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Service activities relating to drinking water supply, wastewater and stormwater systems — Guidelines on alternative drinking water service provision during a crisis

Activités de service relatives aux systèmes d'alimentation en eau potable, aux systèmes d'assainissement et aux systèmes de gestion des eaux pluviales — Lignes directrices relatives à l'approvisionnement alternatif en eau potable en cas de crise

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 224, *Service activities relating to drinking water supply, wastewater and stormwater systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Drinking water is fundamental to life and its distribution is considered to be an essential service. Drinking water supply relies on systems that can be subject to disruption from internal or external factors including operational error, lack of rehabilitation, damage to the drinking water system, malicious acts (e.g. vandalism, criminality or terrorism) and natural disasters (e.g. earthquakes, floods, hurricanes or volcanic eruptions).

This document is intended for drinking water utilities that normally provide a service without interruption through a drinking water distribution network. It provides guidelines for the effective implementation of alternative drinking water service (ADWS) provision during extended periods of disruption to drinking water supply.

In many cases, operational and organizational processes will exist within drinking water utilities to deal with short periods of localized interruption to drinking water distribution. However, if the service interruption exceeds the duration or extent of anticipated events, an interruption can escalate into a crisis at local, regional or, exceptionally, national levels.

NOTE 1 For adequacy and consistency, guidance in this document typically assumes an operational response at a crisis level. However, the guidelines are applicable for all levels of operational incidents requiring ADWS deployment including normal business continuity preparedness and response.

NOTE 2 For guidance on the management of crises see ISO 24518 and ISO/TS 24520.

A significant water interruption (arising from quantity and/or quality issues) can impact public and personal health and wellbeing, and economic performance. A prolonged interruption can progressively threaten the coherence of the community served.

The roles of relevant authorities, responsible bodies, drinking water utilities and operators can differ between and within countries and result in different minimum requirements for ADWS provision. Nevertheless, it is generally recommended that such organizations recognize the importance of uninterrupted drinking water distribution, even at times of crisis for the drinking water utility, for the wellbeing of the community served.

Drinking water utilities are encouraged to reduce the risk of water supply interruption. This is typically achieved by a combination of good planning, design, procurement, installation, operation and maintenance of the drinking water assets. Such measures should include the provision of an ADWS for users during a crisis.

It is also recommended that the drinking water utility's capability to provide an ADWS will be consistent with the maximum likely service interruption (extent and duration) identified through risk assessment. The provision of an ADWS necessitates thorough preparation (e.g. to address planning, procurement, logistics, control and communication), as well as awareness of the need and commitment at all levels of the organization to be effective and efficient.

ADWS during a crisis can be provided using one of the two following principles, or both in combination:

a) using the drinking water distribution network in a non-conventional manner;

b) not using the drinking water distribution network.

This document describes the principal issues to be considered when:

1) planning for and deploying ADWS provision;

2) anticipating and addressing stakeholders' ADWS needs and communicating with stakeholders on ADWS deployment.

ADWS planning and provision can include guidelines by responsible bodies on monitoring and control methods. This document covers water quality issues only to the extent that they relate to drinking water provided via an ADWS.

Service activities relating to drinking water supply, wastewater and stormwater systems — Guidelines on alternative drinking water service provision during a crisis

1 Scope

This document provides guidelines on alternative drinking water service (ADWS) provision during a crisis.

This document addresses:

a) ADWS principles and methods;

b) ADWS operational planning and implementation.

This document is not applicable to:

1) planned water supply interruptions forming part of drinking water utilities' normal operations;

NOTE However, many of the principles and methods described can be appropriate in such circumstances.

2) drinking water supplied for the ongoing operation of key establishments and facilities during a crisis, such as hospitals, homes for the aged, schools, reception facilities and vital plants;

3) water supplied for industrial, agricultural or commercial purposes;

4) water supplied to temporary settlements such as refugee camps;

5) the development and implementation of a crisis management system for water service, which is covered by ISO 24518 and ISO/TS 24520.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 24513, *Service activities relating to drinking water supply, wastewater and stormwater systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24513 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
alternative drinking water service
ADWS
drinking water provided to *users* (3.15) by means other than through the normal drinking water system

Note 1 to entry: ADWS can be required due to the loss of supply or due to the fact that the water currently being supplied is believed unfit for the intended use.

Note 2 to entry: For the purposes of this document, ADWS only refers to the supply of drinking water. There can, however, be occasions where it is decided for public health (e.g. toilet flushing) and safety (e.g. firefighting) reasons to temporarily supply non-drinking water via the drinking water distribution network in parallel with an ADWS.

3.2
containerized drinking water
packaged water
drinking water (3.4) deployed in containers for *ADWS* (3.1) provision

EXAMPLE 1 Bottled water, pre-prepared and hygienically sealed, with a predetermined shelf-life.

EXAMPLE 2 A personal water bag, pre-prepared but empty, and filled during an incident.

EXAMPLE 3 Static water tanks; towed bowsers; mobile water tankers, disinfected and deployed, and filled during an incident.

3.3
crisis
event or situation which affects or is likely to affect the organization or its provided services which requires more than the usual means of operation and/or organizational structures to deal with it

3.4
drinking water
DEPRECATED: potable water
water intended for human consumption

Note 1 to entry: Requirements for drinking water quality specifications are generally laid down by the national *relevant authorities* (3.10). Guidelines have been established by the World Health Organization (WHO).

3.5
drinking water allocation
daily per-capita *drinking water* (3.4) quota to be supplied to users during *ADWS* (3.1) provision

Note 1 to entry: The *relevant authority* (3.10), the *responsible body* (3.11) or the *drinking water utility* (3.7) (in the absence of guidance from the relevant authority or responsible body) can determine drinking water allocation(s) for categories of *user* (3.15).

Note 2 to entry: Drinking water allocations can differ between categories of user and can exclude some categories of user.

Note 3 to entry: The size of drinking water allocations can be varied at different times during the *crisis* (3.3).

EXAMPLE Per-capita domestic user in first 12 h of crisis response; per-capita per-day domestic user after first 12 h; per-capita per-day special needs user.

3.6
drinking water distribution network
asset system for distributing *drinking water* (3.4)

Note 1 to entry: Drinking water distribution network can include pipes, valves, hydrants, pumping stations and reservoirs, and other metering and ancillary infrastructure and components.

Note 2 to entry: Pumping stations and reservoirs can be sited either in the waterworks or in the drinking water distribution network.

3.7
drinking water utility
whole set of organization, processes, activities, means and resources necessary for abstracting, treating, distributing or supplying *drinking water* (3.4) and for providing the associated services

Note 1 to entry: Some key features for a drinking water utility are:

— its mission, to provide drinking water services;

— its physical area of responsibility and the population within this area;

— its *responsible body* (3.11);

— the general organization with the function of operator being carried out by the responsible body, or by legally distinct operator(s);

— the type of physical systems used to provide the services, with various degrees of centralization.

Note 2 to entry: The term "drinking water utility" addresses a utility dealing only with drinking water.

Note 3 to entry: When it is not necessary or it is difficult to make a distinction between responsible body and operator, the term "drinking water utility" covers both.

Note 4 to entry: In common English, "drinking water service" can be used as a synonym for "drinking water utility", but this document does not recommend using the term in this way.

3.8
interruption
situation where the service is not available or only partially available

Note 1 to entry: Interruptions can be planned or unplanned.

3.9
management
coordinated activities to direct and control a *drinking water utility* (3.7)

Note 1 to entry: Management can include establishing policies and objectives, and processes to achieve these objectives.

Note 2 to entry: The word "management" sometimes refers to people, i.e. a person or group of people with authority and responsibility for the conduct and control of a service. When "management" is used in this sense, it should always be used with some form of qualifier to avoid confusion with the concept "management" as a set of activities defined above. For example, "management should…" is deprecated whereas "crisis management team should…" is acceptable. Otherwise, different words should be adopted to convey the concept when related to people, for example managerial or managers.

Note 3 to entry: The term "management" can be qualified by a specific domain it addresses. Examples include public health management, environmental management and risk management.

3.10
relevant authority
organization with appropriate statutory powers of control

EXAMPLE National, regional or local governments, public agencies, regulators.

Note 1 to entry: Relevant authority is a category of *stakeholder* (3.13).

Note 2 to entry: For a given *drinking water utility* (3.7) there can be several relevant authorities, which have jurisdiction in different domains.

3.11
responsible body
body that has the overall legal responsibility for providing *drinking water* (3.4), wastewater or stormwater services for a given geographic area

EXAMPLE A local or municipal government (e.g. for a village, town or city), a regional government, a national or federal government through a specified agency or a private company.

Note 1 to entry: Responsible body is a category of *stakeholder* (3.13).

Note 2 to entry: The responsible body can be legally distinct, or not, from the operator(s). The responsible body can be public or private.

Note 3 to entry: The responsible body acts within a framework of law and governance established by the relevant authorities. It generally establishes the strategy, the specific policies adapted to the characteristics of its area of responsibility and the general organization of the relevant water utility.

Note 4 to entry: The responsible body can operate the water utility directly with its own means through an internal operator (direct or internal *management* (3.9) or "in house") or entrust one or several operators for the operations ("outsourced" or contracted management).

3.12
service area
local geographic area where an organization has the legal or contractual responsibility to provide a service

Note 1 to entry: The service area can be established, for example, by political boundaries (e.g. citywide utility), legislative action (e.g. formation of a utility district) or interjurisdictional agreements (e.g. intercity agreements to provide wastewater services).

3.13
stakeholder
interested party
person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity

EXAMPLE *Users* (3.15) and building owners, *relevant authorities* (3.10), *responsible bodies* (3.11), operators, employees of the operator, external product suppliers and providers of other services, contractors, communities, customers and environmental associations, financial institutions, scientific and technical organizations, laboratories.

Note 1 to entry: Stakeholders will typically have an interest in the performance or success of an organization.

Note 2 to entry: For the application of this document, environment is considered as a specific stakeholder.

3.14
temporary point of distribution
TPD
temporary interface where the *user* (3.15) can access an alternative drinking water service

3.15
user
DEPRECATED: consumer
person, group or organization that benefits from *drinking water* (3.4) delivery and related services, wastewater service activities, stormwater service activities or reclaimed water delivery and related services

Note 1 to entry: Users are a category of *stakeholder* (3.13).

Note 2 to entry: Users can belong to various economic sectors: domestic, institutional, commercial, industrial or resource exploitation (e.g. agricultural, forestry, mining).

Note 3 to entry: The term “consumer” can also be used, but in most countries the term “user” is more frequent when referring to public services.

Note 4 to entry: For the purpose of this document the term only refers to individuals and not organizations.

4 Principles for alternative drinking water service provision

4.1 General

In order to determine its ADWS provision, a drinking water utility should first have a clear understanding of its normal operation during typical (non-crisis) circumstances.

During a crisis involving an interruption to drinking water distribution, the drinking water utility should ensure an ADWS is provided to users and also ensure that assets which are intended to be used in contact with drinking water are authorized by the relevant authority. Such assets could include cleaned and disinfected drinking water containers.

Ideally, users should only take containerized drinking water according to predetermined drinking water allocation(s), see Annex C. However, in practice, with high user demand and limited drinking water utility resources available to control the issuing of drinking water, this can be difficult to achieve.

The drinking water utility's pre-planning of issuing drinking water should aim to ensure a suitable level of control, including a contingency for excessive withdrawals. Inability to exercise such control can lead to legitimate users' needs remaining unfulfilled. This can have consequences, including a decline in ADWS service levels and financial and reputational impacts. Drinking water utilities can encourage users to exercise restraint by providing adequate public information both in advance of and during a crisis (see Clause 7).

The required water quality for ADWS provision is determined by the relevant authorities and/or responsible bodies. However, the possible need to distribute non-drinking water through the drinking water distribution network (if necessary, and in parallel with ADWS) should also be recognized. Such a measure can be necessary for public health (e.g. toilet flushing) and public safety (e.g. firefighting) reasons. In such circumstances, the water usage constraints that need to be complied with should be strongly emphasized through stakeholder communications.

4.2 Alternative drinking water service approaches

4.2.1 General

The drinking water utility can adopt one or both of the ADWS approaches described in 4.2.2 and 4.2.3.

4.2.2 Using the drinking water distribution network in a non-conventional manner

This approach involves the drinking water utility supplying drinking water to users via the drinking water distribution network but using different means than the regular operational methods.

Proven methods of ADWS provision using the distribution network in a non-conventional manner are described in 6.2.

4.2.3 Not using the drinking water distribution network

This approach involves temporary points of distribution (TPDs) being established throughout the affected service area. Examples of TPD methods are described in Annex A. The drinking water utility should, during its normal operations (i.e. prior to the onset of a crisis), have communicated to users the need to approach a TPD to receive drinking water during a crisis. This approach allows the drinking water utility to provide users with drinking water reasonably close to their normal point of use.

Proven methods of ADWS provision not using the drinking water distribution network are described in 6.3.

5 Planning for alternative drinking water service provision

5.1 General

ADWS provision should form an integral part of the drinking water utility's wider crisis management response.

During normal operation, and based on a risk assessment, the drinking water utility should identify the disruption scenarios that can lead to the need for ADWS provision and which cannot be managed by the drinking water utility's normal organizational structures and operational means.

The drinking water utility should take into consideration that more than one approach and method can be used during a crisis. The drinking water utility should decide upon the preferred approaches and methods for ADWS provision, according to the considerations listed in 6.1.

The drinking water utility should prepare engineering, operational and logistical plans to implement its chosen approach(es) to ADWS provision. The methods of ADWS provision selected should be planned and exercised during times of normal operation, and responders should be appropriately trained in order to demonstrate their readiness when required.

5.2 Pre-planning

5.2.1 Establishing individual disruption scenarios

The drinking water utility should take the following into consideration:

a) possible circumstances of the crisis;

b) relevant characteristics of the drinking water system of individual service areas, such as gravity fed/pumped areas; pressure zones; and water quality features/constraints;

c) characteristics of the environment of individual service areas, such as rural/urban distinctions and topographical features that provide access or act as barriers (e.g. highways, rivers, railways);

d) characteristics of the users in individual service areas;

e) its available resources (including personnel).

5.2.2 Pre-planning in accordance with the disruption scenario

Based on each crisis scenario, the drinking water utility should:

a) decide on the type and, where applicable, quantity of ADWS resources to be deployed (e.g. bottled water, water tankers) and the timescale for their provision;

b) identify and coordinate ADWS procurement within and outside the service area(s) affected;

c) identify possible alternatives for water sourcing, conveyance, treatment and drinking water distribution in cases of water contamination;

d) prepare logistical and engineering plans to implement the chosen approach(es) to provide the quantity and quality of ADWS provision required;

e) identify the responders necessary to conduct field operations during a crisis and provide adequate training and support to permit them to display readiness when required;

f) consider quantities and storage capacity for firefighting purposes, if applicable.

5.3 Securing resources and planning for their mobilization

Planning to secure and mobilize resources for ADWS provision should include the following:

a) Determining the area affected by the crisis within the service area(s): the drinking water utility should determine the area(s) likely to be affected according to the individual circumstances of the crisis.

b) Additional considerations such as variable weather conditions, the nature of the service area (e.g. rural, urban), topographical features (e.g. estuaries, rivers, valleys, hills), the presence of infrastructure (e.g. highways, railways, airfields, ports) and socio-economic considerations.

c) Operational and engineering plans for supplying water: the drinking water utility should organize its drinking water system in a manner that permits as great a degree of flexibility and resilience as is deemed practicable and cost-effective (e.g. installing additional valves and interconnections beyond those essential for normal use; installing foundations, power supplies and pipework to accept temporary pumping installations).

   Such plans could include the distribution of non-drinking water if such provision mitigates risks to public health or public safety (e.g. for toilet flushing or firefighting purposes). However, before running drinking water again, the pipes should be flushed and residual chlorine should be checked when appropriate to confirm that it is within the numerical standards.

d) Per-capita drinking water allocation(s): the drinking water utility should establish the per-capita drinking water allocation(s) as a fundamental factor of ADWS planning. The per-capita drinking water allocation(s) is particularly significant for ADWS methods where the normal drinking water distribution network is not used. The per-capita drinking water allocation directly determines the extent of resources (including personnel) needed for ADWS operations (see Annex C).

   The drinking water utility should take into account the local legal or regulatory obligation for the per-capita drinking water allocation(s) as well as for water quality. Where the resource implications of addressing a worst-case disruption scenario put the ability to meet this obligation under strain, this should be escalated to the drinking water utility's management. This issue could prompt further discussion with the relevant authorities.

   The drinking water utility should aim to balance users' expectations and the practicability of providing a reasonable daily drinking water allocation.

   NOTE A divergence between the legal or regulatory requirement for per-capita drinking water allocation(s) and users' expectations of a minimum reasonable quantity is possible.

e) Planning TPDs: the drinking water utility should plan the locations and number of TPDs based on the numbers and types of users and service areas.

f) Resources for the TPDs: the drinking water utility should plan the type and scope of resources required for each TPD (e.g. containerized drinking water, personnel, vehicles, safety equipment). Resources should be based on the relevant drinking water allocation(s) per capita and the numbers of users that an individual TPD is designed to support.

g) Alternative water resources: in the case that alternative water resources are proposed, the drinking water utility should plan and coordinate these – considering options both within and outside the affected service area. Consideration should be given to:

   1) periods when an alternative water resource could be unavailable due to inadequate water quality and quantity (e.g. low source water level; algal bloom);

   2) possible alternative(s) for conveyance, treatment and drinking water distribution by use of a temporary waterworks (e.g. by utilizing portable treatment systems) which could make a normally unusable water resource viable;

3) how a water tanker could be filled up from an alternative water resource.

h) ADWS provision: the drinking water utility should plan for adequate ADWS provision by developing:

1) a logistics plan for securing adequate supplies of containerized drinking water (see Annex D). Where this involves provision of bottled water, the plan should include pre-coordination with bottled water producers or suppliers. Such co-ordination could include contractual arrangements for the supply of agreed quantities and product sizes. It could also include arrangements for minimum stock levels (held by the supplier and/or the drinking water utility) and the product's delivery to designated TPDs or intermediate storage destinations. Such agreements should also specify timeframes for implementation including out-of-normal working hours arrangements.

2) pre-coordination with other service providers to facilitate:

— transportation of ADWS resources to the TPDs;

— filling and replenishment of drinking water at the TPDs;

— collection and return of ADWS resources from the TPDs following recovery from the crisis.

3) informing stakeholders on ADWS provision, while addressing the differing needs of each type of user.

4) pre-coordination with other third parties, for example:

— neighbouring and other drinking water utilities (if mutual aid arrangements can be agreed);

— military aid to the civil community (if such a protocol exists);

— other stakeholders from whom understanding, support and/or agreement to the ADWS arrangements are essential for maintaining public confidence.

i) Internal and external communications: the drinking water utility should develop a communications plan for internal and external communications during the deployment of an ADWS, which should include:

1) The identification of responsibilities for coordination during a crisis, including ADWS provision, deployment and replenishment; and identification of any operational issues that could require escalation for tactical or strategic decisions. Those responsible for ADWS provision should include updates about the effectiveness of those communications and the need to further tailor them to enhance interactions between the drinking water utility and its stakeholders.

2) Guidance on how relevant issues and decisions are managed and then communicated to achieve the desired outcomes.

3) Crisis management decision processes (e.g. internal communications; user communications; stakeholder management) for framing and communicating relevant messages.

Guidance on ADWS communication issues is provided in Clause 7.

j) Users with special needs: guidance on ADWS provision for users with special needs is provided in Clause 8 and Annex E. The drinking water utility should plan ADWS provision for users with specials needs as follows:

1) during normal operations, by preliminary identification of such special needs;

2) during a crisis, by liaising with both internal and external stakeholders to ensure that any dynamic supply adjustments to the requirements of users with special needs are captured and incorporated into the ADWS response.

k) Responders: the drinking water utility should make the necessary personnel planning arrangements for ADWS provision to be implemented. All relevant personnel should be trained

periodically during normal operations. Training of any third parties anticipated to be involved in ADWS provision should be undertaken – either at the request of the drinking water utility or as other opportunities arise. Training should include practical exercises of all relevant personnel and third parties.

6 Implementation of alternative drinking water service provision

6.1 General

The two approaches to ADWS provision outlined in 4.2 include various accepted ADWS implementation methods. A drinking water utility's choice among these methods is likely to be governed by its preferred approach – determined during the planning stage (see Clause 5).

For each crisis, subject to these pre-existing constraints, the drinking water utility should determine the decision process for establishing which method(s) to use according to the:

a) circumstances of the crisis;

b) characteristics of the drinking water system specific to the service area(s) affected;

c) characteristics of the environment specific to the service area(s);

d) characteristics of the users; and

e) available resources (including personnel).

More than one implementation method can be used during a crisis.

6.2 Non-conventional methods for drinking water distribution network use

6.2.1 General

In this approach, water is supplied to users via the drinking water distribution network, but not in the normal operational manner. Sometimes the service level can be of a lower standard than during normal service provision.

6.2.2 Distribution of drinking water by erection of standpipes

Where water quality is maintained but water quantity is constrained by the crisis, the drinking water utility can operate ADWS provision by erecting temporary standpipes connected to the drinking water distribution network. Such a method can create control issues with regards to the assets (e.g. the standpipes themselves and the hydrants on which they are mounted), the quantities of water discharged and the resulting flow disturbances in the drinking water distribution network. Deployment of this method depends on the drinking water utility's resources to manage the operation of the assets and can be affected by the degree of cooperation anticipated from users.

6.2.3 Recharging of isolated drinking water distribution network assets by water tankers

According to circumstances and the event characteristics (e.g. treatment plant failure; aqueduct failure), the drinking water utility can use mobile tankers to recharge drinking water system storage assets, such as reservoirs, or the drinking water distribution network itself (by pumped or gravity feed). This action can enable continued drinking water supply to users through the drinking water distribution network.

This method can require relevant authorities' approval, is dependent on sustained recharge of the drinking water distribution network and carries an increased risk of contaminating the network.

6.2.4 Lowering the pressure at which drinking water is supplied

Drinking water should be supplied through the normal drinking water distribution network, at lower pressure than normal, by controlling valves and other water assets in accordance with circumstances and engineering constraints. This method can require relevant authorities' approval of a minimum sustained pressure in the drinking water distribution network.

6.3 Methods not using the drinking water distribution network

6.3.1 General

In this approach, TPDs should be established by trained personnel across the service area(s) affected by the crisis. The drinking water utility should advise able-bodied users to independently approach a TPD to get drinking water according to their determined drinking water allocation. Different arrangements should be made for users with special needs (Clause 8). Users should be advised of TPDs locations within close proximity to their residence or workplace or where they can legitimately claim a need. A drinking water utility representative should be present to assist users (where resources and/or the number and configuration of TPDs permit).

TPDs should be located (by prior agreement where necessary) in central, familiar and accessible places for users. Recommended locations for TPDs can be (by pre-planning – including risk assessment), for example, schools, public parks, community or sport centres.

Alternatively, in urban areas with high population densities and reduced availability of public spaces, TPDs can be located at the roadside with sufficient controls, including pedestrian and vehicular segregation and clear warning of any temporary obstructions or hazards that a TPD's installation could create. In addition, adequate lighting for night-time use should be provided, and provision of security measures should be considered in advance based on local circumstances (see D.6).

The TPD should include equipment for the hygienic dispensing of drinking water such as water tanks, containerized drinking water and access points. Other equipment can be made available for use by the drinking water utility's representatives, such as radio communication equipment, night vision equipment, flashlights, basic tools, first aid kits and megaphones.

6.3.2 Temporary point of distribution methods

6.3.2.1 General

One or more of the following TPD methods should be used for distribution of drinking water to users.

6.3.2.2 Static water tanks connected to multi-drinking water taps

Static water tanks can be connected to multi-drinking water taps, from which users can draw drinking water. Each static water tank should be replenished by mobile tanker periodically (typically several times a day) with fresh drinking water from an external resource configured for rapid refilling of mobile tankers. The efficiency of this method depends on the reliability of the replenishment cycles and minimization of ADWS overuse by users.

In this method the replenishment may be done by another mobile water tanker, or by the rotation of full mobile tankers or towed bowsers for depleted ones. In this method, the drinking water utility should strive to provide water continuously, unless interrupted briefly by the rotation of the mobile tankers or towed bowsers.

6.3.3 Containerized drinking water

A drinking water utility can carry a stock of containerized drinking water for ADWS provision. During a crisis, stock can be rapidly depleted and contingency plans for resupply of stock should be prepared.

To deploy this method, prior arrangements with containerized drinking water producers or suppliers should be made, and stock is likely to be delivered in bulk (e.g. palletized and packaged in plastic wrapping for stability/security).

For TPDs utilizing a spacious location, the layout of the TPDs should allow for the safe unloading and breaking down of bulk deliveries under the control of trained personnel. Users should be prevented from undertaking this task.

Alternatively, TPDs located in high-density urban areas (e.g. roadside) require an intermediate location to be established where the containerized drinking water deliveries can be broken down into manageable quantities for safe delivery.

Arrangements for the storage, separation and recycling of bulk delivery waste materials should be considered. Arrangements for environmentally acceptable methods of collection and recycling or disposal of empty drinking water containers should be implemented.

Containerized drinking water can also be delivered directly to users in certain circumstances. This method does not require the use of a TPD. Caution should be exercised to avoid raising stakeholders' expectations that this is a standard response method in every crisis.

6.3.4 Via a fixed water resource

For this drinking water distribution method, a fixed water resource such as a hydrant, reservoir, underground storage tank or well can be used where the quantity of drinking water in the water resources is sufficient.

The TPD should be located in the service area with adequate measures to protect the resource, such as backflow prevention devices. Typically, multiple drinking water taps are connected to the resource and made available for providing drinking water.

This method is mostly deployed in small-scale events, where a limited proportion of the service area is affected. However, this method could be expanded (with pre-planning) to larger-scale events.

6.3.5 Via mobile water tankers or towed bowsers

For this method, drinking water should be carried by mobile tankers or towed bowsers in cycles throughout the service area. Where practicable, the users should be able to receive drinking water on a regular basis consistent with the cycle within close proximity to their residence or workplace or where they can legitimately claim a need. Users should be told the route being followed, approximate timings, stopping points (or arrangements to flag down the driver) and users' expected behaviours. The drinking water utility may provide additional resources to supervise the discharge process where significant numbers of users are gathered.

7 Internal and external communications

7.1 General

The drinking water utility should consider, in advance of any incident requiring ADWS provision, informing the relevant stakeholders more widely about its plans for ADWS delivery. During a crisis with an ADWS component, the drinking water utility should use its chosen communications strategy and tools to convey information about the ADWS deployment. The strategy should permit two-way communication with stakeholders allowing ADWS deployment to be amended as necessary to address relevant issues.

7.2 Preparing stakeholders in advance of a crisis involving alternative drinking water service provision

7.2.1 Tailored messaging

The drinking water utility should provide information to users on how the drinking water utility will, and how the users are requested to, respond during an ADWS event. Other stakeholders could require more specific advice, and possibly face-to-face briefings, to ensure that all expectations are discussed and outputs agreed.

7.2.2 Preparing users

Users' preparation requirements may, for example, be communicated through the drinking water utility's website; social media; automated calling, texting or emailing; a periodic note attached to the water bill; or public presentations to community bodies.

Communications should include information about the following:

a) self-help and self-control in the acquisition of containerized drinking water;

b) drinking water storage and safe retention periods;

c) ADWS deployment methods and user interactions.

7.2.3 Preparing key stakeholders

Depending on the relationship with each key stakeholder, more sensitive information regarding preparation requirements could be communicated, including the maximum credible event the drinking water utility plans to be capable of responding to while satisfying the required criteria.

Key assumptions, constraints or limitations affecting such a response should be shared with key stakeholders subject to their relevance and appropriate security requirements.

7.3 Alternative drinking water service information during a crisis

7.3.1 General

A key aspect of communications on ADWS provision is the need to reassure stakeholders that the drinking water utility remains in control of its planned drinking water distribution activities in response to the crisis. Such reassurance should help to mitigate stress and discourage unhelpful behaviours (e.g. panic-buying of excessive quantities of containerized drinking water; unwarranted storage of excessive volumes of drinking water in advance of any supply interruption).

Guidance on communications issued by the drinking water utility during a crisis is provided in ISO 24518.

7.3.2 How to communicate

7.3.2.1 Tailored communications

The drinking water utility should provide information to users on the crisis, what is being done to deploy an ADWS and the users' role during the deployment of the ADWS.

Other stakeholders may require more specific, direct and individual briefings.

The drinking water utility should determine, jointly with each stakeholder or their representative(s), the most appropriate means of these stakeholder communications.

7.3.2.2 Communicating with users

Given the dynamic nature of an ADWS response, dynamic communication methods should be employed in addition to more traditional methods.

Dynamic communication methods can include:

a) the drinking water utility's website;

b) automated texting and/or email;

c) websites of external stakeholders (using links to the relevant page(s) of the drinking water utility's website to maintain the currency of information);

d) media outlets (radio, television, newspapers, websites and other internet portals);

e) social media;

f) the drinking water utility's relevant call centre(s) (using temporary staffing or recorded messaging where necessary to manage increased call volumes and resourcing constraints);

g) loudspeaker announcements (manual, vehicular or airborne).

Traditional communication methods can include:

1) printed warning notices;

2) newspapers (reports and paid advertisements);

3) billboards;

4) portable electronic messaging signs.

Rules and regulations dealing with privacy policy should be taken into account.

7.3.2.3 Communicating with other stakeholders

Given the dynamic nature of an ADWS response, communication should also be offered to relevant stakeholders depending on their preferences. This communication should supplement existing communication methods and be consistent with the information being supplied to all users.

Such communication methods can include:

a) phone communications (at predetermined intervals or ad hoc);

b) email updates;

c) text messages;

d) faxed reports;

e) drinking water utility representation within local, regional or national contingency bodies or committees;

f) regular face-to-face reporting.

7.3.2.4 Communication tools and techniques

Useful communication tools and techniques can include:

a) pre-prepared ADWS script templates for completion during an event;

b) frequently asked question (FAQ) and answer sheets dealing with common issues and concerns associated with ADWS events;

c) customer response scripts for all relevant drinking water utility personnel;

d) briefing notes for personnel who may be approached directly by users for the latest information;

e) regular updates for all drinking water utility personnel and third-party support teams to assist them in answering queries.

7.3.3 What to communicate

7.3.3.1 Information to users

Information distributed to users during a crisis should be consistent and include:

a) the current situation, its causes and consequences (where available);

b) the current forecast of the service interruption's duration (where available);

c) the nature of the ADWS response;

d) reassurance that the situation remains under control;

e) guidance and advice on appropriate and inappropriate behaviours by users;

f) details of the ADWS deployment (or where to find such details);

g) reassurance on the preservation of drinking water quality and self-help steps to aid its preservation;

h) where to find further information and the nature of further updates.

The drinking water utility should always maintain the highest integrity in communicating with users and other stakeholders, and never knowingly provide false or misleading comments on progress to restore service.

7.3.3.2 Information to other stakeholders

Supplementary information distributed to other stakeholders during a crisis can include:

a) reports to responsible bodies (mandatory and voluntary);

b) further details of the drinking water utility's crisis management response;

c) implications for individual stakeholders;

d) constraints, risks and opportunities arising from the crisis;

e) requests for support from individual stakeholders;

f) proposed communication arrangements, information sources and update frequencies.

8 Alternative drinking water service provision for users with special needs

The drinking water utility should include in its standard ADWS processes measures to support individuals with physical or intellectual impairment and ensure that these people are aware of the service interruption and receive ADWS provision consistent with their needs and capabilities.

Users with special needs can include people:

a) who are incapable of accessing the ADWS facilities on their own and cannot be assisted by someone else, such as a relative, carer or friend;

b) who may need targeted information in special formats (e.g. users of Braille, the deaf who may not hear audible warnings regarding service interruption);

c) who have special needs (e.g. a medical condition requiring drinking water; a mental capacity issue which means they may not understand the nature of the service interruption and its implications for themselves).

Annex E contains guidance on modification of ADWS processes to support users with special needs.

Annex A
(informative)

Examples of layouts of, and assets deployment at, temporary points of distribution

A.1 Temporary point of distribution scheme examples

The main elements which should be set up in a TPD are illustrated in Figure A.1 and Figure A.2.

Figure A.1 illustrates the basic components where users are directed to a centralized access point that can be closely controlled by the drinking water utility.

Figure A.2 illustrates the basic components where users receive ADWS provision through static tanks or mobile bowsers close to their normal point of distribution (e.g. at the roadside close to their homes or workplaces).

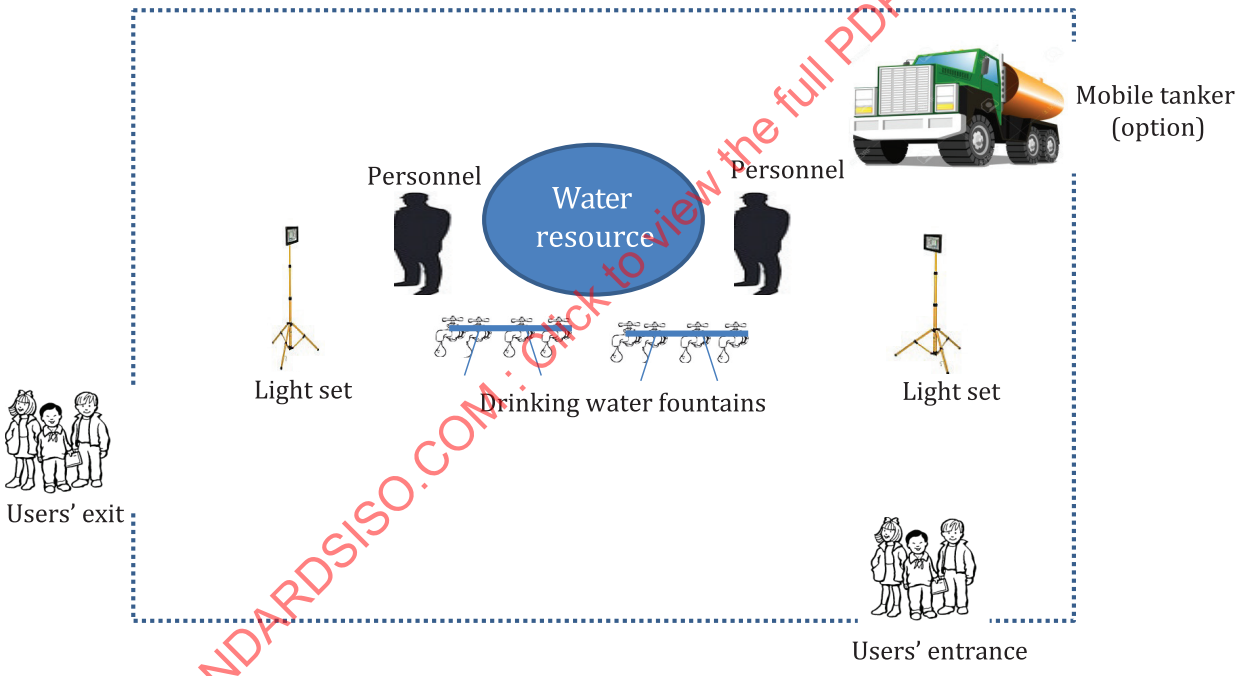


Figure A.1 — A centralized access point TPD scheme

The example TPD in Figure A.1 would typically be manned continuously. The example in Figure A.2 is more likely to be visited periodically to ensure its condition and serviceability remain satisfactory and to replenish its static assets' contents.

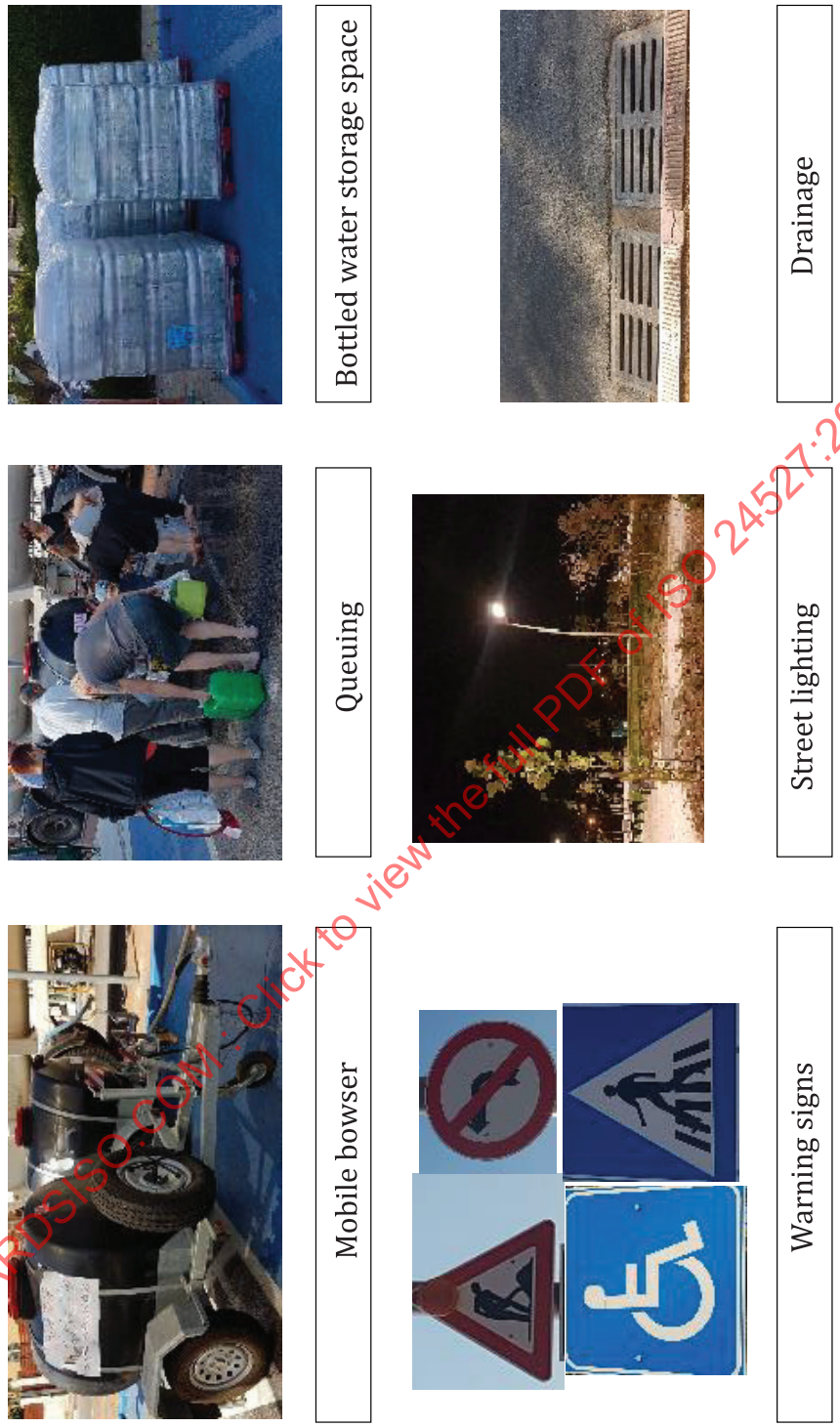


Figure A.2 — Components of a TPD close to users' normal point of delivery

A.2 Drinking water tanks in use

A.2.1 Static tanks for use in a temporary point of distribution

Static tank(s) can be of several types. The type and extent of the static tanks deployed at individual or across multiple TPDs should be determined according to the relevant drinking water allocation(s), number of users and the number of opened TPDs within that part of the service area affected.

Examples of static tanks are described and illustrated in Annex B.

A.2.2 Personal water bags

Personal water bags can be distributed to users in the TPD or issued in advance. The bags should be filled with water by the users at the TPD. The same bag is used until the end of the crisis. An example is described in B.3 and illustrated in Figure B.6.

A.2.3 Mobile tanker

A mobile tanker can be used for replenishment cycles and/or as a water resource in the TPD. Preferably, the mobile tanker should include a pump to deliver water to other drinking water storage assets. Examples are described in B.4 and illustrated in Figures B.7 to B.10.

A.3 Bottled water

Bottled water can be used as a water resource in the TDP. In this case, there might be no need for multi-drinking water taps at the TDP.

A.4 Fixed water resource

A fixed water resource such as a hydrant, reservoir or well can be used as a water resource for a TDP. A multi-drinking water tap should be connected to the water resource to enable more efficient drinking water distribution for users, see Figure A.3. In this case there is no need for replenishment.

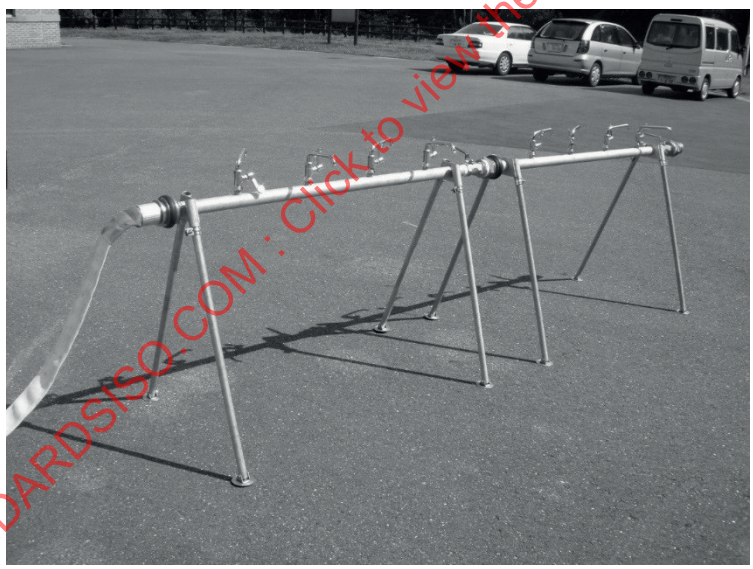


Figure A.3 — Multi-drinking water tap

Annex B
(informative)

Containerized drinking water

B.1 General

The following examples of containerized drinking water can be used in a crisis (manufacturer's guidance on the useful life of the asset should be followed):

a) static water tanks for use in TPDs;

b) personal drinking water bags for users to receive water at TPDs;

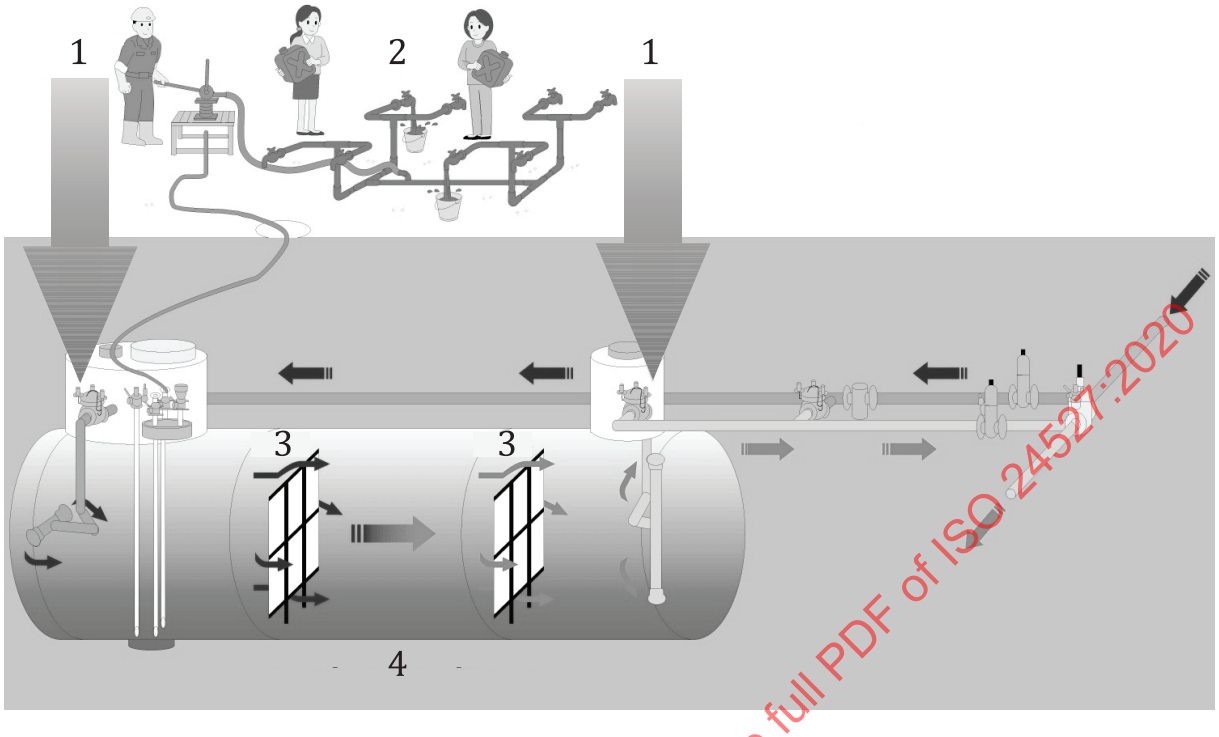
c) bottled water;

d) mobile tankers for replenishment.

B.2 Examples of static drinking water tanks

B.2.1 Underground storage tank

Emergency stop valves of an underground storage tank can be designed to shut automatically when an event occurs. Thus, the underground storage tank can work as both a small drinking water service reservoir and as a wide-bore pipe in normal conditions. Baffle plates can be installed causing turbulent flow to avoid the occurrence of stagnant water. For ADWS provision, drinking water can be obtained from the underground storage tank by powered pumps or, if necessary, by manual pumping, see Figure B.1.



SOURCE: Yokohama Waterworks Bureau, reproduced with permission

Key

1	emergency stop valve
2	taps
3	baffle
4	underground storage tank
⟵	inflow
⟵	outflow

Figure B.1 — Underground storage tank

B.2.2 Flexible tank – type 1

B.2.2.1 General

Flexible tanks consist of an exterior cover and a filling bag.

B.2.2.2 Flexible tank exterior cover

A flexible tank's exterior cover should be resistant to UV radiation.

A flexible tank's multi-drinking water taps should be sized to match the entrance size of any containerized water assets (e.g. personal bags) the ADWS has been designed to integrate with.

Flexible tanks typically include an air-inlet valve and can include a pressure relief valve.

The shelf-life of a flexible tank is typically moderately long (e.g. 5 years or more).

Figure B.2 illustrates an example of a flexible tank.

B.2.2.3 Flexible tank filling bag

A flexible tank's filling bag is typically made for single use and is generally capable of uninterrupted ADWS provision for one month or more. At the end of an event, the bag is replaced by a new bag or drained and decommissioned to its original state for use in subsequent crises.

A flexible tank's filling bag can be replaced easily.

B.2.2.4 Flexible tank platform

A flexible tank platform's design should include the following considerations:

a) transportation: its weight should allow easy carrying;

b) strength: it should be strong enough to safely support its own and the tank's weight when full;

c) stability: it should be stable enough to withstand the rigours of attention by users at all stages from standing alone to supporting a full tank of water;

d) installation: it should allow for safe and easy assembly and dismantling;

e) height: it should be tall enough to permit full gravitational discharge of the flexible tank's contents via the multi-drinking water tap;

f) multi-drinking water taps connection: it should carry clips or include a connection mechanism to permit attachment of multi-drinking water taps (see B.2.2.5 and Figure A.3).

B.2.2.5 Multi-drinking water taps

B.2.2.5.1 The multi-drinking water taps can be directly connected to the flexible tank, or placed at a distance from the tank, connected by hoses, to reduce the risk of damage to the tanks by users.

B.2.2.5.2 The multi-drinking water taps which are connected to the flexible tank contain several taps permitting multiple users to fill their drinking water containers simultaneously. The number of taps can be determined by hydraulic design or experimentation and their spacing should suit local circumstances. Where personal water bags are used, the taps' diameter should be designed to match the entrance of the personal water bag.

Figure B.2 — Flexible tank type 1

B.2.3 Flexible tank - type 2

Another type of tank is shown in Figure B.3. It can be stored in folded form and inflated with an air pump when it is to be used as a tank. It can be placed on a flat stand to serve as a water well without pumping.

Figure B.3 — Flexible tank type 2

B.2.4 Rigid static tanks

Rigid static tanks are available in a variety of sizes and capacities (see Figure B.5).

Some static tanks can be earthquake-resistant. This type of static tank can be used safely while earthquakes are occurring (see Figure B.4).

Figure B.4 — Earthquake-resistant static tank

Figure B.5 — Rigid static tanks

B.3 Personal water bag

Design considerations for a personal water bag (see Figure B.6) include the following:

a) volume in accordance with drinking water allocation(s);

b) flat when empty, for efficient storage;

c) a sealable, leak-proof opening located in the top of the bag. This should be larger than the size of the multi-drinking water taps to reduce spillage when filling;

d) a handle to assist in carrying the bag. It should have a load capacity in accordance with the bag's weight when full;

e) instructions on the bag's operation, cleaning and drying together with relevant warnings in an appropriate language, printed on the front or the back of the bag;

f) a shelf-life of 15 years or more in dry conditions before use; resistant to UV radiation;

g) packaged in a portable format that would allow 15 or more years' use;

h) resistant to wear while in use, including reuse, when filled with water;

i) capable of being refilled to support continual use for 30 successive days.

Figure B.6 — Personal water bag

B.4 Examples of mobile tankers for replenishment

B.4.1 Flexible tank on a platform truck

B.4.1.1 General

Flexible tanks consist of an exterior cover and a filling bag.

B.4.1.2 Flexible tank exterior cover

A flexible tank's exterior cover:

a) should be resistant to UV radiation;

b) has both drain and fill tap. The former's diameter should be at least 50mm (or in accordance with the filling tap's diameter);

c) can include a pressure relief valve;

d) has a shelf-life of several years (e.g. 5 years or more);

e) can include an individual water pump;

f) should include anchoring strips in accordance with the weight of the tank – for example, one strip is typically installed every one metre of the tank's length;

g) should be robust enough to protect itself and the flexible filling bag from damage (when used in accordance with its handling instructions) for the planned life of the product.

B.4.1.3 Flexible tank's filling bag

The filling bag inside of a flexible tank is typically intended for single use and should be capable of uninterrupted ADWS provision for one month or more. At the end of a particular event, the bag is replaced by a new bag or drained and decommissioned for use in subsequent crises. Figure B.7 illustrates such a flexible tank, strapped to a flat-bed truck.

A flexible tank's filling bag should be capable of easy replacement. Figure B.7 illustrates a flexible filling tank strapped to a flat-bed truck.

Figure B.7 — Flexible tank strapped on a flat-bed truck

B.4.2 Mobile tankers

Mobile water tankers can take many forms, sizes and means of transportation. The tank linings, fittings and accessories should be suitable for contact with drinking water and capable of complete and repeated disinfection over their working lives.

See examples of mobile tankers in Figures B.8 and B.9.

Figure B.8 — Mobile tanker

Figure B.9 — Mobile tanker

B.5 Bottled water

Drinking water utilities can hold limited stocks of bottled water appropriate to their short-term needs. Volumes are determined based on turnover and storage conditions (consistent with the product's shelf-life). Contractual arrangements with suppliers are typically used to supplement these stocks.

Plastic bottles can cause a deterioration in the quality of drinking water in the bottle after an extended period of storage.

Figure B.10 illustrates a storage and deployment situation.

Figure B.10 — Bottled water

Annex C
(informative)

Determining drinking water allocations

C.1 General

To properly plan for and respond to a water crisis requiring ADWS provision, the drinking water utility should establish a set drinking water quota per day per capita to be supplied to users during the crisis and until the drinking water system is restored. The quota's value (e.g. in litres/person/day) can be influenced by several factors including, but not limited to, the nature of the population of users, geographical influences, regulatory or organizational requirements, the capability of the drinking water utility and the availability of ADWS provision.

The quota can be a single value for all users or a set of values dependent on specified criteria.

Once the drinking water utility has established the quota(s) it can derive a minimum quantity for ADWS provision per day based on its estimate of users fitting the specified criteria in the service area(s) affected.

C.2 Pre-determining minimum water allocation requirements

If possible, drinking water utilities should work with relevant authorities in the planning stages to determine a minimum per-capita drinking water allocation that takes into account the basic requirements of health or regulations. This value can then be used during the crisis to determine the appropriate scale and method(s) of ADWS provision. Completing such an exercise also allows for establishing predetermined TPD locations with the necessary assets and resources assigned to the TPDs' establishment.

C.3 Factors affecting minimum drinking water allocation requirements

Although it is possible that a predetermined value for minimum per-capita drinking water allocation has been established, several factors could require its re-evaluation and, if necessary, its revision to address users with special needs. The World Health Organization recognizes that, to provide drinking water for the basics of hydration only, several factors exist that can increase this base value. These include consideration of the needs of users who have a requirement for a greater quantity of drinking water, such as young children, pregnant or nursing women, the elderly and people with certain illnesses that can have increased fluid requirements. Vulnerable users can be pre-identified by the drinking water utility or can self-present during the crisis. Also, hydration levels are greatly affected by the climatic conditions and the amount of activity and associated thermal stress experienced by a user. These can result in an increased drinking water allocation being required.

C.4 Additional factors in determining drinking water allocation beyond human health

Although the main purpose of ADWS provision is satisfying a per-capita drinking water allocation that meets the basic requirements of human health, many additional factors should be considered during the event. Decisions should be made regarding the level of service provided beyond such basic requirements. For example, will the drinking water utility supply enough water for sanitary purposes such as the flushing of toilets, for bathing or for cooking?