

Country Profile Report

under OSPAR Agreement 18-01

FEDERAL REPUBLIC OF GERMANY

Section 1: Summary document detailing

1. Relevant national authorities and responsibilities

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

The Federal Ministry is the supreme German authority responsible for nuclear safety and radiation protection. Tasks are, inter alia,

- implementation of international regulations in national legislation,
- supervision of compliance with national legislation in the federal states,
- co-operation and co-ordination with other national and international institutions, ministries or NGOs,
- preparing legal drafts for the government,
- giving support to parliamentary law-making procedure and
- international reporting and public relations.

Federal Office for Radiation Protection (BfS)

The Federal Office for Radiation Protection is a scientific-technical authority in the scope of the BMU with competences in the field of radioactivity and radiation. Its task is to comprehensively support the ministry in protecting humans, other organisms and environment against the harmful effects of radiation and radioactive contamination.

Authorities of the federal states

Each federal state has its own authorities for nuclear safety and radiation protection, which are responsible for the regulation and supervision of facilities dealing with radioactive material or ionising radiation.

2. National legislation and basis for regulation

Acts and Ordinances

The national legislation on nuclear safety and radiation protection is based on two Acts: The **Atomic Energy Act** and the **Radiation Protection Act**. The former one concentrates on regulations concerning the civil usage of nuclear power and its safety. The latter one regulates and defines general radiation protection issues for nuclear and non-nuclear sector. These Acts ensure that beings and the environment are properly protected against radiation risks by applying BAT/BEP and that Germany responsibly meets its international obligations. The **Radiation Protection Ordinance** specifies overall regulations from the above mentioned Acts in more detail.

General Administrative Provisions, Regulatory Guidelines and Recommendations

General Administrative Provisions (Allgemeine Verwaltungsvorschriften, AVV) give detailed instructions to national and federal administrations how to implement legal obligations in practice. Thus, the **AVV IMIS** establishes how the national and federal authorities must construct, maintain and operate the Integrated Measurement and Information System (IMIS) for the surveillance and monitoring of radioactivity in the environment. The **AVV Tätigkeiten**, a General Administrative Provision concerning practices, minutely prescribes how to calculate the effective dose for a representative person from public caused by discharges of radioactive material with air or water.

The **Guideline concerning Emission and Immission Monitoring of Nuclear Installations** (Richtlinie zur Emissions- und Immissionsüberwachung kerntechnischer Anlagen, REI) serves as a guide to the competent authority when specifying the requirements for emission and environmental monitoring of radioactive material in administrative permits for commissioning, operation or decommissioning of nuclear facilities. The REI contains default measurement programmes for emission and environmental monitoring. Concerning emission measurements the REI refers to various safety standards from the Committee for Nuclear Technology (see below).

The **Verification of the Licensee's Monitoring of Radioactive Effluents from Nuclear Power Plants** (Richtlinie Kontrolle der Eigenüberwachung radioaktiver Emissionen aus Kernkraftwerken, KR) defines a mandatory programme to independently assure the quality of activity measurements performed by licensees.

Official **Procedure Manuals for Monitoring of Radioactive Substances in the Environment and External Radiation** (Messenleitungen für die Überwachung radioaktiver Stoffe in der Umwelt und externer Strahlung) are issued by the Federal Ministry for Environment, Nature Conservation and Nuclear Safety. These manuals contain instructions how to determine activity concentrations and specific activities in various environmental samples. Their application by official institutions is mandatory in order to ensure national standards in measurement and determination of activities.

Safety Standards from the Committee for Nuclear Technology (KTA)

The Committee for Nuclear Technology (Kerntechnischer Ausschuss, KTA) issues safety standards that reflect the state of scientific and technological advancement, taking into account the BAT and BEP.

Conventional technical standards, DIN

Furthermore conventional technical standards, in particular the national standards of the German Institute for Standardisation (DIN) and also the international standards of ISO and IEC, are applied just as they are in the design and operation of all technical installation, as far as the conventional standards correspond to the state of the art in science and technology.

All safety standards issued by KTA and DIN are reviewed regularly every five years.

3. Application of BAT/BEP in domestic legislation

For each nuclear facility the Atomic Energy Act demands in § 19a a permanent improvement of nuclear safety and an evaluation report on nuclear safety every ten years. The Radiation Protection Act obliges radiation protection supervisors in § 8 and § 72 to consider the state of

the art in science and technology (BAT/BEP) to avoid unnecessary exposures and to further reduce contamination of the environment.

For nuclear installations in Germany, the state of scientific and technological advancement, taking into account the BAT and BEP, is defined in technical guidelines, such as safety standards, issued by the Committee for Nuclear Technology. Specifically, the safety standard series KTA 3601 to KTA 3605 include requirements for technical standards in "Activity Control and Activity Management". Within the context of discharges into water, the safety standard KTA 3603 provides technical requirements and detailed information on techniques for "Facilities for Treating Radioactively Contaminated Water in Nuclear Power Plants". The corresponding regulation for emissions into the atmosphere is KTA 3605 "Treatment of Radioactively Contaminated Gases in Nuclear Power Stations with Light Water Reactors". In addition to the requirements for the design of the systems, these safety standards also contain requirements concerning absolute reliability in terms of safety, regular testing and maintenance of the installed systems.

4. Dose limit, constraints and discharge limit setting rationale

Dose limits

In planned exposure situations the total effective dose to members of the public resulting from all practices must not exceed 1 mSv per calendar year (§ 80 Radiation Protection Act). For the eye lens and the skin the annual equivalent dose limits are 15 mSv and 50 mSv, respectively.

The annual effective dose limit for occupational exposure is 20 mSv. The organ dose limit for the eye lens is as well 20 mSv and the limit for skin, hands, forearms, feet and ankles is 500 mSv each (§ 78 Radiation Protection Act). An organ dose limit of 2 mSv is defined for the uterus of women of childbearing age. The Radiation Protection Act regulates further occupational dose limits or exceptions from the above mentioned values for some more specific cases, e.g. for minors and unborn children.

In emergency situations the reference value for the effective dose is 100 mSv for the public and up to 500 mSv for emergency helpers.

Additionally, in § 99 Radiation Protection Ordinance an effective dose limit of 0.3 mSv is specified for the exposure of individual members of the public resulting from radioactive emissions by air and water, respectively.

Emission limits

The administratively permitted annual limits for the liquid and gaseous emissions of each facility or installation ensure that the dose limit of 1 mSv for members of the public is not exceeded during normal operation and decommissioning. The emission limits are either taken from table 6 in attachment 11 of the Radiation Protection Ordinance (activity concentrations) or stipulated by the competent authority based on a dose assessment prescribed in the AVV Tätigkeiten.

5. Regulation, surveillance and monitoring of emissions

The Atomic Energy Act and the Radiation Protection Act specify which installations and facilities as well as practices need administrative permits or announcements and which conditions at least have to be fulfilled to get a licence. Of course, the basic radiation protection standards and principles have to be met as well as compliance with technical safety standards need to be warranted to receive a permission.

Moreover, the competent authority has either the legal obligation or at least the legal authorisation to decree surveillance and monitoring of emissions and environment (§ 103 Radiation Protection Ordinance). Surveillance and monitoring programmes are usually in accordance with The Guideline concerning Emission and Immission Monitoring of Nuclear Installations (REI). In conjunction with the REI the guidelines KTA 1503 "Monitoring the Discharge of Radioactive Gases and Airborne Radioactive Particulates", KTA 1504 "Monitoring and Assessing the Discharge of Radioactive Substances with Water" and KTA 1507 "Monitoring the Discharge of Radioactive Substances from Research Reactors" give instructions on monitoring of emissions, which specify the type of sampling, sample treatment, time periods of sampling, radionuclides considered, detection limits, reporting, etc.

6. Environmental monitoring programmes

Additionally to the emission monitoring, environmental radioactivity in the vicinity of nuclear installations is monitored, too. Details are regulated by the competent authority that usually is applying the monitoring programme suggested by the REI. Monitored environmental media are e.g. drinking water, ground and surface water, foodstuff, precipitation, or soil. The sampling and the sample measurements are defined to cover dose contributions from direct irradiation, inhalation and ingestion during normal operation conditions and basis accidents or severe accidents.

Furthermore, an Integrated Measurement and Information System (IMIS) was established to monitor radioactivity not only in the vicinity of nuclear installations but also distributed on the entire territory of the republic. IMIS is a huge database fed by comprehensive environmental monitoring programmes conducted by national and federal state authorities. The measurement programmes cover a wide range of environmental media, e.g. sediments, air (local dose rate), soils, sewage sludge, waters from different origin (ground, rivers, lakes, Baltic and North Sea), foodstuff and so on. Details are described in the AVV IMIS.

7. Radiation dose assessment methods

Hydrodynamical and meteorological models combined with a radioecological model are used to assess doses for a reference person representing the German population. These models, their parameter values and additional assumptions are described in the AVV Tätigkeiten and therein specified references. The dose to members of the public is calculated under conservative assumptions, i.e. the actually obtained dose of an individual is most probably far below the calculated dose.

8. Environmental norms and standards

All legal and administrative regulation aims at preventing or at least minimising emission, release or loss of radionuclides into the environment. The radioactivity in several environmental samples is steadily monitored across the entire German territory and especially in the vicinity of nuclear installations. For further details see paragraphs 5. *Regulation, Surveillance and Monitoring of Emissions* and 6. *Environmental Monitoring Programmes*.

9. Quality assurance

Nuclear installations are inspected several times per year by the licensing authorities. Licensees of nuclear installations are obligated to measure and report their discharges. All measurements must be performed in accordance to the official Procedure Manuals for Monitoring of Radioactive Substances in the Environment and External Radiation. To verify that the facilities comply with the emission surveillance programme, the Verification of the Licensee's Monitoring of Radioactive Effluents from Nuclear Power Plants provides that double

samples are randomly measured at independent official laboratories, preferably by the Federal Office for Radiation Protection (BfS). Using the reported emissions, the Federal Office for Radiation Protection (BfS) calculates the annual radiation exposure of members of the general public for all nuclear facilities in Germany under the terms of the AVV Tätigkeiten.

Furthermore, licensees of nuclear installations and their commissioned laboratories have the obligation to annually take part at intercomparison/proficiency tests provided by various national authorities.

The independent scrutiny of self-monitoring and the mandatory intercomparison measurements for quality assurance are essentially identical with the operators' measurements in line with the technical safety standards KTA 1503.1 and 1504. Therefore, the quality of environmental and discharge sample measurements, and the assessment of impact of discharges on members of the general public is based not only on the work of the operators but also on a national system of regulators, governmental bodies and independent advisors.

Section 2: Nuclear Power Plants (in operation)

OSPAR-ID	Name	Location	Year of Commissioning/ Decommissioning	Receiving waters	Catchment area	Other information
DE02	KBR Brokdorf	Brokdorf Schleswig-Holstein	1986	Elbe, North Sea	Elbe	
DE09a	KKE Emsland	Lingen Lower Saxony	1988	Ems, North Sea	Ems	
DE11b	GKN II Neckarwestheim	Neckarwestheim Baden-Württemberg	1988	Neckar, North Sea	Neckar	
DE05	KWG Grohnde	Grohnde Lower Saxony	1984	Weser, North Sea	Weser	

Section 3: Reprocessing facilities

none

Section 4: Fuel fabrication facilities (in operation)

OSPAR-ID	Name	Location	Year of Commissioning/ Decommissioning	Receiving waters	Catchment area	Other information
DE09	ANF	Lingen Lower Saxony	1979	Ems, North Sea	Ems	
DE19	URENCO	Gronau North Rhine Westphalia	1985	Municipal sewage system, Vechte/IJsselmeer, North Sea	Vechte/IJsselmeer	

Section 5: Radioactive waste treatment facilities

No facilities with discharges to OSPAR regions

Section 6: Research reactors (in operation)

OSPAR-ID	Name	Location	Year of Commissioning/ Decommissioning	Receiving waters	Catchment area	Other information
DE26	FRMZ Mainz	Mainz Rhineland-Palatinate	1965	Main, Rhine, North Sea	Main	

Section 7: Decommissioning activities

OSPAR-ID	Name	Location	Year of Commissioning/ Decommissioning	Receiving waters	Catchment area	Other information
DE01a	KBA Biblis A	Biblis Hesse	1974/2011	Rhine, North Sea	Rhine	NPS
DE01b	KBB Biblis B	Biblis Hesse	1976/2011	Rhine, North Sea	Rhine	NPS
DE03	KKB Brunsbüttel	Brunsbüttel Schleswig-Holstein	1976/2011	Elbe, North Sea	Elbe	NPS

DE04	KKG Grafenrheinfeld	Grafenrheinfeld Bavaria	1982/2015	Main, Rhine, North Sea	Main	NPS
DE08a	KKK Krümmel	Krümmel Schleswig-Holstein	1983/2011	Elbe, North Sea	Elbe	NPS
DE09b	KWL Lingen	Lingen Lower Saxony	1968/1977	Ems, North Sea	Ems	NPS
DE10	KMK Mülheim-Kärlich	Mülheim-Kärlich Rhineland-Palatinate	1988/2004	Rhine, North Sea	Rhine	NPS
DE11a	GKN I Neckarwestheim	Neckarwestheim Baden-Württemberg	1976/2011	Neckar, Rhine, North Sea	Neckar	NPS
DE12	KWO Obrigheim	Obrigheim Baden-Württemberg	1968/2008	Neckar, Rhine, North Sea	Neckar	NPS
DE13a	KKP1 Phillipsburg 1	Phillipsburg Baden-Württemberg	1979/2011	Rhine, North Sea	Rhine	NPS
DE13b	KKP2 Phillipsburg 2	Phillipsburg Baden-Württemberg	1984/2019	Rhine, North Sea	Rhine	NPS
DE14	KKR Rheinsberg	Rheinsberg Brandenburg	1966/1990	Havel, Elbe, North Sea	Havel	NPS
DE15	KKS Stade	Stade Lower Saxony	1972/2003	Elbe, North Sea	Elbe	NPS
DE16	KKU Unterweser	Esenhamm Lower Saxony	1978/2011	Weser, North Sea	Weser	NPS
DE17	KWW Würgassen	Beverungen North Rhine Westphalia	1971/1997	Weser, North Sea	Weser	NPS
DE24	HMI Berlin	Berlin Berlin	1958/2019	Havel, Elbe, North Sea	Havel	Research Reactor
DE08b	HZG Geesthacht	Geesthacht Schleswig-Holstein	1958/2010	Elbe, North Sea	Elbe	Research Reactor
	FZR Rossendorf	Dresden-Rossendorf Saxony	1957/1991	Municipal sewage system, Elbe, North Sea	Elbe	Research Reactor
DE25	FRJ1 Jülich	Jülich North Rhein Westphalia	1962/2006	Rur, Maas/Meuse, North Sea	Rur	Research Reactor

DE18	KIT Karlsruhe	Karlsruhe Baden-Württemberg	1961/1981	Rhine, North Sea	Rhine	Research Reactor
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NPS: Nuclear Power Station