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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

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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](http://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](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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](http://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 intended for human consumption

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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).

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### 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

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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

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#### 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;