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BSI Standards Publication

Service activities relating to drinking water supply systems and wastewater systems — Crisis management — Good practice for technical aspects

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National foreword

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Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Concepts and principles **7**
4.1 General 7
4.2 Crisis management phases 8

5 Preparedness **10**
5.1 General 10
5.2 Establishing the context 11
5.3 Commitment 12
5.4 Risk assessment 12
5.5 Procedures and plans, responding, repairing and restoring 12
5.6 Structure and organization 13
5.7 Procedures and tools to identify a crisis and initiate the crisis management team 13
5.8 Training and exercise 15
5.9 Crisis management team 16
5.10 Communication and cooperation 16
5.10.1 Crisis management team communications with users and other stakeholders 16
5.10.2 Cooperation and communications between the water utility and the relevant authorities in the event of a crisis 18
5.11 Provisions of plans and resources 20
5.11.1 Emergency physical facilities 20
5.11.2 Water utility personnel safety measures 20
5.11.3 Sampling and analysis capability and capacity 20
5.11.4 Alternative water supply 20
5.11.5 Resource availability 20
5.12 Monitoring and review 20
5.13 Documentation 20

6 Response **21**
6.1 General 21
6.2 Situation ascertainment 21
6.3 Situation assessment 21
6.4 Decision making 22
6.5 Implementation of decisions and issuing of orders 22
6.6 Supervision and control 22
6.7 Process for risk assessment during a crisis 22
6.8 Communications feedback 23

7 Recovery to normal operation **23**
7.1 General 23
7.2 Survey for restoration purposes 23
7.3 Restoration alternatives 24
7.4 Priorities in recovery 24
7.5 Planning the deployment of recovery measures 25
7.6 Repairing the damage 25
7.7 Verification 26
7.7.1 General 26
7.7.2 Verification of quality in the drinking water supply system 26
7.7.3 Verification of quality in the wastewater system 26
7.8 Restoring the service 27
7.8.1 General 27

Documents
Document Sharing Hub

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Full document details: PD ISO/TS 24520:2017

7.8.2 Restoration of drinking water service ... 27
7.8.3 Restoration of wastewater service ... 27
7.9 Assessments for recovery stage ... 27

8 Monitoring and review of the crisis management system ... 27
8.1 Performance measurement and monitoring ... 27
8.2 Issues to address when monitoring the performance of a training procedure ... 28
8.3 Crisis management system maintenance process ... 28
8.4 Crisis management system assessment ... 29

9 Management review ... 29

Annex A (informative) **Preparedness ... 31**

Annex B (informative) **Recovery to normal operation ... 41**

Bibliography ... 43

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 224, *Service activities relating to drinking water supply systems and wastewater systems — Quality criteria of the service and performance indicators*.

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Introduction

Water is the source of life, without which humans, as well as other species, cannot survive. In many countries, there is a lack of knowledge regarding crisis management of drinking water and wastewater services.

Impairment of the drinking water service would change the quality of life of the affected population in the immediate period while in the medium-term it could affect their ability to survive. Therefore, the continuous and orderly supply of clean water is of paramount importance for the population. The collection, treatment and safe disposal of sanitary wastewater are also important if illness and/or inundation are to be prevented and the environment protected. This document describes good practice in the establishment of technical crisis management systems drawn from experience contributed by relevant national authorities.

The approach of a water utility when preparing for any crisis should encompass all pertinent aspects of water supply and the collection, treatment and safe disposal of wastewater. The water utility needs to cooperate with all relevant authorities concerned with the crisis. Effective crisis management should ensure that the actions taken before, during and after the crisis consider the natural environment as well as the impact on the health and wellbeing of the population. Effective communication with the public is necessary to mitigate or prevent panic and to establish trust in the water utility by disclosing important information appropriately in the area affected by a crisis, in neighbouring areas or to any other stakeholders.

This document can be used as a toolkit by water utilities where they wish to review their current capability to prepare for, respond to and recover from a crisis in an effective and efficient manner. It is not intended as a complete guide to crisis management. Water utilities can consult ISO 24518 if they need further guidance.

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Service activities relating to drinking water supply systems and wastewater systems — Crisis management — Good practice for technical aspects

1 Scope

This document provides guidance to water utilities on good practice in technical aspects of crisis management.

This document is applicable to all water utilities, of whatever size, whether public or private, that wish to review the effectiveness and efficiency of their service activities relating to preparation for, response to and recovery from a crisis.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
alternative wastewater service
wastewater (3.40) *service* (3.37) provided to *users* (3.39) by means other than through the normal collection and treatment system

3.2
alternative water supply
water provided to *users* (3.39) by means other than through the normal treatment and distribution system

3.3
analysis
systematic examination in which the biological or technical system is decomposed into its component parts using suitable methods, after which the parts are then organized and evaluated

Note 1 to entry: Analysis also includes water quality sampling operations carried out after sample preparation to determine the amount of concentration of the analyte(s) of interest present in the sample.

3.4
asset
capital-forming goods used for the provision of the *service* (3.37)

Note 1 to entry: Assets can be tangible or intangible. Examples of tangible assets are land, buildings, pipes, tanks, treatment plants, equipment and hardware. Examples of intangible assets are software and databases.

Note 2 to entry: Contrary to consumables, assets can be depreciated (tangible assets) or amortized (intangible assets) in accounting systems.

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3.5
audit
systematic, independent and documented *process* (3.30) for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled

Note 1 to entry: An audit can be an internal audit (first party) or an external audit (second party or third party) and it can be a combined audit (combining two or more disciplines).

Note 2 to entry: "Audit evidence" and "audit criteria" are defined in ISO 19011.

3.6
availability
extent to which the *infrastructure* (3.20), *assets* (3.4), resources and employees of a *water utility* (3.41) enable effective provision of *services* (3.37) to *users* (3.39) according to specified *performances* (3.27)

3.7
capability
quality (3.31) of being able to perform a given activity

3.8
competence
ability to apply knowledge and skills to achieve intended results

Note 1 to entry: Demonstrated competence is sometimes referred to as qualification.

3.9
consequence
outcome of an event affecting *objectives* (3.25)

3.10
continual improvement
recurring activity to enhance *performance* (3.27)

Note 1 to entry: The *process* (3.30) of establishing *objectives* (3.25) and finding opportunities for improvement is a continual process through the use of *audit* (3.5) findings and audit conclusions, *analysis* (3.3) of data, *management* (3.23) reviews or other means and generally leads to corrective action or preventive action.

3.11
crisis
event or situation which affects or is likely to affect the *organization* (3.26) or its provided *services* (3.37) which requires more than the usual means of operation and/or organizational structures to deal with it

3.12
crisis management plan
document specifying which *procedures* (3.29) and associated resources should be applied by whom and where to a particular type of *crisis* (3.11)

3.13
drinking water
DEPRECATED: potable water
water intended for human consumption

Note 1 to entry: *Requirements* (3.34) for drinking water *quality* (3.31) specifications are generally laid down by the national relevant authorities. Guidelines are established by the World Health Organization (WHO).

3.14
effectiveness
extent to which planned activities are realized and planned results are achieved

3.15
efficiency
relationship between the result achieved and the resources used

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3.16
environment
surroundings in which an *organization* (3.26) operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation

Note 1 to entry: Surroundings in this context extend from within an organization to the global system.

Note 2 to entry: For the application of this document, environment is considered as a specific *stakeholder* (3.38). The interests of this specific stakeholder can be represented by *relevant authorities* (3.33), by the communities or by other groups, such as non-governmental organizations (NGOs).

3.17
hazard
source of potential harm

Note 1 to entry: Harm in the context of a water utility can include injury to stakeholders; compromising of public health; degradation of the environment; a deterioration in service quality; reputational and/or financial damage; and consequential sanctioning by the relevant authorities.

Note 2 to entry: Capacity for harm can also arise from compromised service provision. In this context a hazard can be considered to be a biological, chemical, physical or radiological agent in, or condition of, water with the potential to cause harm to public health or the *environment* (3.16). This perspective is based on the definition of "hazard" in the WHO Water Safety Plan Manual [expanded to include "condition", which includes quantity (i.e. a shortage or an excess), hence making it applicable also to *wastewater* (3.40) *service* (3.37)].

Note 3 to entry: Other sources of potential harm exist within the water utility's organizational context. These hazards can be internal or external to the *organization* (3.26). Internal hazards could be tangible (e.g. a toxic chemical store; potential energy stored behind a dam perched on a hillside above a town; a chamber potentially containing a hazardous atmosphere) or intangible (e.g. poorly documented procedures; inadequate training; an inappropriate organizational culture). External hazards could be tangible (e.g. earthquake; flooding; forest fire) or intangible (e.g. social unrest; terrorism, cyber threat, corruption; financial instability).

3.18
hazardous event
event that introduces one or more *hazards* (3.17) to, or fails to remove them from, the *drinking water* (3.13) system or the *wastewater* (3.40) system

Note 1 to entry: The equivalent French word for the English expression "hazardous event" is "evenement dangereux". However, the English word "danger" has been removed from this document as it is synonymous with "hazard". Both "hazard" and "danger" convey the concept of a potential *risk* (3.36). When it comes to describing hazard, the English terminology remains consistent, e.g. "fire hazard", but the equivalent French expression "Il y a risque d'incendie" migrates to using the equivalent of the English term "risk". The difficulty is that the meanings of "hazard" and "risk" are subtly different in English. The first conveys the potential exposure (i.e. the impact) while the second additionally conveys the likelihood of that impact's occurrence (risk = impact × likelihood). So a "hazardous event" might be a lightning strike in a wooded area. But if this occurred when the woodland was wet, rather than dry, the risk of a resulting fire would be low rather than high.

3.19
incident
deviation from normal operating conditions

Note 1 to entry: An incident is characterized by its cause, the extent and the *consequences* (3.9) of the deviation.

3.20
infrastructure
system of facilities, equipment and *services* (3.37) needed for the operation of a utility *organization* (3.26)

Note 1 to entry: In a *water utility* (3.41), it is advisable to reserve the term "infrastructure" for physically fixed equipment and installations.

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3.21
interruption
situation where the *service* (3.37) is not available

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

3.22
maintenance
combination of all technical, administrative and managerial actions during the life cycle of an *asset* (3.4) intended to retain it in, or restore it to, a state in which it can perform the required function

3.23
management
coordinated activities to direct and control a *service* (3.37)

Note 1 to entry: Management can include establishing *policies* (3.28) and *objectives* (3.25), and *processes* (3.30) 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, e.g. managerial or managers.

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

3.24
monitoring
determining the status of a system, a *process* (3.30), a product, a *service* (3.37) or an activity

Note 1 to entry: For the determination of the status, there can be a need to check, supervise or critically observe.

Note 2 to entry: Monitoring is generally a determination of the status of an object carried out at different stages or different times.

3.25
objective
result to be achieved

Note 1 to entry: An objective can be strategic, tactical or operational.

Note 2 to entry: Objectives can relate to different disciplines (such as financial, health and safety, and environmental objectives) and can apply at different levels [such as strategic, organization-wide, project, product and *process* (3.30)].

Note 3 to entry: An objective can be expressed in other ways, e.g. as an intended outcome, a purpose, an operational criterion, as a *crisis* (3.11) objective or by the use of other words with similar meaning (e.g. aim, goal or target).

Note 4 to entry: In the context of a crisis management system, crisis objectives are set by the *organization* (3.26), consistent with the crisis management *policy* (3.28), to achieve specific results.

3.26
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its *objectives* (3.25)

Note 1 to entry: The concept of organization includes, but is not limited to, sole-trader, company, corporation, firm, enterprise, authority, partnership, association, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

Note 2 to entry: For the purposes of this document, the organization will usually be a *water utility* (3.41).

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3.27
performance
measurable result

Note 1 to entry: Performance can relate either to quantitative or qualitative findings.

Note 2 to entry: Performance can relate to the *management* (3.23) of activities, *processes* (3.30), products, *services* (3.37), systems or *organizations* (3.26).

3.28
policy
agreed intentions and direction for performing a *service* (3.37) as formally expressed by the technical management board

3.29
procedure
specified way to carry out an activity or a *process* (3.30)

Note 1 to entry: Procedures can be documented or not.

3.30
process
set of interrelated or interacting activities that use inputs to deliver an intended result

3.31
quality
degree to which a set of inherent characteristics fulfils *requirements* (3.34)

Note 1 to entry: There is a clear distinction between quality of the product [*drinking water* (3.13) or treated *wastewater* (3.40)] and quality of the *service* (3.37). This document does not give technical specifications for product quality.

3.32
recovery
provision of *policies* (3.28), *procedures* (3.29) and *process* (3.30) that are necessary to restore operations critical to the resumption of *service* (3.37)

Note 1 to entry: Recovery represents the last stage to be carried out during the *crisis* (3.11) phase and the post-crisis phase prior to the routine operations.

3.33
relevant authority
public body entitled to set general *policies* (3.28), plans or *requirements* (3.34), or to check compliance with these rules, concerning all the *water utilities* (3.41) included in its area of jurisdiction

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

Note 1 to entry: For a given water utility, there can be several relevant authorities, which have jurisdiction in different domains.

3.34
requirement
need or expectation that is stated, generally implied or obligatory

Note 1 to entry: "Generally implied" means that it is custom or common practice for *drinking water* (3.13) or *wastewater* (3.40) utilities, the *users* (3.39) of the *service* (3.37) and other *stakeholders* (3.38), that the need or expectation under consideration is implied.

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3.35
restriction
situation where the *service* (3.37) does not meet the *availability* (3.6) conditions specified in the service agreement

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

3.36
risk
combination of the likelihood of a *hazardous event* (3.18) and the severity of *consequences* (3.9), if the *hazard* (3.17) occurs in the *drinking water* (3.13) supply or *wastewater* (3.40) system

Note 1 to entry: Risk is often characterized by reference to potential events and consequences or a combination of these.

Note 2 to entry: The English term "likelihood" does not have a direct equivalent in some languages; instead, the equivalent of the term "probability" is often used. However, in English, "probability" is often narrowly interpreted as a mathematical term. Therefore, in risk management terminology, "likelihood" is used with the intent that it should have the same broad interpretation as the term "probability" has in many languages other than English.

Note 3 to entry: Risk can also be defined as the effect of uncertainty on *objectives* (3.25), where uncertainty is the state, even partial, of deficiency of information related to understanding or knowledge of an event, its *consequence* (3.9) or likelihood.

3.37
service
result of a *process* (3.30)

Note 1 to entry: Service is the result of at least one activity necessarily performed at the interface between the provider of the service and, in the first place, its *user* (3.39) and, in the second place, an *stakeholder* (3.38). Service is generally intangible. Provision of a service can involve, for example, the following:

— activity performed on a tangible product supplied by the user, e.g. *wastewater* (3.40);

— activity performed on an intangible product coming from the user, e.g. processing new connection requests;

— delivery of an intangible product, e.g. delivery of information;

— creation of ambience for the user, e.g. reception offices.

Note 2 to entry: The word "service" in common English can also refer to the entity providing the actions related to the subject in question, as is implicit in such phrases as "bus service", "police service", "fire service" and "water or wastewater service". In this context and usage, "service" implies the entity that is delivering the service, e.g. "the public transport of passengers", "the provision of public security", "fire protection and response" and "delivering drinking water or collecting wastewater". If "service" can be understood in this way, "water service" becomes synonymous with "water utility"; hence in this document, in order to avoid confusion, only this definition applies.

3.38
stakeholder
interested party
person or *organization* (3.26) that can affect, be affected by or perceive itself to be affected by a decision or activity

EXAMPLE *Users* (3.39) and building owners, *relevant authorities* (3.33), responsible bodies, operators, employees of the operator, external product suppliers and providers of other *services* (3.37), 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* (3.27) or success of an organization.

Note 2 to entry: For the application of this document, *environment* (3.16) is considered as a specific stakeholder.

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3.39
user
person, group or *organization* (3.26) that benefits from *drinking water* (3.13) delivery and related *services* (3.37) or from *wastewater* (3.40) service activities

Note 1 to entry: Users are a category of *stakeholder* (3.38).

Note 2 to entry: Users can belong to various economic sectors: domestic users, commerce, industry, tertiary activities, agriculture.

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. It is not appropriate for wastewater services.

3.40
wastewater
water arising from any combination of domestic, institutional, commercial or industrial activities, surface runoff and any accidental sewer inflow/infiltration water and which can include collected stormwater, discharged to the e*nvironment* (3.16) or sewer

Note 1 to entry: The definition of wastewater in this document also includes sanitary waste in undiluted form.

Note 2 to entry: Wastewater can flow in separate or combined sewer systems.

3.41
water utility
whole set of *organization* (3.26), *processes* (3.30), activities, means and resources necessary for abstracting, treating, distributing or supplying *drinking water* (3.13) or for collecting, conveying, treating and disposing of *wastewater* (3.40) and for providing the associated *services* (3.37)

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

— its mission, to provide drinking water services or wastewater services, or both,

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

— its responsible body,

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

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

Note 2 to entry: Drinking water utility addresses a utility dealing only with drinking water; wastewater utility addresses a utility dealing only with wastewater.

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

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

4 Concepts and principles

4.1 General

The water utility should establish crisis management plans during normal operations. These plans should be based on risk assessments of the water utility's operations and activities with relevant data being gathered as necessary. These plans should enable the following:

— the early recognition of an actual or impending crisis situation;

— the provision of resources which may be needed in a crisis situation.

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See Annex A for more details.

4.2 Crisis management phases

Crisis management is a phased system as described in Figure 1.

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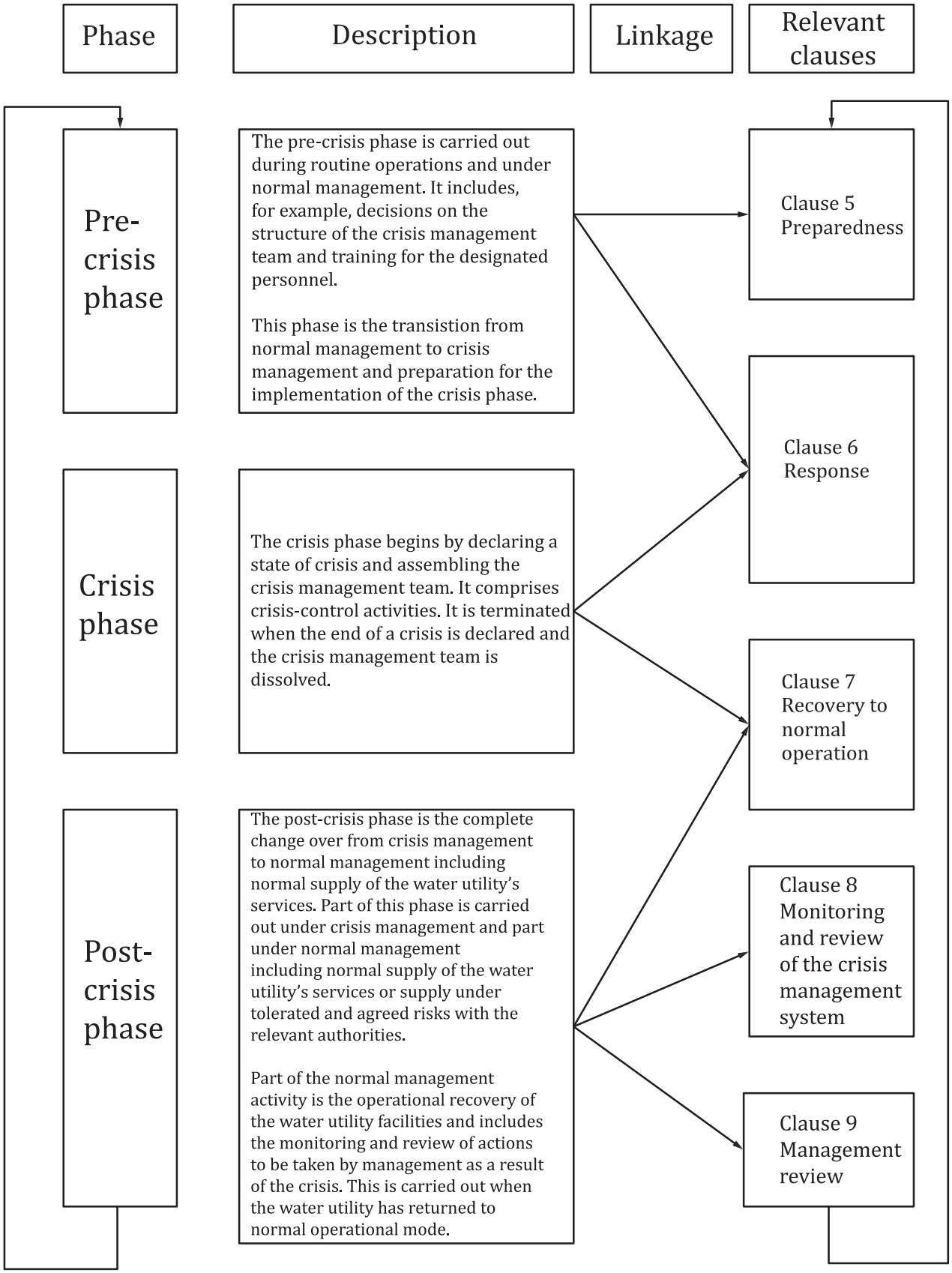

Figure 1 — Sequence of crisis management phases

Figure 2 illustrates the relationships of the sequence, overlap and relative intensity of the response, recovery and restoration activities during the three phases of a crisis.

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