

Safety Standards

of the

Nuclear Safety Standards Commission (KTA)

KTA 1504 (2022-11)

**Monitoring and Assessing the Discharge of
Radioactive Substances with Water**

(Überwachung der Ableitung radioaktiver Stoffe mit Wasser)

The previous versions of this safety standard were issued in
1978-06, 1994-06, 2007-11, 2015-11 and 2017-11

If there is any doubt regarding the information contained in this translation, the German wording shall apply.

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Monitoring and Assessing the Discharge of Radioactive Substances with Water

KTA 1504

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PLEASE NOTE: Only the original German version of this safety standard represents the joint resolution of the 35-member Nuclear Safety Standards Commission (Kerntechnischer Ausschuss, KTA). The German version was made public in the Federal Gazette (Bundesanzeiger) on July 25, 2023. Copies of the German versions of the KTA safety standards may be mail-ordered through the Wolters Kluwer Deutschland GmbH (info@wolterskluwer.de). Downloads of the English translations are available at the KTA website (<http://www.kta-gs.de>).

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Comments by the Editor:

Taking into account the meaning and usage of auxiliary verbs in the German language, in this translation the following agreements are effective:

shall	indicates a mandatory requirement,
shall basically	is used in the case of mandatory requirements to which specific exceptions (and only those!) are permitted. It is a requirement of the KTA that these exceptions - other than those in the case of shall normally - are specified in the text of the safety standard,
shall normally	indicates a requirement to which exceptions are allowed. However, exceptions used shall be substantiated during the licensing procedure,
should	indicates a recommendation or an example of good practice,
may	indicates an acceptable or permissible method within the scope of the present safety standard.

Basic Principles

(1) The safety standards of the Nuclear Safety Standards Commission (KTA) have the task of specifying those safety-related requirements which shall be met with regard to precautions to be taken in accordance with the state of science and technology against damage arising from the construction and operation of the plant (Sec. 7, para. (2), subpara. (3) Atomic Energy Act - AtG) in order to attain the protective goals specified in the AtG, the Radiation Protection Act (StrlSchG) and the Radiation Protection Ordinance (StrlSchV) as well as further detailed in the Safety Requirements for Nuclear Power Plants (SiAnf) and the Interpretations of the SiAnf.

(2) The permanently installed and mobile radiation protection instrumentation, among other objectives, serves to protect the persons inside and outside of the facility from ionizing radiation, and to ascertain the specified normal functioning of the equipment

- a) for keeping solid, liquid and gaseous radioactive substances within the intended enclosure,
- b) for the handling and controlled conduction of radioactive substances within the facility, and
- c) for monitoring and assessing the discharge of radioactive substances.

The safety standards in the KTA 1500 series specify concrete safety related requirements for this instrumentation.

(3) The present safety standard KTA 1504 details the requirements that apply to the technical equipment and the supplementary administrative measures considered necessary for the monitoring and assessment of the discharge of radioactive substances with water during specified normal operation and when design basis accidents occur.

(4) Monitoring and assessing the discharge of radioactive substances with water contributes to meeting the requirements of Sec. 8 StrlSchG, and Secs 99, 102 and 103 StrlSchV which specify that measures are taken such that

- a) any exposure or contamination of persons and the environment – taking due account of the state of science and technology and considering the conditions of each individual case – are kept as low as possible even below the values specified in StrlSchG (Sec. 8 para. (2)),
- b) any uncontrolled discharge of radioactive substances into the environment is prevented (Sec. 99 para. (4) of StrlSchV), and
- c) the discharge is monitored and assessed, and its type and quantity of activity is reported to the proper authority at least once a year (Sec. 103 para. (1) of StrlSchV). The associated monitoring and assessment assemblies are subject to the requirements of Sec. 90 of StrlSchV.

(5) The monitoring and assessment of the discharge of radioactive substances with water must fulfil the following tasks:

- a) the detailed assessment of the radioactive substances discharged with water as a basis for the evaluation of the radiological effects,
- b) the automatic initiation of alarm signals.

(6) The equipment of the licensee required for performing the tasks under para. (5) are divided into

- a) stationary measuring equipment and
- b) mobile measuring equipment needed for performing the detailed assessment.

Note:

These are, e.g., nuclide-specific alpha emitter and gamma ray measuring stations, total-alpha and total-gamma measuring stations as well as scintillation measuring stations for liquids, and automatic sample extraction assemblies.

(7) In addition to meeting the requirements of the present safety standard, the Federal Water Act (WHG) and the individual water act of the respective State (*Bundesland*) shall also be fulfilled.

(8) When discharging waste water into a public sewage system, the pertaining requirements and prohibitions under local statutory law shall be observed.

1 Scope

This safety standard applies to the equipment and facilities for monitoring and assessing the discharge of radioactive substances with water from nuclear power plants with light water reactors during specified normal operation and when design basis accidents occur.

Notes:

(1) The requirements of in the present safety standard regarding stationary measuring equipment take into consideration that both, during specified normal operation and when design basis accidents occur, the radioactive substances are discharged in a controlled way. In the case of a failure of containers, of components and connecting pipe lines, the escaping water will either be held back in vessel-shaped compartments or are collected via drainage systems in sumps, drip pans or vessels such that, when a design basis accident happens, no immediate discharge to the environment will occur. It is, therefore, not necessary to correlate the content of this safety standard with the categories of accident survey display or wide range display.

(2) The requirements concerning nuclear power plants with pressurized water reactors (PWR) apply to those plants with U-tube steam generators.

2 Definitions

(1) Discharge of radioactive substances

The discharge of radioactive substances is the intentional release of liquid, aerosol-bound or gaseous radioactive substances from the facility along the paths designated for this purpose.

(2) Specified normal operation

The specified normal operation comprises

- a) operating processes for which the plant, assuming the able function of all systems (fault free condition), is intended and suited (normal operation);
- b) operating processes which occur in the event of a plant component or system malfunction (fault condition), insofar as safety related reasons do not stand against continued operation (abnormal operation);
- c) maintenance procedures (inspection, servicing, repair).

(3) Detailed assessment of radioactive substances

The detailed assessment is a special form of monitoring and assessing that consists of identifying and determining the activity of the radionuclides or radionuclide groups discharged over a specified time span. The detailed assessment is based on the actual measurement value. The uncertainty is stated separately.

(4) Cesium-137 equivalent (water)

The Cesium-137 equivalent is a derived measurement quantity in units of Bq/m³. It is calculated by multiplying a measured gamma count rate of the measurement source with the ratio of the activity concentration and the gamma count rate of a Cesium-137 standard solution determined under similar conditions.

Note:

The measurements, both of the measurement source and of the Cesium-137 standard solution, are performed with a similar measuring equipment, the same measurement arrangement, similar radiation sources and the same gamma ray energy ranges.

(5) Decision measurement

A decision measurement in accordance with the present safety standard is a measurement of the activity concentration or of the Cesium-137 equivalent of representative water samples (cf. definition (12)) performed in a measurement laboratory by the licensee under his own responsibility regarding the decision on the discharge of radioactive substances with water.

(6) Decision threshold

The decision threshold is a calculated value of a physical quantity (e.g., activity, activity concentration, specific activity) that is compared with a measurement value to help decide whether the measured quantity is realistic or is merely a background effect.

Notes:

- (1) The decision thresholds are determined in accordance with DIN EN ISO 11929-1.
- (2) Examples for the determination of the characteristic limits are given in Status Report KTA-GS 82.

(7) Release

The release of radioactive substances is the unintentional leakage of radioactive substances from the intended enclosures into the facility or the environment.

(8) Calibration of a measuring equipment for radiation monitoring and assessment

Calibration of a measuring equipment for the radiation monitoring and assessment consists of determining the relationship between a measurement quantity as a fixed value of reference standards (e.g., activity of the calibration source) and the displayed value (e.g., count rate)

(9) Stationary measuring equipment

Stationary measuring equipment - in the sense of this term's usage in safety standards KTA 1501, KTA 1502, KTA 1503.1 to KTA 1503.3, KTA 1504 and KTA 1507 – are characterized in that

- a) they are permanently installed,
- b) they are tied into the instrumentation and controls and into the power supply system, and
- c) their measurement signals are displayed and recorded in the control room.

(10) Mixture sample

A mixture sample is a uniform mixture of the individual or cumulative samples or of parts of these samples extracted over a specified time span.

(11) Detection limit

The detection limit is a calculated value of a physical quantity (e.g., activity, activity concentration, specific activity) that is compared with a specified reference value in order to determine whether the measurement procedure is suited for the measurement purpose.

Notes:

- (1) The detection limits are determined in accordance with DIN EN ISO 11929-1.
- (2) Examples for the determination of the characteristic limits are given in Status Report KTA-GS 82.

(12) Representative sample (water)

A representative sample is one the examination of which permits determining the type and quantity of radioactive substances discharged with water.

Note:

Principally, any mass-proportional or time-proportional extraction of samples may be considered as being representative. The latter, however, may only be considered representative if a correlation between the extracted samples and the medium being monitored or assessed exists for all operating conditions in accordance with the operating manual of the respective power plant.

(13) Cumulative sample

A cumulative sample is a sample created by a continuous or near-continuous extraction over a specified time span.

Note:

A week is established as being the time span between Monday, 0:00 hours and the following Sunday, 24:00 hours.

A month is established as being the time span of the successive weeks falling entirely or predominantly into the individual calendar month.

A quarter year is established as being the time span of the calendar quarter year under consideration of the definitions of week and month cited above.

A year is established as being the time span of the calendar year under consideration of the definitions of week, month and quarter year cited above.

(14) Switching threshold

The switching threshold of a measuring equipment is that value of a physical quantity (e.g., activity concentration) which, when exceeded, causes a switching procedure to be automatically executed.

(15) Threshold limit

The threshold limit is plant-specific value which, when exceeded, calls for the taking of certain measures.

(16) Design basis accident

Design basis accident is a chain of events which, upon its occurrence, would require interrupting the plant operation or task activity for reasons of safety, and which shall be considered in the plant design or, with regard to the task activity, for which protective measures are provided.

(17) Monitoring and assessment

Monitoring and assessment collectively indicate any kind of a controlled measurement of physical quantities including the comparison of the results with specified values.

Notes:

- (1) Monitoring and assessment consists of, e.g.,
 - a) a continuous measurement or
 - b) an analysis of samples (e.g., in the measurement laboratory) or
 - c) a correlation of measurement values

and, in each case, comparing the results with values specified for the physical quantities (e.g., license values, operational values).

- (2) To verify compliance with licensed limit values the upper limit of the probabilistically symmetric coverage interval is applied.

(18) Coverage interval

The coverage interval contains the area of potential true values of the measurand based on available information with a specified probability.

Note:

The limits of the probabilistically symmetric coverage interval are determined in accordance with DIN EN ISO 11929-1.

3 Measurement Objects and Measurement Procedures

Note:

Appendix A and **Appendix B** are exemplary illustrations showing the systems to be monitored and assessed together with the respective measuring equipment and sample extraction locations.

3.1 Water Bodies and Associated Systems to be Monitored and Assessed

Radioactive substances shall be measured and assessed in the following water bodies and associated systems, unless radioactive discharges can be avoided by the design and the operation of the nuclear power plant.

(1) Radioactively contaminated waste waters

Discharge tank of the system for discharging waste water from the controlled area.

(2) Auxiliary service water

Open system for cooling the nuclear intermediate cooling circuits which may be radioactively contaminated.

(3) Waste water from the turbine building

System for discharging the waste water from the water or steam circuit and the operational waste water from the turbine building.

Note:

This includes, e.g. in PWRs, the backwash or regeneration water from the condensate and blowdown demineralizing systems, and, e.g. in BWRs, the water from the coolant drainage pool.

(4) Auxiliary steam system

System for supplying consumers in the nuclear and conventional areas with heating steam.

(5) Circulating water

System for cooling the turbine condensers.

(6) Receiving water discharge

System for discharging cooling water from the re-circulation cooling systems.

(7) Additional plant-specific paths

A detailed assessment of the activity discharges shall be prepared for the additional plant-specific paths unless these meet the insignificance criterion specified under Section 3.8.

3.2 Radioactively Contaminated Waste Water

3.2.1 Sample extraction

Prior to any discharge, a water sample shall be extracted that is representative for the entire content of the waste water discharge tank, and that is suited for the decision measurement and preparation of mixture samples (cf. **Appendix C**). For this purpose, the entire content of the tank shall be homogenized, e.g., by closed-loop pumping, by agitating or stirring. The duration of homogenizing should be adapted to the vessel size and should continue for at least 30 minutes. Prior to extracting the sample, the sample extraction line shall be flushed with the homogenized water. Beginning with the start of homogenization until the end the discharge procedure no water may be led into the waste water discharge tank. One liter of the sample shall be used for the decision measurement specified under Section 3.2.2 and shall be safely stored as evidential sample for the duration of one year (one-liter sample). Other parts shall be used to prepare mixture samples proportional in size to the respective discharges during a week, quarter year or year to be

used for the detailed assessment (cf. **Appendix C**) and to prepare monthly mixture samples for determining the Tritium content as specified under Section 3.2.4.5.

3.2.2 Decision measurement

The decision about a discharge from the waste water discharge tank shall be based on the Cesium-137 equivalent of the one-liter sample and shall be determined by an integral measurement of the gamma radiation in the energy range above 60 keV.

3.2.3 Discharge

The water from the waste water discharge tank may be pumped off only if the value of the Cesium-137 equivalent does not exceed $2 \cdot 10^7$ Bq/m³ and a written release by a duly authorized person has been issued. During the discharge, the activity concentration of the waste water shall be continuously monitored by a measuring equipment for the integral gamma radiation. Whenever the Cesium-137 equivalent exceeds $2 \cdot 10^7$ Bq/m³ or a failure of the measuring equipment occurs this shall be displayed and recorded in the main control room; the discharge shall be automatically discontinued.

3.2.4 Detailed assessment

In the detailed assessment, the uncertainties arising during sample extraction and processing as well as the uncertainties from the measurement and analysis procedures shall be taken into consideration.

Note:

The requirements for the detection limits specified below apply to the respective measurement and analysis procedures on water samples.

3.2.4.1 Gamma ray emitters

Within the week following their preparation, the individual weekly mixture samples shall be subjected to gamma-spectrometric analyses. At a minimum, the radionuclides listed in **Table 3-1** shall be considered. The detection limit of the measuring equipment for determining activity concentrations shall not exceed $1 \cdot 10^3$ Bq/m³ for Cobalt-60 when measuring a sample of demineralized water. The measurement duration for the detailed assessment shall be at least long enough to achieve the specified detection limit for Cobalt-60. Within the framework of the gamma-spectrometric analyses it shall be checked whether additional radionuclides not listed in **Table 3-1** are plant-specifically present in the waste water. If any are detected, only those radionuclides with a half-life longer than 8 days need to be considered in the detailed assessment.

Radionuclides	
Chromium-51	Silver-110m
Manganese-54	Tellurium-123m
Cobalt-57	Antimony-124
Cobalt-58	Antimony-125
Iron-59	Iodine-131
Cobalt-60	Cesium-134
Zinc-65	Cesium-137
Zirconium-95	Barium-140
Niobium-95	Lanthanum-140
Ruthenium-103	Cerium-141
Ruthenium-106	Cerium-144

Table 3-1: Gamma ray emitting radionuclides to be considered in the detailed assessment

3.2.4.2 Radioactive strontium

Within the month following their preparation, the quarter-annual mixture samples shall be analyzed for their content of Strontium-89 and Strontium-90. The detection limit of the procedure for determining the activity concentration shall not exceed $5 \cdot 10^2$ Bq/m³.

3.2.4.3 Alpha emitters

Within the month following their preparation, the quarter annual mixture samples shall be analyzed for their content of alpha emitters (total alpha activity). The detection limit of the procedure for determining the total alpha activity concentration shall not exceed $2 \cdot 10^2$ Bq/m³ for Americium-241. If the examination of the sample shows an total alpha emitter activity concentration higher than $1 \cdot 10^3$ Bq/m³, the sample shall be examined for the content of individual alpha emitters. The radionuclides listed in **Table 3-2** shall be considered. The detection limit of the procedure for determining the activity concentrations shall not exceed 50 Bq/m³ for Americium-241. In the detailed assessment, it is permissible to consider the radionuclide pair Plutonium-329 and Plutonium-240 as one.

Radionuclides	
Plutonium-238	Americium-241
Plutonium-239	Curium-242
Plutonium-240	Curium-244

Table 3-2: Alpha emitting radionuclides to be considered in the detailed assessment

3.2.4.4 Iron-55 and Nickel-63

Within the quarter year following their preparation, the annual mixture samples shall be analyzed for their content of Iron-55 and Nickel-63. The detection limit of the procedure for determining the activity concentration shall not exceed $2 \cdot 10^3$ Bq/m³.

3.2.4.5 Tritium

Within the month following their preparation, the monthly mixture samples shall be analyzed for their content of Tritium. The detection limit of the procedure for determining the activity concentration shall not exceed $4 \cdot 10^4$ Bq/m³.

3.2.4.6 Correction for radioactive decay

The activity concentration of the radionuclides determined in the detailed assessment measurements of the mixture samples shall be corrected to the middle of the individual collection time spans using the respective half-life values of the radionuclides.

3.3 Service Water

3.3.1 Monitoring and assessment

(1) The monitoring and assessment of the discharge of activity shall be carried out indirectly by monitoring and assessing the activity concentration of the Cesium-137 equivalent in the nuclear intermediate cooling circuits and by monitoring and assessing the make-up feed volume of demineralized water in the nuclear intermediate cooling circuits. To this end,

- a) a continuously operating and integrally measuring gamma ray measuring equipment shall be installed in each of the nuclear intermediate cooling circuits;

- b) the make-up feed volume of demineralized water required to cover the water losses from each of the nuclear intermediate cooling circuits shall be determined and recorded in daily intervals. Demineralized water volumes that provably have not been mixed into the intermediate cooling water do not have to be taken into consideration;

- c) a sample shall be extracted every month from each of the nuclear intermediate cooling circuits and shall be analyzed for its Tritium content.

(2) In case the cooling water of the generator cooling circuit is contaminated with Tritium, a sample shall be extracted every month and shall be analyzed for its Tritium content.

(3) In case the service water is introduced directly into a water body, the procedures specified under Sections 3.6.1, 3.6.2 and 3.6.4 shall be followed.

3.3.2 Securing of evidence

With respect to securing of evidence, a cumulative sample of at least one liter shall be extracted over the course of each week by automatically functioning equipment from the re-circulated service water before this is mixed with any other waters; each of these samples shall be safely stored for the period of one year.

3.3.3 Detailed assessment

(1) A weekly sample shall be extracted from the respective nuclear intermediate cooling circuits if the factorial product of Cesium-137 equivalent and make-up feed volume of demineralized water is larger than or equal to $4 \cdot 10^6$ Bq/d. If the factorial product of Cesium-137 equivalent and make-up feed volume of demineralized water is larger than or equal to $4 \cdot 10^8$ Bq/d, then the samples shall be extracted on a daily basis. These samples shall be subjected to a gamma- spectrometric analyses as specified under Section 3.2.4.1 within the week following their extraction.

Note:

Any simultaneously occurring leakages of the nuclear coolers and intermediate component cooling circuits can also be detected by the Tritium measurement specified under Section 3.3.1 item c).

(2) A monthly mixture sample shall be prepared from the samples extracted under para. (1) and, within the month following its preparation, shall be analyzed for its Strontium-89 and Strontium-90 content as specified under Section 3.2.4.2, for its alpha emitter content as specified under Section 3.2.4.3, and for its Tritium content as specified under Section 3.2.4.5.

(3) The activity concentrations of the radionuclides in the samples shall be converted to the middle of the individual collection time spans using the respective half-life values of the radionuclides; the resulting values shall, then, be multiplied with the make-up feed volume of demineralized water determined as specified under Section 3.3.1 para. (1) item b) for the respective collection time span.

(4) These examinations shall be performed observing the requirements for the detection limits as specified under Section 3.2.4.

3.3.4 Failure of a gamma ray measuring equipment

In the case of failure of a gamma ray measuring equipment of the nuclear intermediate cooling circuits, a one-liter sample shall be extracted daily and the Cesium-137 equivalent of this sample determined by an integral measurement of the gamma radiation in the energy range above 60 keV. If this measurement indicates that the factorial product of Cesium-137 equivalent and make-up feed volume of demineralized water is larger than or equal to $4 \cdot 10^6$ Bq/d, a detailed assessment of the activity as specified under Section 3.3.3 shall be performed.

3.4 Waste Water from the Turbine Building

3.4.1 Turbine building waste water from nuclear power plants with pressurized water reactors

3.4.1.1 Monitoring and assessment

(1) Monitoring and assessment of the activity discharge shall be performed indirectly by measuring the Cesium-137 equivalent in the steam generator blowdown system by means of continuously operating and integrally measuring gamma ray measuring equipment.

(2) A sample shall be extracted monthly from the water of the secondary cooling system and shall be analyzed for its Tritium content.

(3) Operational regulations shall be established to ensure that no water with an total activity concentration that exceeds $2 \cdot 10^7 \text{ Bq/m}^3$ is discharged from the turbine building.

3.4.1.2 Securing of evidence

With respect to securing of evidence, flow-rate-proportional cumulative samples, or mixture samples proportional to the discharge quantity shall be prepared on a weekly basis from the turbine building waste water before the waste water is mixed into any other water bodies. One liter of each of these samples shall be safely stored for the period of one year.

3.4.1.3 Detailed assessment

(1) Whenever the monitoring and assessment specified under Section 3.4.1.1 indicates a Cesium-137 equivalent that exceeds $4 \cdot 10^5 \text{ Bq/m}^3$, an additional part of the cumulative or mixture sample specified under Section 3.4.1.2 shall be subjected to a gamma-spectrometric analysis. From these samples accumulated within a single month, a discharge-mass proportional mixture sample shall be prepared and, in the month following its preparation, analyzed for its content of Strontium-89 and Strontium-90 as specified under Section 3.2.4.2. In the month following their preparation, the monthly mixture samples shall be examined for their content of alpha emitters as specified under Section 3.2.4.3 and Tritium as specified under Section 3.2.4.5.

(2) Whenever the monitoring and assessment specified under Section 3.4.1.1 para. (2) indicates a Tritium-specific activity concentration that exceeds $1 \cdot 10^6 \text{ Bq/m}^3$, a detailed assessment of the discharge of Tritium shall be performed.

(3) The activity concentrations of the samples shall be converted to the middle of the individual collection time spans using the associated half-life values of the radionuclides; the resulting values shall, then, be multiplied with the volume of waste water from the turbine building in the respective collection time span.

(4) These examinations shall be performed observing the requirements for the detection limits as specified under Section 3.2.4.

3.4.1.4 Failure of a gamma ray measuring equipment in the steam generator blowdown system

In the case of failure of a gamma ray measuring equipment in the steam generator blowdown system, a one-liter sample shall be extracted daily from the respective blowdown train, and the Cesium-137 equivalent of this sample shall be determined by an integral measurement of the gamma radiation in the energy range above 60 keV. If this measurement indicates a Cesium-137 equivalent that exceeds $4 \cdot 10^5 \text{ Bq/m}^3$, a detailed assessment of the activity as specified under Section 3.4.1.3 shall be performed.

3.4.1.5 Monitoring and assessment of the activity discharge from the turbine building sump during plant shutdown

(1) During plant shutdown, flow-rate-proportional daily cumulative samples or discharge-proportional daily mixture samples shall be extracted from the turbine building sump, and their Cesium-137 equivalent shall be determined without delay by an integral measurement of the gamma radiation in the energy range above 60 keV. If this measurement indicates a Cesium-137 equivalent that exceeds $4 \cdot 10^4 \text{ Bq/m}^3$, a detailed assessment of the activity discharge as specified under Section 3.2.4.1 shall be performed.

(2) A permissible alternative to para. (1) is monitoring and assessing the activity discharge by measuring the Cesium-137 equivalent by means of continuously operating and integrally measuring gamma ray measuring equipment. If this measurement indicates a Cesium-137 equivalent that exceeds $4 \cdot 10^4 \text{ Bq/m}^3$, the procedure specified under para. (1) shall be applied.

3.4.1.6 Condensate demineralizing system

The water from the condensate demineralizing system accumulated during backwash or regeneration and subsequent flushing shall be examined prior to any discharge. To this end, a representative sample shall be extracted and analyzed as specified under Section 3.2.2 in a measurement laboratory. If the Cesium-137 equivalent of this sample exceeds $2 \cdot 10^6 \text{ Bq/m}^3$, the entire charge shall be directed to the facilities for processing radioactively contaminated water. If the Cesium-137 equivalent is smaller than or equal to $2 \cdot 10^6 \text{ Bq/m}^3$, the water may be discharged directly without prior treatment. Basically, a detailed assessment of the discharges shall be performed as specified under Section 3.2.4. A detailed assessment of the discharges is not required if the value for the Cesium-137 equivalent is smaller than $4 \cdot 10^4 \text{ Bq/m}^3$.

3.4.1.7 Blowdown demineralizing system

The water accumulated from the blowdown demineralizing system during backwash or regeneration and subsequent flushing shall be examined prior to any discharge. To this end, a representative sample shall be extracted and analyzed as specified under Section 3.2.2 in a measurement laboratory. If the Cesium-137 equivalent exceeds $2 \cdot 10^6 \text{ Bq/m}^3$, the entire charge shall be directed to the facilities for processing radioactively contaminated water. If the Cesium-137 equivalent is smaller than or equal to $2 \cdot 10^6 \text{ Bq/m}^3$, the water may be discharged directly without prior treatment. Basically, a detailed assessment of the discharges shall be performed as specified under Section 3.2.4. A detailed assessment of the discharges is not required if the Cesium-137 equivalent is smaller than $4 \cdot 10^4 \text{ Bq/m}^3$.

3.4.2 Turbine building waste water from nuclear power plants with boiling water reactors

(1) The turbine building is part of the controlled area. The turbine building waste water shall be diverted to the facilities for processing radioactively contaminated water; after processing, the waste water shall be dealt with as specified under Section 3.2.

(2) When water is discharged from the cooling water evacuation tank then, over a time span of up to one week, a flow-rate-proportional cumulative sample or a discharge-mass proportional mixed sample shall be extracted from the discharge pipe by means of automatic devices. The Cesium-137 equivalent shall be determined for a one-liter sample of these extractions by an integral measurement of the gamma radiation in the energy