis parameters in water treatment plant

Water treatment plant must be assessed according to the 44 drinking water quality parameters established by the WHO guidelines.

- (2) Required analysis parameters at water supply area and tap water

Drinking water at water supply area and tap water must be assessed according to the 12 drinking water quality parameters established by the WHO guidelines.

- (3) Turbidity statement at water supply area and tap water

For achieving A⁺⁺⁺ rate, turbidity statements must be assessed by criteria. Criteria of turbidity statement is that turbidity analysis data at water supply area and tap water should be less than 0.2 NTU per year more than 95% and under 0.5 NTU

5.5.5 Analysis frequency

Analysis shall be performed four times a year considering seasonal variability.

5.5.6 Analysis organization (ISO certified laboratory)

Analysis on the water quality shall be conducted by ISO certified laboratory in the country where applicant city belongs to. If it is not possible for internationally certified analysis organization to analyze under local circumstances, it is required to discuss and proceed with UNESCO recommendation.

5.5.7 Calculation of analysis

(1) The evaluation score is 50% - Excess rate.

$$\text{* Excess rate} = \frac{\text{Number of times exceeding the water quality standard}}{\text{Parameters} \times \text{Number of samples} \times 4 \text{ Times}} \times 50\%$$

Ex.) ① Number of samples: 2 for WTP, 120 for water supply area (Population: 300,000)

② Water quality parameters: 44 for WTP, 12 for water supply area

③ Number of times exceeding the water quality standard: 300 times

$$\Rightarrow \text{Deduction: } 50\% - \frac{300 \text{ times}}{(44 \times 2 + 12 \times 120) \times 4 \text{ times}} \times 50\% = 47.546\%$$

(2) In any case where the quantitative score is less than 27% out of 30%, it is failure.

5.5.8 Submit of the evaluation report

(1) Drinking water quality analysis report

The report shall be submitted quarterly to UNESCO and Technical advisor. [Annex 5-1, 5-2]. The report shall be submitted with test report and raw data provided by ISO certification laboratory. When submitting the report, national drinking water quality analysis data that are performed by applicant cities shall be submitted together by their own form.

(2) Final report

The applicant city will prepare an evaluation report for the seal which will be submitted to UNESCO and the technical advisor. If the evaluation report shows that the water quality analysis exceeds the water quality standards set, then the city is required to prepare documents analyzing the problems occurred. [Annex 5-3]

5.5.9 Coordination of opinion from applicant city

(1) If applicant city has an opinion including problem and complaint regarding the result, it can be submitted with final report. [Annex 9]

(2) The opinion is considered by the Board of Seal of Excellence, and it can be affected to evaluation result.

6 Evaluation of Water Supply System (Qualitative Evaluation)

6.1 Evaluation Overview

6.1.1 Application period

This instruction is maintained, unless otherwise indicated on the changes in the application period.

6.1.2 Inspection cycle for water supply system performance

Water supply system performance is evaluated at once.

6.2 Documents and Records Management

6.2.1 Finally confirmed evaluation results of water supply system are submitted to UNESCO board of Seal of Excellence.

6.2.2 UNESCO and technical advisor shall keep one copy of report of water supply system performance, respectively, for at least three years.

6.3 Preparation of Evaluation

6.3.1 Technical advisor shall send example of self-assessment documentation to applicant city just after approval of UNESCO. Applicant city shall proceed self-assessment according to the form and submit the report to technical advisor within 3months. [detailed in Annex4]

6.3.2 Technical advisor shall verify self-assessment report and request additional information and data if needed.

6.4 Organization of Evaluation team

6.4.1 Evaluation team shall be organized by experts in each field (water treatment process and water quality, distribution system, and facility management) from IHP Water Family and would have external experts such as IWA, WHO, and technical advisor if necessary.

6.4.2 Evaluation team shall be four members

Classification	Team leader	Water treatment process & water quality	Distribution system	Facility management
Member	1	1	1	1

6.4.3 Evaluation team member shall implement their task under control of team leader and team leader could hold an additional position with members, if necessary. For qualification, an evaluation team leader is required to have been engaged for at least 20 years in activities related to water supply system.

6.4.4 Evaluation team shall be trained by technical advisor before evaluation of water supply system.

6.5 Evaluation Scope

6.5.1 Evaluation scope basically shall include water source, water treatment plant, and distribution system of applicant city.

(1) If the number of water treatment plants in applicant city exceed 2, evaluation team and technical advisor shall discuss about selecting 2 water treat plants for evaluation.

(2) When selecting water treatment plants, technical advisor and evaluation team shall focus on representation of plant considering source type, treatment process and distribution characteristics.

6.5.2 Identify obstacles and hazards on sustainable water cycle and try to seek the solution and alternatives.

6.5.3 Suspended facilities of water supply system shall be excluded from the evaluation targets, but the causes of suspension shall be clearly indicated. If evaluation team and technical advisor decide suspended facilities are needed for securing the safety of drinking water, the facilities shall be included in evaluation targets.

6.6 Evaluation Procedures

6.6.1 Evaluation procedure overview

<p>Preliminary meeting (1st day)</p>	<p>Pre-meeting for performance evaluation and plans <i>Sharing of evaluation parameters in detail and direction</i></p>
<p>Review performance documents (1~2nd day)</p>	<p>Review self-evaluation documents from applicant city in each evaluation item.</p>
<p>Performance check with field survey (2~5th day)</p>	<p>Check performance of each item of evaluation tool-kit <i>Field survey and interview according to evaluation tool-kit</i></p>
<p>Evaluation result meeting (5th day)</p>	<p>Brief on evaluation result Gather opinions of applicant city on evaluation result and check action plan for improvement.</p>

6.6.2 Preparations of applicant city for evaluation

- (1) Prepare the following information of water supply system.
 - Types and characteristics of water source and intake
 - Water treatment process in each plant (coagulation, precipitation to disinfection process or advanced treatment with ozone and biological activated carbon)
 - Scale and characteristics of distribution system and issues
- (2) Prepare the following including room and evidence materials for evaluation.
 - Evaluation room including the laptop
 - Self-assessment result based on each evaluation item. [Annex 4]
 - Action plan for improvement and implementation
 - Designate the hands-on working group in applicant city who can interview in English for field survey in each evaluation.

6.6.3 Preliminary meeting for evaluation

- (1) Evaluation team shall determine the direction of evaluation, contents, and assignment of team members.
- (2) Evaluation team leader shall explain evaluation direction to the applicant city.

6.6.4 Review and check evaluation

- (1) Evaluation team shall review self-assessment result from applicant city.
- (2) Evaluation team check according to evaluation handbook in connection with field survey (water quality management with turbidity and residual chlorine, quantity management with flow and pressure) and technical advisor advise to evaluation team about specific issues for evaluation, if needed. [Annex7]

6.6.5 Evaluation result meeting

- (1) Evaluation team and technical advisor shall discuss the following on the evaluation results and prepare for the result report according to the form of [Annex 6 and 7].
 - Evaluation team shall determine the results of evaluation derived from field survey.
 - Evaluation team and technical advisor could give a technical opinion with priority for the improvements (short-term improvement (1 year or less), mid-term improvement (2 years or less), and long- term improvement (2 years or more) and implementation measures. [Annex 8]
- (2) Based on the results of the meeting, the leader of evaluation team reports on the evaluation results with good points and weak points briefly of system (not including specific scores) and gathers the opinions of the applicant city.

6.6.6 Submit of the evaluation report

Evaluation team and technical advisor shall discuss the following on the evaluation results

- (1) Evaluation team shall prepare evaluation report and submit it to technical advisor including evaluation sheet and action plan for improvement. [Annex 6, 7, 8]
- (2) Technical advisor reviews final reports and submit to UNESCO.

6.6.7 Coordination of opinion from applicant city

- (1) Sharing evaluation report with applicant city before submission to UNESCO.
- (2) If applicant city has opinion including problem and complaint regarding the result, it can be submitted with final report. [Annex 9]
- (3) The opinion is considered by Board of Seal of Excellence, and it can affect the final result.

6.7 Evaluation Parameters and Grade

6.7.1 Evaluation parameters

Evaluation parameters are comprised of total 65 parameters: 15 parameters for comprehensive evaluation, 12 parameters for water source, 23 parameters for water treatment plant, and 15 parameters for distribution system.

Classification	Comprehensive evaluation	Source water	Water treatment	Distribution system	Total
Sub-total	15	12	23	15	65

6.7.2 Modification of evaluation parameters

Evaluation parameters can be modified including addition or deletion upon the following cases.

- (1) If there is need for new parameters for safe and continuous drinking water supply to cope with the local climate changes and water quality issues. Then it could be modified as additional parameters.
- (2) If parameters are judged to be less or not efficient in comparison with current status and international drinking water quality management. Then it could be modified as parameters deleted.

6.7.3 Calculation of performance grades [Annex 4]

- (1) The evaluation score is converted the ratio, the sum of evaluated score on applicant city divided by the sum of excellent evaluation score, into 50%.

* Evaluation score: Imporatnce degree(A:1~5),Appropriateness of operation(B:1(poor), 3(fair), 5(excellent))

$$Evaluation\ Score = \frac{Sum\ of\ evaluatied\ score\ in\ appicant\ city}{Sum\ of\ excellent\ evaluation\ score} \times 50\%$$

7. Reference

For more information beyond this guideline, follow WHO guideline and material as below.

- (1) Guideline for drinking water quality (WHO)
- (2) Water safety plan manual (WHO)
- (3) A practical guide to auditing water safety plans (WHO)
- (4) Developing drinking water quality regulations and standards (WHO)

Annex 1. List of Definition of Terms

1.1. Water Safety Plan (WSP)

A Water Safety Plan is a plan, which ensures the safety of drinking water with a comprehensive risk assessment, and risk management approach that encompasses all steps in water supply from catchment to consumer.

1.2. Evaluation of Drinking Water Quality

This is the analysis procedure through which the WHO guideline parameter will be measured at the water treatment plant and at the tap water as part of the quantitative evaluation of drinking water.

1.3 Evaluation of Water Supply System

Evaluation procedure by the evaluation team, which includes a site visit at the applicant city and an assessment on the use of the water resources, the operation of the water treatment plant and the water supply network.

1.4 Evaluation Parameters

Direct and indirect physical, chemical and biological changes in water quality, deterioration of facilities, or operation conditions that can threaten quality of drinking water.

1.5 Evaluation Score

The Evaluation Score is classified into three stages namely: excellent, fair and poor. This score will be multiplied by the importance degree (A Score) and the appropriateness of operation (B Score)

1.6 Importance Degree (A Score)

Value for evaluating the water management based on the frequency of occurrence, degree of seriousness and influence on drinking water management

1.7 Appropriateness of Operation (B Score)

Value for assessing water management based on appropriateness of operation.

1.8 Water Evaluation Index

A quantitative index shows the level of management based on the water supply system performance and drinking water safety assessment. The closer to 100%, the better it is.

Application Form**1. General Information**

Name of city	Person in charge
	Name(organization) : Contact : e-mail :

2. Status of Intake station and Water source

Name of Intake station	Water intake capacity (m ³ /d)	Related WTP	Turbidity in Water source Yearly average (NTU)	Characteristic of Water source

3. Status of WTP

Name of WTP	Percentage of population of supplied water service(%) (=serviced population/total population)	Rate of utilization(%) (=Maximum flow per day(m ³ /d)/Capacity per day (m ³ /d)	Turbidity in water reservoir Yearly average (NTU)	Type of treatment process

* Type of treatment process need to state for process in details (If necessary, attach diagram of process)

4. Status of Water supply management

Diameter of pipe and length of each(mm, km)	Revenue water ratio (1-NRW, %)	Reservoir(m ³ , days) (Capacity of each, and the number of days to be capable to provide to supplied area)

5. Activities for UN SDG6 (Clean Water and Sanitation)

* Main Activities of candidate city (water security : Water quantity, water quality, and disaster management including flood)

(Cases) Various supporting and cooperating activities related to water security with international countries with developing countries

- Field of international training
- Field of joint research
- Field of international cooperation
- Field of international support

* Attach related resources of Activities

6. Commitment of Participation

* state the commitment of Mayor, Minister with responsibility for water/sanitation or Parliament for participation of project

7. Confirmation

This city, as applicant, submits the project for award on UNESCO Seal of Excellence for Urban Water Management, understanding the award process, and confirming the role and responsibility of the applicant.

The award is limited to the water quality and distribution system for the year proceeding the award;

To create this award, UNESCO relies upon the information provided by the city and the results of the laboratory, and UNESCO cannot represent that the information is accurate, complete or up-to-date.

Date :

Name :

Signature :

Drinking water analysis information

1. Information of drinking water analysis

1.1 Regulation for drinking water quality analysis

* Analysis parameters, criteria, frequency, sampling points, etc.

1.2 Water analysis data (recent 1 year)

No.	Analysis parameter	Local Criteria (mg/L)	WHO Criteria (mg/L)	Results (mg/L)				Remark
				Average	Max	Min	Median	
1								
2								
...								

* Without using upon table, applicant city can use their own program to submit water analysis data

2. Status of water supply system

3. Sampling points

3.1 Current sampling points

* Sampling points link with water supply area.

3.2 Recommended sampling points for evaluation

* Number of sampling points are determined considering the sampling conditions in applicant city. (Annex 5.5.1)

* Sampling points link with water supply area.

Annex 4. Self-assessment report for water supply system

1. Self-assessment report Information

- 1.1 After receiving the sample assessment-report by technical advisor, the applicant city prepares the report containing self-assessment results, the reasons for the evaluation, basis and evidence.
- 1.2 The report shall be submitted to UNESCO and Technical advisor within 3 months.
- 1.3 If self-assessment report is difficult to use in the evaluation, it can be requested to be rewritten.
- 1.4 Annex4-3 (Basis and evidence by evaluation parameters) form will be provided by Technical advisor.
- 1.5 When submitting the evidence documents, it should be presented in order of action plan and result according to plan.
- 1.6 The evidence documents can be submitted in free form with their own language, but there should be brief explanation for the documents written as English.

2. Consideration for scoring

- 2.1 Appropriateness: 1(poor), 3(fair), 5(excellent) or N/A
- 2.2 Remark: Reason for N/A
- 2.3 Calculation

$$\text{Evaluation Score} = \frac{\text{Sum of evaluated score in applicant city}}{\text{Sum of excellent evaluation score}} \times 50\%$$

- 2.4 Evaluation basis: Reason for appropriateness result
- 2.5 Action plan: Name of action plan including regulation or operation manual

Self-assessment result overview

Classification		Number of parameters	Score		
			Evaluation score of applicant city	Total evaluation score	Evaluation score
Comprehensive evaluation	Excellent				
	Fair				
	Poor				
	N/A				
Source water	Excellent				
	Fair				
	Poor				
	N/A				
Water treatment	Excellent				
	Fair				
	Poor				
	N/A				
Distribution system	Excellent				
	Fair				
	Poor				
	N/A				
Total					

Annex 4-2

Filled in by applicant city

Detailed result by evaluation parameters

1. Source water

No.	Parameters	Importance degree	Appropriateness	Remark
WS-6	Securing proper water resource sustainability management for stable water supply	5		vulnerability assessment
WS-1	Securing proper upstream source water protection from pollution of surface water	5		
WS-2	Securing proper upstream source water protection from pollution of groundwater (could be the transboundary items 6.5) ex) Namibia + Botswana, National or international aspect	5		
WS-3	Securing proper source water protection from pollution of non-conventional water	5		
WS-4	Securing proper online monitoring system of source water	3		Monitoring of water resource
WS-5	Securing proper toxic pollutants monitoring system of source water	3		
WS-7	Securing proper designed intake flow	5		Securing and monitoring for intake
WS-8	Securing proper intake protection from pollution	5		
WS-9	Securing proper maintenance for stable power supply facility of intake station	3		
WS-10	Securing proper emergency program in case of blackout of intake station	3		
WS-11	Securing proper pump capacity & installation for optimal operation of intake station	3		
WS-12	Securing proper pump operation & maintenance of intake station	3		

2. Water treatment

No.	Parameters	Importance degree	Appropriateness	Remark
WT-1	Securing proper chemicals management & storage	2		Securing and monitoring for confusion
WT-2	Securing proper chemical feeding capacity system	2		
WT-3	Securing proper chemical monitoring system	2		
WT-4	Securing proper emergency program of chemicals to cope with high-turbidity	2		
WT-5	Securing proper chemical mixing process	2		
WT-6	Securing proper coagulation & flocculation process	2		Securing and monitoring for coagulation
WT-7	Securing proper management & operation in sedimentation process	5		

WT-8	Securing proper online monitoring system in sedimentation process	3		Securing and monitoring for sedimentation
WT-9	Securing proper timely sludge removal	3		
WT-10	Securing proper management & operation in filtering process	5		Securing and monitoring for filtering
WT-11	Securing proper online monitoring system in filtering process	5		
WT-12	Securing proper turbidity removal in filtering process	5		
WT-13	Securing proper disinfectant management & storage in disinfection process	2		Securing and monitoring for disinfection
WT-14	Securing proper protection from disinfectant leakage accident in disinfection process	5		
WT-15	Securing proper disinfection to inactive pathogenic microorganism in disinfection process	5		
WT-16	Securing proper online monitoring system in clean water reservoir	3		Securing and monitoring for storage
WT-17	Securing proper outer sanitation in clean water reservoir	3		
WT-18	Securing proper inner sanitation(cleaning) in clean water reservoir	3		
WT-19	Securing proper maintenance for stable power supply facility in WTP	3		Securing for continuity
WT-20	Securing proper emergency program in case of blackout in WTP	3		
WT-21	Securing proper pump capacity & installation for optimal operation in WTP	3		
WT-22	Securing proper pump operation & maintenance in WTP	3		
WT-23	Securing proper plant operation ratio (%)	5		

3. Distribution system

No.	Parameters	Importance degree	Appropriateness	Remark
DS-1	Securing proper drinking water supply in storage tank	4		Securing and monitoring for storage
DS-2	Securing proper disinfection in storage tank	5		
DS-3	Securing proper turbidity management in storage tank	5		
DS-4	Securing proper online monitoring system in storage tank	3		
DS-5	Securing proper outer sanitation in storage tank	3		
DS-6	Securing proper inner sanitation(cleaning) in storage tank	3		
DS-7	Securing proper security system from illegal access in storage tank	2		
DS-8	Securing proper water pressure management in distribution system	5		Securing and monitoring for

DS-9	Securing proper safety of drinking water quality in pipeline	5		stability of the system
DS-10	Securing proper security system from illegal access in boost station	2		
DS-11	Securing proper maintenance for stable power supply facility in distribution system	3		
DS-12	Securing proper emergency program in case of blackout in distribution system	3		
DS-13	Securing proper pump capacity & installation for optimal operation in boost station	3		
DS-14	Securing proper pump operation & maintenance in boost station	3		
DS-15	Securing proper customer satisfaction	5		

4. Comprehensive evaluation

No.	Parameters	Importance degree	Appropriateness	Remark
CO-1	Securing proper operational manpower of intake station	2		Human resource capacity
CO-2	Securing proper operational manpower of WTP	2		
CO-3	Securing proper operational manpower of distribution system	2		
CO-4	Securing proper check-up & repair system for stable operation of intake station	2		Ensuring the presence of repair system
CO-5	Securing proper check-up & repair system for stable operation of WTP	2		
CO-6	Securing proper check-up & repair system for stable operation of distribution system	2		
CO-7	Securing proper risk management with operational manual of source water	2		Risk management
CO-8	Securing proper risk management with operational manual of WTP	2		
CO-9	Securing proper risk management with operational manual of distribution system	2		
CO-10	Water quality analysis & data management of source water	2		Water quality analysis
CO-11	Water quality analysis & data management of WTP	2		
CO-12	Water quality analysis & data management of distribution system	2		
CO-13	Securing proper Quality Control for on-line monitoring system of Source water	1		QA/ QC
CO-14	Securing proper Quality Control for on-line monitoring system of WTP	1		
CO-15	Securing proper Quality Control for on-line monitoring system of distribution system	1		

Basis and evidence by evaluation parameters

Ex.

WS-1 Securing proper upstream source water protection from pollution in surface water			
Person in charge	<i>Filled in by applicant city</i>		
Period of application	-		
Performance criteria	① Securing establishment of action plan (legal basis, operational guidelines, etc.) for proper upstream source water protection from pollution in surface water ② Securing proper operation based on action plan - Protection from potential upstream pollutant including such as sewage, livestock excretions, leachate, water from factory etc. - Proper location and operation of pollution control facility, etc.		
Criteria	<ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation 		
Action plan	<i>Filled in by applicant city</i>		
Appropriateness	<i>Filled in by applicant city</i>	Evaluation Basis	<i>Filled in by applicant city</i>
Evidence documents	<ul style="list-style-type: none"> • Resources of pollution source (location, potential pollutants) • Resources of pollutant management 		

Annex 5. Evaluation of drinking water quality parameters

1. Information for drinking water quality parameters

1.1 Drinking water quality parameters are decided by sum of Category I, II and III

Category	Title	Explain
I	Required analysis parameters	Essential analysis parameters for drinking water safety. They can be modified by considering water environment, water treatment process, pipeline materials, etc.
II	Local national standard parameters	Established by national standards of applicant city.
III	Local water quality issues	UNESCO and the technical advisor are eligible to suggest additional parameters for analysis in consideration of local drinking water quality and water quality issues

1.2 Water quality criteria follow the WHO guideline for drinking water quality.

1.3 If both parameters in category I and II are overlap, adapt parameters in category I

1.4 Water analysis fee follow the ISO certified laboratory and national analysis fee.

1.5 Drinking water quality report shall be submitted quarterly.

1.6 Water quality analysis result by ISO certified laboratory shall be submitted with test report and raw data.

1.7 When submitting drinking water quality report, National drinking water quality analysis data that is performed by applicant cities shall also be submitted, on their own form.

1.8 After 2nd reporting from applicant city, UNESCO and technical advisor will review the report and it will be used as reference for evaluation of water supply system.

1.9 Annex 5-1, 5-2 are lists of required analysis parameters. If local national standard parameters or local issue parameters are added, fill the table below the list of required analysis parameters.

2. Detail rules for required analysis parameters

2.1 The applicant city may request UNESCO to adjust some analysis parameters considering water environment and water treatment process. (However, when requesting adjustment of items, baseline data(past water quality data, etc.) must be submitted to UNESCO)

2.2 For Lead, Copper, and Iron, adjusting the items by reviewing the pipe material used.

2.3 Radionuclides are selected by local characteristics.

2.4 Disinfection by-products can be added or changed depending on chemicals.

3. Information for WHO criteria

A: Temporary recommended value due to detection limit

C: Aesthetically recommended value

D: Value can be exceeded by disinfection

P: Temporary recommended value due to uncertainty of health impact data

T: Temporary recommended value which is difficult to meet by water treatment & source water protection

Drinking Water Quality in WTP

WTP			Date		
No.	Classification	Analysis parameters	Criteria (mg/L)	Results (mg/L)	Category
1	Microorganism	Total colony count	< 100CFU		I
2		Escherichia coli(<i>E. coli</i>)	ND /100mL		
3	Harmful organic substances	Benzene	0.01		
4		Dichloromethane	0.02		
5		Carbon tetrachloride	0.004		
6		Toluene	(0.7, C)		
7		Xylenes	(0.5, C)		
8		Trichloroethylene(TCE)	(0.02, P)		
9		Tetrachloroethylene(PCE)	0.04		
10		Benzo(a)pyrene	0.0007		
11		Vinyl chloride	0.0003		
12		Acrylamide	0.0005		
13		1,2-Dichloroethane	0.03		
14		Epichlorohydrin	(0.0004, P)		
15	Pesticides	2,4-dichlorophenoxyacetic acid(2,4-D)	(0.03)		
16		Pentachlorophenol	(0.009, P)		
17	Harmful inorganic substances	Nitrate	50 as NO ₃ ⁻		
18		Nitrite	3 as NO ₂ ⁻		
19		Arsenic(As)	(0.01, A, T)		
20		Boron(B)	2.4		
21		Cadmium(Cd)	0.003		
22		Chromium(Cr)	(0.05, total P)		
23		Fluoride(F)	1.5		
24		Mercury(Hg)	0.006		
25		Lead(Pb)	(0.01, A, T)		
26		Selenium(Se)	(0.04, P)		
27		Antimony	0.02		
28		Nickel(Ni)	0.07		
29		Barium(Ba)	0.7		
30	Cyanide(CN)	0.17			
31	Disinfection by products	Total Trihalomethanes(THMs)	1		
32		Chlorine residual/Chlorine	(chlorine:5, C)		
33		Bromate	(0.01, A, T)		
34	Aesthetically influential substances	Aluminium(Al)	0.1		
35		Chloride(Cl)	250		
36		Color	15 TCU		
37		Iron(Fe)	0.3		
38		Odor	None		
39		Manganese(Mn)	0.1		
40		pH	(6.5~8.5)		
41		Sulfate	250		
42		Turbidity(NTU)	0.5 NTU		
43		Copper(Cu)	2		
44	Radioactive substances	Radionuclides	-		
					II
					...
					III
					...

Annex 5-2

Filled in by applicant city

Drinking Water Quality at Water supply area

Water supply area		Date			
No	Classification	Analysis parameters	Criteria (mg/L)	Results (mg/L)	Category
1	Microorganism	Escherichia coli (<i>E.coli</i>)	ND/100mL		I
2	Harmful inorganic substances	Nitrate	50 as NO ₃ ⁻		
3		Nitrite	3 as NO ₂		
4		Lead(Pb)	(0.01, A, T)		
5	Disinfection by products	Chlorine residual/Chlorine	(chlorine:5, C)		
6		Total Trihalomethanes(THMs)	1		
7	Aesthetically influential substances	Copper(Cu)	2		
8		Iron(Fe)	0.3		
9		Manganese(Mn)	0.05		
10		Odour	ND		
11		pH	(6.5~8.5)		
12		Turbidity	0.5 NTU		
..					II
..					...
..					III
..					...

Drinking Water Quality Evaluation Report

1. Evaluation overview

1.1 Evaluation period

1.2 Evaluation city

1.3 Evaluation contents (including sampling points with map and evaluating parameters)

2. Evaluation result

2.1 Water quality parameters meeting WHO and national water quality criteria

2.2 Water quality parameters exceeding WHO and national water quality criteria

3. Review comments for exceeding parameters

3.1 Reason of exceeding

3.2 Way to improve water quality

Annex 6.

Filled in by evaluation team

Water Supply System Evaluation Report

1. Evaluation overview

- 1.1 Evaluation period
- 1.2 Evaluation city
- 1.3 Evaluation contents

2. Evaluation result

- 2.1 Comprehensive evaluation
- 2.2 Source water
- 2.3 Water treatment plant
- 2.4 Distribution system

3. Action plan for improvement

- 3.1 Strategies for drinking water quality improvement
- 3.2 Action plan for improvement with budget program

Annex 7.

Filled in by evaluation team

Evaluation Sheet of Water Supply System Performance

Classification	Parameters	Performance	Acquired score	Opinion	Remark
1.Comprehensive Operation	CO-1 Securing proper operational manpower in intake station	A(Importance degree) = 4, B(Appropriateness) ·Excellent: 5 ·Fair : 3 ·Poor : 1	= Importance degree × Appropriateness		※ Attach reference and back data

Filled in by evaluation team

Action Plan for Improvement of Water Supply System

Classification	Evaluation parameters				Plans for improvement	Required budget (USD)	Expected date of implementation	Classification (Short-term/ Med-term/ Long-term)	Priority (1/2/3)	Charging division
	Code	Performance	Grade							
			current	Goal						
Water source	WS-1	Securing proper upstream source water protection from pollution in surface water	(ex.) Poor	(ex.) Excellent	Detailed plan	000	'April 2022	Short term	1	000
							'April 2022	Med term	2	
							'April 2022	Long term	3	

Annex 9. Coordination of opinion

Filled in by applicant city

1. Problems for evaluation

2. Cause and basis of problem

3. Required considerations during award

Annex 10. Tool for Evaluation of Water Supply System

UNESCO Seal of Excellence for Urban Water Management

Tool for Evaluation of Water Supply System

2021

1. Introduction

1.1 The purpose of water supply system evaluation is to ensure the safety of tap water quality and stability of tap water supply by managing all possible hazards in water supply system.

1.2 The purpose of this handbook is to provide criteria of performance for 65 water supply system performances

1.3 Classifications are comprised of 4 classifications of comprehensive operation, source water, water treatment, and distribution system.

Classification	Comprehensive operation	Source water	Water treatment	Distribution system	Total
Sub-total	15	12	23	15	65

2. Performance elements and derivation of grade

2.1 Each of the performance element is to assess appropriateness according to criteria.

2.2 Performance contents are evaluated by the Importance degree (A score) and appropriateness (B score).

2.3 Importance degree (A) and performance are classified into 5 steps according to Likert-type scale*.

* Likert-type scale: As a scale measuring the thought or cognition on a specific object, Likert-type scale is the most frequently used with 5scale among 3, 5 and 7scale.

		Severity or Consequence				
		Insignificant or no impact - Rating: 1	Minor compliance impact - Rating: 2	Moderate aesthetic impact - Rating: 3	Major regulatory impact - Rating: 4	Catastrophic public health impact - Rating: 5
Likelihood or frequency	Almost certain / Once a day - Rating: 5	5	10	15	20	25
	Likely / Once a week - Rating: 4	4	8	12	16	20
	Moderate / Once a month - Rating: 3	3	6	9	12	15
	Unlikely / Once a year - Rating: 2	2	4	6	8	10
	Rare / Once every 5 years - Rating: 1	1	2	3	4	5

2.4 Importance degree (A) is classified based on the importance of each performance for water supply system.

Score	1	2	3	4	5
Importance	Very Low	Low	Fair	High	Very High

2.5 Appropriateness (B) is classified with the establishment of action plan and proper operation based on action plan.

- **Excellent** : Establish action plan and proper operation based on action plan
- **Fair** : Establish action plan and improper operation based on action plan
- **Poor** : No action plan and improper operation

Score	1	2	3	4	5
Appropriateness	Poor	-	Fair	-	Excellent

2.6 Appropriateness scores are calculated in each performance by multiplying importance degree and performance.

2.7 Each of the performance is assessed according to the detailed performance handbook.

2.8 If needed, it is feasible to supplement and modify performance contents in a more specific manner than in the handbook.

3. Consultation matters

3.1 Applicant city must be able to supply tap water to consumers at all times.

3.2 Applicant city must submit a self-assessment report containing self-assessment results, the reasons for the evaluation, and evidence before the on-site evaluation.

* If self-assessment report is difficult to use in the evaluation, it can be requested to be rewritten.

3.3 When submitting the evidence, it should be presented in order of action plan and result according to plan.

* The evidence can be submitted in free form by reference to the sample standard report provided by Technical advisor.

3.4 Technical advisor can review appropriateness of applicant city's action plan, and this opinion may have an impact on the final evaluation.

3.5 Field check location is selected by evaluation team based on resources of applicant city's facility.

* Field validation is used as a reference for evaluation.

3.6 In the event of an accident occurring in the applicant city water facility, if the response procedure is smoothly carried out, it is regarded as 'proper operation'.

3.7 If it is necessary to meet the appropriate operation standards by establishment & implementation of the water supply facility improvement plan at the time of evaluation, it is then regarded as 'proper operation'

3.8 If water quality and quantity accidents occur within a short time (within 24hours) for facility improvement and repair, they are not included in the evaluation result if the reason is reasonable.

3.9 The evaluation of water supply system performance is an evaluation tool that verifies the contents of the work performed prior to the time of evaluation, so the award cannot guarantee the incidents occurring in the future.

I

Water Source

Classification	WS-1 Securing proper water resource sustainability management for stable water supply												
Intake station operation	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper water resource sustainability management for stable water supply ② Securing proper operation based on action plan - Water supply and demand - Health of aquatic ecosystem - Water governance, etc.											
	Performance contents	A score : Importance degree = 5 B score : Appropriateness											
	Importance degree (A Score)	5											
	Appropriateness (B Score)	<table border="1" data-bbox="699 741 1386 819"> <thead> <tr> <th data-bbox="699 741 869 779">Criteria</th> <th data-bbox="869 741 1040 779">Poor</th> <th data-bbox="1040 741 1211 779">Fair</th> <th data-bbox="1211 741 1386 779">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 779 869 819">B score</td> <td data-bbox="869 779 1040 819">1</td> <td data-bbox="1040 779 1211 819">3</td> <td data-bbox="1211 779 1386 819">5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
	B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Salt water intrusion - Over extraction –Raw water storage - Declining groundwater tables – Competing water use - Natural events(heavy rain, floods, droughts)												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of water resource management 												

Classification	WS-2 Securing proper upstream source water protection from pollution in ground water											
Water source management	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper upstream source water protection from pollution in ground water ② Securing proper operation based on action plan - Protection from potential upstream pollutant including such as sewage, livestock excretions, leachate, water from factory etc. - Proper location and operation of pollution control facility, etc.										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td style="width: 25%;">Poor</td> <td style="width: 25%;">Fair</td> <td style="width: 25%;">Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	-Naturally occurring chemicals - Treatment failure - Backflow flow into well - Natural events - Seepage of agricultural contaminants - Seepage from on-site sanitation and sewerage systems - Seepage of industrial waste - Dirty bucket - Runoff from surface contaminants to poorly constructed or maintained well - Development - Animal/animal waste access at uncovered well - Well/borehole headworks not watertight - Borehole casing corroded or incomplete - Meteorology and weather patterns- Seasonal variations - Geology - Forestry – Mining - Abattoirs - Transport-roads, railways, airports - Unconfined aquifer - Housing-septic tanks - Wildlife -Recreational use											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <ul style="list-style-type: none"> - Bank filtered water : No pollution sources within 2km upstream - Groundwater : No pollution sources within 200m radius <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of pollution source (location, potential pollutants) • Resources of pollutant management 											

Classification	WS-3 Securing proper source water protection from pollution in nonconventional water											
Water source management	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper source water protection from pollution in nonconventional water ② Securing proper operation based on action plan - Protection from potential upstream pollutant including such as sewage, livestock excretions, leachate, water from factory etc. - Proper location and operation of pollution control facility, etc.										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" data-bbox="699 777 1383 871"> <thead> <tr> <th data-bbox="699 777 871 824">Criteria</th> <th data-bbox="871 777 1043 824">Poor</th> <th data-bbox="1043 777 1216 824">Fair</th> <th data-bbox="1216 777 1383 824">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 824 871 871">B score</td> <td data-bbox="871 824 1043 871">1</td> <td data-bbox="1043 824 1216 871">3</td> <td data-bbox="1216 824 1383 871">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	-Discharge of sewage – Algal blooms -Agriculture -Discharge of industrial effluents -Unconfined aquifer -Development, construction activity -Major spills -Solid waste, refuse disposal sites -Human activities –Natural events -Treatment failure -Meteorology and weather patterns -Seasonal variations –Geology –Forestry -Mining -Transport-roads, railways, airports -Housing-septic tanks -Abattoirs –Wildlife -Recreational use											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of pollution source (location, potential pollutants) • Resources of pollutant management 											

Classification	WS-4 Securing proper online monitoring system of source water											
Water source management	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper online monitoring system of source water ② Securing proper operation based on action plan - Installation & Operation of water quality online monitoring system (turbidity, disinfectant concentration, etc.) - Alarming system for emergency of abnormal parameter, etc.										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" data-bbox="695 943 1385 1028"> <thead> <tr> <th data-bbox="695 943 868 983">Criteria</th> <th data-bbox="868 943 1040 983">Poor</th> <th data-bbox="1040 943 1212 983">Fair</th> <th data-bbox="1212 943 1385 983">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="695 983 868 1028">B score</td> <td data-bbox="868 983 1040 1028">1</td> <td data-bbox="1040 983 1212 1028">3</td> <td data-bbox="1212 983 1385 1028">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Telemetry											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city operate manpower-based monitoring instead of online monitoring system, this parameter would be evaluation by manpower-based</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of on-line monitoring system(Installation & Operation) • [Field check] Check the field situation of on-line monitoring system • [Field check] Securing alarming system operation 											

Classification	WS-5 Securing proper toxic pollutants monitoring system of source water											
Water source management	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper toxic pollutants monitoring system of source water ② Securing proper operation based on action plan - Installation & Operation toxic pollutants monitoring including fish, water flea, and algae - Real time monitoring, etc.										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" data-bbox="699 943 1390 1025"> <thead> <tr> <th data-bbox="699 943 868 981">Criteria</th> <th data-bbox="868 943 1037 981">Poor</th> <th data-bbox="1037 943 1206 981">Fair</th> <th data-bbox="1206 943 1390 981">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 981 868 1025">B score</td> <td data-bbox="868 981 1037 1025">1</td> <td data-bbox="1037 981 1206 1025">3</td> <td data-bbox="1206 981 1390 1025">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Telemetry											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Real time monitoring : Surveillance function thorough the image transmission</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of toxic pollutants monitoring system with photos • [Field check] Check the field situation of toxic pollutants monitoring system 											

Classification	WS-6 Securing proper upstream source water protection from pollution in surface water												
Water source management	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper upstream source water protection from pollution in surface water ② Securing proper operation based on action plan - Protection from potential upstream pollutant including such as sewage, livestock excretions, leachate, water from factory etc. - Proper location and operation of pollution control facility, etc.											
	Performance contents	A score : Importance degree = 5 B score : Appropriateness											
	Importance degree (A Score)	5											
	Appropriateness (B Score)	<table border="1" data-bbox="695 920 1385 1008"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	-Discharge of sewage -Discharge of industrial effluents -Agriculture -Development, construction activity -Runoff from roads near intake -Major spills -Animal husbandry -Solid waste, refuse disposal sites -Mining activity -Forestry -Landslides -Human activities -Algal blooms -Natural events -Meteorology and weather patterns -Treatment failure -Seasonal variations -Geology -Housing-septic tanks -Abattoirs -Wildlife -Recreational use -Unconfined aquifer												
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation * Operational reference in Korea <ul style="list-style-type: none"> - Surface water, reservoir water, river bed water : No pollution sources within 4km upstream (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of pollution source (location, potential pollutants) • Resources of pollutant management 												

Classification	WS-7 Securing proper designed intake flow				
Intake station operation	Period of application	-			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper designed intake flow ② Securing proper operation based on action plan - Proper operation for designed intake flow - Intake protection from floating garbage, waste, splint, timber etc. - Intake water level management - Case study of intake water restriction, etc.			
	Performance contents	A score : Importance degree = 5 B score : Appropriateness			
	Importance degree (A Score)	5			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
	Related threats to Water Safety of WHO Guide	- Salt water intrusion - Over extraction –Raw water storage - Declining groundwater tables – Competing water use - Natural events(heavy rain, floods, droughts)			
Explanation of Criteria	1) Criteria • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation * Operational reference in Korea				
	Criteria	Surface water	Reservoir water	Bank filtered water	Groundwater
	Excellent	Securing equipment for protection	Operate selective intake system & Securing equipment for protection	Secure proper depth more than 2 meters	Secure water table & survey
	Fair	-	Unappropriate selective intake system or Unobtained equipment for protection	-	Unstable water table or do not survey
	Poor	Unobtained equipment for protection	Unappropriate selective intake system & Unobtained equipment for protection	Unobtained proper depth more than 2 meters	Unstable water table & do not survey
(2) Evidence documents (English) • Resources of intake station operation • Resources of quantity of water intake					

Classification	WS-8 Securing proper intake protection from pollution												
Intake station operation	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper intake protection from pollution ② Securing proper operation based on action plan - Installation & Operation intake protection facility such as oil fence, algae preventing screen, or filth screen etc. - Possess absorbent or oil fence - Establishment of emergency program in case of pollution, etc.											
	Performance contents	A score : Importance degree = 5 B score : Appropriateness											
	Importance degree (A Score)	5											
	Appropriateness (B Score)	<table border="1" data-bbox="697 869 1385 956"> <thead> <tr> <th data-bbox="697 869 868 909">Criteria</th> <th data-bbox="868 869 1038 909">Poor</th> <th data-bbox="1038 869 1209 909">Fair</th> <th data-bbox="1209 869 1385 909">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="697 909 868 956">B score</td> <td data-bbox="868 909 1038 956">1</td> <td data-bbox="1038 909 1209 956">3</td> <td data-bbox="1209 909 1385 956">5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
	B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Source water contamination - Potential for informal solid waste disposal												
Explanation of Criteria	1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of installation & operation intake protection from pollution • [Field check] Check the field situation of protection for intake water quality 												

Classification	WS-9 Securing proper maintenance for stable power supply facility in intake station				
Facility& Operation	Period of application	-			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper maintenance for stable power supply facility in intake station ② Securing proper operation based on action plan - Proper maintenance for long term required replacement - Standby equipment management - Check and repair system for facility, etc.			
	Performance contents	A score : Importance degree = 3 B score : Appropriateness			
	Importance degree (A Score)	3			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
	Related threats to Water Safety of WHO Guide	- Power failure – Power supply			

Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of standby equipment management • Annual check & maintenance statement • Electrical facility drawing 											
	Classification											
		WS-10 Securing proper emergency program in case of blackout in intake station										
Facility & Operation	Period of application	-										
	Performance criteria	<p>① Securing establishment of action plan (legal basis, operational guidelines, etc.) for proper emergency program in case of blackout in intake station</p> <p>② Securing proper operation based on action plan</p> <p>- Emergency program including standby power supply in case of blackout, etc.</p>										
	Performance contents	<p>A score : Importance degree = 3</p> <p>B score : Appropriateness</p>										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
	B score	1	3	5								
Related threats to Water Safety of WHO Guide	- Power failure – Power supply											

Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of facility power consumption • Resources of generator capacity and maintenance statement • Electrical facility drawing
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Classification	WS-11 Securing proper pump capacity & installation for optimal operation in intake station				
Facility & Operation	Period of application	-			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper pump capacity & installation for optimal operation in intake station ② Securing proper operation based on action plan - Proper pump arrangement design for optimizing intake - Pump type considering on site intake situation - Check Auxiliary pump & intake facility management, etc.			
	Performance contents	A score : Importance degree = 3 B score : Appropriateness			
	Importance degree (A Score)	3			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
Related threats to Water Safety of WHO	- Pressure fluctuation - Flooding - Intermittent supply				

	Guide	
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of pump capacity & installation in intake station • Resources of pump maintenance and management in intake station 	

Classification	WS-12 Securing proper pump operation & maintenance in intake station			
Facility & Operation	Period of application	Recent 1year		
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper pump operation & maintenance in intake station ② Securing proper operation based on action plan - Proper pump O&M with monitoring - O&M of water hammer prevention facility - O&M of submersion prevention facility, etc.		
	Performance contents	A score : Importance degree = 3 B score : Appropriateness		
	Importance degree (A Score)	3		
	Appropriateness (B Score)	Criteria	Poor	Fair
	B score	1	3	5

	<p>Related threats to Water Safety of WHO Guide</p>	<ul style="list-style-type: none"> - Pressure fluctuation - Intermittent supply
<p>Explanation of Criteria</p>	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Pump operation & maintenance statement • Resources of protection from water hammer • Resources of prevention from submersion 	

II

Water Treatment

Classification	WT-1 Securing proper chemicals management & storage												
Mixing& Coagulation process	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper chemicals management & storage ② Securing proper operation based on action plan - Proper selection of chemical type - Install chemical overflow bump - Install sensor to prevent leakage - Check crack in chemical tank and pipe - Storage in a separated space - Not allowed with unauthorized access (Installing lock for security etc.) - Maintain the record of used and unused chemical in tank, etc.											
	Performance contents	A score : Importance degree = 2 B score : Appropriateness											
	Importance degree (A Score)	2											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td style="width: 25%;">Poor</td> <td style="width: 25%;">Fair</td> <td style="width: 25%;">Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Chemicals are of poor quality – Incorrect chemical used - Unapproved treatment chemicals and materials - Contaminated treatment chemicals												
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resource of chemical type selection (test result etc.) • Resources of securing chemical tank management • [Field check] Installation of overflow bump & Operation of sensor • [Field check] Protection from unauthorized access 												

Classification	WT-2 Securing proper chemical feeding capacity system				
Mixing& Coagulation process	Period of application	-			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper chemical feeding capacity system ② Securing proper operation based on action plan - Establish chemical feeding & standby system - Proper feeding injector capacity of 20 to 80% for design capacity - Secure feeding accuracy with flow meter, etc.			
	Performance contents	A score : Importance degree = 2 B score : Appropriateness			
	Importance degree (A Score)	2			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
	Related threats to Water Safety of WHO Guide	- Alum, polyaluminium chloride dosing malfunction - Improper alum, PAC dosing rate - Chemical supply exhausted			
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of chemical feeding & standby system • Resources of chemical feeding capacity • [Field check] Check the field situation of chemical feeding system 				

Classification	WT-3 Securing proper chemical monitoring system											
Mixing& Coagulation process	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper chemical monitoring system ② Securing proper operation based on action plan - Alarming system for limit level (upper and lower) in chemical tank - Alarming system for breakdown of chemical feeder - Proper protection from chemical overdosing accident, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5		
	Criteria	Poor	Fair	Excellent								
	B score	1	3	5								
Related threats to Water Safety of WHO Guide	- Alum, polyaluminium chloride dosing malfunction - Improper alum, PAC dosing rate - Chemical supply exhausted											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of monitoring for chemical feeding • [Field check] Securing alarming system operation 											

Classification	WT-4 Securing proper emergency program of chemicals to cope with high-turbidity											
Mixing& Coagulation process	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper emergency program of chemicals to cope with high-turbidity ② Securing proper operation based on action plan - Proper Jar-test to check chemical feeding - Management of chemical injection table considering each turbidity & proper feeding rate for emergency - Secure maximum chemical feeding capacity for highest turbidity condition, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5		
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Alum, polyaluminium chloride dosing malfunction - Improper alum, PAC dosing rate - Chemical supply exhausted - Treatment failure											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of emergency program of chemicals to cope with high-turbidity • Resources of Jar-test & injection table 											

Classification	WT-5 Securing proper chemical mixing process											
Mixing& Coagulation process	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper chemical mixing process ② Securing proper operation based on action plan - Installation of proper mixing type (mechanical, hydraulic and diffusion system in pipeline) - Proper mixing intensity(G value) and feeding location - Mixing monitoring by pH, SCD (Stream Current Detector) etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5		
	Criteria	Poor	Fair	Excellent								
	B score	1	3	5								
Related threats to Water Safety of WHO Guide	- Inadequate mixing of chemicals											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea - Coagulation mixing intensity(G value) : above 300/sec</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of chemical mixing system(Installation & Operation) • [Field check] Check the field situation of chemical mixing system 											

Classification	WT-6 Securing proper coagulation & flocculation process												
Mixing& Coagulation process	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper coagulation & flocculation process ② Securing proper operation based on action plan - Installation of proper flocculation type and operation - Proper mixing intensity(G value) with tapering speed, etc.											
	Performance contents	A score : Importance degree = 2 B score : Appropriateness											
	Importance degree (A Score)	2											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
	B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Insufficient contact time for floc formation - Improper mixing speed for floc formation												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <ul style="list-style-type: none"> - Mixing intensity : 400 ~ 1500/sec - Residence time : 20 ~ 40minute <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of coagulation & flocculation system(Installation & Operation) • [Field check] Check the field situation of coagulation & flocculation system 												

Classification	WT-7 Securing proper management & operation in sedimentation process				
Sedimentation (settling)process	Period of application	Recent 1 year			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper management & operation in sedimentation process ② Securing proper operation based on action plan - Checklist & maintenance guideline of sedimentation process - Evaluation of settling efficiency with operating parameters - Management of effluent turbidity, etc.			
	Performance contents	A score : Importance degree = 5 B score : Appropriateness			
	Importance degree (A Score)	5			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
	Related threats to Water Safety of WHO Guide	- Floc removal mechanism malfunctions			
Explanation of Criteria	(1) Criteria				
	<ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation 				
	* Operational reference in Korea				
	Classification	Lateral flow sedimentation		Suspended solid contact clarifier	
		Coagulation Basin	Ordinary basin		
	Over flow load	Less than 500m ³ /m/day	-	-	
	Surface loading	15 ~ 30 m m/minute	5~10mm/minute	40~60mm/minute	
	Mean velocity	Less than 0.4m/minute	Less than 0.3m/minute	-	
	Capacity	-	-	1.5~2 hours storage capacity of proposed rate of treatment	
	Classification	Inclination plate		Dissolved air flotation	
		Lateral flow	upstream		
	Surface loading	4~9mm/minute	12~28mm/minute	10~15m/hour	
Mean velocity	Less than 0.6m/minute	Less than 0.25m/minute	-		
Angle	60°	55~60°	60~70°		
(2) Evidence documents (English)					
<ul style="list-style-type: none"> • Resources of operation manual for sedimentation • Resources of turbidity removal in sedimentation process 					

Classification	WT-8 Securing proper online monitoring system in sedimentation process												
Sedimentation (settling)process	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper online monitoring system in sedimentation process ② Securing proper operation based on action plan - Online monitoring system management for turbidity, pH, disinfectant concentration etc. - Alarming system for emergency of abnormal parameter, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" data-bbox="699 869 1358 958"> <thead> <tr> <th data-bbox="699 869 868 913">Criteria</th> <th data-bbox="868 869 1038 913">Poor</th> <th data-bbox="1038 869 1214 913">Fair</th> <th data-bbox="1214 869 1358 913">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 913 868 958">B score</td> <td data-bbox="868 913 1038 958">1</td> <td data-bbox="1038 913 1214 958">3</td> <td data-bbox="1214 913 1358 958">5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Telemetry												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city operate manpower-based monitoring instead of online monitoring system, this parameter would be evaluation by manpower-based</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of on-line monitoring system(Installation & Operation) • [Field check] Check the field situation of on-line monitoring system • [Field check] Securing alarming system operation 												

Classification	WT-9 Securing proper timely sludge removal												
Sedimentation (settling) process	Period of application	-											
	Performance criteria	① Securing establishment of action plan (legal basis, operational guidelines, etc.) for proper timely sludge removal ② Securing proper operation based on action plan - Proper guideline of sludge drain and periodical removal - Proper setting drain frequency considering local condition, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" data-bbox="699 797 1382 893"> <thead> <tr> <th data-bbox="699 797 868 840">Criteria</th> <th data-bbox="868 797 1038 840">Poor</th> <th data-bbox="1038 797 1209 840">Fair</th> <th data-bbox="1209 797 1382 840">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 840 868 893">B score</td> <td data-bbox="868 840 1038 893">1</td> <td data-bbox="1038 840 1209 893">3</td> <td data-bbox="1209 840 1382 893">5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
	B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Floc removal mechanism malfunctions												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Criteria of sludge removal frequency • Resources of sludge removal • [Field check] Check the field situation of sludge removal 												

Classification	WT-10 Securing proper management & operation in filtering process																			
Filtering Process	Period of application	Recent 1 year																		
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper management & operation in filtering process ② Securing proper operation based on action plan - Checklist & maintenance guideline of filtering process including backwashing - Evaluation of filtering efficiency with operating parameters - Management of effluent turbidity, etc.																		
	Performance contents	A score : Importance degree = 5 B score : Appropriateness																		
	Importance degree (A Score)	5																		
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent															
		B score	1	3	5															
Related threats to Water Safety of WHO Guide	- Improper media - Flow rate in excess of design limits - Infrequent filter backwashing - Ineffective filter backwashing - Filter backwashing with raw water - Inadequate filter maintenance - Inadequate filter media depth																			
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation * Operational reference in Korea <table border="1" style="margin: 10px auto;"> <thead> <tr> <th style="text-align: center;">Classification</th> <th style="text-align: center;">Fast filtering paper</th> <th style="text-align: center;">Slow filtering speed</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">UFRV</td> <td style="text-align: center;">410 m³/m³ or above</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">L/de</td> <td style="text-align: center;">1,000 or above</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">Filtering speed</td> <td style="text-align: center;">-</td> <td style="text-align: center;">Up to 8 m/day</td> </tr> <tr> <td style="text-align: center;">Water depth</td> <td style="text-align: center;">100~150 cm</td> <td style="text-align: center;">90~120 cm</td> </tr> </tbody> </table> (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of operation manual for filtering 					Classification	Fast filtering paper	Slow filtering speed	UFRV	410 m ³ /m ³ or above	-	L/de	1,000 or above	-	Filtering speed	-	Up to 8 m/day	Water depth	100~150 cm	90~120 cm
Classification	Fast filtering paper	Slow filtering speed																		
UFRV	410 m ³ /m ³ or above	-																		
L/de	1,000 or above	-																		
Filtering speed	-	Up to 8 m/day																		
Water depth	100~150 cm	90~120 cm																		

Classification	WT-11 Securing proper online monitoring system in filtering process				
Filtering Process	Period of application	-			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper online monitoring system in filtering process ② Securing proper operation based on action plan - Online monitoring system management for water quality including turbidity etc. - Online monitoring system management for flow and level etc. - Alarming system for emergency of abnormal parameter, etc.			
	Performance contents	A score : Importance degree = 5 B score : Appropriateness			
	Importance degree (A Score)	5			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
	Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Telemetry			
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city operate manpower-based monitoring instead of online monitoring system, this parameter would be evaluation by manpower-based</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of on-line monitoring system(Installation & Operation) • [Field check] Check the field situation of on-line monitoring system • [Field check] Securing alarming system operation 				

Classification	WT-12 Securing proper turbidity removal in filtering process												
Filtering Process	Period of application	Recent 1 year											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper turbidity removal in filtering process ② Securing proper operation based on action plan - Management of effluent turbidity											
	Performance contents	A score : Importance degree = 5 B score : Appropriateness											
	Importance degree (A Score)	5											
	Appropriateness (B Score)	<table border="1" data-bbox="699 869 1385 958"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Improper media - Flow rate in excess of design limits - Infrequent filter backwashing - Ineffective filter backwashing - Filter backwashing with raw water - Inadequate filter maintenance - Inadequate filter media depth												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Less than 0.2 NTU per year more than 95% & Maximum 0.5 NTU or less • Fair : Less than 0.5 NTU per year more than 95% & Maximum 1 NTU or less • Poor : Less than 0.5 NTU per year under 95% or Maximum 1 NTU exceed <p>* Daily (or more) analysis data should be submitted. If not, appropriateness score will be poor.</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of turbidity removal in filtering process 												

Classification	WT-13 Securing proper disinfectant management & storage in disinfection process				
Disinfection process	Period of application	-			
	Performance criteria	① Securing establishment of action plan (legal basis, operational guidelines, etc.) for proper disinfectant management & storage in disinfection process ② Securing proper operation based on action plan - Proper selection of disinfectant type - Check chlorine leakage detecting device - Check blocking valve and safety valve for safety - Not allowed with unauthorized access (Installing lock for security etc.) - Maintain the record of used and unused disinfectant in tank, etc.			
	Performance contents	A score : Importance degree = 2 B score : Appropriateness			
	Importance degree (A Score)	2			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
	Related threats to Water Safety of WHO Guide	- Expired chlorine used - Chlorine of poor quality - Contaminated treatment chemicals - Unapproved treatment chemicals and materials			
Explanation of Criteria	(1) Criteria • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) • Resource of disinfectant type selection (test result etc.) • Resources of securing chemical tank management • [Field check] Installation of overflow bump & Operation of sensor • [Field check] Protection from unauthorized access				

Classification	WT-14 Securing proper protection from disinfectant leakage accident in disinfection process															
Disinfection process	Period of application	-														
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper protection from disinfectant leakage accident in disinfection process ② Securing proper operation based on action plan - Check national safety test on equipment considering local national regulation - Main proper concentration(15~20%) of neutralized solution(soda lime) considering local national regulation - Securing safety equipment including lime diffuser, gas mask and safety tools, etc.														
	Performance contents	A score : Importance degree = 5 B score : Appropriateness														
	Importance degree (A Score)	5														
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5						
	Criteria	Poor	Fair	Excellent												
B score	1	3	5													
Related threats to Water Safety of WHO Guide	- Dosing equipment malfunction - Unapproved treatment chemicals and materials - Contaminated treatment chemicals															
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation * Operational reference in Korea <ul style="list-style-type: none"> - Safety inspection cycle of high pressure gas preserving facility(one time/year) and dangerous device(hoist with 2tons)(two times/year)) - Bombe reexamination <table border="1" style="width: 100%; text-align: center; margin-top: 10px;"> <thead> <tr> <th>Classification</th> <th>Below 15year</th> <th>More than 15year ~ below 20year</th> <th>20year or above</th> </tr> </thead> <tbody> <tr> <td>500L or above</td> <td>Every five years</td> <td>Every two years</td> <td>Every one year</td> </tr> <tr> <td>Below 500L</td> <td>Every three years</td> <td>Every two years</td> <td>Every one year</td> </tr> </tbody> </table>				Classification	Below 15year	More than 15year ~ below 20year	20year or above	500L or above	Every five years	Every two years	Every one year	Below 500L	Every three years	Every two years	Every one year
	Classification	Below 15year	More than 15year ~ below 20year	20year or above												
500L or above	Every five years	Every two years	Every one year													
Below 500L	Every three years	Every two years	Every one year													
(2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of chlorine neutralizing equipment • Resources of safety equipment and safety test • [Field check] Check the field situation of the safety of chlorine feeding system 																

Classification	WT-15 Securing proper disinfection to inactive pathogenic microorganism in disinfection process				
Disinfection process	Period of application	Recent 1year			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper disinfection to inactive pathogenic microorganism in disinfection process ② Securing proper operation based on action plan - Proper inactivation ratio for virus (99.99%) and giardia (99.9%) considering CT value to guarantee the safety of drinking water - Proper condition of pH, turbidity and contact time for pathogen kill, etc.			
	Performance contents	A score : Importance degree = 5 B score : Appropriateness			
	Importance degree (A Score)	5			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
Related threats to Water Safety of WHO Guide	- pH too high for effective chlorination - Turbidity too high for effective chlorination - Insufficient contact time for pathogen kill - Incorrect dose calculation - Chlorine supply exhausted - Dosing equipment malfunction - Poor calibration of dosing/testing equipment				
Explanation of Criteria	(1) Criteria • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation * If applicant city does not use CT parameter, there should be another way to evaluate proper disinfection * Operational reference in Korea - Inactivation ratio(more than 1) for virus(99.99%) and giardia(99.9%) * CT calculated = Chlorine residual(mg/L) × Contact time(Minute) * Inactivation ratio = CT calculated / CT request				
	(2) Evidence documents (English) • Resources of disinfection to inactivate pathogenic microorganism • [Field check] Check the field situation of disinfection process				

Classification	WT-16 Securing proper online monitoring system in clean water reservoir												
Clean water reservoir management	Period of application	Recent 1 year											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper online monitoring system in clean water reservoir ② Securing proper operation based on action plan - Online monitoring system management for water quality including turbidity etc. - Online monitoring system management for flow and level etc. - Alarming system for emergency of abnormal parameter, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Telemetry												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city operate manpower-based monitoring instead of online monitoring system, this parameter would be evaluation by manpower-based</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of on-line monitoring system(Installation & Operation) • [Field check] Check the field situation of on-line monitoring system • [Field check] Securing alarming system operation 												

Classification	WT-17 Securing proper outer sanitation in clean water reservoir												
Clean water reservoir management	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper outer sanitation in clean water reservoir ② Securing proper operation based on action plan - Secure ventilating openings, windows and window screen against mosquito and insect - Check the possibility of polluted water from outside - Check concrete aging, crack and leakage of reservoir, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Access by animals/birds(through unscreened vents) - Runoff from roof - Leaching from construction materials												
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of protection from outside pollutant & rain water • Resources of clean water reservoir sanitation • [Field check] Check the field situation of protection from outside pollutant & rain water 												

Classification	WT-18 Securing proper inner sanitation(cleaning) in clean water reservoir				
Clean water reservoir management	Period of application	Recent 1 year			
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper inner sanitation(cleaning) in clean water reservoir ② Securing proper operation based on action plan - Guideline for cleaning frequency - Cleaning process in detail - Post-cleaning reservoir management, etc.			
	Performance contents	A score : Importance degree = 3 B score : Appropriateness			
	Importance degree (A Score)	3			
	Appropriateness (B Score)	Criteria	Poor	Fair	Excellent
		B score	1	3	5
Related threats to Water Safety of WHO Guide	- Tank dirty or sediment accumulates - Improper cleaning practice				
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <p>- Cleaning frequency is more than once a year</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of clean water reservoir sanitation • [Field check] Check the field situation of inner sanitation 				

Classification	WT-19 Securing proper maintenance for stable power supply facility in WTP											
Facility & Operation	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper stable power supply(maintenance) in WTP ② Securing proper operation based on action plan - Proper maintenance for long term required replacement - Standby equipment management - Check and repair system for facility, etc.										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 25%;">Criteria</th> <th style="width: 25%;">Poor</th> <th style="width: 25%;">Fair</th> <th style="width: 25%;">Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Power failure – Power supply											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of standby equipment management • Annual check & maintenance statement • Electrical facility drawing 											

Classification	WT-20 Securing proper emergency program in case of blackout in WTP											
Facility & Operation	Period of application	-										
	Performance criteria	① Securing establishment of action plan (legal basis, operational guidelines, etc.) for proper emergency program in case of blackout in WTP ② Securing proper operation based on action plan - Emergency program including standby power supply in case of blackout, etc.										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 25%;">Criteria</th> <th style="width: 25%;">Poor</th> <th style="width: 25%;">Fair</th> <th style="width: 25%;">Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Power failure – Power supply											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of facility power consumption • Resources of generator capacity and maintenance statement • Electrical facility drawing 											

Classification	WT-21 Securing proper pump capacity & installation for optimal operation in WTP												
Facility & Operation	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper pump capacity & installation for optimal operation in WTP ② Securing proper operation based on action plan - Proper pump arrangement design for optimizing intake - Pump type considering on site intake situation - Check Auxiliary pump & intake facility management, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" data-bbox="697 898 1386 987"> <thead> <tr> <th data-bbox="697 898 868 943">Criteria</th> <th data-bbox="868 898 1038 943">Poor</th> <th data-bbox="1038 898 1214 943">Fair</th> <th data-bbox="1214 898 1386 943">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="697 943 868 987">B score</td> <td data-bbox="868 943 1038 987">1</td> <td data-bbox="1038 943 1214 987">3</td> <td data-bbox="1214 943 1386 987">5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Pressure fluctuation - Flooding - Intermittent supply												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of pump capacity & installation in WTP • Resources of pump maintenance and management in WTP 												

Classification	WT-22 Securing proper pump operation & maintenance in WTP											
Facility & Operation	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper O&M for water supply pump in WTP ② Securing proper operation based on action plan - Proper pump operation & maintenance with monitoring - O&M of water hammer prevention facility - O&M of submersion prevention facility, etc.										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td style="width: 25%;">Poor</td> <td style="width: 25%;">Fair</td> <td style="width: 25%;">Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Pressure fluctuation - Intermittent supply											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Pump operation & maintenance statement • Resources of protection from water hammer • Resources of prevention from submersion 											

Classification	WT-23 Securing proper plant operation ratio(%)											
Facility & Operation	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper plant operation ratio(%) ② Securing proper operation based on action plan - Guideline for proper operation ratio considering local condition - Proper future plan to improve existing operation ratio (%), etc.										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Flow rate in excess of design limits - Capacity of treatment works											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan * Excellent : more than 60% ~ below 90% • Fair : Establish action plan and improper operation based on action plan * Fair : below 60% or more than 90% ~ less than 100% • Poor : No action plan and improper operation * Poor : Over 100% * Operation ratio = daily maximum supply(m3/day) /design capacity (m3/day) <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of recent operation rate(%) of WTP • [Field check] Check the field situation of operation ration 											



Distribution System

Classification	DS-1 Securing proper drinking water supply in storage tank												
Storage tank management	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper drinking water supply in storage tank ② Securing proper operation based on action plan - Proper capacity management considering water quality & supply - Proper standby tank operation, etc. * Field check the performance of within 5 storage tanks randomly in local area											
	Performance contents	A score : Importance degree = 4 B score : Appropriateness											
	Importance degree (A Score)	4											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td style="width: 25%;">Poor</td> <td style="width: 25%;">Fair</td> <td style="width: 25%;">Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Intermittent supply												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <p>- Around 12 hours storage capacity of design daily maximum water supply</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of retention time in storage tank 												

Classification	DS-2 Securing proper disinfection in storage tank											
Storage tank management	Period of application	Recent 1year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper disinfection in storage tank ② Securing proper operation based on action plan - Proper disinfectant concentration management including residual chlorine in drinking water - Proper DBP(disinfection by-product) management including THM(tri halo methane), etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Residual not maintained through network - Disinfection by-products - Algal growth - Expired chlorine used - Chlorine of poor quality											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <p>- Residual chlorine in drinking water should be more than 1.0mg/L</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of disinfectant concentration data in storage tank • [Field check] Check the field situation of disinfectant concentration in storage tank 											

Classification	DS-3 Securing proper turbidity management in storage tank											
Storage tank management	Period of application	Recent 1year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper turbidity management in storage tank ② Securing proper operation based on action plan - Proper turbidity management based on local regulation, etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" data-bbox="699 898 1385 987"> <thead> <tr> <th data-bbox="699 898 868 943">Criteria</th> <th data-bbox="868 898 1037 943">Poor</th> <th data-bbox="1037 898 1206 943">Fair</th> <th data-bbox="1206 898 1385 943">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 943 868 987">B score</td> <td data-bbox="868 943 1037 987">1</td> <td data-bbox="1037 943 1206 987">3</td> <td data-bbox="1206 943 1385 987">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Sediment or biofilm build-up and re-suspension or release - Opening/closing valves											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <ul style="list-style-type: none"> - Turbidity in drinking water should be less than 0.5NTU <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of turbidity data in storage tank • [Field check] Check the field situation of turbidity in storage tank 											

Classification	DS-4 Securing proper online monitoring system in storage tank											
Storage tank management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper online monitoring system in storage tank ② Securing proper operation based on action plan - Online monitoring system management for water quality including turbidity etc. - Online monitoring system management for flow and level etc. - Alarming system for emergency of abnormal parameters, etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Telemetry											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city operate manpower-based monitoring instead of online monitoring system, this parameter would be evaluation by manpower-based</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of on-line monitoring system(Installation & Operation) • [Field check] Check the field situation of on-line monitoring system • [Field check] Securing alarming system operation 											

Classification	DS-5 Securing proper outer sanitation in storage tank											
Storage tank management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper outer sanitation in storage tank ② Securing proper operation based on action plan - Secure ventilating openings, windows and window screen against mosquito and insect - Check the possibility of polluted water from outside - Check concrete aging, crack and leakage of storage tank - Prevention contamination when checking storage tank, etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Access by animals/birds(through unscreened vents) - Runoff from roof - Leaching from construction materials - Entry of contaminated groundwater - Contamination during sampling - Open service reservoir – Leaking service reservoir											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of protection from outside pollutant & rain water • Resources of storage tank sanitation • [Field check] Check the field situation of protection from outside pollutant & rain water 											

Classification	DS-6 Securing proper inner sanitation(cleaning) in storage tank											
Storage tank management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper inner sanitation(cleaning) in storage tank ② Securing proper operation based on action plan - Guideline for cleaning frequency - Cleaning process in detail - Post-cleaning tank management, etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 3 B score : Appropriateness										
	Importance degree (A Score)	3										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Improper cleaning practices - Algal growth - Tank dirty or sediment accumulates											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation * Operational reference in Korea - Cleaning frequency is more than once a half-year (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of storage tank sanitation • [Field check] Check the field situation of inner sanitation 											

Classification	DS-7 Securing proper security system from illegal access in storage tank											
Storage tank management	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper security from illegal access in storage tank ② Securing proper operation based on action plan - Install protective fence and devices - Install monitoring devices including CCTV and monitoring sense, etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 25%;">Criteria</th> <th style="width: 25%;">Poor</th> <th style="width: 25%;">Fair</th> <th style="width: 25%;">Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Security/vandalism - Unprotected service reservoir access											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of security in storage tank • [Field check] Check the field situation of security in storage tank 											

Classification	DS-8 Securing proper water pressure management in distribution system											
Pipeline management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper water pressure management in distribution system ② Securing proper operation based on action plan - Maintaining proper water pressure management in pipeline - Selection of water pressure measuring points, etc.										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Pressure fluctuation - Mains burst											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <p>- Water supply pressure should be more than 150 kPa</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of pressure monitoring system • [Field check] Check the field situation of pressure monitoring system 											

Classification	DS-9 Securing proper safety of drinking water quality in pipeline												
Pipeline management	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper safety of drinking water quality in pipeline ② Securing proper operation based on action plan - Check unintentional cross connection - Prevention leaching of chemicals from pipeline materials - Prevention sediment or biofilm buildup and resuspension or release - Proper auxiliary installation(blow off-pipe etc) - Management contaminants drawn into pipeline system due to low pressure, sewers, drains and leaks, etc.											
	Performance contents	A score : Importance degree = 5 B score : Appropriateness											
	Importance degree (A Score)	5											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td style="width: 25%;">Poor</td> <td style="width: 25%;">Fair</td> <td style="width: 25%;">Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Unintentional cross connection - Illegal or unauthorized connections - Leaching of chemicals from pipeline materials - Sediment or biofilm buildup and resuspension or release - Contaminants drawn into system - Use of unapproved materials - Third party access to hydrants - Contaminant land												
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Water supply network drawing • Resources of replacement & renovation in water supply network 												

Classification	DS-10 Securing proper security system from illegal access in boost station											
Pipeline management	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper security system from illegal access in boost station ② Securing proper operation based on action plan - Install protective fence and devices - Install monitoring devices including CCTV and monitoring sense, etc. * Field check the performance of within 5 storage tanks randomly in local area										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Security/ vandalism											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of security in boost station • [Field check] Check the field situation of security in boost station 											

Classification	DS-11 Securing proper maintenance for stable power supply facility in distribution system												
Facility & Operation	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper maintenance for stable power supply in distribution system ② Securing proper operation based on action plan - Proper maintenance for long term required replacement - Standby equipment management - Check and repair system for facility, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Power failure – Power supply												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of standby equipment management • Annual check & maintenance statement • Electrical facility drawing 												

Classification	DS-12 Securing proper emergency program in case of blackout in distribution system												
Facility & Operation	Period of application	-											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper water pressure management in distribution system ② Securing proper operation based on action plan - Emergency program including standby power supply in case of blackout, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Power failure – Power supply												
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of facility power consumption • Resources of generator capacity and maintenance statement • Electrical facility drawing 												

Classification	DS-13 Securing proper pump capacity & installation for optimal operation in boost station												
Facility & Operation	Period of application	-											
	Performance criteria	① Securing establishment of action plan (legal basis, operational guidelines, etc.) for proper pump capacity & installation for optimal operation in boost station ② Securing proper operation based on action plan - Proper pump arrangement design for optimizing intake - Pump type considering on site intake situation - Check Auxiliary pump & boost facility management, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Pressure fluctuation - Flooding - Intermittent supply												
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of pump capacity & installation in boost station • Resources of pump maintenance and management in boost station 												

Classification	DS-14 Securing proper pump operation & maintenance in boost station												
Facility & Operation	Period of application	Recent 1 year											
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper pump operation & maintenance in boost station ② Securing proper operation based on action plan - Proper pump O&M with monitoring - O&M of water hammer prevention facility - O&M of submersion prevention facility, etc.											
	Performance contents	A score : Importance degree = 3 B score : Appropriateness											
	Importance degree (A Score)	3											
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>	Criteria	Poor	Fair	Excellent	B score	1	3	5			
	Criteria	Poor	Fair	Excellent									
B score	1	3	5										
Related threats to Water Safety of WHO Guide	- Pressure fluctuation - Intermittent supply												
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Pump operation & maintenance statement • Resources of protection from water hammer • Resources of prevention from submersion 												

Classification	DS-15 Securing proper customer satisfaction											
Customer Satisfaction	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper customer satisfaction ② Securing proper operation based on action plan - Managing list for customer complaints - Proper activity for customer complaints related to source water - Proper activity for customer complaints related to distribution system - Proper follow-up management, etc.										
	Performance contents	A score : Importance degree = 5 B score : Appropriateness										
	Importance degree (A Score)	5										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Any hazard not controlled/mitigated within the catchment - Any hazard not controlled/mitigated within distribution											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of customer satisfaction 											

IV

Comprehensive Operation

Classification	CO-1 Securing proper operational manpower in intake station											
Proper operational manpower	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper operational manpower in intake station ② Securing proper operation based on action plan - Appropriate operational personnel on each facility - Career and education management, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="699 943 1385 1025"> <thead> <tr> <th data-bbox="699 943 871 981">Criteria</th> <th data-bbox="871 943 1043 981">Poor</th> <th data-bbox="1043 943 1216 981">Fair</th> <th data-bbox="1216 943 1385 981">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 981 871 1025">B score</td> <td data-bbox="871 981 1043 1025">1</td> <td data-bbox="1043 981 1216 1025">3</td> <td data-bbox="1216 981 1385 1025">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Insufficiently trained operators											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Manpower status & Job assignment • Career & education background 											

Classification	CO-2 Securing proper operational manpower in WTP											
Proper operational manpower	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper operational manpower in WTP ② Securing proper operation based on action plan - Appropriate operational personnel on each facility - Career and education management, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="699 945 1383 1021"> <thead> <tr> <th data-bbox="699 945 871 981">Criteria</th> <th data-bbox="871 945 1043 981">Poor</th> <th data-bbox="1043 945 1216 981">Fair</th> <th data-bbox="1216 945 1383 981">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 981 871 1021">B score</td> <td data-bbox="871 981 1043 1021">1</td> <td data-bbox="1043 981 1216 1021">3</td> <td data-bbox="1216 981 1383 1021">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Insufficiently trained operators											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Manpower status & Job assignment • Career & education background 											

Classification	CO-3 Securing proper operational manpower in distribution system											
Proper operational manpower	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper operational manpower in distribution system ② Securing proper operation based on action plan - Appropriate operational personnel on each facility - Career and education management, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="695 943 1385 1025"> <thead> <tr> <th data-bbox="695 943 868 981">Criteria</th> <th data-bbox="868 943 1040 981">Poor</th> <th data-bbox="1040 943 1212 981">Fair</th> <th data-bbox="1212 943 1385 981">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="695 981 868 1025">B score</td> <td data-bbox="868 981 1040 1025">1</td> <td data-bbox="1040 981 1212 1025">3</td> <td data-bbox="1212 981 1385 1025">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Insufficiently trained operators											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Manpower status & Job assignment • Career & education background 											

Classification	CO-4 Securing proper check-up& repair system for stable operation in intake station											
Operation & Maintenance	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper check-up& repair system for stable operation in intake station ② Securing proper operation based on action plan - Organization & operation for system - Maintenance & facility management situation - Prevention checklist & activities, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="695 943 1385 1025"> <thead> <tr> <th data-bbox="695 943 871 981">Criteria</th> <th data-bbox="871 943 1040 981">Poor</th> <th data-bbox="1040 943 1214 981">Fair</th> <th data-bbox="1214 943 1385 981">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="695 981 871 1025">B score</td> <td data-bbox="871 981 1040 1025">1</td> <td data-bbox="1040 981 1214 1025">3</td> <td data-bbox="1214 981 1385 1025">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
	B score	1	3	5								
Related threats to Water Safety of WHO Guide	- Instrumentation failure											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of checkup & repair system organization in intake station • Resources of check maintenance statement in intake station 											

Classification	CO-5 Securing proper check-up& repair system for stable operation in WTP											
Operation & Maintenance	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper check-up & repair system for stable operation in WTP ② Securing proper operation based on action plan - Organization & operation for system - Maintenance & facility management situation - Prevention checklist & activities, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
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	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Instrumentation failure											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of checkup & repair system organization in WTP • Resources of check maintenance statement in WTP 											

Classification	CO-6 Securing proper check-up& repair system for stable operation in distribution system											
Operation & Maintenance	Period of application	-										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper check-up & repair system for stable operation in distribution system ② Securing proper operation based on action plan - Organization & operation for system - Maintenance & facility management situation - Prevention checklist & activities, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
	B score	1	3	5								
Related threats to Water Safety of WHO Guide	- Instrumentation failure											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of checkup & repair system organization in distribution system • Resources of check maintenance statement in distribution system 											

Classification	CO-7 Securing proper risk management with operational manual in source water											
Operation manual for risk management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper risk management with operational in source water ② Securing proper operation based on action plan - Establish manual for securing water quantity & quality - Establish manual for coping with accident - Establish emergent liaison system - Establish emergent recovery system - Establish emergent manpower arrangement plan - CPX drill for operation manual, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="695 1034 1385 1122"> <thead> <tr> <th data-bbox="695 1034 871 1077">Criteria</th> <th data-bbox="871 1034 1038 1077">Poor</th> <th data-bbox="1038 1034 1214 1077">Fair</th> <th data-bbox="1214 1034 1385 1077">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="695 1077 871 1122">B score</td> <td data-bbox="871 1077 1038 1122">1</td> <td data-bbox="1038 1077 1214 1122">3</td> <td data-bbox="1214 1077 1385 1122">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
	B score	1	3	5								
Related threats to Water Safety of WHO Guide	- Any hazard not controlled/mitigated within the catchment - Flooding – Fire/explosion – Power supply – By-pass facility											
Explanation of Criteria	(1) Criteria <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation (2) Evidence documents (English) <ul style="list-style-type: none"> • Resources of source water risk management • Result of CPX drill for operation manual 											

Classification	CO-8 Securing proper risk management with operational manual in WTP											
Operation manual for risk management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for risk management with operational manual in WTP ② Securing proper operation based on action plan - Establish manual for securing water quantity & quality - Establish manual for coping with accident - Establish emergent liaison system - Establish emergent recovery system - Establish emergent manpower arrangement plan - CPX drill for operation manual, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 25%;">Criteria</th> <th style="width: 25%;">Poor</th> <th style="width: 25%;">Fair</th> <th style="width: 25%;">Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Any hazard not controlled/mitigated within treatment - Flooding – Fire/explosion – Power supply – By-pass facility											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of WTP risk management • Result of CPX drill for operation manual 											

Classification	CO-9 Securing proper risk management with operational manual in distribution system											
Operation manual for risk management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper risk management with operational manual in distribution system ② Securing proper operation based on action plan - Establish manual for securing water quantity & quality - Establish manual for coping with accident - Establish emergent liaison system - Establish emergent recovery system - Establish emergent manpower arrangement plan - CPX drill for operation manual, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="699 1034 1383 1122"> <thead> <tr> <th data-bbox="699 1034 871 1077">Criteria</th> <th data-bbox="871 1034 1043 1077">Poor</th> <th data-bbox="1043 1034 1216 1077">Fair</th> <th data-bbox="1216 1034 1383 1077">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 1077 871 1122">B score</td> <td data-bbox="871 1077 1043 1122">1</td> <td data-bbox="1043 1077 1216 1122">3</td> <td data-bbox="1216 1077 1383 1122">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Any hazard not controlled/mitigated within distribution - Flooding – Fire/explosion – Power supply – By-pass facility											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of distribution system risk management • Result of CPX drill for operation manual 											

Classification	CO-10 Water quality analysis & data management in source water											
Water quality analysis & data management	Period of application	Recent 1 year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for water quality analysis & data management in source water ② Securing proper operation based on action plan - Water quality analysis based on related local regulation - Data management, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Meteorology and weather patterns - Seasonal variations – Geology – Agriculture – Forestry - Industry – Mining –Transports-roads, railways, airports - Development – Housing-septic tanks – Abattoirs – Wildlife - Recreational use – Unconfined aquifer – Treatment failure											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city improve their operation & facility by using water quality analysis data, this parameter evaluation would be added points</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Local water quality standards • Results of water quality analysis data 											

Classification	CO-11 Water quality analysis & data management in WTP											
Water quality analysis & data management	Period of application	Recent 1year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for water quality analysis & data management in WTP ② Securing proper operation based on action plan - Water quality analysis based on related local regulation - Data management, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Criteria</th> <th>Poor</th> <th>Fair</th> <th>Excellent</th> </tr> </thead> <tbody> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Meteorology and weather patterns - Seasonal variations – Geology – Agriculture – Forestry - Industry – Mining –Transports-roads, railways, airports - Development – Housing-septic tanks – Abattoirs – Wildlife - Recreational use – Unconfined aquifer – Treatment failure											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city improve their operation & facility by using water quality analysis data, this parameter evaluation would be added points</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Local water quality standards • Results of water quality analysis data 											

Classification	CO-12 Water quality analysis & data management in distribution system											
Water quality analysis & data management	Period of application	Recent 1year										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for water quality analysis & data management in distribution system ② Securing proper operation based on action plan - Water quality analysis based on related local regulation - Data management, etc.										
	Performance contents	A score : Importance degree = 2 B score : Appropriateness										
	Importance degree (A Score)	2										
	Appropriateness (B Score)	<table border="1" data-bbox="699 943 1385 1025"> <thead> <tr> <th data-bbox="699 943 871 981">Criteria</th> <th data-bbox="871 943 1043 981">Poor</th> <th data-bbox="1043 943 1216 981">Fair</th> <th data-bbox="1216 943 1385 981">Excellent</th> </tr> </thead> <tbody> <tr> <td data-bbox="699 981 871 1025">B score</td> <td data-bbox="871 981 1043 1025">1</td> <td data-bbox="1043 981 1216 1025">3</td> <td data-bbox="1216 981 1385 1025">5</td> </tr> </tbody> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
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Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* If applicant city improve their operation & facility by using water quality analysis data, this parameter evaluation would be added points</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Local water quality standards • Results of water quality analysis data 											

Classification	CO-13 Securing proper Quality Control for on-line monitoring system in Source water											
QC for online monitoring system	Period of application	Recent 5 years										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper Quality Control for on-line monitoring system in Source water ② Whether proper operation by execution plan - Proper selection of on-line monitoring system to QC - Implementation of QC, etc.										
	Performance contents	A score : Importance degree = 1 B score : Appropriateness										
	Importance degree (A Score)	1										
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	Criteria	Poor	Fair	Excellent								
B score	1	3	5									
Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Poor calibration of dosing/testing equipment											
Explanation of Criteria	<p>(1) Criteria</p> <ul style="list-style-type: none"> • Excellent : Establish action plan and proper operation based on action plan • Fair : Establish action plan and improper operation based on action plan • Poor : No action plan and improper operation <p>* Operational reference in Korea</p> <p>- Quality control frequency is more than once every two years</p> <p>(2) Evidence documents (English)</p> <ul style="list-style-type: none"> • Resources of QC for on-line water quality monitoring system 											

Classification	CO-14 Securing proper Quality Control for on-line monitoring system in WTP											
QC for online monitoring system	Period of application	Recent 5 years										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper Quality Control for on-line monitoring system in WTP ② Securing proper operation based on action plan - Proper selection of on-line monitoring system to QC - Implementation of QC, etc.										
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Classification	CO-15 Securing proper Quality Control for on-line monitoring system in distribution system											
QC for online monitoring system	Period of application	Recent 5 years										
	Performance criteria	① Securing establishment of action plan(legal basis, operational guidelines, etc.) for proper Quality Control for on-line monitoring system in distribution system ② Securing proper operation based on action plan - Proper selection of on-line monitoring system to QC - Implementation of QC, etc.										
	Performance contents	A score : Importance degree = 1 B score : Appropriateness										
	Importance degree (A Score)	1										
	Appropriateness (B Score)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 25%;">Criteria</td> <td>Poor</td> <td>Fair</td> <td>Excellent</td> </tr> <tr> <td>B score</td> <td>1</td> <td>3</td> <td>5</td> </tr> </table>			Criteria	Poor	Fair	Excellent	B score	1	3	5
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Related threats to Water Safety of WHO Guide	- Failure of alarms and monitoring equipment - Poor calibration of dosing/testing equipment											
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