ORDINANCE ON THE QUALITY OF WATER INTENDED FOR HUMAN CONSUMPTION

(*Trinkwasserverordnung – TrinkwV 2001*)[*],[†])

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Non-official Translation[‡]

1. Chapter One

General provisions

Section 1

Purpose of the Ordinance

It is the purpose of this Ordinance to protect human health from the adverse influences resulting from any contamination of water intended for human consumption, by ensuring its wholesomeness and purity as stipulated in the following provisions.

Section 2

Scope of application

This Ordinance regulates the quality of water intended for human consumption, hereafter referred to as drinking water. It does not cover

1. natural mineral water as defined in section 2 of the Mineral and Table Water Ordinance,
2. medicinal water as defined in section 2 para 1 of the Medicinal Products Act *(Arzneimittelgesetz),*
3. swimming and bathing pool water,
4. water in water-bearing devices that are connected to the drinking water installation that
   (a) according to the generally recognised codes of practice, are not part of the drinking water installation as defined by the generally recognised codes of practice and

[*] This Ordinance serves to implement Council Directive 98/83/EC on the quality of water intended for human consumption of 3 November 1998 (OJ L 330/32 of 5.12.1998), last amended by Regulation (EC) No 596/2009 of the European Parliament and of the Council of 18 June 2009 (OJ L 188/14 of 18.7.2009)

[†] This Ordinance serves to implement Council Directive 2013/51/EURATOM of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption (OJ L 296 of 7.11.2013)

(b) must be fitted with a safety device that complies with the generally recognised codes of practice,

and that is downstream of a safety guard pursuant to letter b.

(2) Installations and water from installations that are intended for the withdrawal or supply of water that does not have drinking water quality and that can be installed in addition to the water supplies as specified in section 3 no. 2 are only covered by this Ordinance where it explicitly refers to such installations.

Section 3

Definition of terms

Within the meaning of this Ordinance

1. “drinking water”, irrespective of the water’s state of aggregation and irrespective of whether or not it is intended for supply via pipework, in water transport vehicles or closed containers, is

   a) all water, either in its original state or after treatment, that is intended for drinking, cooking, preparation of food and beverages or, in particular, for the further domestic purposes, as follows:

      aa) personal care and cleansing,

      bb) cleaning of objects that are intended to come into contact with food,

      cc) cleaning of objects that are intended to come into more than temporary contact with the human body.

   b) all water used in food-producing establishments for the manufacture, processing, preservation or marketing of products or substances intended for human consumption, unless otherwise stipulated by the competent authority based on an exemption under section 18 para 1 sentence 3.

2. “water supplies” are

   a) supplies including the related pipeline network from which at least 10 cubic metres per day of drinking water are withdrawn or supplied to intermediate customers through a fixed distribution network or from which drinking water is supplied to at least 50 persons through a fixed distribution network (central waterworks);

   b) supplies including the related distribution network from which less than 10 cubic metres per day of drinking water are withdrawn or used within the framework of a commercial or public activity without constituting a supply pursuant to letter a or letter c (decentralised small-scale waterworks);

   c) supplies including the related drinking water installation, from which less than 10 cubic metres per day of drinking water are withdrawn for domestic use (small-scale supplies for domestic use);

   d) supplies on board landcraft, watercraft and aircraft and other mobile supply installations including all pipework, fittings, appliances and drinking water storage tanks (water storage containers) that are fitted between the point where the drinking water passes from a supply pursuant to letter a, b or letter f and the draw-off point; water abstraction equipment operated on board are also included (mobile supplies);

   e) drinking water installations from which drinking water is provided by a supply pursuant to letter a or letter b to consumers (continuous water distribution);

f) supplies from which drinking water is withdrawn or supplied to consumers and that are operated temporarily or that are temporarily connected to an installation pursuant to letter a, b or letter e (temporary water distribution);

3. “drinking water installation“ is the total of the pipework, fittings and appliances that are installed between the point at which the drinking water passes from a water supply to the user and the draw-off point;

4. “water supply zone“ is a geographically defined area within which the drinking water supplied to consumers or intermediate customers comes from one or more sources and within which the expectable drinking water quality may be considered as being approximately uniform;

5. “health office” is the authority designated under Land law for the implementation of this Ordinance and the staff of which includes a public health officer;

6. “competent authority” is the authority designated by the Laender on the basis of Land law by means of rule of law;

7. “raw water“ is water abstracted from the resource using water abstraction plant for immediate treatment to become drinking water or for distribution as drinking water without treatment;

8. “treatment agents” are all substances that are used in the abstraction, treatment and distribution of drinking water up to the tap and that can change the composition of the drinking water off the tap;

9. “technical action value” is the value that, when exceeded, gives reason to fear an avoidable health hazard related to the drinking water installation and leads to measures to check the sanitary and technical condition of the drinking water installation being taken in the form of a risk analysis;

9a. “parametric value for radioactive substances” is the value of radioactive substances in drinking water above which the competent authority shall assess whether the presence of radioactive substances in drinking water poses a risk to human health which requires action.

9b. “indicative dose” is the committed effective dose for one year of drinking water ingestion, resulting from all the radionuclides whose presence has been detected in drinking water, of both natural and artificial origin, but excluding tritium and radon-222 as well as potassium-40 and short-lived radon decay products;

10. “commercial activity” is the direct or indirect, targeted supply of drinking water within the framework of a lease or another self-employed, regular and for-profit activity;

11. “public activity” is the supply of drinking water to an indeterminate, changing and not personally related group of persons;

12. “large-scale drinking water heater” is an installation with a

a) storage drinking water calorifier or central instantaneous drinking water heater, each with a volume of more than 400 litres or

b) volume of more than three litres in not less than one pipe between the outflow of the drinking water heater and the tap; the contents of circulation pipework is not considered;

corresponding installations in single and two-family houses are not considered large-scale drinking water heaters.

2. Chapter Two

Drinking Water Quality

Section 4

General requirements

(1) Drinking water must be of a quality that ensures the absence of any adverse effect on human health, specifically through pathogens, from its ingestion or consumption. It must be pure and wholesome. This requirement is deemed to be fulfilled if at least the generally recognised codes of practice are complied with in water treatment and water distribution and the drinking water meets the requirements laid down in sections 5 to 7.

(2) The entrepreneur and other owner of a water supply may not supply water that fails to meet the requirements stipulated in section 5 paras 1 to 3 and section 6 paras 1 and 2 or the derogations from the limit values stipulated in Annex 2 that are tolerated under section 9 paras 5 and 6 or permitted under section 10 paras 1, 2, 5 and 6 as drinking water nor make it available to others.

(3) The entrepreneur and other owner of a water supply may not supply water that fails to meet the requirements stipulated in section 7 or the derogations from the limit values stipulated in Annex 3 Part I that are tolerated under section 9 paras 5 and 6 as drinking water nor make it available to others.

Section 5

Microbiological requirements

(1) Drinking water may not contain water-borne pathogens as specified in section 2 no. 1 of the Protection against Infection Act (*Infektionsschutzgesetz*) at concentrations that are a potential hazard to human health.

(2) Drinking water may not exceed the limit values for microbiological parameters laid down in Annex 1 Part I.

(3) Drinking water intended to be supplied in closed containers may not exceed the limit values for microbiological parameters laid down in Annex 1 Part II.

(4) Concentrations of microorganisms that can contaminate the drinking water or adversely affect its quality must be kept as low as reasonably possible considering the circumstances of each case and according to the generally recognised codes of practice.

(5) Where, with respect to any microbial contamination of raw water, the entrepreneur and other owner of a water supply or water abstraction plant or a person contracted by them discover facts that may lead to the emergence of a communicable disease as specified in section 2 no. 3 of the Protection against Infection Act, or assumes that such facts are present, the water must be treated, if necessary including disinfection, according to the generally recognised codes of practice with due attention to section 6 para 3. In pipeline networks or part of them, in which the requirements pursuant to para 1 or 2 can only be met through disinfection, the entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letters a and b, or, if drinking water is supplied within the framework of a commercial or public activity, pursuant to letter d or letter f, must have available a sufficient disinfection capacity using free chlorine, chlorine dioxide or other suitable disinfection agents or procedures that are included in a list published by the Federal Environmental Agency as stipulated in section 11.

Section 6

Chemical requirements

(1) Drinking water may not contain chemical substances at concentrations that are of potential hazard to human health.

(2) Drinking water may not exceed the limit values for chemical parameters laid down in Annex 2. Serial number 4 of Annex 2 Part II shall be applied from 1 December 2013; until 30 November 2013, the limit value shall be 0.025 milligrammes per litre.

(4) Concentrations of chemical substances that can contaminate the drinking water or adversely affect its quality must be kept at as low as reasonably possible considering the circumstances of each case and according to the generally recognised codes of practice.

Section 7

Indicator parameters

(1) Drinking water must comply with the limit values and requirements for indicator parameters set out in Annex 3. This does not apply to the technical action value in Annex 3 Part II.

(3) Drinking water intended to be supplied in closed containers may not exceed the limit value laid down in Annex 3 Part I serial number 5.

Section 7a
Radiological requirements

Drinking water may not contain any substances that include one or more radionuclides of which the activity or concentration cannot be disregarded from a radiation protection point of view. Compliance with this requirement is assumed if the parametric values for radioactive substances stipulated in Annex 3a Part I are not exceeded.

Section 8

Point of compliance

The limit values stipulated according to section 5 paras 2 and 3 and section 6 para 2 as well as the limit values and requirements stipulated according to section 7 as well as the requirements according to section 7a must be complied with, in the case of

1. drinking water that is provided through pipework on pieces of land or within premises and facilities or in landcraft, watercraft or aircraft, at the point where it emerges from the taps that are part of a drinking water installation and deliver drinking water,
2. drinking water in an appliance connected to the drinking water installation that, in line with the generally recognised codes of practice, is not part of the drinking water installation, at the safety device necessary according to the generally recognised codes of practice,
3. water from water transport vehicles at the vehicle’s tap,
4. water that is intended for supply in closed containers, at the point of filling.

Section 9

Measures in the case of non-compliance with limit values, the non-fulfilment of requirements, the exceedance of technical action values as well as the exceedance of parametric values for radioactive substances

(1) If it comes to the knowledge of the health office that the limit values stipulated in sections 5 to 7 in conjunction with Annexes 1 to 3 are not complied with or the requirements are not fulfilled in a water supply zone, it shall decide without delay whether the non-compliance or non-fulfilment puts the health of the consumers affected at risk and whether the water supply affected or parts of it can continue to operate until further notice. In doing so, it shall also consider any hazards to human health that might arise if drinking water supply was interrupted or its withdrawal or use restricted. The health office shall immediately inform the entrepreneur or other owner of the violative water supplies of its decision and orders the measures necessary to prevent the hazard to human health. If the cause of non-compliance or non-fulfilment is unknown, the health office shall order an immediate investigation to be performed or shall perform it on its own. If the cause of non-compliance or non-fulfilment is a water supply pursuant to section 3 no. 2 letter e, para 7 shall apply.

(2) Where a hazard to human health is to be feared in a water supply zone, the health office shall order the entrepreneur or other owner of the water supply affected to arrange for an alternative supply. Where it is not reasonably feasible for the entrepreneur and other owner of the water supply to do so, the health office shall examine if continuation of the water supply affected can be permitted subject to certain conditions and shall order the measures necessary to that end. Section 10 para 8 shall apply *mutatis mutandis*.

(3) Where a hazard to human health cannot be ruled out even by means of orders or imposed conditions as stated in para 2, the health office shall order that the operation of the water supply affected in a water supply zone be interrupted. The water supply in affected pipeline networks or parts thereof must be immediately interrupted,

1. if the water in the pipeline network is contaminated with pathogens pursuant to section 5 at concentrations that are likely to cause direct damage to human health and
2. there is no possibility of sufficiently disinfecting the contaminated water pursuant to section 5 para 5, or
3. if it is contaminated by chemical substances at concentrations that are likely to cause an acute damage to human health.

The interruption and resumption of operations of the water supply affected in a water supply zone shall be carried out with due attention to the generally recognised codes of practice. While drinking water use is being restricted, deviations from sentences 1 and 2 shall only be an option if this is necessary to maintain public safety.

(4) In case of non-compliance with or non-fulfilment of any of the limit values or requirements stipulated in sections 5 and 6, the health office shall immediately order the necessary measures to be taken forthwith to restore water quality and that priority be awarded to the implementation of these measures. The urgency of these measures shall be commensurate with the degree of hazard to human health and public safety.

(5) In case of non-compliance with or non-fulfilment of the limit values or requirements specified in section 7, the health office shall order measures to restore drinking water quality. The health office may, after having looked at the circumstances of the individual case, decide not to order measures if adverse effects on human health are not to be feared and impacts on the materials used are unlikely. The health office shall stipulate up to which value and for what period of time the non-compliance or non-fulfilment will be tolerated. Paras 8 and 9 shall remain unaffected.

(5a) If the parametric values for radioactive substances stipulated in Annex 3a Part I are

being exceeded in a water supply zone, the competent authority shall consider whether the presence in drinking water of radioactive substances poses a risk to human health that requires action. If such a health risk is present, it shall order the action necessary. Para 1 sentences 2 to 4, para 2, para 3 sentences 1, 3 and 4 as well as section 10 para 8 shall apply *mutatis mutandis*.

(6) If it comes to the health office's knowledge that microorganisms or chemical substances are present in a water supply zone that are a potential hazard to human health and that are not subject to a limit value pursuant to Annexes 1 and 2, the health office shall stipulate, with due attention to section 5 para 1 and section 6 para 1 up to which concentrations and for what period of time these microorganisms or chemical substances may be present in the drinking water. Para 7 shall remain unaffected.

(7) If facts become known that connect a non-compliance with or non-fulfilment of the limit values or requirements laid down in sections 5 to 7 to the drinking water installation or its inadequate maintenance, the health office shall order

1. appropriate measures to be taken to eliminate or mitigate the health hazards that might arise from the non-compliance or non-fulfilment, and
2. that the consumers affected be appropriately informed and advised about possible additional measures they should take on their own responsibility or restrictions on use they should make.

In the case of water supplies pursuant to section 3 no. 2 letter e that are not operated within the framework of a public activity, the health office can make these orders. For the purposes of sentence 1, the health office must advise the entrepreneur or other owner of the drinking water installation about possible measures to take.

(8) If it comes to the health office's knowledge that the technical action value stipulated in Annex 3 Part II is exceeded in a drinking water installation, and if the entrepreneur or other owner of the violative water supply does not fulfil his obligations pursuant to section 16 subsection 7, the health office shall request him to fulfil these obligations. If the entrepreneur or other owner of a water supply does not fulfil his obligations completely and within the stipulated period of time even in spite of the health office's request, the latter shall examine whether and within which period of time health protection measures need to be taken and shall order them, if necessary. The health office's authorities resulting from section 20 shall remain unaffected.

(9) Paras 1 to 5 as well as 6 and 7 shall apply *mutatis mutandis* to water supplies pursuant to section 3 no. 2 letter c. In case of non-compliance with or non-fulfilment of the limit values or requirements stipulated in section 6, the health office can, after review, on a case-by-case basis and with the approval of the competent highest Land authority or an agency designated by it, waive the imposition of measures provided that any hazards to human health can be ruled out. The health office shall stipulate up to which value and for what period of time the non-compliance or non-fulfilment will be tolerated.

Section 10

Granting of derogations from limit values for chemical parameters

(1) If, in the course of an investigation pursuant to section 9 subsection 1 sentence 1, the health office finds that a derogation from the limit value of a parameter pursuant to Annex 2 will not cause any hazard to human health and can be eliminated within a maximum of 30

days through measures pursuant to section 9 subsection 4, it shall stipulate the value admissible for this parameter during this period of time as well as the period of time granted for eliminating the derogation. Sentence 1 does not apply if the limit value in question has not been complied with for a combined total of more than 30 days during the twelve months preceding the examination.

(2) The health office shall stipulate to what extent and for which period of time a derogation from the limit value affected may be granted if, in the course of the examinations pursuant to section 9 subsection 1, it finds that

1. the reasons for the non-compliance with a limit value for a parameter pursuant to Annex 2 cannot be eliminated by measures within 30 days,
2. the continuation of the water supply for a certain time beyond this period of time will not cause a hazard to human health and
3. the water supply in the affected part of the water supply zone cannot be reasonably maintained otherwise.

The entrepreneur or other owner of the violative water supply shall be informed about the decision without delay.

(3) The granting of the derogation pursuant to para 2 shall be limited to the shortest possible period and may not exceed three years. In the case of water supply zones supplying more than 1 000 cubic metres per day or serving more than 5 000 persons, the health office shall inform the Federal Ministry of Health or an agency designated by it about this decision via the official channels within six weeks.

(4) Subsection 2 does not apply to drinking water that is intended for supply in containers unless this water is supplied to the consumers for a limited period of time pending the restoration of regular water supply as a substitute for the piped water supply.

(5) Prior to the expiry of the granted derogation, the health office shall examine whether suitable measures have been taken that restored the parameters to an admissible value range. If this is not the case, the health office may, after the approval of the competent highest Land authority or an agency designated by it, grant another derogation for a period of not more than three years. The health office shall inform the Federal Ministry of Health or an agency designated by it within six weeks via the official channels about the reasons for granting this derogation.

(6) In exceptional circumstances, the health office may inform the Federal Ministry of Health or one of the agencies designated by it via official channels that it is necessary to ask the European Commission for a third derogation. This request must made not later than five months prior to the expiry of the second derogation. The period covered by the request for a third derogation may not exceed three years.

(7) Any derogation granted pursuant to paras 2 and 5 as well as the notification pursuant to para 6 to the Federal Ministry of Health or an agency designated by it must specify at least the following:

1. the characteristics and geographical description of the water supply zone, the quantity of drinking water supplied per day and the number of persons served;
2. the reason for non-compliance with the limit value concerned;
3. the surveillance results from the past three years (minimum, median and maximum values);
4. the number of persons affected and whether or not relevant food-production undertakings are affected;

5. an appropriate surveillance programme, with an increased surveillance frequency, where necessary;

6. a summary of the necessary measures including a timetable for the work, an estimate of the cost and provisions for reviewing;

7. the required duration of the derogation and the maximum permissible value for the parameter concerned that is envisaged for the derogation.

Notifications shall be made in the format specified by the European Commission pursuant to Article 13 paragraph 4 of Directive 98/83/EC on the quality of water intended for human consumption (OJ L 330/32 of 5.12.98) and with the minimum information detailed there in the form communicated by the Federal Ministry of Health after participation of the Laender. Any further format requirements made by the Federal Ministry of Health, particularly governing uniform EDP procedures, are subject to the approval of the *Bundesrat*.

(8) The health office must ensure through corresponding orders when granting derogations or restricting the use of drinking water that the population affected by the derogation or restriction on use as well as the entrepreneur or other owner of another affected water supply are promptly and appropriately informed by the entrepreneur or other owner of the violative water supply or by the competent authority about these measures and the conditions governing them as well as, if necessary, about measures to be taken for their own protection. Moreover, the health office must ensure that certain population groups for which the derogation could present a special risk are warned and, if necessary, informed about measures to be taken for their own protection.

(9) Subsections 1 to 8 do not apply to water supplies pursuant to section 3 no. 2 letter c.

3. Chapter Three

Treatment and Disinfection

Section 11

Treatment agents and disinfection procedures

(1) Only treatment agents may be used during drinking water abstraction, treatment and distribution that are included in a list published by the Federal Ministry of Health. The list must contain requirements on the use of these agents covering

1. purity,
2. exclusive purposes for which they may be used,
3. quantities that may be added,
4. maximum concentrations of residual quantities and reaction products that may be left in the drinking water,
5. other conditions of use.

It shall also include the minimum concentrations of free chlorine, chlorine dioxide or other treatment agents for disinfection after completion of disinfection. The list shall also specify the scope of necessary testing for treatment agents. Only procedures, including the conditions for their use that ensure their appropriate effectiveness, may be applied for drinking water disinfection that have been included into the list. The list shall be kept by the Federal Environmental Agency and published in the Federal Gazette (*Bundesanzeiger*) as well as on the internet. The valid list shall be the list of treatment agents and disinfection procedures pursuant to section 11 of the Drinking Water Ordinance 2001 as amended for the eighteenth time, as of October 2015.

(2) For the purposes of treatment and disinfection, substances may only be used in the following special cases, after they have been published in the list pursuant to para 1:

1. for the requirements of the *Bundeswehr* federal armed forces on behalf of the Federal Ministry of Defence;
2. for civil requirements in a state of defence on behalf of the Federal Ministry of the Interior;
3. in emergencies or large-scale disasters when the water supply is seriously endangered with the approval of the authorities responsible for civil protection.

(3) The substances and procedures shall only be included in the list if they are sufficiently effective under the conditions referred to in para 1 and have no avoidable or unreasonable effects on human health and the environment. Treatment agents that

1. were lawfully produced in another State party to the Agreement on the European Economic Area or
2. lawfully produced or placed on the market in another Member State of the European Union or Turkey,

shall be included in the list referred to in para 1 if the Federal Environmental Agency has found that they permanently achieve the same level of protection required in Germany. In making this determination, the Federal Environmental Agency shall consider the result of tests conducted in the Member State of origin, Turkey or another State party to the Agreement on the European Economic Area.

(4) The Federal Environmental Agency shall decide on the drafting and updating of the list, especially the inclusion of treatment agents and disinfection procedures, after consulting with the Laender, the *Bundeswehr* and the Federal Railway Authority, the Federal Office of Civil Protection and Disaster Assistance as well as the interested expert communities and associations.

(5) The entrepreneur and other owner of water supplies, authorities, technical regulators engaged in drinking water supply and producers, importers or users of treatment agents or disinfection procedures can file applications with the Federal Environmental Agency to have treatment agents or disinfection procedures included into the list pursuant to para 1. They must submit the necessary documentation to prove compliance with the requirements pursuant to para 3. If the Federal Environmental Agency determines that the requirements pursuant to para 3 are fulfilled, it shall include the treatment agent or disinfection procedure as the list pursuant to para 1 is updated for the next time.

(6) The details of the procedures pursuant to paras 4 and 5 shall be stipulated by the Federal Environmental Agency in rules of procedure.

(7) The entrepreneur and other owner of a water supply must, when adding treatment agents or using disinfection procedures pursuant to para 1 sentence 1, comply with the requirements of para 1 sentence 1 or of an exemption pursuant to section 12. They may not supply water to which treatment agents have been added contrary to subsection 1 or an exemption pursuant to section 12 as drinking water nor make it available to others.

Section 12

Exemptions

(1) If the decision pursuant to section 11 para 3 sentence 1 requires the testing of a treatment agent or disinfection procedure, the Federal Environmental Agency can, on request, approve temporary exemptions from section 11 para 1 sentences 1 and 5 if facts warrant the presumption that the testing is not likely to cause any hazard to human health or the environment. The exemption must be limited in time and scope to the minimum necessary. Section 11 para 1 sentence 6 shall apply *mutatis mutandis*.

(2) The Federal Environmental Agency can revoke the exemption if there are indications that the treatment agent or disinfection procedure does not satisfy the requirements of section 11 para 3 sentence 1.

4. Chapter Four

DUTIES OF THE ENTREPRENEUR AND OTHER OWNER OF A WATER SUPPLY

Section 13

Obligations to notify

(1) The health office shall be notified in writing about:

1. the establishment of a water supply at least four weeks in advance;
2. the first-time commissioning or recommissioning of a water supply at least four weeks in advance as well as the decommissioning of a water supply or parts of it within three days;
3. any structural or operational modifications to drinking water-bearing parts of a water supply that can significantly affect drinking water properties, at least four weeks in advance;

4. the transfer of ownership or usufruct of a water supply to another person at least four weeks in advance;

5. the construction of commissioning of a water supply and the envisaged duration of operations as early as possible.

(2) Specifically, the entrepreneur or other owner of a water supply shall be subject to the following obligations to notify:

1. pursuant to section 3 no. 2 letter a the obligation to notify pursuant to para 1 nos. 1 to 4;

2. pursuant to section 3 no. 2 letter b the obligation to notify pursuant to para 1 nos. 1 to 4;

3. pursuant to section 3 no. 2 letter c the obligation to notify pursuant to para 1 nos. 1 to 4;

4. pursuant to section 3 no. 2 letter d the obligation to notify pursuant to para 1 nos. 2 and 3, if water is supplied within the framework of a commercial or public activity;

5. pursuant to section 3 no. 2 letter e the obligation to notify pursuant to para 1 nos.1 to 4, if water is supplied within the framework of a public activity;

6. pursuant to section 3 no. 2 letter f the obligation to notify pursuant to para 1 no. 5.

(3) The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 shall, on request, submit to the health office the following documents:

1. technical plans of an existing or planned water supply;

2. in case of a structural or operational change only the technical plans for the part of the supply that is affected by the change;

3. documents on the protection zones or, if none have been established, documents on the environment of the water catchment insofar as these are relevant for water abstraction.

(4) The entrepreneur and other owner of installations that are intended for the withdrawal or supply of water that does not have drinking water quality and that are installed in the household in addition to the water supplies pursuant to section 3 no. 2, shall immediately notify their existence to the competent authority. For the rest, the notification obligations for water supplies pursuant to para 1 nos 1, 2 and 4 as well as para 3 nos 1 and 2 shall apply *mutatis mutandis*.

Section 14

Analysis obligations

(1) The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letter a or letter b shall perform the following analyses of the water or have them performed pursuant to para 2 sentence 1 and section 15 paras 1 and 2 and with due attention to para 6, in order to ensure that the drinking water complies with the requirements of this Ordinance at the point where it enters the drinking water installation:

1. microbiological analyses to ascertain if the limit values set out in section 5 para 2 or para 3 in conjunction with Annex 1 are being complied with;

2. chemical analyses to ascertain if the limit values set out in section 6 para 2 in conjunction with Annex 2 are being complied with;

3. analyses to ascertain if the limit values and requirements pursuant to section 7 in conjunction with Annex 3 are being complied with;

4. analyses to ascertain if the derogations tolerated pursuant to section 9 paras 5 and permitted pursuant to section 10 paras 1, 2, 5 and 6 are being complied with;

5. analyses to ascertain if the requirements of section 11 are being complied with.

(2) The scope and frequency of the analyses pursuant to para 1 shall be determined *mutatis mutandis* according to Annex 4. Where samples from distribution networks are concerned, section 19 para 2 sentence 4 shall apply *mutatis mutandis* with respect to the sampling point stipulated in section 19 para 2 sentence 4. Sampling plans must be coordinated with the health office. In the case of water supplies pursuant to section 3 no. 2 letter c, the health office shall determine the intervals at which individual analyses pursuant to para 1 nos 2 to 5 the intervals shall be carried out. These intervals may not exceed three years. Analyses to determine whether the limit values stipulated in Annex 1 Part I and Annex 3 Part I serial nos. 4, 5, 10 and 11 are complied with, must take place at least once a year in these supplies. In the case of water supplies pursuant to section 3 no. 2 letter d, from which drinking water is supplied within the framework of a commercial or public activity, and for water supplies pursuant to letter f, the health office shall determine the intervals at which individual analyses pursuant to para 1 nos. 1 to 5 shall be carried out. Para 3 shall remain unaffected. Monitoring of water supplies pursuant to section 3 no. 2 that has been carried out within the framework of surveillance measures pursuant to section 19 para 1 in conjunction with paras 5 and 7, can be counted towards the scope and frequency of the mandatory analyses.

(3) The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letter d or letter e, which includes a large-scale drinking water heater shall, with due attention to para 6, if they supply drinking water within the framework of a commercial or public activity, analyse the water or have it analysed through systemic analyses pursuant to sentence 3 at several representative sampling points for the parameter stipulated in Annex 3 part II. The duty to analyse stipulated in sentence 1 applies to facilities that include showers or other installations in which drinking water is aerosolised. The scope and frequency of the analyses are laid down in Annex 4 part II letter b. The entrepreneur and other owner of a water supply pursuant to sentence 1 shall ensure that appropriate sampling points are provided at the water supplies that comply with the generally recognised codes of practice. Samples must be taken according to the generally recognised codes of practice.

(4) The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letter a or letter b must carry out regularly, but at least once a year, inspections of the protection zones belonging to the water supply or have them carried out to identify any changes that might affect drinking water properties. If no protection zones have been established, they shall carry out walkthroughs of the environment of the water catchment or have them carried out. The result of the walkthrough must be documented and submitted to the health office on request. The documentation must be retained for ten years. If the outcome of the walkthroughs requires it, corresponding analyses of the untreated water shall be performed or commissioned.

(5) The entrepreneur and other owner of a water supply must also analyse the drinking water at the special request of the competent authority pursuant to section 9 para 1 sentence 1 or section 20 para 1 or have it analysed accordingly.

(6) The entrepreneur or other owner of a water supply must have the analyses pursuant to paras 1 to 5 carried out by an analytical laboratory that has been authorised pursuant to section 15 para 4.

Section 14a

Obligation to analyse for radioactive substances

(1) The entrepreneur and other owner of a water supply pursuant to section 3 No. 2 letter°a shall perform drinking water analyses or have them performed to verify that the drinking water does not exceed the parametric values for radioactive substances stipulated pursuant to section 7a in conjunction with Annex 3a Part I, at the point where it enters the drinking water installation. Section 19 para 2 sentence 4 shall apply *mutatis mutandis*. Sentence 1 shall apply to the entrepreneur and other owner of a water supply pursuant to section 3 No. 2 letter b, if the competent authority so orders. Drinking water analysis for the presence of artificial radionuclides are usually not necessary. The competent authority can order analyses for artificial radionuclides, if it has reasonable grounds to assume that the parametric values for radioactive substances stipulated in Annex 3a Part I might be exceeded.

(2) Conduct, scope and frequency of the initial analysis and regular analyses shall be those stipulated in Annex 3a Part III. If water supplies are already in operation on 26 November 2015, the initial analysis shall be carried out by 26 November 2019.

(3) Analyses of water supplies pursuant to section 3 No 2 letters a and b that are carried out within the framework of surveillance pursuant to section 20a para 1 can be counted towards the scope and frequency of the mandatory analyses.

(4) Analyses pursuant to para 1 are not necessary if, on the basis of representative sampling, surveillance data or other reliable information, the competent authority has determined that, for a period to be set by the latter, radioactive substances will not be present in a water supply zone at levels that are likely to exceed the parametric values for radioactive substances. Moreover, the competent authority can determine, on request,

1. that the initial analysis is not necessary if the entrepreneur and other owner of a water supply proves, by means of representative sampling, surveillance data or other reliable information, that the parametric values for radioactive substances stipulated in Annex 3a Part I are not being exceeded and
2. that regular analyses are not necessary if the entrepreneur and other owner of a water supply proves, by means of initial analysis in line with the method set out in Annex 3a Part III, compliance with the parametric values for radioactive substances pursuant to Annex 3a Part I or an insignificant exceedance that is negligible from a radiation protection point of view.

Section 15

Methods of analysis and analytical laboratories

(1) In performing the analyses pursuant to section 14 the methods of analysis specified in Annex 5 shall be used. Methods of analysis other than those specified in Annex 5 Part I may be used if the Federal Environmental Agency has generally stated on request that the results obtained in using them are equivalent, within the meaning of the generally recognised codes of practice, to the results obtained in using the stipulated procedures and at least equally reliable as the results obtained with the stipulated procedures and after they have been published by the Federal Environmental Agency in a list of alternative methods on the internet.

(2) Analyses for the parameters mentioned in Annexes 2 and 3 shall be performed using methods that yield sufficiently reliable measuring results and also comply with the specified performance characteristics mentioned in Annex 5 Parts II and III.

(2a) Analyses pursuant to section 14a shall be performed using the analysis methods and performance characteristics mentioned in Annex 3a Part III no. 3.

(3) The entrepreneur and other owner of a water supply shall immediately record the result of each analysis pursuant to section 14, 14a and 20 in writing or on data carriers including the particulars pursuant to sentence 2 or have it recorded. The sampling point shall be identified by municipality, street, house number and tap, the dates of sampling and analysis of the water sample and the method of analysis. The competent highest Land authority or another agency that is responsible under Land law can order that identical form sheets be used or EDP procedures applied for the records. The entrepreneur and other owner of a water supply shall send a copy of the record to the health office within a period of two weeks from the completion of analysis. In the case of analyses pursuant to section 14a, the copy of this record shall also be sent to the competent authority unless identical with the health office. Both the original and the copy referred to in section 19 para 4 sentence 3 shall be kept accessible for a period of not less than ten years from the data of analysis. A copy of the records for analyses pursuant to section 14 para 3 need not be sent to the health office. Section 16 para 1 sentence 1 shall remain unaffected.

(4) The analyses required under sections 14, 14a para 1, section 16 paras 2 and 3 as well as sections 19, 20 and 20a including the sampling may only be carried out by correspondingly authorised analytical laboratories. The competent highest Land authority or an agency designated by it shall, on request, grant an analytical laboratory that operates in this Land and has not yet been authorised by another Land, the authorisation if the analytical laboratory

1. complies with the provisions of Annex 5, or in respect of radioactive substances, the requirements set out in Annex 3a Part III No 3,
2. works to the generally recognised codes of practice,
3. operates an internal quality assurance system,
4. successfully participates in external quality assurance programmes at least once a year,
5. has personnel that is sufficiently qualified for the work they do, and
6. has been accredited by a national accreditation agency of a Member State of the European Union for drinking water analyses.

The authorisation shall apply nationwide. The competent highest Land authority or an agency designated by it must publish a list of the analytical laboratories authorised by this Land.

(5) An agency independent of the analytical laboratories that is designated by the competent highest Land authority shall regularly verify if the prerequisites of para 4 sentence 2 are complied with by the analytical laboratories authorised and listed in this Land.

Section 16

Special Obligations to Notify and Act

(1) The entrepreneur and other owner of a water supply shall notify the health office, in case of radioactive substances in drinking water the competent authority, immediately

1. if the limit values stipulated in section 5 paras 2 and 3 or section 6 para 2 in conjunction with the Annexes 1 and 2 have been exceeded or the technical action value established in Annex 3 Part II has been exceeded,
2. if the requirements of section 5 para 1, section 6 para 1 are not being fulfilled or the limit values and requirements of section 7 in conjunction with Annex 3 are not being complied

with,

2a. if the parametric values for radioactive substances set out in section 7a para 1 in conjunction with Annex 3a Part I are being exceeded,

3. if limit values of or minimum requirements for parameters for which the health office has ordered an analysis pursuant to section 20 para 1 no. 4 are not being complied with,

4. if the maximum values tolerated pursuant to section 9 paras 5, 6 and 9 or permitted pursuant to section 10 paras 1, 2, 5, 6 and 9 are being exceeded for the parameters concerned.
In addition, the entrepreneur and other owner of a water supply shall immediately notify the health office of any organoleptically perceivable alterations of the drinking water as well as extraordinary events in the surroundings of the water resource or at the water supply that may affect drinking water properties. The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letters a, b or letter c shall immediately inform the health office if contaminations of the raw water come to their knowledge that may lead to the limit values being exceeded in the drinking water. In case of non-compliance with limit values or requirements, the supply of drinking water from the time of notification pending the decision by the health office pursuant to sections 9 and 10 on the measures to be taken shall be considered permitted unless the water supply must be interrupted at once as stipulated in section 9 para 3 sentence 2. To be able to comply with the obligations set out in sentences 1 to 3, the entrepreneur and other owner of a water supply shall ensure by means of a contract that the analytical laboratory commissioned by them must inform them at once about any identified derogations from the limit values set out in sections 5 to 7 or requirements as well as about any exceedance of the technical action value. The competent authority shall be notified of any changes in respect of radioactive substances pursuant to para 1 sentences 2 and 3 that are known to have occurred.

(2) Where facts pursuant to para 1 sentence 1 are identified or alterations pursuant to para 1 sentences 2 and 3 perceived, the entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letters a, b, c or where drinking water is supplied within the framework of a commercial or public activity, pursuant to letter d, are obliged to carry out immediate investigations to identify the cause or have them carried out and to take immediate remedial action or have such action taken. Section 9 para 9 shall remain unaffected.

(3) In the cases where they become aware that facts have been discovered according to which the drinking water in the drinking water installation is altered in such a way that it does not comply with the requirements of sections 5 to 7, the entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letters c, de, e or letter f must, where necessary, carry out immediate investigations to identify the cause or have them carried out and take immediate remedial action or to have such action taken and to inform the health office immediately thereof.

(4) The entrepreneur and other owner of a water supply pursuant to section 3 no 2 letters a and b or, where drinking water is supplied within the framework of a commercial or public activity, pursuant to letters d and e or letter f shall, at least weekly, record in writing or on data carriers the treatment agents used pursuant to section 11 para 1 sentence 1 or section 12 para 1 and their concentrations in the drinking water or have them recorded. In the case of water supply pursuant to section 3 no. 2 letters d, e and f, the Federal Environmental Agency may, in the list pursuant to section 11 para 1 or in the exemption pursuant to section 12 para 1, stipulate a different recording frequency. The records shall be kept accessible to the subscribers and consumers during the usual business hours from the date of use of the agents for a period of six months or shall be made available on request. If the drinking water is supplied to subscribers or consumers, the entrepreneur and the other owner of a water supply pursuant to section 3 no 2 letters a, b, d, e or letter f shall furthermore, when starting the addition of a treatment agent pursuant to section 11 para 1 sentence 1 or section 12 para 1, immediately inform the subscribers and consumers affected in writing about this agent and

its concentration in the drinking water. Moreover, subscribers and consumers affected shall be regularly and directly informed in writing at least once a year about all treatment agents used. In the case of water supplies pursuant to section 3 no. 2 letters a and b, this information can be published in the local daily newspapers. In the case of water supplies pursuant to section 3 no. 2 letter e that are operated within the framework of a commercial or public activity, the information may be posted in a suitable place.

(5) The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letter a or letter b shall draw up an action plan pursuant to sentence 2 that takes into account the local circumstances of the water supply. This action plan must contain particulars on

1. how, in the cases where the water supply must be interrupted at once pursuant to section 9 para 3 sentence 2, the changeover to another water supply shall take place and
2. which agencies are to be informed when a derogation is detected and who is obliged to transmit this information.

The action plan must have been submitted by the time of commissioning at the latest, must be updated in case of material changes and is subject to the approval of the competent health office. The competent highest Land authority or another agency that is responsible under Land law can order that identical form sheets be used or EDP procedures applied for the action plans.

(6) Special obligations to notify and to act set out in Annex 3 serial numbers 2, 10, 11 and 18 shall remain unaffected.

(7) If it comes to the knowledge of the entrepreneur or other owner of a water supply pursuant to section 3 no. 2 letter d or letter e that the technical action level stipulated in Annex°3 Part II is being exceeded, he must immediately

1. carry out investigations to identify the causes or have them carried out; these investigations must include a site inspection as well as a verification of compliance with the generally recognised codes of practice,
2. prepare a risk analysis or have it prepared and
3. carry out the measures or have them carried out that are necessary according to the generally recognised codes of practice to protect the consumers' health.

The entrepreneur and other owner shall immediately inform the health office about the measures they have taken. The entrepreneur and the other owner must keep records on the measures pursuant to sentence 1 or have them kept. They must retain the records for a period of ten years after the necessary measures pursuant to sentence 1 no. 3 have been concluded and submit them to the health office on request. In carrying out the measures pursuant to sentence 1 nos. 2 and 3 the entrepreneur and other owner must observe the recommendations of the Federal Environmental Agency. The entrepreneur and other owner of the water supply must immediately inform the consumers affected about the outcome of the risk analysis and the restrictions on drinking water use that might result from it.

Section 17

Requirements for installations for the abstraction, treatment or distribution of drinking water

(1) Installations for the abstraction, treatment or distribution of drinking water must be planned, built and operated at least according to the generally recognised codes of practice.

(2) Materials used for the construction or maintenance of installations that are used for the abstraction, treatment or distribution of drinking water and come into contact with drinking water may not

1. directly or indirectly compromise the protection of human health provided for in this Ordinance,

2. adversely affect the odour or taste of the water or

3. leach substances into the drinking water at quantities larger than those inevitable when the generally recognised codes of practice are complied with.

The entrepreneur and other owner of installations for the abstraction, treatment or distribution of drinking water must ensure that only materials are used for construction or maintenance that comply with the requirements mentioned in sentence 1.

(3) The Federal Environmental Agency shall stipulate an assessment basis to provide the concrete details of the requirements pursuant to sentence 2 para 1. The assessment basis can include, specifically:

1. Test instructions with test parameters, test criteria and methodological requirements to assess the hygienic suitability of the starting materials pursuant to number 2, the materials pursuant to number 3 and the materials in products made thereof.

2. Positive lists of the starting materials that are hygienically suited for the production of materials, including restrictions on the use of the starting materials,

3. Positive lists of materials that have been shown in tests to be hygienically suited for coming into contact with drinking water, including restrictions on the use of these materials in certain products or with certain drinking waters.

The Federal Environmental Agency shall decide for which groups of materials it will stipulate an assessment basis. Once it has stipulated an assessment basis for a group of materials, it will be binding after a period of two years following its publication. If the assessment basis contains positive lists pursuant to sentence 2 no. 2 or no. 3, only starting materials or materials that are included in the positive lists may be used for the construction or maintenance of installations pursuant to para 2.

(4) The assessment basis pursuant to para 3 sentence 2 no. 1 shall be stipulated and updated by the Federal Environmental Agency *ex officio*. The assessment basis pursuant to para 3 sentence 2 nos 2 and 3 shall be stipulated or updated by the Federal Environmental Agency on request. Requests must include the necessary documentation to prove compliance with the prerequisites pursuant to para 2 sentence 1 and pursuant to para 3 sentence 2 no. 1. Tests and assessments referring to the prerequisites pursuant to para 2 sentence 1 and para 3 that were carried out in another Member State of the European Union, another State party to the Agreement on the European Economic Area or in Turkey shall be recognised. In matters of public interest, the Federal Environmental Agency can also stipulate or update an assessment basis pursuant to para 3 sentence 2 nos 2 and 3 *ex officio*. Prior to any stipulation and updating, the Federal Environmental Agency shall consult with the Laender, the *Bundeswehr*, the Federal Railway Authority as well as the interested expert communities and associations. The Federal Institute for Risk Assessment shall support the Federal Environmental Agency in assessing materials under hygienic aspects. The Federal Environmental Agency shall publish the assessment basis in the Federal Gazette and on the internet. The Federal Environmental Agency shall specify the details of the procedure in rules of procedure.

(5) Products and procedures are assumed to comply with the requirements of paras 1 to 3 if this was confirmed by means of a certificate issued by a certifier accredited for the drinking water sector.

(6) Water supplies from which drinking water is supplied may not be connected to water-bearing parts which contain or transport water that is not intended for human consumption pursuant to section 3 no. 1, without a safety device that complies with the generally recognised codes of practice. The entrepreneur and other owner of a water supply pursuant to

section 3 no. 2 must colour-code the pipes of different supply systems or have them colour-coded in a permanent way when they are fitted. They must mark taps of water that is not intended for human consumption pursuant to section 3 no. 1 or have them marked in a permanent way when they are set up and, if necessary, secure them against improper use.

5. Chapter Five

Surveillance

Section 18

Surveillance by the health office

(1) The health office shall monitor the water supplies pursuant to section 3 no. 2 letters a, b and c and, where water is provided within the framework of a commercial or public activity, pursuant to letter d as well as the water supplies pursuant to letter e, where drinking water is supplied within the framework of a public activity, and the water supplies pursuant to letter f for compliance with the requirements of the Ordinance through corresponding examinations. This shall only apply to water supplies from which drinking water for purposes pursuant to section 3 no. 1 letter b is withdrawn if the competent authority has not permitted an exemption. The competent authority can permit exemptions if it is convinced that the quality of the water used cannot adversely affect the safety of the finished product. Water supplies pursuant to section 3 no. 2 letters d and e, unless drinking water is supplied within the framework of a commercial or public activity, as well as water supplies pursuant to letter e, where drinking water is supplied only within the framework of a commercial activity, or other installations pursuant to section 13 para 4 can be included into surveillance if, considering the circumstances of the individual case, doing so is necessary for the protection of human health or to ensure an impeccable drinking water quality.

(2) Where it is necessary within the framework of surveillance pursuant to para 1, the persons carrying out the surveillance shall be entitled

1. to enter upon land, rooms and facilities as well as landcraft, watercraft and aircraft, in which there are water supplies, during the usual business hours or office hours,
2. to take samples according to the generally recognised codes of practice, to inspect the books and other documents including electronic data carriers and to prepare copies or extracts therefrom,
3. to require the entrepreneur and other owner of a water supply to provide all necessary information, especially on the operation and the operation routines including their control,
4. to prevent impending risks to public safety and order to enter upon the land, rooms and facilities as well as vehicles specified in number 1 even outside the hours mentioned there and even when they serve residential purposes at the same time. The basic right to the inviolability of the home (Article 13 para 1 of the Basic Law) shall be limited in this respect.

The documents pursuant to number 2 include specifically the records on the analyses pursuant to sections 14 and 20, the most recent technical plans of the water supply and documents on the related protection zones or, in their absence, the surroundings of the water catchment if they are relevant for water abstraction.

(3) The entrepreneur and other owner of a water supply as well as any other person who

possesses actual power over the land, rooms, facilities and vehicles specified in para 2 nos. 1 and 4 shall be obliged,

1. to support the persons carrying out the surveillance in the execution of their task, specifically to indicate them on request the rooms, facilities and equipment, to facilitate access to these rooms, to open up containers and to enable them to take samples,

2. to supply the information requested.

(4) The person required to provide information can refuse to give information on questions which, if answered, would expose him, or one of his family members, as designated in section 383 subsection 1 numbers 1 to 3 of the Code of Civil Procedure, to the risk of criminal prosecution or proceedings under the Act on Administrative Offences (*Gesetz über Ordnungswidrigkeiten*).

(5) The surveillance of radioactive substances shall be that stipulated in section 20a.

Section 19

Scope of surveillance

(1) Within the framework of surveillance pursuant to section 18 the health office shall check compliance with the duties incumbent on the entrepreneur and other owner of a water supply on the basis of this Ordinance. The investigations shall also comprise the inspections of the water supplies pursuant to section 3 no. 2 letters a, b and c including the related protection zones or, in their absence, the surroundings of the water catchment if they are relevant for water abstraction, as well as the sampling of water and analysis of the water samples. The need to inspect water supplies pursuant to section 3 no. 2 letters d, e and f shall be determined by the competent health office. Section 9 para 8 shall remain unaffected. Section 14 shall govern the scope of analysis, section 15 paras 1 and 2 the method of analysis and section 15 para 3 sentences 1 to 3 the recording of the analytical results, each applying *mutatis mutandis.* The surveillance frequency shall be that stipulated in para 5.

(2) The health office shall establish a sampling plan for each water supply zone that ensures compliance with the obligations to report laid down in section 21. The sampling plan shall cover

1. the analysis frequency laid down in Annex 4,

2. the scope of check monitoring and audit monitoring and

3. the timing of monitoring and the sampling point.

Samples shall be consistently taken at the point of compliance pursuant to section 8 to ensure that the drinking water complies with the requirements of the Ordinance. In a distribution network, however, samples for certain parameters can be taken alternatively within the water supply zone or at the treatment works provided that the drinking water is not likely to undergo adverse changes within the distribution network with respect to the parameter tested. Samples should be taken so that they are representative of the quality of the drinking water supplied or withdrawn throughout the whole year. Seasonal variations shall be taken into consideration. The sampling plan may include all water supplies supplying drinking water representative of the water supply zone concerned. If necessary, the health office shall carry out supplementary analyses or have them carried out. The competent highest Land authority or another agency that is responsible under Land law can order that identical form sheets be used or EDP procedures applied for the health office's sampling plans.

(3) The health office can do the sampling or analyse the water samples pursuant to paras 1 and 2 itself or commission an analytical laboratory to perform these tasks. It can re-

quest the entrepreneur and other owner of the water supply to designate an analytical laboratory that is to do the sampling or analyse the water samples. It can also order the entrepreneur and other owner of the water supply to commission an analytical laboratory; in this case, the entrepreneur and other owner shall transmit the analysis result to the health office. Analytical laboratories pursuant to sentences 1 to 3 must be authorised pursuant to section 15 para 4. The competent highest Land authority may stipulate additional requirements for the analytical laboratories. The health office shall inform the entrepreneur or other owner of the water supply in the cases of sentences 1 and 2 about the analysis result. The costs of taking and analysing the water samples specified in sentences 1 to 3 shall be borne by the entrepreneur and other owner of the water supply.

(4) Records shall be kept of the surveillance results. The competent highest Land authority or another agency that is responsible under Land law can order that identical form sheets be used or EDP procedures applied for the records. One copy of the records shall be transmitted to the entrepreneur or other owner of the water supply. The health office shall retain the record for a period of ten years.

(5) In the case of water supplies pursuant to section 3 no. 2 letters a and b, the surveillance measures pursuant to para 1 shall be carried out at least once a year; if surveillance has not given ground for major complaints throughout a period of four years, the health office may carry out surveillance at longer intervals, but at least once every three years. The surveillance frequency for water supplies pursuant to section 3 no. 2 letter c shall be specified by the health office. The intervals between the surveillance episodes may not exceed three years. Water supplies pursuant to section 3 no. 2 letter d that are operated within the framework of a commercial or public activity shall be surveilled at least once every three years. In the case of water supplies on board landcraft, watercraft and aircraft that are not operated within the framework of a commercial or public activity, the health office shall determine whether and at what intervals it will perform these measures. Water transport vehicles shall be surveilled at least four times a year.

(6) No advance notice may be given of the surveillance measures.

(7) For water supplies pursuant to section 3 no. 2 letter e from which drinking water is supplied within the framework of a public activity, for water supplies pursuant to letter d from which drinking water is made available within the framework of a commercial or public activity, as well as for water supplies pursuant to letter f, the health office shall analyse or have analysed at least those parameters that are likely to undergo adverse changes inside the drinking water installation, within the framework of surveillance. For implementation purposes, the health office shall establish a surveillance programme based on suitable random checks.

(8) The scope of the surveillance of radioactive substances shall be that stipulated in section 20a.

Section 20

Orders of the health office

(1) If necessary in light of the circumstances of the individual case, for the protection of human health or for ensuring the impeccable drinking water quality, the health office can order the entrepreneur and other owner of a water supply to

1. take the samples or have them taken by a specific analytical laboratory at specific sampling points according to specific technical implementation requirements and at certain times,
2. perform immediately specific analyses according to a specific method of analysis and outside the regular analyses or have them performed immediately,
3. to perform the analyses pursuant to section 14 or have them performed

a) at intervals shorter than those mentioned in this provision

b) on a greater number of samples

4. to perform analyses or have them performed to ascertain,

   a) whether micro-organisms other than those tested for according to Annex 1 are contained in the drinking water at concentrations

   b) whether parameters other than those tested for according to Annexes 2 and 3 are contained in the drinking water at concentrations

   that are a potential hazard to human health,

5. take measures that are necessary to eliminate a contamination that is indicated by limit values in excess of those set pursuant to section 5 para 2 and section 6 para 2 in conjunction with Annexes 1 and 2, or by non-compliance with the limit values and requirements set pursuant to section 7 in conjunction with Annex 3 and section 11 para 1 sentence 1 or by another circumstance, or to prevent future contaminations.

(2) If drinking water is supplied from a water supply pursuant to section 3 no. 2 letter a or letter b to another water supply pursuant to letter a or letter b, the health office can regulate which entrepreneur and other owner has to perform the analyses pursuant to section 14 or have them performed.

(3) Orders issued by the competent authority in respect of radioactive substances shall be subject to section 20a.

Section 20a

Surveillance of radioactive substances by the competent authority

(1) The competent authority shall monitor the water supplies pursuant to section 3 no. 2 letter a and, if analysis for parametric values of radioactive substances has been ordered, pursuant to section 3 No. 2 letter b, for compliance with the obligations to notify and act in respect of radioactive substances in drinking water by means of corresponding analyses. Water supplies pursuant to section 3 No. 2 letter c may be included in the surveillance and the competent authority can order corrective measures if it deems them necessary to protect human health. Section 18 paras 2 to 4 shall apply *mutatis mutandis*.

(2) Surveillance pursuant to para 1 shall include inspections of the water supplies as well as the taking and analysis of water samples. Section 19 paras 3 and 4 shall apply *mutatis mutandis*. The competent authority shall determine the surveillance frequency. The competent authority can limit its surveillance efforts to verifying the results of the analyses the entrepreneur or other owner of a water supply must carry out according to section 14a

(3) If necessary in light of the circumstances of the individual case for the protection of human health, the health office can order the entrepreneur and other owner of a water supply to

1. take the samples or have them taken by a specific analytical laboratory at specific sampling points according to specific technical implementation requirements at specific times

2. perform immediately specific analyses according to a specific method of analysis and outside the regular analyses or have them performed immediately,

3. perform the analyses pursuant to section 14a

   a) at intervals shorter than those mentioned in this provision
   b) on a greater number of samples

or have them performed accordingly.

(4) If a water supply pursuant to section 3 No. 2 letter a or letter b supplies drinking water to another water supply pursuant to section 3 No.2 letter a or letter b, the competent authority may decide which entrepreneur and other owner of a water supply shall perform the analyses pursuant to section 14a or have them performed.

(5) Surveillance for radioactive substances by the competent authority can be waived if the latter has determined pursuant to section 14a para 4 sentence 1 that radioactive substances are not present in the water supply zone at concentrations likely to exceed the parametric values for radioactive substances.

Section 21

Information of consumers and obligations to report

(1) The entrepreneur and other owner of a water supply pursuant to section 3 no. 2 letter a or letter b and, where the supply is operated within the framework of a commercial or public activity, pursuant to letter d or letter e, have to inform the consumers affected at least once a year by means of suitable and current information material about the quality of the drinking water provided to them on the basis of the analysis results pursuant to section 14, 14a and, where applicable, pursuant to section 19 para 7 and section 20. This includes particulars about the treatment agents used in treatment and distribution as well as particulars that are necessary for the selection of appropriate materials for the drinking water installation according to the generally recognised codes of practice. From 1 December 2013 the entrepreneur and the other owner of a water supply pursuant to section 3 no. 2 letters a and b or, where the supply is operated within the framework of a commercial or public activity, pursuant to letter e, shall inform the consumers affected if pipes made from lead exist in the supply operated by them, as soon as this fact comes to their knowledge. The entrepreneur and the other owner of a water supply pursuant to section 3 no. 2 letter f and, where the installation is operated within the framework of a commercial or public activity, pursuant to letters d and e, have to make all consumers affected aware of the information received by them pursuant to sentence 1 in writing or by posting a notice to that effect.

(2) If the parametric values for radioactive substances stipulated in section 7a are being exceeded and regulatory measures imposed to address a human health risk, the entrepreneur and other owner of a water supply pursuant to section 3 No. 2 letter a or letter b are obliged to inform the consumers affected about this situation and possible precautions, as appropriate, as soon as they become aware of it. If the competent authority of a water supply zone has reasonable grounds to assume that the persons who supply themselves from a water supply pursuant to section 3 No. 2 letter c might be exposed to a human health risk from a radiation protection point of view, it shall inform the entrepreneurs or other owners of this water supply about the potential risk and the precautionary measures to be taken, if necessary.

(3) The health office shall transmit, by 15 March for the past calendar year, to the competent highest Land authority or the agency designated by it the data on drinking water quality with due attention to section 19 for water supply zones supplying at least 10 cubic metres of drinking water or serving at least 50 persons per day. The competent highest Land authority can stipulate that the data be transmitted on data carriers or by another electronic means and that the data transmitted be compatible with the interface stipulated by it. The competent highest Land authority or a body notified by it shall transmit its report to the Federal Ministry of Health or an agency designated by it by 15 April of the same year. The report shall be made in the format specified by the European Commission pursuant to Article 13 paragraph 4 of Directive 98/83/EC on the quality of water intended for human consumption (OJ L 330/32 of 5.12.98) and with the minimum information detailed there in the form communicated by the Federal Ministry of Health after participation of the Laender. Any further

format requirements made by the Federal Ministry of Health, particularly governing uniform EDP procedures, shall be subject to the approval of the *Bundesrat*.

6. Chapter Six

Special Provisions

Section 22

Enforcement within the sphere of responsibility of the *Bundeswehr*

Within the sphere of responsibility of the *Bundeswehr* Federal Armed Forces and in the sphere of responsibility of the troops stationed in the Federal Republic of Germany on the strength of treaties under international law, the enforcement of this Ordinance shall be incumbent on the competent agencies of the *Bundeswehr*.

Section 23

Enforcement within the sphere of responsibility of the German Federal Railways

Within the sphere of responsibility of the German Federal Railways, the enforcement of this Ordinance with respect to water supplies in rolling stock as well as fixed installations used exclusively for supplying water to rolling stock shall be incumbent on the Federal Railway Authority. Within its sphere of responsibility, it shall exercise the powers and perform the duties of health office, competent authority and competent highest Land authority except the task pursuant to section 15 para 4. Within its sphere of responsibility it shall also be competent administrative authority pursuant to section 36 para 1 no. 1 of the Regulatory Offences Act (*Gesetz über Ordnungswidrigkeiten*).

7. Chapter Seven

CRIMINAL OFFENCES AND ADMINISTRATIVE OFFENCES

Section 24

Criminal offences

(1) Any person who, as an entrepreneur or other owner of a water supply pursuant to section 3 no. 2 letter a, b or, if supply takes place within the framework of a commercial or public activity, a water supply pursuant to letter d or letter e, or a water supply pursuant to letter f, wilfully or by negligence supplies water as drinking water or makes it available as such to others contrary to section 4 para 2 or section 11 para 7 sentence 2, shall be punished according to section 75 paras 2 and 4 of the Protection against Infection Act.

(2) Any person who, through any wilful action referred to in section 25, spreads a disease mentioned in section 6 para 1 no. 1 of the Protection against Infection Act or a pathogen mentioned in section 7 of the Protection against Infection Act, shall be liable to prosecution pursuant to section 74 of the Protection against Infection Act.

Section 25

Administrative offences

An administrative offence within the meaning of section 73 para 1 no. 24 of the Protection against Infection Act shall be deemed to be committed by anyone who wilfully or by negligence

1. contrary to section 5 para 5 sentence 2 does not have available a sufficient disinfection capacity,

2. contravenes an enforceable order pursuant to section 9 para 1 sentence 4, also in conjunction with para 5a, sentence 3, pursuant to section 9 para 4 sentence 1, para 5a sentence 2 or para 7 sentence 1 no. 1, section 20 para 1 or 20a para 3

3. contrary to section 13 para 1, also in conjunction with para 4 sentence 2, contrary to section 13 para 4 sentence 1 or section 16 para 1 sentences 1, 2 or sentence 3, fails to make a notification or fails to do so correctly, in full or in time,

4. contrary to section 14 para 1 or para 3 sentence 1 or 14a para 1 fails to perform an analysis or fails to perform it properly, in full or in the manner prescribed and fails to have it performed at all, properly, in full or in the manner prescribed,

4a. contravenes an enforceable order pursuant to section 14 para 2 sentence 4 or sentence 7,

5. contrary to section 15 para 3 sentence 1 fails to record the analysis result or fails to do so correctly, in full, in the manner prescribed or in time,

6. contrary to section 15 para 3 sentence 4 or sentence 5 fails to submit a copy or fails to do so in time or fails to retain the original or a copy mentioned there or fails to retain it for not less than ten years,

7. contravenes section 15 para 4 sentence 1, by performing an analysis,

8. contrary to section 16 para 2 sentence 1 fails to perform an analysis or an immediate remedial measure or fails to do so in time and fails to have it performed or fails to have it performed in time,

8a. contrary to section 16 para 3 fails to inform the health office or fails to do so properly, in full or in time,

9. contrary to section 16 para 4 sentence 1 or sentence 3 fails to draw up a record or fails to do so properly, in full, in the manner prescribed or in time or fails keep it available or fails to keep it available for not less than six months,

10. contrary to section 16 para 4 sentence 4 fails to make public a treatment agent or its concentration in the drinking water or fails to do so properly, in full, in the manner prescribed or in time,

11. contrary to section 16 para 5 sentence 1 fails to draw up an action plan or fails to do so properly, in full or in time,

11a. contrary to section 16 para 7 sentence 1 no 1 fails to perform a test mentioned there or fails to do so in time and fails to have it performed at all or in time

11b. contrary to section 16 para 7 sentence 1 no. 2 fails to draw up a risk analysis or fails to do so in time or fails to have it drawn up at all or in time,

11c. contrary to section 16 para 7 sentence 1 no 3 fails to perform a measure mentioned there or fails to do so in time and fails to have it performed at all or in time

11d. contrary to section 16 para 7 sentence 2 fails to inform the health office immediately about the measures taken,

11e. contrary to section 16 para 7 sentence 3 fails to keep records referred to there or fails to have them kept,

11f. contrary to section 16 para 7 sentence 4 fails to retain records referred to there or fails to retain them for at least ten years or fails to submit them at all or in time,

11g. contrary to section 16 para 7 sentence 6 fails to inform a consumer or fails to do so properly, in full or in time,

11h. contrary to section 17 para 1 fails to plan, construct or operate a facility properly,

11i. contrary to section 17 para 2 sentence 2 fails to ensure that only materials pursuant to section 17 para 2 sentence 1 no 2 or no 3 are used,

12. contrary to section 17 para 6 sentence 1 connects a water supply to a water-bearing part mentioned there,

13. contrary to section 17 para 6 sentence 2 or sentence 3 fails to mark a pipe or tap or fails to do so properly or in time and fails to have it marked at all, properly or in time,

14. contrary to section 18 para 3 fails to support a person or fails to furnish a piece of information or fails do so properly, in full or in time,

15. contrary to section 21 para 1 sentence 1 fails to submit information material or fails to do so properly, in full or in time,

16. contrary to section 21 para 1 sentence 3 or para 2 fails to inform a consumer or fails to do so properly, in full or in time or ,

17. contrary to section 21 para 1 sentence 4 fails to make a piece of information public or fails to do so properly, in full or in time.

Annex 1
(to section 5 paras 2 and 3)

Microbiological parameters

Part I:
General requirements for drinking water

Serial No.	Parameter	Limit value*) 100ml)
1	*Escherichia coli (E. coli)*	0/100ml
2	*Enterococci*	0/100ml

*) The values stipulated factor in the measurement uncertainties involved in analysis and sampling methods.

Part II:
Requirements for drinking water intended for supply in closed containers

Serial No.	Parameter	Limit value*)
1	*Escherichia coli (E.coli)*	0/250 ml)
2	*Enterococci*	0/250 ml
3	*Pseudomonas aeruginosa*	0/250 ml

*) The values stipulated factor in the measurement uncertainties involved in analysis and sampling methods.

Annex 2
(to section 6 para 2)

Chemical Parameters

Part I:
Chemical parameters whose concentration does not usually increase in the distribution network including the drinking water installation

Serial No.	Parameter	Limit Value*) mg/l	Comments
1	Acrylamide	0.00010	The limit value refers to the residual monomer concentration in drinking water as calculated from the maximum release according to specifications of the corresponding polymer and the polymer dose used. Evidence of compliance with the limit value can only be furnished through drinking water analysis. The requirements of section 11 remain unaffected.
2	Benzene	0.0010	
3	Boron	1.0	
4	Bromate	0.010	
5	Chromium	0.050	
6	Cyanide	0.050	
7	1,2—dichloro-ethane	0.0030	
8	Fluoride	1.50	
9	Nitrate	50	The sum of nitrate concentrations in mg/l divided by 50 and nitrite concentration in mg/l divided by 3 may not exceed 1 mg/l.
10	Pesticide active ingredients and biocide active ingredients	0.00010	Pesticide active ingredients and biocide active ingredients means: organic insecticides, organic herbicides, organic fungicides, organic nematicides, organic acaricides, organic algicides, organic rodenticides, organic antimucosals, related products (i.a. growth regulators) and the relevant metabolites, degradation and reaction products. Only pesticide active ingredients and biocide active ingredients that are likely to be present in a given water catchment area need be monitored. The limit value applies to each pesticide active ingredient and biocide active ingredient. In the case of aldrine, dieldrin, heptachlor and heptachlor epoxide, the limit value is 0.000030 mg/l.
11	Total pesticide active ingredients and biocide active ingredients	0.00050	The parameter indicates the sum of the individual pesticide active ingredients and biocide active ingredients detected and quantified in the monitoring procedure. See note 1
12	Mercury	0.0010	
13	Selenium	0.010	
14	Tetrachloroethene and trichloroethene	0.010	Sum of the detected and quantified concentrations of individual substances. See note 1
15	Uranium	0.010	

*) The values stipulated factor in the measurement uncertainties involved in analysis and sampling methods.

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Part II:
Chemical parameters whose concentrations in the distribution network including the drinking water installation can increase

Serial No.	Parameter	Limit Value*) mg/l	Comments
1	Antimony	0.0050	
2	Arsenic	0.010	
3	Benzo(a)pyrene	0.000010	

4	Lead	0.010	Basis is a representative sample of consumers' average weekly drinking water intake. The competent authorities ensure that all appropriate measures are taken to reduce the concentration of lead in drinking water as much as possible. Measures to achieve compliance with this value progressively give priority where lead concentration in drinking water is highest
5	Cadmium	0.0030	Inclusive of the cadmium compounds absorbed by water stagnating in pipes
6	Epichlorohydrin	0.00010	The limit value refers to the residual monomer concentration in water, calculated from the maximum release according to the specifications of the corresponding polymers and the polymer dose used. Proof of compliance with the limit value can also be furnished by drinking water analysis
7	Copper	2.0	Basis is a representative sample of consumers' average weekly drinking water intake. Analysis within the framework of surveillance pursuant to section 19 para 7 can usually be dispensed with if the pH value in the supply zone is greater than or equal to 7.8
8	Nickel	0.020	Basis is a representative sample of consumers' average weekly drinking water intake.
9	Nitrite	0.50	The sum of nitrate concentration in mg/l divided by 50 and nitrate concentration in mg/l divided by 3 may not exceed 1. The value of 0.10 mg/l for nitrite may not be exceeded at the exit of the waterworks
10	Polycyclic aromatic hydrocarbons	0.00010	Sum of the following detected and quantified substances: benzo(b)fluoroanthene, benzo(k)fluoroanthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene (Note 1)
11	Trihalomethanes	0.050	Sum of the reaction products in drinking water that result from water disinfection or oxidation detected and quantified at the consumer's tap: tricholoromethane (chloroform), bromodichloromethane, dibromochloromethane and tribromomethane (bromoform); analysis in the supply network is not necessary, if a value of 0.01 mg/l is not exceeded at the exit of the waterworks. The health office can temporarily allow higher concentrations at the tap in the drinking water installation up to 0.1 mg/l if this is necessary due to disinfection measures for infection control reasons (Note 1)
12	Vinyl chloride	0.00050	The limit value refers to the residual monomer concentration in drinking water as calculated from the maximum release according to specifications of the corresponding polymer and the polymer dose used. Proof of compliance with the limit value can also be furnished by drinking water analysis

*) The values stipulated factor in the measurement uncertainties involved in analysis and sampling methods.

Note 1: Prerequisite for calculating totals is at least the attainment of the limit of determination specified by the analytical method for each compound.

Annex 3
(to section 7 and section 14 para 3)

Indicator Parameters Part I
General Indicator Parameters

Serial No.	Parameter	Unit, as	Limit value/ Requirement*)	Comments
1	Aluminium	mg/l	0.200	
2	Ammonium	mg/l	0.50	The cause of any sudden or continuous increase in the usual concentration must be investigated
3	Chloride	mg/l	250	The water should not be aggressive (note 1)
4	Clostridium perfringens (incl. spores)	number/ 100 ml	0	This parameter need not be measured unless the water originates from or is affected by surface water. In the event of non-compliance with this limit value, the competent authority arranges for investigations into the supply system to ensure that there is no danger to human health due to the appearance of pathogenic microorganisms, e.g. Cryptosporidium. The competent authority informs the Federal Ministry of Health via the competent highest Land authority about the result of these investigations.
5	Coliform bacteria	number/100 ml		The limit value for drinking water intended for supply in closed containers is 0/250 ml
6	Iron	mg/l	0.200	
7	Colour (spectral absorption coefficient Hg 436 nm)	m^{-1}	0.5	Determination of the spectral absorption coefficient with spectral photometer or filter photometer.
8	Odour threshold (as TON)		3 at 25 °C	Alternatively, a qualitative analysis (odour pursuant to Directive 98/83/EC) can be carried out during check monitoring in an effort to attest an odour acceptable to the consumer and to rule out abnormal changes. The analysis method pursuant to DIN EN 1622 shall be applied.
9	Taste		acceptable to consumers and no abnormal change	If microbial contamination is suspected, taste sampling can be dispensed with.
10	Colony count at 22 °C		no abnormal change	When using the analysis method pursuant to Annex 5 Part I (d) (bb), the following limit values apply: 100/ml at the consumer's tap; 20/ml immediately on completion of treatment in the disinfected drinking water; 1000/ml in water supplies pursuant to section 3 no. 2 (c) as well as in water containers of facilities pursuant to letter d. The entrepreneur or other owner of a water supply shall, irrespective of the procedure used, immediately report any sudden or continuous increase to the competent authority. The analysis method pursuant to Annex 5 Part I (d)(bb) may not be used for drinking water intended for supply in closed containers. In the case of drinking water intended for supply in closed containers the limit is 100/ml.
11	Colony count at 36°C		no abnormal change	When using the analysis method pursuant to Annex 5 Part I (d) (bb), the limit value is 100/ml. The entrepreneur or other owner of a water supply shall, irrespective of the method used, immediately report any sudden or continuous increase to the competent authority. The analysis method pursuant to Annex 5 Part I (d)(bb) may not be used for drinking water intended for supply in closed containers. In the case of drinking water intended for supply in closed containers the limit is 20/ml.
12	Conductivity	µS/cm	2 790 at 25°C	The drinking water should not be aggressive (notes 1 and 2)
13	Manganese	mg/l	0.050	

14	Sodium	mg/l	200	
15	Total organic carbon (TOC)		no abnormal change	
16	Oxidisability	mg/l O_2	5.0	This parameter need not be measured if the parameter TOC is analysed
17	Sulphate	mg/l	250	The drinking water should not be aggressive (note 1)
18	Turbidity	nephelometric turbidity units (NTU)	1.0	The limit is considered met if the limit is not exceeded ex water treatment works. The entrepreneur or any other owner of a water supply pursuant to section 3(2)(a) or (b) have to report any sudden or continuous increase immediately to the competent authority. The latter also applies to the distribution network
19	Hydrogen ion concentration	pH units	≥ 6.5 and ≤ 9.5	The drinking water should not be aggressive (note 1). For drinking water intended to be filled into closable containers, the minimum value can be lowered to 4.5 pH units. The minimum value can be lower if this drinking water naturally contains carbon dioxide.
20	Calcite dissolution capacity	mg/l $CaCO_3$	5	The requirement applies to water supplies pursuant to section 3 no. 2 letters a and b. This requirement is considered to be met if the pH value at the exit of the water works is ≥ 7.7. Downstream of the blending point of drinking water from two or more water works the calcite dissolution capacity in the distribution network may not exceed the value of 10 mg/l. For water supplies pursuant to section 3 no. 2 letter c it is recommended that this requirement be complied with unless other measures to address drinking water corrosiveness towards materials are taken. Calculation method 3 set out in DIN 38404-10 shall be applied

*) *) The values stipulated factor in the measurement uncertainties involved in analysis and sampling methods.

Note 1: The corresponding evaluation, particularly on the selection of appropriate materials within the meaning of section 17, shall take place according to the generally recognised codes of practice.

Note 2: Measuring at other temperatures is permitted; in this case, EN 27888 must be taken into account

Part II
Special indicator parameter for drinking water installations

Parameter	Technical action value
Legionella spec.	100/100ml

Annex 3a

(re sections 7a, 9, 14a)

Requirements for drinking water in respect of radioactive substances

Part I
Parametric values for radon-222, tritium and indicative dose

Serial No.	Parameter	Parametric value	Unit
1	Radon-222	100	Bq/l
2	Tritium	100	Bq/l
3	Indicative dose	0.10	mSv/a

Part II

Calculation of the indicative dose

The indicative dose shall be calculated based on the measured radionuclide concentrations and the dose coefficients published in *Bundesanzeiger* Nos. 160a and b of 28 August 2001 *Teil* II, and assuming an annual intake of 730 litres of drinking water, by multiplying these three factors. In the process, the radionuclides included in the table below must be consistently tested for. The activity concentrations of potassium-40, tritium and radon-222 as well as short-lived radon decay products need not be accounted for. Where information suggests that other radionuclides might be present in the drinking water at doses that may cause the indicative dose to be exceeded, these shall be tested for, as well.

Instead of an indicative dose calculation, the competent authority can consider it as proxy evidence that the parametric value for the indicative dose is not being exceeded, if the sum of the ratios of the measured radionuclide concentrations [$Ci_{(mess)}$] and the reference activity concentrations [$Ci_{(ref)}$]listed in the table is smaller than or equal to 1.

$$\sum_{i=1}^{n} \frac{Ci\,(\mathrm{mess})}{Ci(\mathrm{ref})} \leq 1$$

Where:

[$Ci_{(mess)}$] = measured activity concentration of the radionuclide *i*

[$Ci_{(ref)}$] = reference activity concentration of the radionuclide *i*

n = number of radionuclides detected

Reference activity concentrations of radioactive substances in drinking water

Serial No.	Radionuclide	Reference activity concentration (Note 1)
Radionuclides of natural origin		
1	U-238	3.0 Bq/l
2	U-234	2.8 Bq/l
3	Ra-226	0.5 Bq/l
4	Ra-228	0.2 Bq/l
5	Pb-210	0.2 Bq/l
6	Po-210	0.1 Bq/l
Radionuclides of artificial origin		
7	C-14	240 Bq/l
8	Sr-90	4.9 Bq/l
9	Pu-239/Pu-240	0.6 Bq/l
10	Am-241	0.7 Bq/l
11	Co-60	40 Bq/l
12	Cs-134	7.2 Bq/l
13	Cs-137	11 Bq/l
14	I-131	6.2 Bq/l

Note 1: This table includes the reference activity concentrations calculated for the most common natural and artificial radionuclides. The values are precise calculations referring to a dose of 0.1°mSv based on the above-mentioned foundations and assumptions. The reference activity concentrations for other radionuclides can be similarly calculated.

Part III

Conduct, scope and frequency of analysis

1. Analysis concept

To comply with the analysis requirement pursuant to section 14a para 1, analyses are necessary unless the competent authority has made a determination pursuant to section 14a para 4.

The concept distinguishes between initial analysis and regular analyses.

a) Initial analysis

The initial analysis serves to identify and assess the activity concentrations present over an annual average and comprises four analyses of activity concentrations at four different quarters within a 12-month period.

If, after the initial analysis has been carried out, material changes to water abstraction or water treatment occur that are likely to adversely affect the level of radionuclides, analyses shall be repeated as though they were initial analyses.

Initial analysis is not necessary if the competent authority has made a determination pursuant to section 14a para 4 sentence 2 No. 1.

b) Regular analyses

Regular drinking water analyses are necessary if the initial analysis revealed exceedances of one or more parametric values for radioactive substances. The minimum frequencies shall be those set forth in the Table.

Regular analyses are not necessary if the competent authority has made a determination pursuant to section 14a para 4 sentence 2 No. 2.

If the competent authority orders treatment measures to reduce the level of radionuclides in drinking water as stipulated in section 9 para 5a, regular analyses shall be conducted to verify long-term treatment effectiveness.

In the case of naturally occurring radionuclides that have a stable activity concentration borne out by previous data, the competent authority may, depending on the local circumstances, stipulate lower analysis frequencies and adjust the scope of analysis.

Minimum analysis frequency

Serial No.	**Volume of water distributed or produced each day within a supply zone in cubic metres per day** (Note 1)	**Number of analyses per year** (Note 2)
1	volume ≤ 1 000	1
2	1 000 < volume ≤ 10 000	1 Plus 1 each per 3300 cubic metres per day in excess of 10000 cubic metres per day (remaining amounts are rounded upwards to 3300 cubic metres)
3	10 000 < volume ≤ 100 000	3 Plus 1 each per 10000 cubic metres per day in excess of 10000 cubic metres per day (remaining amounts are rounded upwards to 10000 cubic metres)
4	volume > 100 000	10 Plus 1 each per 25000 cubic metres per day in excess of 100000 cubic metres per day (remaining amounts are rounded upwards to 25000 cubic metres)

Note 1: The volumes are calculated as averages over a calendar year. As a proxy for the volume of water supplied or produced, the competent authority may also use the population size of a supply zone to determine the minimum frequency, assuming a daily *per capita water* consumption of 200 litres.

Note 2: If possible, sampling should be evenly distributed across time and geography.

2. Analysis conditions, scope of analysis and parameter evaluation

a) Radon-222

An initial analysis for radon-222 shall be carried out to identify the scale of a possible exposure to radon in drinking water.

Compliance with the parametric value for radon-222 shall be assumed if the average activity concentration of radon measured over four different quarters does not exceed this value.

b) Tritium

An analysis for tritium is not necessary unless the competent authority has reasonable grounds to assume that the parametric value for radioactive substances stipulated in Annex 3a Part II might be exceeded. In this case, the competent authority may order such an analysis.

Whenever the parametric value for tritium is found to be exceeded, the drinking water must be tested for other artificial radionuclides, since tritium is considered to be an indicator nuclide for the presence of artificial radioactive substances.

c) Indicative dose

An analysis for artificial radionuclides is usually not necessary unless the competent authority orders such an analysis.

Various methods may be used to carry out an initial analysis for the indicative dose of natural radionuclides: screening, including the determination of the gross alpha activity concentration $C_{\text{alpha-ges}}$, and individual nuclide determination**.** If compliance with the parametric value for the indicative dose cannot be demonstrated through screening, the indicative dose must be assessed by determining the individual nuclides.

aa) Screening methods with a screening value for $C_{\text{alpha-ges}}$ ≤ 0.1 Becquerel per litre

The gross alpha activity concentrations and the activity concentrations of lead-210 and radium-228 shall be determined, calculated as an average over four different quarters.

Compliance with the parametric value for the indicative dose shall be assessed in line with Part II. The screening value for the gross alpha activity concentration shall be 0.1 Becquerel per litre:

$$\frac{\mathrm{C}\ alpha - \text{-ges}\ \ (\mathrm{mess})}{0.1\ \mathrm{Bq/l}} + \frac{\mathrm{C\ Ra} - 228\ (\mathrm{mess})}{0.2\ \mathrm{Bq/l}} + \frac{\mathrm{C\ Pb} - 210\ (\mathrm{mess})}{0.2\ \mathrm{Bq/l}} \leq 1$$

bb) Screening method with a screening value for *C*alpha ges ≤ 0.05 Becquerel per litre

Compliance with the parametric value for the indicative dose shall also be assumed without further nuclide-specific testing, if the gross alpha activity concentration is equal to or less than 0.05 Becquerel per litre.

If the competent authority has ordered testing for artificial radionuclides, a screening value of 1.0 Becquerel per litre shall be used for assessing the residual beta activity concentration $C_{\text{beta-rest}}$:

$C_{\text{beta-rest}}$ ≤ 1.0 Becquerel per litre*)

*) Residual beta activity concentration = gross beta activity concentration minus the potassium-40 activity concentration

The gross alpha and gross beta activity concentrations need not be determined if the individual nuclides are determined directly.

cc) Individual nuclide determination

The activity concentrations of the individual nuclides shall be determined. Compliance with the parametric value for the indicative dose shall be assessed in line with Part II.

3. Analysis methods and performance characteristics

The sampling and analysis methods to establish the parametric values for radioactive substances shall be in line with the generally recognised codes of practice.

The analysis methods used must be at least able to measure the activity concentrations with the following performance characteristics.

Performance characteristics

Serial No.	Parameters, gross activity concentrations and radionuclides	Limit of detection (Notes 1 and 2)
1	Tritium	10 Bq/l
2	Radon-222	10 Bq/l
3	Gross alpha activity concentration Gross beta activity concentration	0.04 Bq/l (Note 3) 0.4 Bq/l
4	U-238	0.02 Bq/l
5	U-234	0.02 Bq/l
6	Ra-226	0.04 Bq/l
7	Ra-228	0.02 Bq/l (Note 4)
8	Pb-210	0.02 Bq/l
9	Po-210	0.01 Bq/l
10	C-14	20 Bq/l
11	Sr-90	0.4 Bq/l
12	Pu-239/Pu-240	0.04 Bq/l
13	Am-241	0.06 Bq/l
14	Co-60	0.5 Bq/l
15	Cs-134	0.5 Bq/l
16	Cs-137	0.5 Bq/l
17	I-131	0.5 Bq/l

Note 1: The limit of detection shall be calculated according to the ISO standard 11929: Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionising radiation — Fundamentals and application (ISO 11929:2010), with probabilities of errors of 1st and 2nd kind of 0.05 each.

Note 2: Measurement uncertainties shall be calculated and documented. Additionally, the confidence interval may be given, stipulating a probability 1 – y of 95 per cent.

Note 3: This limit of detection only applies where a screening value of 0.1 Becquerel per litre is used regarding the activity concentrations of lead-210 and radium-228. If the screening value is 0.05 Becquerel per litre without further nuclide-specific testing and if only natural radionuclides need to be considered, the limit of detection shall be 0.025 Becquerel per litre.

Note 4: This limit of detection only applies to the initial analysis to establish an indicative dose for a new water resource. If the initial analysis indicates that radium-228 is unlikely to exceed 20 per cent of the derived concentration, an analysis method with a limit of detection of up to 0.08 Becquerel per litre for radium-228 may be used for regular analyses.

Annex 4
(to sections 14 and 19)

Scope and frequency of monitoring

Part I
SCOPE OF MONITORING

a) Check monitoring

The following parameters are the subject of check monitoring, whereby individual analyses can be dispensed with for parameters where measurements are continuously read and recorded:

Aluminium (note 1)
Ammonium
Clostridium perfringens (incl. spores) (note 2)
Coliform bacteria
Iron (note 1)
Conductivity
Escherichia coli (E. coli)
Colour
Odour
Taste
Colony count at 22°C and 36°C
Pseudomonas aeruginosa (note 3)
Turbidity
Hydrogen ion concentration

In the case of water supplies pursuant to section 3 no 2 letter a the health office may reduce the number of analyses for parameters that are subject to check monitoring if

1. the analysis results of the monitoring carried out over at least two consecutive years are constant and substantially better than the limit values and requirements stipulated in Annexes 1 to 3 and
2. it assumes that no circumstances that are likely to adversely affect drinking water quality are to be expected.

The minimum quantity of analyses may not be less than half the number specified in Annex 4 part II.

Note 1: Only necessary when the substance is added according to section 11. In all other cases, the parameters are included in the list for audit monitoring
Note 2: Only necessary if the water originates from surface water or is affected by surface water
Note 4: Only necessary for drinking water intended for supply in closed containers

b) Audit monitoring

All parameters specified in annexes 1 to 3 that are not listed under the check monitoring, or do not have to be tested for as part of check monitoring, are the subject of audit monitoring. This does not apply if the check monitoring in respect of a specific parameter is restricted to a certain situation, such as the filling of drinking water into containers or microbiological analysis in certain parts of the drinking water installation, or if the competent authorities determine that for a period to be specified by the latter, a parameter is not likely to be present in a certain water supply zone at concentrations that might jeopardize compliance with the relevant limit value.

Part II
FREQUENCY OF ANALYSIS

a) Minimum frequency of drinking water analyses in a supply zone

<table>
<tr><th>Volume of water distributed or produced each day within a supply zone in cubic metres per day (Note 1)</th><th>Check monitoring

Number of analyses per year (Note 2)</th><th>Audit monitoring

Number of analyses per year</th></tr>
<tr><td>≤ 10</td><td>1</td><td>1</td></tr>
<tr><td>>10 to ≤ 1 000</td><td>4</td><td>1</td></tr>
<tr><td>>1 000 to ≤ 10 000</td><td rowspan="3">4
plus 3 each per every additional 1 000 cubic metres per day in excess of 1 000 cubic metres per day (remaining amounts are rounded upwards to 1 000 cubic metres)</td><td>1
plus 1 each per 3 300 cubic metres per day (remaining amounts are rounded upwards to 3 300 cubic metres)</td></tr>
<tr><td rowspan="2">>10 000 to ≤ 100 000</td><td rowspan="2">3
plus 1 each per 10 000 cubic metres per day (remaining amounts are rounded upwards to 10 000 cubic metres)</td></tr>
<tr><td rowspan="2">>100 000</td></tr>
<tr><td>10
plus 1 each per 25 000 cubic metres per day (remaining amounts are rounded upwards to 25 000 cubic metres)</td></tr>
</table>

Note 1: The volumes are calculated as averages taken over a calendar year.
Note 2: In the event of intermittent short-term supply by water transport vehicles, the water supplied therein is analysed every 48 hours if the water container concerned has not been cleaned or refilled within this period.

b) Monitoring of drinking water installations pursuant to section 14 para 3

The parameter Legionella spec. must be monitored at least once a year in line with the requirements of section 14 para 3. Water supplies pursuant to section 2 para 2(e), from which drinking water is supplied within the framework of a commercial but not public activity, must be monitored at intervals of not more than three years in line with the requirements of section 14 para 3. The first monitoring episode must be completed by 31 December 2013. For water supplies pursuant to section 3 no. 2 (d), the health office shall specify the frequency.

If the annual monitoring for Legionella spec. has not given rise to any objection in three consecutive years, the health office can stipulate longer monitoring intervals of up to three years provided that the supply installation and mode of operation have not been modified and are demonstrably in line with the generally recognised codes of practice. This extension of monitoring intervals is not possible in areas with patients who have an elevated risk of nosocomial infections (such as hospitals, prevention and rehabilitation facilities, outpatient surgery facilities, dialysis facilities, maternity facilities).

The number and specification of the representative sampling points pursuant to section 14 para 3 sentence 1 shall follow the generally recognised codes of practice. Sampling shall be done as specified in “Purpose b“ of DIN EN ISO 19458. The quantity of water flushed prior to filling the sampling container may not exceed three litres.

III. MINIMUM ANALYSIS FREQUENCY OF DRINKING WATER INTENDED FOR SUPPLY IN CLOSED CONTAINERS

Volume of drinking water intended to be supplied in closed containers, in cubic metres per day (Note 1)	Routine analyses Number of analyses per year	Comprehensive analyses Number of analyses per year
≤ 10	1	1
> 10 to ≤60	12	1
> 60	1 for each 5 cubic metre (remaining amounts are rounded upwards to 5 cubic metres)	1 for each 100 cubic metres (remaining amounts are rounded upwards to 100 cubic metres)

Note 1: The volumes are calculated as averages taken over a calendar year.

Annex 5
(to section 15 paras 1,2 and 4)

Specifications for Parameter Analysis

Part I
Parameters for which methods of analysis are specified

The following principles for methods of microbiological analysis are given either for reference, whenever a CEN/ISO method is given or for guidance, pending the possible future adoption of further CEN/ISO international methods for these parameters.

a) Coliform bacteria and Escherichia coli (E.coli) DIN EN ISO 9308-1
b) Enterococci DIN EN ISO 7899-2
c) Pseudomonas aeruginosa DIN EN ISO 16266
d) Enumeration of culturable microorganisms - Colony count 22°C and 36°C:
aa) pursuant to DIN EN ISO 6222)
bb) Colony count is defined as the number of colonies visible at 6x to 8x magnification that form from the bacteria contained in 1 millilitre of the water to be tested in a pour plate culture with nutrient-rich, peptone substrate (1 % meat extract, 1 % peptone) at incubation temperatures of (20 ± 2) °C and (36 ± 1) °C after (44 ± 4) hours incubation time. Usable substrates differ mainly with regard to the solidifying agent, so that the following methods are possible:

aaa) Agar-gelatin-substrates, incubation temperatures (20 ± 2) °C and (36 ± 1) °C, incubation time (44 ± 4) hours or

bbb) Agar-substrates, incubation temperatures (20 ± 2) °C and (36 ± 1) °C, incubation time (44 ± 4) hours

e) Clostridium perfringens (including spores):
(membrane filtration followed by anaerobic incubation of the membrane on m-CP agar at (44 ± 1)°C for (21 ± 3) hours. Count opaque yellow colonies that turn pink or red after exposure to ammonium hydroxide vapours for 20 to 30 seconds.

The composition of m-CP agar is:

Basal medium	
Tryptose	30 g
Yeast extract	20 g
Sucrose	5 g
L-cysteine hydrochloride	1 g
$MgSO_4 \bullet 7H_2O$	0.1 g
Bromocresol purple	0.04 g
Agar	15 g
Water (Note 1)	1 000 ml

Dissolve the ingredients of the basal medium, adjust pH to 7.6. Autoclave at 121°C for 15 minutes. Allow the medium to cool and add:

D-cycloserine	0.04 g
Polymyxine-B sulphate	0.025 g
Indoxyl-β-D-glucoside	0.06 g

to be dissolved in 8 ml sterile water before addition

Filter-sterilised 0.5 % phenolphthalein diphosphate solution	20 ml
Filter-sterilised 4.5 % $FeCl_3 \bullet 6H_2O$	2 ml

f) Legionella: The testing for Legionella spec. must be carried out in line with ISO 11731

and DIN EN ISO 11731 Part 2 considering any relevant recommendations from the Federal Environmental Agency.

Note 1: Only distilled or deionised water may be used that is free from substances inhibiting bacterial growth under the testing conditions and that complies with DIN ISO 3696.

Part II
Parameters for which performance characteristics are specified

For the following parameters, the specified performance characteristics are that the method of analysis used must, as a minimum, be capable of measuring concentrations equal to the limit value with the trueness, precision and detection limit specified below. Whatever the sensitivity of analysis used, the result must be expressed using at least the same number of decimals as for the limit value in the Annexes 2 and 3.

Serial No.	Parameter	Trueness in % of the limit value (Note 1)	Precision in % of the limit value (Note 2)	Detection limit in % of the limit value (Note 3)	Comments
1	Acryl amide				To be controlled by product specification
2	Aluminium	10	10	10	
3	Ammonium	10	10	10	
4	Antimony	25	25	25	
5	Arsenic	10	10	10	
6	Benzo(a)pyrene	25	25	25	
7	Benzene	25	25	25	
8	Lead	10	10	10	
9	Boron	10	10	10	
10	Bromate	25	25	25	
11	Cadmium	10	10	10	
12	Chloride	10	10	10	
13	Chromium	10	10	10	
14	Cyanide	10	10	10	The method should determine total cyanide in all forms
15	1,2-dichloroethane	25	25	10	
16	Iron	10	10	10	
17	Conductivity	10	10	10	
18	Epichlorohydrin				To be controlled by product specification
19	Fluoride	10	10	10	
20	Copper	10	10	10	
21	Manganese	10	10	10	
22	Sodium	10	10	10	
23	Nickel	20	10	10	
24	Nitrate	10	10	10	
25	Nitrite	10	10	10	
26	Oxidisability	25	25	10	
27	Pesticides and biocidal agents	25	25	25	The performance characteristics apply to each pesticide active ingredient and biocide active ingredient and will depend on the agent concerned. The limit of detection may not be achievable for all pesticide active ingredients and biocide active ingredient, but Member States should strive to achieve this standard.

28	Polycyclic aromatic hydrocarbons	25	25	25	The performance characteristics apply to the individual compounds specified at 25% of the limit value in Annex 2
29	Mercury	20	10	10	
30	Selenium	10	10	10	
31	Sulphate	10	10	10	
32	Tetrachloroethene	25	25	10	The performance characteristics apply at 50% of the limit value in Annex 2
33	Trichloroethene	25	25	10	The performance characteristics apply at 50% of the limit value in Annex 2
34	Trihalomethanes	25	25	10	The performance characteristics apply to the individual compounds specified at 25% of the limit value in Annex 2
35	Uranium	10	10	10	
36	Vinyl chloride				To be controlled by product specification

For hydrogen ion concentration the specified performance characteristics are that the method of analysis used must be capable of measuring concentrations equal to the limit value with a trueness of 0.1 pH unit and a precision of 0.1 pH unit. For turbidity monitoring in treated surface water the specified performance characteristics are that the method of analysis used must, as a minimum, be capable of measuring turbidity values with a trueness, precision and limit of detection of 25% each.

Note 1: This term is defined in ISO 5725.
Note 2: Limit of detection is either
- three times the relative within-batch standard deviation of a natural sample containing a low concentration of the parameter or
- five times the relative within-batch standard deviation of a blank sample.

Part III

3. Parameters for which no performance characteristics are specified

Colour
Odour
Taste
Total organic carbon