

# **SECOND REPORT ACCORDING TO ART. 9 NUCLEAR SAFETY DIRECTIVE**

Vienna, July 2020

## Content

<b>A Introduction .....</b>	<b>4</b>
<b>B. Article by Article Review .....</b>	<b>6</b>
Article 4 Legislative, regulatory and organisational framework.....	6
Article 4.1 .....	6
Article 4.1 (a) .....	7
Article 4.1 (b).....	8
Article 4.1 (c) .....	9
Article 4.1 (d).....	11
Article 4.1 (e).....	12
Article 4.2.....	12
Article 5.....	13
Article 5.1 .....	13
Article 5.2 .....	13
Article 5.2 (b).....	14
Article 5.2 (c) .....	15
Article 5.2 (d).....	15
Article 5.2 (e).....	15
Article 5.2 (f).....	16
Article 5.3 .....	16
Article 5.3 (b).....	16
Article 5.3 (c) .....	18
Article 5.3 (d).....	18
Article 6 – Licence holders.....	19
Article 6.1 (a).....	19
Article 6.1 (b).....	20
Article 6.1 (c).....	22
Article 6.1 (d).....	25
Article 6.1 (e).....	26
Article 6.1 (f) .....	29
Article 7 – Expertise and skills in nuclear safety .....	31

Article 8 – Transparency .....	31
Article 8.1.....	31
Article 8.1 (b).....	32
Article 8.2.....	33
Article 8.3.....	33
Article 8.4.....	35
Article 8a Nuclear safety objective for nuclear installations .....	35
Article 8a.1 .....	35
Article 8a.2.....	36
Article 8a.2 (a).....	36
Article 8a.2 (b).....	36
Article 8b: Implementation of the nuclear safety objective for nuclear installations.....	37
Article 8b.1.....	37
Article 8b.....	37
Article8b.2 (a) .....	38
Article 8b.2 (b).....	39
Article 8b.2 (c).....	40
Article 8b.2 (d).....	41
Article 8c: Initial assessment and periodic safety review .....	41
Article 8c.....	41
Article 8c (b).....	41
Article 8d: On-site emergency preparedness and response.....	42
Article8d.1. ....	42
Article 8d.2.....	43
Article 8e Peer Reviews .....	43
Article8e.1.....	43
Article 8e. (2).....	44
Article 8e.3.....	44
Article8e.4.....	45
<b>Abbreviations .....</b>	<b>46</b>
<b>Imprint.....</b>	<b>47</b>

# A Introduction

The second report under Article 9.1 of Council Directive 2009/71/Euratom of 25 June 2009 establishing a community framework for the nuclear safety of nuclear installations, as amended by the Council Directive 2014/87/Euratom of 8 July 2014, follows the structure given in the ENSREG guideline regarding Member States to submit Reports by 22 July 2020 as required under Article 9.1 INFCIRC/572/Rev. 6. Its content has been updated, in particular taking into account all recent changes of the legislative and regulatory framework and upgrades of the TRIGA Research Reactor as of the date of submission of this report.

This report focusses on oversight over the TRIGA Research Reactor as the only facility under the scope of the NSD in Austria.

Austria published a new Radiation Protection Act on June 17<sup>th</sup>, 2020 in the Federal Gazette (BGBl. I 50/2020) that will overhaul regulatory oversight structure for radiation protection in general. This includes the transfer of the competency regarding the regulatory oversight of the TRIGA Research Reactor from the Austrian Federal Ministry of Education, Science and Research to the Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology on January 1<sup>st</sup>, 2020. As this new Act does not enter into force until August 1<sup>st</sup>, 2020, this report will describe the framework for safety as in force on July 22<sup>nd</sup>, 2020. Where the new legislative framework effects the compliance of said framework with the NSD, reference will be made under the relevant articles.

Austria has never operated a nuclear power plant and according to the Constitutional Law on a Nuclear-free Austria [BGBl. I No. 149/1999: Bundesverfassungsgesetz für ein atomfreies Österreich] there is a legal prohibition to do so in the future.

Currently, there is one facility under the purview of this directive in Austria: The TU Wien operates a pool type TRIGA Mark II Research Reactor. It has a maximum steady state thermal output of 250 kW and pulsing capabilities up to 250 MW. Being in operation since March 1962, the reactor is exclusively used for basic and applied academic research and teaching purposes. As it is the closest research reactor to the IAEA headquarters, it is also frequently used by IAEA staff for development and calibration of safeguards instruments. In 2012 all irradiated fuel elements from the core and the spent fuel storage were shipped to the Idaho National Lab and replaced by 78 19,9% enriched standard TRIGA fuel elements, which were loaned to the TU Wien by the US Department of Energy. With this new core the TRIGA Research Reactor went critical on 27 November 2012. These fuel elements will be returned to

the USA after 2025, unless the parties of the contract agree upon an extension. Presently, the total number of fuel elements in the core is 80 (plus 5 fuel elements in the in-pool storage racks plus 5 fresh fuel elements in the fuel storage). The total activity of these fuel elements after one year of cooling time is  $7.27 \times 10^{13}$  Bq and after ten years approx.  $1.5 \times 10^{13}$  Bq. The TU Wien has a total spent fuel storage capacity of 168 fuel elements.

The reactor instrumentation, the control system, the primary and secondary cooling circuits, the reactor control room as well as the radiation warning system have undergone a major overhaul from April 2014 until April 2017. The operating license was suspended for the period of the refurbishment and re-established in autumn of 2016. Generally, the license is open ended, but may be suspended in case of non-compliance with the framework for safety.

As the re-instrumentation of the reactor facility was extensive, there are no short to mid-term plans for other major system upgrades. While a decommissioning scenario for the TRIGA Research Reactor has been prepared and assessed, there are currently no plans for the decommissioning of the facility.

# B. Article by Article Review

## Article 4 Legislative, regulatory and organisational framework

### Article 4.1

**Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for the nuclear safety of nuclear installations**

The legislative and regulatory framework comprises the legal areas of radiation protection, installation safety, safeguards and physical protection of nuclear material and nuclear facilities. As Austria is a Federal State, a number of federal (Bund), provincial (Länder) and district authorities (Bezirksverwaltungsbehörden) are involved in the regulation of these matters. While the legislation is made on the federal level, the execution is entrusted to the provincial or district authorities largely. Major nuclear installations or activities, however, are subject to federal authority and inspection. This applies in particular to the TRIGA Research Reactor.

The following acts form the primary legislative framework for nuclear safety for nuclear installations:

Law Prohibiting the Use of Nuclear Fission for Energy Purposes, Constitutional Law on a "Nuclear-free Austria"

The use of nuclear energy for peaceful purposes in Austria has significantly been influenced by the passing of the Law Prohibiting the Use of Nuclear Fission for Energy Purposes in 1978 and of the Constitutional Law on a "Nuclear-free Austria" in 1999.

The Constitutional Law on a "Nuclear-free Austria" [BGBl. No. I Nr. 149/1999, BVG Atomfreies Österreich] prohibits the construction and operation of installations for the production of energy by means of nuclear fission as well as – with some exemptions – the transport of fissile materials in Austria. Where an international obligation exists, the international obligation would prevail. The use of installations for research and development activities is compatible with the quoted constitutional law.

## Radiation Protection Act

The Radiation Protection Act [BGBl. No. 227/1969, Strahlenschutzgesetz] entered into force on 1 January 1971. The act regulates the handling of radiation sources, the operation of facilities and the radiation monitoring; this includes licensing, protection of workers and population, management of radioactive waste, natural radioactive material, radiological emergency management and nuclear safety. Since 2002 it has been amended several times to implement Euratom legislation.

As of June 4<sup>th</sup>, 2020, the Austrian Parliament passed a new Radiation Protection Act (Strahlenschutzgesetz 2020), which will enter into force on August 1<sup>st</sup>, 2020. This act, along with the soon to be published new Radiation Protection Ordinances, fully transposes all relevant EU Council directives including the NSD.

## Federal Act on Civil Liability for Damage Caused by Radioactivity

The Federal Act on Civil Liability for Damage caused by Radioactivity (Nuclear Liability Act) [BGBl. I Nr. 170/1998: Atomhaftungsgesetz 1999] entered into force on 1 January 1999. The Act covers any damage to persons or property resulting from ionizing radiation due to nuclear installations, nuclear substances and radionuclides. Further coverable damages are the costs of the removal of impairments to the environment and the costs of preventing measures undertaken to avert immediate danger originating from nuclear installations, nuclear substances or radionuclides.

### **Article 4.1 (a)**

#### **the allocation of responsibilities and coordination between relevant state bodies**

The BMBWF currently has the sole responsibility for nuclear installations and non-medical particle accelerators within universities excepting accelerators for medical applications and research institutions of the Austrian Academy of Sciences as a competent authority responsible for licensing and supervision, therefore coordination in regard to matters under the scope of this directive are minimal. Said competency is allocated through the Radiation Protection Act.

Where there are interfaces to competences of other Ministries (i.e. emergency preparedness and response), the Ministries act in coordination and cooperation in regulatory issues at federal level. This cooperation is regulated in details in the Federal Ministries Act.

## **Article 4.1 (b)**

### **national nuclear safety requirements, covering all stages of the lifecycle of nuclear installations**

The authority and responsibility of the regulatory body for promulgating regulations and preparing guidance is granted by the Radiation Protection Act by empowering the Ministries having responsibilities in ensuring radiation and nuclear safety to issue ordinances regulating various activities falling into their authorities.

The following ordinances form the secondary legislative framework for nuclear safety:

#### General Radiation Protection Ordinance

The General Radiation Protection Ordinance [BGBl. II No. 191/2006: Allgemeine Strahlenschutzverordnung, AllgStrSchV entered into force on 1 June 2006. The last amendment of this ordinance was in 2015. This legislation contains regulations in connection with radiation protection (dose limits, requirements for exposed workers, requirements for sealed and unsealed radioactive sources, requirements for research reactors, etc.). According to this ordinance, the prime responsibility for nuclear safety of a research reactor rests with the license holder. The General Radiation Protection Ordinance provides evidence of graded approach with regard to the authorization process (exemption from authorization and including specific provisions for research reactors and high activity sealed sources).

#### Ordinance for Interventions in Case of Radiological Emergencies and in Case of Lasting Exposure

The Ordinance for Interventions in case of Radiological Emergencies and in case of Lasting Exposure [BGBl. II No. 145/2007: Interventionsverordnung] entered into force on 26 June 2007. It contains regulations in connection with interventions in case of radiological emergencies and in case of lasting exposure from a past radiological emergency or a past practice. These include inter alia significant releases of radioactive material due to accidents involving facilities or practices, accidents during the transport of radioactive material or terrorist acts using radioactive material.

#### Ordinance on the Shipment of Radioactive Waste

The Ordinance on the Shipment of Radioactive Waste [BGBl. II Nr. 47/2009: Radioaktive Abfälle-Verbringungsverordnung] entered into force on 19 February 2009. With this



ordinance, the EU Council Directive 2006/117/EURATOM on the supervision and control of shipments of radioactive waste and spent fuel was transposed into national law.

#### **Article 4.1 (c)**

##### **a system of licensing and prohibition of operation of nuclear installations without a licence**

The types of licensing are defined in Part II of the Radiation Protection Act (Articles 5, 6, 7 and 10) being further detailed by the General Radiation Protection Ordinance. Different types of authorisations are required by law for different stages of different facilities (construction and testing, and operation respectively). This constitutes a graded approach in the system of licensing. Siting and design are included in the construction stage, while decommissioning is included in the operation stage.

Pursuant to Article 5 of the Radiation Protection Act, installations under the act require authorisation prior to the beginning of construction, including the design of the installations. According to Article 6 an operating license is granted if the installation has been constructed in compliance with the specified conditions and obligations, if the radiation protection officer has been nominated and if the regular operation of the installation entails no hazard from ionising radiation. Article 7 regulates the licensing procedure for installations not requiring a construction permit, beyond of the scope of this convention. A concept for decommissioning and dismantling, a concept for the recycling or reuse of radioactive substances and the management of radioactive waste is obligatory for the TRIGA Research Reactor.

The first step of the licensing process is the submittal of the request for a license. The licensing documentation, which becomes part of the licensing, shall include a detailed description of the intended handling of sources. Therefore, the licensing is issued only for the activities described in the application. Requirements on licensing differ for facilities and activities in cases where a construction license must precede the operation licence and for facilities and activities where no construction license is required. Necessary documents must be enclosed with the application for the granting of an operation authorisation. In the case of the TRIGA Research Reactor detailed description of the intended handling and its scope in connection with a safety analysis, an accident analysis and an emergency response plan is required. For facilities and activities with lower risk a graded approach applies.

In granting of an authorization for a facility or an activity, the regulatory body may impose limits, conditions and controls on the authorized party's subsequent activities. According to

the underlying regulations one of the conditions to obtain an operation authorisation is to designate a radiation protection officer with recognised qualification.

All authorization applicants are required to conduct a safety analysis and to submit a safety analysis report in support of the application. The general content of the safety analysis is specified in the law as listed among the requirements on authorization above. Detailed requirements are explicitly determined for radioactive waste management facilities and for research reactors in the General Radiation Protection Ordinance, where the content of the safety report is specified. For other facilities and activities, there are regulatory guides defining the necessary content of the safety analysis.

In case after the issuance of an operation or handling license, it is found that radiation protection is not sufficiently ensured despite of the fulfilment of all conditions and requirements, the competent authority may impose additional requirements for operation.

The Federal Minister of Education, Science and Research is responsible for authorizations related to nuclear research facilities. The General Radiation Protection Ordinance requires that siting and design of a research reactor shall be authorized in accordance with the provisions by IAEA Safety Standard SSR-3. Siting and design are included in the construction phase. In order to obtain a construction license, a concept for decommissioning is required to be presented by the applicant. According to Article 5(3) of the radiation Protection Act, the licensing procedure for construction also includes provisions for trial operation. This provision is also applicable for changes or expansions of the installation. Furthermore, the General Radiation Protection Ordinance prescribes obligations of the licensee with respect to the operation of the research reactor, including stipulations on the operating organization. Accordingly, the research reactor shall be staffed with

- reactor management;
- reactor operators, who need authorization;
- radiation protection officer and other radiation protection experts;
- nuclear safety officer and deputy officer

All of whom needing proof of having successfully participated in training in the specialised fields as required by the Ordinance.

The Radiation Protection Act requires a license for the construction and operation of a research reactor and explicitly prohibits the construction or operation without appropriate license. There are no exceptions to this requirement.

#### **Article 4.1 (d)**

##### **a system of regulatory control of nuclear safety performed by the competent regulatory authority**

The Radiation Protection Act requires inspections by the responsible authorities to verify that the authorized party is in compliance with the regulatory requirements established in the Radiation Protection Act and the Radiation Protection Ordinance, as well as with the conditions specified in the authorization. The frequency of inspections are determined by the Radiation Protection Act. Facilities and activities inspected once a year for example, include research reactors, radioactive waste management facilities, high-activity sources and particle accelerators. The inspection frequencies prescribed by the Act are minimum values. In case of planned changes or for important reasons (i.e., complaints, suspicion of unlawful operation, etc.;) that may significantly affect the safety of the facility or in case of significant deficiencies in the operation of the facility or in the activity, further inspections may be held as laid down in Section 18 of the Radiation Protection Act. The inspectors have full access to any supervised facility or activity, at any time.

The regulatory authority of the research reactor (BMBWF) has established a formal process for inspection which includes inspection guidelines, as described in its Regulatory Supervision Handbook. An inspection programme is established every year and the annual inspection is announced. The methods to be used range from questioning, perusal and examination of the operator's documents/information/test plans all the way to on-the-spot inspections.

The inspection frequencies as prescribed by the law are the minimum values. Thus, for the research reactor there should be at least one inspection per year, but in case of planned changes or events that may significantly affect the safety or in case of significant deficiencies in the research reactor operation, there may be more than one inspection in a year. Prior to the inspection, the licensee is obliged to submit a set of documentation listed in the Regulatory Supervision Handbook (including e.g. annual reports on operation, on radiation protection, and on environmental monitoring, safety analysis report, report on training, test results and information on any safety related change in the operation of the research reactor). The authority and its expert(s) review and assess the submitted documents. During the inspection, the reports of the licence holder are discussed and any measures to be taken are recorded. In the extreme case when the inspection reveals that one or more of the

conditions for granting the licence are not being complied with and there is an unacceptable risk to the health or life of humans, the operation shall be prohibited.

The outcome of an inspection is discussed between the inspector (technical expert) and the legal experts of the regulatory body as basis for enhancement of processes and the planning of topical inspections.

#### **Article 4.1 (e)**

**effective and proportionate enforcement actions, including, where appropriate, corrective action of suspension of operation and modification or revocation of a license**

Principles and practice of enforcement of legal and regulatory expectations are defined by Article 18 of the Radiation Protection Act. Accordingly, in events of imminent danger, due to the handling of sources, the authority must arrange for all appropriate measures to avert this danger. For this purpose, it can issue preliminary injunctions and act in accordance with the provisions of the Administration Enforcement Act on substitute performance.

In addition, the Radiation Protection Act allows stipulating additional requirements for operation if so required to adequately ensure radiation protection or nuclear safety, even after the license has been granted.

The regulatory body takes enforcement actions in response to non-compliances with regulatory requirements. Enforcement actions stipulated by the legal background are mainly restricted to fines and the revocation of the licences in severe cases.

The Radiation Protection Act lists the fines for various unlawful acts/administrative offences, provided the act does not constitute a criminal offence within the jurisdiction of the courts and is not subject to more severe penalties according to other administrative provisions.

#### **Article 4.2**

**Member States shall ensure that the national framework is maintained and improved, when appropriate, taking into account operating experience, insights gained from safety analyses for operating nuclear installations, development of technology and results of safety research, when available and relevant**

Maintenance of the legal framework is typically related to changes in the EU-level framework or to changes in the federal level organizational basis. Furthermore, lessons learnt from

international best practices or other developments may lead to an ad hoc evaluation and analyses of the framework.

## Article 5

### Article 5.1

**Member States shall establish and maintain a competent regulatory authority in the field of nuclear safety of nuclear installations**

The BMBWF is the competent authority for the licensing of construction, operation and also for the inspection of research reactors and non-medical particle accelerators within the scope of university and research institutions of the Austrian Academy of Sciences as determined within the Radiation Protection Act.

### Article 5.2

**Member States shall ensure the effective independence from undue influence of the competent regulatory authority in this regulatory decision-making. For this purpose, Member States shall ensure that the national framework requires that the competent regulatory authority:**

**(a)**

**is functionally separate from any other body or organisation concerned with the promotion or utilisation of nuclear energy, and does not seek or take instructions from any such body or organisation when carrying out its regulatory tasks;**

As the Constitutional Law on a Nuclear-free Austria prohibits the generation of nuclear energy the functional separation between the regulatory authority and any other body concerned with the promotion and utilisation of nuclear energy is generally of no concern. Regardless, the effective independence of the BMBWF as regulatory body for the TRIGA reactor might be compromised, despite a comprehensive legal framework for safety, as the BMBWF also provides the funding to the TU Wien. This duality is capable to potentially cause a conflict of interest.

While this setup has so far had no effect on the performance and on the decisions of the regulatory body or on the generally very high level of safety, it might have an impact on the independent decision-making processes in the future.

Despite the possible conflicts of interest, the responsible authorities of the regulatory body have performed their functions according to the radiation protection legislation and the safety principles included therein. For example, the Research Reactor received new reactor instrumentation and a new radiation warning system, which were stipulated by the BMBWF in its function as the regulatory authority in light of the findings of the PSR. This refurbishment had to be financed from the universities' global budget, no additional funds were provided.

This potential conflict of interest has been addressed in Austria's IRRS Mission Report in 2018. Therefore, steps were taken to resolve the situation by means of making provisions in the Radiation Protection Act 2020, which will enter into force on August 1<sup>st</sup>, 2020. The new Act transfers the competence for the regulatory oversight for radiation Protection to the BMK y on January 1<sup>st</sup>, 2021, at which time the potential conflict of interest regarding regulatory oversight over the TRIGA Research Reactor will be resolved and effective independence will be ensured.

#### **Article 5.2 (b)**

**takes regulatory decisions founded on robust and transparent nuclear safety related requirements;**

The regulatory control of nuclear and radiation safety for nuclear installations in Austria is fully determined by the Radiation Protection Act, the General Radiation Protection Ordinance and the General Administrative Procedure Act. These legal vehicles ensure a stable, consistent and consequent regulatory supervision both in decision making and in inspection and enforcement performed by the federal Ministries involved.

Further on, for each Ministry a so called Büroordnung, (office regulation, the Federal Ministries Act) exists, that describes the functioning of the Ministry. Documents are always processed electronically.

The Federal Ministry of Science, Research and Economy has developed a Regulatory Supervision Handbook that is meant to summarize all regulatory processes and activities of the Ministry in supervising the research reactor and the related installations.

The underlying regulations provide sufficiently detailed basis for taking objective and consistent decisions in most practical cases without the danger of being influenced by the subjectivity of the staff working on the issue.

Furthermore, the Radiation Protection Act requires that qualified experts must be consulted with regard to fulfilment of the prerequisites of authorization. This is the case with the regulatory oversight with the TRIGA reactor, where external technical experts are consulted as needed.

In addition, the fact that any decision by the regulatory body may be contested at the Federal Administrative Court provides a further guarantee for an unbiased final regulatory decision.

**Article 5.2 (c)**

**is given dedicated and appropriate budget allocations to allow for the delivery of its regulatory tasks as defined in the national framework and is responsible for the implementation of the allocated budget;**

The BMBWF has set aside a specific budget subchapter for its regulatory tasks that enables the BMBWF to carry out its functions appropriately.

**Article 5.2 (d)**

**employs an appropriate number of staff with qualifications, experience and expertise necessary to fulfil its obligations. It may use external scientific and technical resources and expertise in support of its regulatory functions**

The authority within the BMBWF responsible for the oversight consists of three legal staff members, one consultant and four external experts for the evaluation of technical questions related to radiation protection. In view of the comparably small number of authorized parties the number of qualified staff is sufficient.

The staff has to undergo regular training to maintain competence, the specifics of which are determined within the annual "appraisal interviews" (Mitarbeitergespräche) between superior and staff member. The director undergoes said interview with the Director General.

**Article 5.2 (e)**

**establishes procedures for the prevention and resolution of any conflicts of interest;**

Conflicts of interest in regards to the oversight over the TRIGA are resolved as those of any other Austrian administrative bodies: the General Administrative Procedure Act requires that

in exercising their duties, administrative officers shall abstain from exercising their office and cause to have appointed a substitute in matters in which they are personally involved.

### **Article 5.2 (f)**

**provides nuclear safety-related information without clearance from any other body or organisation**

The BMBWF provides information on results of regulatory activities or other relevant events on the BMBWF's website to ensure an appropriate information of the public.

### **Article 5.3**

**Member States shall ensure that the competent regulatory authority is given the legal powers necessary to fulfil its obligations in connection with the national framework described in Article 4 (1). For this purpose, Member States shall ensure that the national framework entrusts the competent regulatory authorities with the following main regulatory tasks, to:**

**(a) propose, define or participate in the definition of national nuclear safety requirements;**

Competency for the preparation of legislation rests with the Federal Minister of Climate Action, Environment, Energy, Mobility, Innovation and Technology. Regardless, the BMBWF is included in deliberations regarding proposed changes to the legal framework as the Minister's Council may only propose legislation to the parliament unanimously and the Minister of Education, Science and Research could withhold his consent if his proposals are not included.

The BMBWF has to issue guides to further specify necessary procedures. In case of its function as regulatory authority the BMBWF has issued a Regulatory Supervision Handbook.

### **Article 5.3 (b)**

**require that the licence holder complies and demonstrates compliance with national nuclear safety requirements;**

Although no specific enforcement policy of the regulatory body is in place, principles and practice of enforcement of legal and regulatory expectations are defined by the Radiation Protection Act. Accordingly, in events of imminent danger, due to the handling of sources, the



authority must arrange for all appropriate measures to avert this danger. For this purpose, it can issue preliminary injunctions and act in accordance with the provisions of the Administration Enforcement Act on substitute performance. (If a person obligated to perform work or a service or in kind has not complied with this obligation at all or not completely or not in due time, the performance missing may be effected, after previous notification, at the cost and risk of the person obligated.) Preliminary injunctions shall be immediately enforceable.

In addition, the Radiation Protection Act allows that in case after the issuance of the operation authorisation it is found that radiation protection is not adequately ensured despite fulfilment of the requirements and compliance with the conditions, additional requirements for operation can be stipulated.

The Radiation Protection Act defines enforcement tools to apply by the BMBWF by stating that operation, handling or use must be prohibited if one of the requirements for granting an authorisation or the use of a type approved is not satisfied.

The district authorities are in charge for the enforcement of the administrative decision issued both by themselves and by the authorities of the Federal Administration or the provinces.

Further judicial punishment actions are defined by the Criminal Code on community criminal acts and offences against environment.

There are two cases in which the competent authority may decide on taking enforcement actions:

- According to the Radiation Protection Act, additional requirements may be included in a license decision and or may be stipulated after the legally binding issue of an authorization, if the necessity emerges at this time to ensure radiation protection requirements. These cases necessitate a deadline for the license holder to comply with any such requirements. The licensee has to report to the competent authority whether or not the criteria have been met and for any other important issues that might arise so that the authority may carry out further inspections.
- The second possible case is the obligation of the authority to prohibit the handling of radioactive sources regulated in the Act as discussed above.

As soon as the authority gains knowledge of the necessity to act, it has to decide if the licensee can be given an additional deadline or if exigent circumstances require immediate action pursuant to the Radiation Protection Act.

### **Article 5.3 (c)**

#### **verify such compliancy through regulatory assessments and inspections:**

The initial review and assessment is conducted by the BMBWF as part of the authorization process. The Radiation Protection Act requires that qualified experts must be consulted in the review and assessment process.

The purpose, scope and criteria for review and assessment are derived from the Radiation Protection Act. The BMBWF has established procedures for review and assessment.

The regulatory review is repeatedly performed during the lifetime of an authorized facility or activity through inspections and review of updated documentation of the authorized party. All information submitted by the authorized party to the regulatory authority is evaluated.

The BMBWF conducts planned, announced, and reactive inspections. According to the Radiation Protection Act, the authority may carry out inspections at any time as prerequisite for the review of the handling of sources (and facilities) as laid down in the Act and for important reasons such as in particular criminal charges, complaints, suspicion of the existence of reasons for a prohibition, suspicion of unlawful operation. While the Radiation Protection Act doesn't require unannounced inspections they are permissible under the current legal framework.

### **Article 5.3 (d)**

#### **propose or carry out effective proportionate enforcement actions:**

For a general overview on enforcement see Section to Article 5.3 (b).

Decisions are made by inspectors based on their professional experience and judgment and the advice received from external experts participating in the inspection. The district authorities are in charge of enforcement in case of noncompliance. As of the writing of this report no enforcement actions have been necessary in regard to the TRIGA Research Reactor.

As a matter of general legal provisions, the applicant or the authorized party may appeal against any decision by the authority. The appeal has to be submitted to the administrative court in the first instance within a prescribed timeframe.

## Article 6 – Licence holders

### Article 6.1 (a)

**The prime responsibility for the nuclear safety of a nuclear installation rests with the licence holder. That responsibility cannot be delegated and includes responsibility for the activities of contractors and sub-contractors whose activities might affect the nuclear safety of a nuclear installation;**

The General Radiation Protection Ordinance assigns the prime responsibility for nuclear safety to the licence holder of a nuclear installation.

Additionally, the Act on Liability for Damage Caused by Radioactivity<sup>1</sup> of 1999 defines the liability for nuclear installations and nuclear substances regardless of culpability. The liability both of the operator of a nuclear installation and the carrier of nuclear substances does in principle not presuppose any negligence on their part. Accordingly, the Act lays down as a rule the strict liability of the said persons. The operator of a nuclear installation is liable for all harm caused by operating the installation. Not only damages resulting from an accident during operation are covered, but also any damages in the ordinary course of operation (i.e. without any sudden incident.).

Furthermore, the Act abandons the principle of „channelling“ of nuclear liability currently governing the international conventions on the subject-matter. That means that compensation cannot only be claimed from the operator of an installation, but the injured party can also take legal action against third parties, e.g. the supplier and the constructor. This is meant to make sure that the person injured can recover all damages even if it is more than the operator can pay.

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<sup>1</sup> Bundesgesetz über die zivilrechtliche Haftung für Schäden durch Radioaktivität (Atomhaftungsgesetz 1999 – AtomHG 1999, BGBl. I No. 170/1998)

## **Article 6.1 (b)**

**when applying for a licence, the applicant is required to submit a demonstration of nuclear safety. Its scope and level of detail shall be commensurate with the potential magnitude and nature of the hazard relevant for the nuclear installation and its site;**

The types of licensing are defined in Part II of the Radiation Protection Act (Sections 5, 6, 7 and 10) being further detailed by the General Radiation Protection Ordinance. Different types of authorisations are required by law for different stages of different facilities (construction and testing, and operation respectively), for handling of sources which do not need an installation and for radiation devices (type approvals). This constitutes a graded approach in the system of licensing. Siting and design are included in the construction stage, while decommissioning is included in the operation stage.

Pursuant to section 5 of the Radiation Protection Act, installations under the act require authorisation prior to the beginning of construction, including the design of the installations. According to section 6 an operating license is granted if the installation has been constructed in compliance with the specified conditions and obligations, if the radiation protection officer has been nominated and if the regular operation of the installation entails no hazard from ionising radiation. Section 7 regulates the licensing procedure for installations not requiring a construction permit, beyond of the scope of this convention. A concept for decommissioning and dismantling, a concept for the recycling or reuse of radioactive substances and the management of radioactive waste are obligatory for any nuclear installation.

The first step of the licensing process is the submittal of the request for a license. The licensing documentation, which becomes part of the licensing, shall include a detailed description of the intended handling of sources. Therefore, the licensing is issued only for the activities described in the application. Requirements on licensing differ for facilities and activities in cases where a construction license must precede the operation licence and for facilities and activities where no construction license is required. Necessary documents must be enclosed with the application for the granting of an operation authorisation. In the case of the TRIGA Research Reactor detailed description of the intended handling and its scope in connection with a safety analysis, an accident analysis and an emergency response plan is required. For facilities and activities with lower risk, a graded approach applies.

In granting of an authorization for a facility or an activity, the regulatory body may impose limits, conditions and controls on the authorized party's subsequent activities. According to the underlying regulations one of the conditions to obtain an operation authorisation is to designate a radiation protection officer with recognised qualification.

All authorization applicants are required to conduct a safety analysis and to submit a safety analysis report in support of the application. The general content of the safety analysis is specified in the law as listed among the requirements on authorization above. Detailed requirements are explicitly determined for radioactive waste management facilities and for research reactors in the General Radiation Protection Ordinance, where the content of the safety report is specified. For other facilities and activities, there are regulatory guides defining the necessary content of the safety analysis.

In case after the issuance of an operation or handling license, it is found that radiation protection is not sufficiently ensured despite of the fulfilment of all conditions and requirements, the competent authority may impose additional requirements for operation.

The Federal Minister of Education, Science and Research (BMBWF) is responsible for authorizations related to nuclear research facilities. The General Radiation Protection Ordinance requires that siting and design of a research reactor shall be authorized in accordance with the provisions by IAEA Safety Standard SSR-3. Siting and design are included in the construction phase. In order to obtain a construction license, a concept for decommissioning is required to be presented by the applicant. According to section 5(3) of the radiation Protection Act, the licensing procedure for construction also includes provisions for trial operation. This provision is also applicable for changes or expansions of the installation. Furthermore, the General Radiation Protection Ordinance prescribes obligations of the licensee with respect to the operation of the research reactor, including stipulations on the operating organization. Accordingly, the research reactor shall be staffed with

- reactor management;
- reactor operators, who need authorization;
- radiation protection officer and other radiation protection experts;
- nuclear safety officer and deputy officer

All of whom needing proof of having successfully participated in training in the specialised fields as required by the Ordinance.

The Radiation Protection Act requires a license for the construction and operation of a research reactor and explicitly prohibits the construction or operation without appropriate license. There are no exceptions to this requirement.

For information on safety assessment see Article 6.1 (c).

### **Article 6.1 (c)**

**licence holders are to regularly assess, verify, and continuously improve, as far as reasonable practicable, the nuclear safety of their installations in a systematic and verifiable manner. That shall include verification that measures are in place for the prevention of accidents and mitigation of the consequences of accidents, including the verification of the application of defence-in-depth provisions;**

Initial review and assessment is conducted by the regulatory body as part of the authorization process and it is required that qualified experts must be consulted in the review and assessment process. The purpose, scope and criteria for review and assessment throughout the lifetime of the installation are derived from the Radiation Protection Act.

Pursuant to section 5(5) of the Radiation Protection Act, a precondition for a construction and operation licence is the existence and positive assessment of a safety analysis report (SAR), which is prescribed by the General Radiation Protection Ordinance. The SAR for the research reactor includes, in compliance with the relevant IAEA requirements

- a detailed description of the reactor site, of the reactor, and of all facilities and ^ activities with safety significance;
- the general safety principles and criteria to be applied to the design;
- the analysis of potential hazards associated with operation of the reactor;
- the safety analyses of the potential accident sequences;
- safety features to avoid or minimize likelihood of accidents or mitigate consequences in accordance with the defence in depth concept;
- information for establishing the operational limits and conditions (OLCs) for the reactor;
- conduct of operations; and
- details on the emergency plan of the research reactor.

The SAR has been updated several times in the past. Recent updates took place in 2017 and 2020 necessitated by relevant modifications to the reactor systems (i.e. reactor instrumentation and control system, ventilation system, area monitoring system). A periodic update of the SAR is mandated by the legal framework.

Aside from a high technical standard of the research reactor and reliable and qualified staff, the licence holder must systematically document and analyse events that have occurred in order to learn from them and to continue improving safety.

The process of event analysis and experience feedback ensures that all events relevant for the TRIGA Research Reactor in Vienna with regard to the development of contributing factors from humans, technology and organisation are analysed and that something is learned from them and, if necessary, that measures are initiated for the TRIGA Research Reactor in Vienna. Instruments for event analysis and experience feedback include the repeat test plan, which also defines the daily rounds and the routine inspections related to radiation protection, and the regular meetings at the TRIGA Research Reactor in Vienna.

The performance of event analyses and of the measures derived from them is subject to regulatory review through analysis of the annual operator report.

A critical role is provided by the nuclear safety officer. The nuclear safety officer is appointed in accordance with section 89b(1) General Radiation Protection Ordinance (AllgStrSchV) in writing by the authorisational and regulatory authority. Any such appointment requires the appointee's consent. Pursuant to section 89b(2) General Radiation Protection Ordinance (AllgStrSchV) the nuclear safety officer should be entrusted with the tasks that need to be performed to warrant the nuclear safety of a research reactor. In particular, these are

- the regular inspection of the installation's technical facilities,
- notification of the license holder without undue delay of any shortcoming with respect to nuclear safety,
- development of improvement and retooling measures on the basis of the inspection results, the officer's operating experience and the exchange of experience with the nuclear safety officers of comparable installations,
- the drafting and ongoing update of the safety report and the emergency response plan in collaboration with the radiation protection officer,
- the documentation and analysis of incidents that qualify as notifiable events and other anomalies,
- participation in the development of operating rules and in the fulfilment of recording and notification obligations for matters relating to nuclear safety and
- participation in the planning of changes to the installation or its operation.

Furthermore, pursuant to section 89b(5) General Radiation Protection Ordinance (AllgStrSchV), the nuclear safety officer shall be responsible for the documentation and analysis of incidents that qualify as notifiable events and other anomalies.

Pursuant to section 89c para 2 General Radiation Protection Ordinance (AllgStrSchV), the general operating rules of the TRIGA Research Reactor shall include measures in the case of

safety-relevant events, criteria for notifiable events as well as event detection and process description in case of incidents and the measures to be taken to avoid event progression and limit the safety impacts.

Findings are to be reported to the regulatory authority. The operator provides an event analysis for both internal events (notifiable events in accordance with INES and those below the notification threshold) and external events that could also be relevant for the TRIGA Research Reactor.

Internal events of the operator (notifiable events in accordance with INES and relevant events below the INES notification threshold) are reported directly to the regulatory authority. Measures are taken in consultation with the authority. There have been no events or near misses in the reporting period.

External events are communicated to the TRIGA Research Reactor in Vienna primarily via the Research Reactor Operators Group (RROG), the Arbeitsgemeinschaft Forschungsreaktoren (AFR) and informal exchanges with IAEA and other reactor operators.

As the occasion arises, external events are discussed directly and summarised in the context of the at least annual meeting of the reactor safety commission and reported by the nuclear safety officer during the annual regulatory interview pursuant to section 17 Radiation Protection Act (StrSchG).

The TU Wien has to prepare several documents for information and transparency, for traceability, documentation and as a working basis for the employees, the authority and as a basis for emergencies. As an example, The TU Wien, as required by the legal framework, has defined operating regulations, an operating manual, a repeat inspection plan, as well as a written documentation about the reactor operation. Maintenance of this documentation is compulsory as long as the reactor is operating. Further documents that have been established are training documents, teachings on the installation, documents about the regular calibration of the instruments, documents about the dosimetry or lists concerning any of the radioactive sources at the installation. Occupationally exposed persons in categories A and B at the TU Wien have to wear dosimeters and are monitored; persons of the category A have to be monitored by conducting medical examinations, which have to be documented. This applies to activities of contractors and sub-contractors as well as the staff of the TU Wien, with legal differentiation between occupationally exposed personal and external persons. The licensee has to provide appropriate protective clothing, to lay down the radiation areas and mark the escape routes. The license holder has to lay down the competences of the employees, their access to the different areas of radiation exposure. A new radiation warning system has been installed, the environment has to be monitored by itself and by outside experts by taking samples and measuring them in a regular interval. An



on-site emergency diesel generator has been installed and an emergency plan regulates the steps in an emergency case. Current events have to be reported immediately.

All these measures intend to keep the highest standards of safety on-site. The BMBWF, as the competent authority, checks the reports and documentation through its experts as described above in the context of the annual inspections and review procedure or on an as-needed basis and verify the accordance to the safety requirements and OLC set through the licence and the legal requirements. Any proposed modification that might significantly affect the safety is subject to a review and assessment prior to approval by the regulatory body.

Review and assessment plans and priorities are established by the Regulatory Body on an annual basis and communicated to the licensees.

#### **Article 6.1 (d)**

**licence holders establish and implement management systems which give due priority to nuclear safety**

According to Section 89a. para. 2 General Radiation Protection Ordinance (AllgStrSchV), the license holder is obligated to set up and apply a management system with the aim of warranting nuclear safety (§ 89a. para. 3-10 leg. cit.) of the installation at all times.

The description of the management system is part of the safety report pursuant to Annex 14 lit. A General Radiation Protection Ordinance (AllgStrSchV).

This system requires authorisation from the authority and must be checked by this authority on a regular basis.

The purpose of the management system is to warrant nuclear safety at all times and to continuously improve nuclear safety; it also serves as a tool for the management level to meet its duty of ensuring safe operation of the research reactor observing the "safety first" principle .

The management system must comprise all activities and facilities with a bearing on nuclear safety. The repeat test plan is a basic tool of the TRIGA management system. Trends or ageing processes are determined in the course of the regular consultations to discuss the results of repeat test plans within the scope of the meeting of the Reactor Safety Commission and appropriate measures are taken.

## **Article 6.1 (e)**

**licence holders provide for appropriate on-site emergency procedures and arrangements, including severe accident management guidelines or equivalent arrangements, for responding effectively to accidents in order to prevent or mitigate their consequences.**

**Those shall in particular: (i) be consistent with other operational procedures and periodically exercised to verify their practicability; (ii) address accidents and severe accidents that could occur in all operational modes and those that simultaneously involve or affect several units; (iii) provide arrangements to receive external assistance; (iv) be periodically reviewed and regularly updated, taking account of experience from exercises and lessons learnt from accidents;**

The procedures to be followed in case of operational occurrences and accidents are laid down in the on-site emergency response plan including:

- description of the installation and its equipment with regard to incidents, including an inventory of equipment and its place of storage
- Specifications for the detection and classification of a design basis accident,
- the definition of responsibilities, in particular those of the company's organisation, in the event of accidents,
- Representation of the procedures in the event of incidents, in particular the alarm sequences,
- Summary of reporting obligations to the authorities, including the determination of relevant contact addresses and reporting channels,
- precautions to ensure the reliability of all communication channels,
- agreements with external emergency services and authorities regarding assistance in the event of incidents, in particular with regard to the provision of additional human resources,
- facilities for initial and subsequent radiological impact assessments, including radiological environmental monitoring, and
- protective actions to minimise the exposure of persons to radiation, in particular the establishment of assembly points for workers inside and outside the reactor building, and measures to delimit and label the radiation hazard area and decontamination measures; and
- measures to ensure the medical care of injured persons, in particular their hospitalisation,
- technical measures to prevent the extension of the consequences of design basis accidents, in particular measures to minimise the release and spread of radioactive substances,
- Specifications for the limitation of the dose for the facility's internal personnel,
- regulations regarding public information,
- Regulations for the resumption of normal operation after the end of an accident,
- Measures to preserve evidence,
- Regulations governing staff training and practice,
- arrangements for reviewing and updating the contingency plan.

The Radiation Protection Act establishes the main responsibilities of the competent authorities in case of radiological emergencies. The General Radiation Protection Ordinance and the Ordinance on Interventions in Emergency Exposure Situations and in Existing Exposure Situations specifies in detail, as do subsequent documents like the Austrian National Radiation Emergency Plan and the Austrian Catalogue of protective actions.

On-site EPR plans have to be prepared by the license holder and are part of the licensing process.

The specific responsibilities related to EPR follow from their responsibilities set by the legislation related to nuclear and radiation safety:

The Federal Minister of Sustainability and Tourism (BMNT) has a 24/7 on call duty service for notification of radiological events. It is responsible for the evaluation of consequences in case of radiological emergencies, classification of the emergency, the decision on protective actions (with participation of the Federal Minister of Labour, Social Affairs, Health and Consumer Protection) and communication (other federal competent authorities and the public). The responsibility also includes governmental monitoring of large-scale radioactive contamination of the environment as well as acting as the Competent Authority for international information exchange (ECURIE, Convention on Early Notification and bilateral agreements).

The Federal Minister of Education, Science and Research as the regulatory body for the research reactor has to review the on-site emergency response plan of the research reactor as well as to receive notifications in case of an emergency at the research reactor.

The Federal Minister of the Interior is responsible for the co-ordination of the National Crisis and Disaster Management and for the international disaster relief, staffing and maintaining the Federal Alarm Centre, which is serving as national information platform and 24/7 Contact Point for information exchange (in the field of radiation protection: ECURIE, Convention on Early Notification and bilateral agreements).

The nine Austrian Provinces are responsible for the implementation of protective actions as well as developing and maintaining the response plans on provincial level (based on the National Response Plans).

The legal framework assigns to the authorized party the responsibility for the on-site Emergency Preparedness and Response. The required content of the on-site emergency response plan for the research reactor is established in Annexes of the General Radiation

Protection Ordinance. The regulatory body evaluates the EPR arrangements of the authorized party during the licensing process, whereas the prospective authorized party has to submit with the application for license a radiation protection programme, which includes an emergency response plan. Additionally, it is required that the authorized party notifies the regulatory body immediately about any emergency and has in place a system for response to an on-site emergency.

For the research reactor, the emergency response plan is included in the Safety Analysis Report and the General Radiation Protection Ordinance requires an update of the Safety Analysis Report whenever a significant change is planned to be approved by BMBWF.

The regulatory authority (BMBWF) reviews and assesses the on-site EPR arrangements of the licence holder (TU Wien) to verify compliance with the regulatory requirements before issuing the authorization for the conduct of the activity.

The license holder is obliged to report any incidents of safety significance to the regulatory body. In addition, the TRIGA Research Reactor is a member of the incident reporting system for research reactors of the IAEA (IRSRR) and has established a model reporting and evaluation system, which has been transferred to other TRIGA Research Reactors through IRSRR.

According to the hazard assessment and emergency preparedness categorization, the TRIGA Research Reactor is a category III facility. Off-site protective actions to be taken into account for EP category III facilities are part of the Austrian National Radiation Emergency Plan Part 3: "Accidents in Austrian nuclear and radiological facilities". These protective actions are based on the safety reports and hazard assessments.

In the urgent phase of a nuclear or radiological emergency the coordination between different responsible authorities in Austria is realized by well-established information pathways and procedures and an Internet based electronic situation reporting platform with restricted access for all responsible authorities. NCAs from neighbouring countries have access to the Austrian system as BMNT has access to similar systems in neighbouring countries.

The recently passed Radiation Protection Act 2020 introduces all requirements by the IAEA GSR Part 7 Safety Standard with regards the national emergency management system. Similarly, the new Radiation Protection Ordinance will include the (on-site) EPR requirements for all category III and IV facilities.

## **Article 6.1 (f)**

**licence holders provide for and maintain financial and human resources with appropriate qualifications and competences, necessary to fulfil their obligations with respect to the nuclear safety of a nuclear installation. Licence holders shall also ensure that contractors and subcontractors under their responsibility and whose activities might affect the nuclear safety of a nuclear installation have the necessary human resources with appropriate qualifications and competences to fulfil their obligations.**

The TRIGA Research Reactor is embedded in the Atominstitut of the TU Wien. Thus, the university as licence holder provides funds for staff, equipment, research and safety of the facility. The regular budget plus additional third party income assure the profound financing to operate the reactor in a safe and efficient way; overall priority is given to the safety of the TRIGA Research Reactor. All relevant safety measures have to be covered by the regular budget.

The TU Wien budget is provided through performance agreements with the BMBWF as well as third party allocations (the latter being much less significant). These public contracts are renegotiated every three years and provide the university with a global budget, which is not subdivided any further and is distributed by the university according to budgetary needs. The BMBWF has no say on the discretionary spending of the universities as they have been granted far reaching autonomy through the Federal Constitution. For more information on potential consequences see Article 5.2 (a).

The TU Wien as well as the Federal Real Estate Agency (Bundesimmobiliengesellschaft – the property owner of the reactor site) have made provisions in their respective balance sheets to provide for the eventual decommissioning of the research reactor, as this will require a significant investment.

While the TU Wien is free to allocate personal resources at her discretion, certain obligations regarding nuclear safety derive from the legal framework: According to section 89(1) General Radiation Protection Ordinance (AllgStrSchV), the license holder is obliged to specify allocation to the following functional groups, the distribution of the key tasks and the transfer of responsibilities:

1. reactor management (all supervisors of reactor operators who have the authority to issue directives)
2. reactor operators (persons authorised to operate and monitor the reactor in the defined scope);
3. radiation protection officer and persons entrusted with ensuring radiation protection;

4. nuclear safety officer and his or her deputy.

Therefore, all critical functions for the safety of the facilities are stipulated by legal requirements.

The regulatory monitoring of the specialist knowledge of the persons responsible and of the staff otherwise engaged is very important, because the staff's knowledge and expertise constitute the basis for human performance and thus for the safe conduct of reactor operations.

Section 43 General Radiation Protection Ordinance (AllgStrSchV) "Education and training in the field of research reactors" establishes the requirements related to the training and expertise of the radiation protection experts appointed and for further persons entrusted with ensuring radiation protection.

Section 89(2) and (3) General Radiation Protection Ordinance (AllgStrSchV) establishes the requirements related to the training and expertise of the nuclear safety officer to be appointed for the operation of the research reactor, such officer's deputy and of the reactor management as well as of the reactor operators required for operation of the research reactor.

In regard to The Austrian Radiation Protection Act (StrSchG) and the General Radiation Protection Ordinance (AllgStrSchV) include regulations for external contractors e.g. to perform maintenance work.

Requirements concerning external persons belonging to category B in radiation areas are regulated in Art. 20 of the General Radiation Protection Ordinance (AllgStrSchV). Those persons have to be instructed according to Art. 16 para. 2 of the General Radiation Protection Ordinance and to be monitored by personal dosimetry according to §§ 25 and 26 of the mentioned Ordinance .

Where the activity of the external person is not carried out on the basis of the undertaking's own authorisation but on the basis of an independent authorisation under radiation protection law, the briefing and exposure assessment pursuant to para. 2 may be omitted. However, this shall apply only if possible exposures are likely to result only from the direct activity of the external persons.

For external persons who are to carry out activities in the radiation area that do not require authorisation (e.g. craftspeople), an application for classification into category B for occupationally exposed persons shall be submitted to the authority.

External workers may only be granted access to the controlled area, if the licence holder ensures that said workers are in compliance with the relevant radiation protection measures, especially regarding possible dangers and the protective actions to be taken.

The TU Wien also provides academic training for nuclear physicists, which guarantees the national supply of experts in nuclear science, which, considering the size of the nuclear activity in the country is not that excessive to begin with.

## Article 7 – Expertise and skills in nuclear safety

See Articles 6.1 (e) and 6.1 (f) which give an overview on the contents of this article.

## Article 8 – Transparency

### Article 8.1

**Member States shall ensure that necessary information in relation to the nuclear safety of nuclear installations and its regulation is made available to workers and the general public, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation. That obligation includes ensuring that the competent regulatory authority and the licence holders, within their fields of responsibility, provide in the framework of their communication policy:**

**(a) information on normal operating conditions of nuclear installations to workers and the general public; and**

The General Radiation protection ordinance stipulates the regulatory authority to inform the public about nuclear safety of Research Reactors as well as regulatory activities. Therefore, the BMBWF typically provides *information to the public* through its website. This is also the case regarding information on its regulatory function for the TRIGA Research Reactor. The website includes an overview on the regulatory function in German and English with updates on recent regulatory activities if necessary.

*Communication from the general public* is typically received by letters, telephone calls and emails, addressed either to the offices or to the Minister.

Note that the Radiation Protection Act does not require consultations with inhabitants near facilities. On the other hand, the General Administrative Procedure Act details the requirements on oral hearings for interested parties. For the scheduling of an oral hearing the persons involved, to the extent they are known, shall be notified personally. If further persons could be involved, the hearing shall also be publicly announced on the official bulletin board of

the municipality, by publication in the newspaper serving for official announcements of the authority, or by publication in the electronic official gazette of the authority. In case of the TRIGA Research Reactor, neighbours bordering on the premises of the reactor facility need to be notified and they may file proposals for consideration in case of changes to the building.

Oral hearings are also held when changes in the reactor core (fuel elements) of the Research Reactor are planned.

Concerning the licence holder the General Radiation Protection Ordinance requires the licence holder to inform the public on the operating condition of the reactor as well as events that are relevant to nuclear safety. Therefore, the University of Technology of Vienna keeps the public informed mainly via the Atominstitut's website with an overview of recent activities and general information on the reactor. Interested parties may also visit the facility with an appointment.

#### **Article 8.1 (b)**

**prompt information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation**

Different provisions exist for *informing the Austrian population* in case of a radiological or nuclear emergency. In case of an emergency, the competent federal authorities will provide urgent information to the public together with the recommendations of protective actions. If necessary, representatives of the Austrian Broadcast Corporation (ORF) and the Austrian Press Agency (APA) will extend the coordination board of the National Crisis and Disaster Management. A call-center can be activated on short notice. Public leaflets on radiation protection, emergency management and protective actions are available ([www.strahlenschutz.gv.at](http://www.strahlenschutz.gv.at)). According to the Ordinance on Interventions, additional information prior and in case of a radiological emergency is provided on the homepage of the BMK.

The exchange of information in case of a radiological or nuclear emergency with the **competent authorities in the neighbouring countries** is guaranteed by three information systems: Austria fulfils the obligations of the Convention on Early Notification of Nuclear Accidents (IAEA), is part of the ECURIE information exchange system organized by the European Commission and has bilateral agreements with all neighboring countries operating nuclear power plants. Austria has been striving for years to extend the bilateral and regional co-operation, which resulted, among others, in automatic exchange of information between emergency centers



relevant for assessing the impact of a radiological or nuclear accident (such as dose rate measurements and source term information) and joint emergency exercises.

Data gathered by the Radiation Early Warning System are exchanged on-line with the corresponding systems in most of the neighboring countries (Slovenia, Slovakia, Czech Republic, Hungary, Germany and Switzerland) on the basis of bilateral arrangements. In parallel, exchange of these data is run on European level via the EURDEP system among the EU member states.

The Austrian Radiation Early Warning System (Strahlenfrühwarnsystem) continuously monitors ambient gamma dose rates with more than 300 measuring stations throughout the country. In addition, 10 aerosol-monitoring stations have been installed near the Austrian borders. The measurement data of these automatic on-line systems are transmitted to the National Centre at BMK and to nine provincial centers located in the provincial capitals. The on-line data of about 100 stations of this system are accessible to the public via internet ([www.strahlenschutz.gv.at](http://www.strahlenschutz.gv.at)) and on the Austrian Broadcast (ORF) Teletext service.

## **Article 8.2**

**Information shall be made available to the public in accordance with relevant legislation and international instruments, provided that this does not jeopardise other overriding interests, such as security, which are recognised in relevant legislation or international instruments.**

Before releasing information to the public the BMBWF applies a risk-benefit-assessment: If security interests counter indicate the publication of information, the information is only publicized in such a way that it is not detrimental to security, if such a generalization is possible. In general, information is provided in such a way that it is easily understandable without going into technical detail to ensure a broad understanding of the subject matter at hand. Concerning the information rights of interested parties with real estate interests in close proximity to the TRIGA Research Reactor see the information provided under Article 8.1.a

## **Article 8.3**

**Member States shall, without prejudice to Article 5 (2), ensure that the competent regulatory authority engages, as appropriate, in cooperation activities on the nuclear safety of nuclear installations with competent regulatory authorities of other Member**

**States in the vicinity of a nuclear installation, inter alia, via the exchange and/or sharing of information.**

The TU Wien's TRIGA Research Reactor is Austria's only nuclear facility. As such, exchange and sharing of experience happens mostly on the international stage.

The license holder is obliged to report any incidents of safety significance to the regulatory body. In addition, the TRIGA Research Reactor Vienna is a member of the incident reporting system of the IAEA (IRSRR) and has established a model reporting and evaluation system, which has been transferred to other TRIGA Research Reactors through IRSRR.

Operational experience is collected and shared among the TRIGA Research Reactors worldwide as well as through the IAEA with the international research reactor community. The Atominstitut (the institute operating the TRIGA Research Reactor within the TU Wien) is a member of the:

- TRIGA community (meets regularly)
- Arbeitsgemeinschaft Forschungsreaktoren (AFR - meets twice a year)
- Research Reactor Operators Group (RROG - meets once a year)
- Research Reactor Fuel Management Group (RRFM - meets once a year),
- International Group on Research Reactor (IGORR - meets every 18 month)
- European Atomic Energy Society (EAES - meets once a year)
- International Nuclear Security Education Network (INSEN – meets yearly).

These communities and meetings provide ample occasions for receiving information and sharing lessons learned on operating experience of other countries and licensees.

International experience is constantly exchanged and updated at these meetings. The results of this information exchange are reflected in the overall technical and organisational status of the Vienna TRIGA facility.

The regulatory authority of the research reactor takes part in the bilateral and multilateral meetings with several neighbouring countries based on bilateral state treaties (all neighbouring countries except Italy and Liechtenstein, as well as Poland and Belarus). During these meetings, information and experience are exchanged in order to deduce relevant lessons learned.

In March 2017 the Federal Ministry of Science, Research and Economy participated in an international information exchange meeting with other research reactor regulatory authorities from Belgium, Germany and the Netherlands. This forum is meant to discuss regulatory experience in research reactor oversight, in the application of graded approach, and to assist

in exchanging information on challenges and good practices and constitutes itself on an ad hoc basis.

Should a safety significant event occur, the regulatory body would require appropriate corrective actions resulting from the analysis of the available information and international practice in similar events, in order to prevent recurrence.

#### **Article 8.4**

**Member States shall ensure that the general public is given the appropriate opportunities to participate effectively in the decision-making process relating to the licensing of nuclear installations, in accordance with relevant legislation, and international instruments.**

See Article 8.1 (a) for the relevant information.

### **Article 8a Nuclear safety objective for nuclear installations**

#### **Article 8a.1**

**Member States shall ensure that the national nuclear safety framework requires that nuclear installations are designed, sited, constructed, commissioned, operated and decommissioned with the objective of preventing accidents and, should an accident occur, mitigating its consequences and avoiding:**

- (a) early radioactive releases that would require off-site emergency measures but with insufficient time to implement them;**
- (b) large radioactive releases that would require protective measures that could not be limited in area or time.**

The General Radiation Protection Ordinance requires that siting of a research reactor shall be authorized in accordance with the provisions by the IAEA Safety Standard SSR-3. Specifically, with regard to the site assessment, the underlying criteria, the evaluation of external site-related hazards, particularly as a consequence of extreme meteorological events, earthquakes or anthropogenic factors, and the appraisal of the impact the planned installation will have on the environment and the population the requirements set by SSR-3 are relevant.

The Austrian legislation stipulates in section 5 (2) and (5) of the General Radiation Protection Ordinance an obligatory evaluation of the potential impact of a planned research reactor on the individuals, the population and the environment according to the requirements set by the IAEA Safety Standard SSR- 3.

As there are no plans to establish new nuclear installations this is currently of very low practical relevance in Austria.

The operating license of the TRIGA Research Reactor includes a requirement on the regularly reporting of environmental monitoring and of "dosimetry for measuring external and internal radiation exposure of people" to the regulatory body and is part of the yearly inspection process according to section 17 of the Radiation Protection Act. So far, no irregular activities or exceedances of dose limits have been reported.

#### **Article 8a.2**

**Member States shall ensure that the national framework requires that the objective set out in paragraph 1:**

#### **Article 8a.2 (a)**

**applies to nuclear installations for which a construction licence is granted for the first time after 14 August 2014**

No construction licence has been issued after August 14<sup>th</sup>, 2014. There are currently no plans to construct a new Research Reactor. Other nuclear installations are prohibited by constitutional law.

#### **Article 8a.2 (b)**

**is used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including in the framework of the periodic safety reviews as defined in Article 8c (b).**

As the NSD has been transposed into the national legal framework its guiding principles have been introduced into the regulatory practices. To further specify requirements and give guidance to the licence holder, the BMBWF issued a Regulatory Supervision Handbook that is meant to summarize all regulatory processes and activities of the Ministry in supervising the research reactor and the related installations and to ensure the continuous improvement for

safety. The BMBWF regularly performs trend analysis based on inspection results from the annual safety procedures and other inspections as well as documentation provided by the licence holder (i.e. repeat test plans) to identify measures for the continuous improvement for safety.

## **Article 8b: Implementation of the nuclear safety objective for nuclear installations**

### **Article 8b.1**

**In order to achieve the nuclear safety objective set out in Article 8a, Member States shall ensure that the national framework requires that where defence-in-depth applies, it shall be applied to ensure that:**

- (a) the impact of extreme external natural and unintended man-made hazards is minimised;**
- (b) abnormal operation and failures are prevented;**
- (c) abnormal operation is controlled and failures are detected;**
- (d) accidents within the design basis are controlled;**
- (e) severe conditions are controlled, including prevention of accidents progression and mitigation of the consequences of severe accidents;**
- (f) organisational structures according to Article 8d(1) are in place.**

Design of a research reactor shall be done in accordance with the IAEA Safety Standard SSR-3, as required by the General Radiation Protection Ordinance. This fact naturally ensures full compliance of the TRIGA Research Reactor design requirements with those stemming from the IAEA Safety Standards. Siting and design are included in the construction phase. Furthermore, the legal framework requires the licence holder of a nuclear installation to include and continuously update such analyses in its safety analysis report.

As there are currently no plans to establish new nuclear installations there have been no activities concerning siting during the reporting period.

### **Article 8b**

**Implementation of the nuclear safety objective for nuclear installations.<sup>2</sup> In order to achieve the nuclear safety objective set out in Article 8a, Member States shall ensure that the national framework requires that the competent regulatory authority and the licence**

**holder take measures to promote and enhance an effective nuclear safety culture. Those measures include in particular:**

Pursuant to section 89b(6) of the General Radiation Protection Ordinance (AllgStrSchV), the license holder shall ensure a high safety culture in all the installation's areas and at all organisational levels.

In the context of supervision, the topic of safety culture is handled as follows:

Human factor and human-technology interface:

As a result, supervision of the "human factor" focuses on expertise and the sense of responsibility of the persons responsible and the staff otherwise engaged, which is why special attention must be paid to the completion of the applicable mandatory training of employees in the area of radiation protection.

Safety in connection with operational experience

In the context of the analysis of events, the TU Wien checks the extent to which human conduct or the human/technology interface was relevant for the event and whether optimisations are required. This takes place in the context of the at least annual meetings of the reactor safety commission. In the context of the annual regulatory interview pursuant to section 17 of the Radiation Protection Act (StrSchG), the nuclear safety officer reports about this as the occasion arises.

Safety due to the organisation

In the context of the repeat tests, experts also assess safety culture with the help of targeted discussions or specific questions in the context of the annual regulatory interview pursuant to section 17 of the Radiation Protection Act (StrSchG) with the management of the TRIGA Research Reactor based on the review questions as determined within the supervisory handbook.

**Article 8b.2 (a)**

**management systems which give due priority to nuclear safety and promote, at all levels of staff and management, the ability to question the effective delivery of relevant safety principles and practices, and to report in a timely manner on safety issues, in accordance with Article 6(d);**

According to section 89a(2) General Radiation Protection Ordinance (AllgStrSchV), the license holder is obliged to set up and apply a management system with the aim of warranting nuclear safety (section 89a.(3)-(10) leg. cit.) of the installation at all times.

The description of the management system is part of the safety report pursuant to Annex 14 lit. A of the General Radiation Protection Ordinance (AllgStrSchV).

This system is checked by the BMBWF on a regular basis.

Basic principles are defined within the supervisory handbook: The management system must comprise all activities and facilities with a bearing on nuclear safety. This must be given highest priority. In addition, it must take into account other requirements of the operator of the research reactor, including operating safety or the performance of experiments.

Workflows are part of the management system and reviewed through the repeat test plan: This plan specifies all the processes, installations and facilities that warrant the reactor's nuclear safety and includes inspection criteria. The proper implementation of the inspections and their results need to be reviewed by the competent persons (management, radiation protection, nuclear safety). Any required maintenance or repairs will be commissioned, monitored and documented by the nuclear safety officer.

A regulatory review of the management system includes

- in addition to verifying compliance with the defined requirements in terms of scope and content of the management system and the operator's report, verifying the plausibility of any representations made,
- recognising trends by analysing parameters,
- assessing whether the management system is being applied to improve safety and promote the safety culture
- determining ambiguities and further concerns within the scope of the annual consultation pursuant to section 17 of the Radiation Protection Act (StrSchG).

### **Article 8b.2 (b)**

**arrangements by the licence holder to register, evaluate and document internal and external safety significant operating experience;**

As for the Research Reactor, the record keeping obligations are set by the General Radiation Protection Ordinance. Accordingly, the license holder shall ensure that records are kept on an

ongoing basis as necessary to assess the safety of the operation in terms of radiation protection and nuclear safety. These records shall also include such information as is needed to reconstruct the causes and the course of notifiable events. The records shall be kept for a period of no less than 30 years and shall be presented to the competent authority, the authority designated to protect employee rights and the responsible accident insurer on request.

Checking of existence of these records is typically performed during inspections. Activities requiring inspection and the frequency and performing of these inspections are stipulated in the Radiation Protection Act. In case of noncompliance with the regulations revealed by inspections, a formal investigation is initiated by the authorities.

The records, such as the Central Dose Register and the Central Source Register are used by the regulatory body when needed, on a case-by-case basis, typically during inspections as well as when preparing various (annual, to the Government, or national) reports.

For information regarding the sharing of operating experience, see input to Article 8.3.

#### **Article 8b.2 (c)**

**the obligation of the licence holder to report events with a potential impact on nuclear safety to the competent regulatory authority; and,**

According to the General Radiation Protection Ordinance, the Nuclear Safety Officer shall analyse incidents that are subject to mandatory reporting and other incidents in order to feedback of operating experience. The Ordinance further stipulates the licensee to develop operating rules that shall address, among others, the measures for safety-relevant events, criteria for reportable events, as well as event detection and process description for accidents and measures to be initiated. Feedback from experience in operating the reactor, taking into account the operational experience for other comparable reactors, is also required to be considered by the periodic safety review.

If there are safety endangering circumstances they have to be reported immediately to the license holder and to the competent authority and the (part of the) facility has to be shut down until the problem could be solved. All these procedures and undertaken measures have to be documented as well.

Depending on the technical problems the regulatory authority may take advice by external experts and impose conditions and requirements for the resumption of the operation.



### **Article 8b.2 (d)**

**for education and training, in accordance with article 7.**

See Articles 6.1 (e) and 6.1 (f) for the required information.

Additionally, the New Radiation Protection Act explicitly stipulates in Section 141 the compulsory training and retraining of staff and external experts working for either the licence holder or the regulatory authority to further strengthen competence for safety.

## **Article 8c: Initial assessment and periodic safety review**

### **Article 8c**

**Member States shall ensure that the national framework requires that:**

**(a) any grant of a licence to construct a nuclear installation or operate a nuclear installation, is based upon an appropriate site and installation-specific assessment, comprising a nuclear safety demonstration with respect to the national nuclear safety requirements based on the objective set in Article 8a;**

The legislative framework includes provisions in regard to construction, siting and relevant assessments. As there are no plans for constructing new nuclear installations this is of very little practical relevance in Austria. See the answers to Articles 4.1 and 6.1 for more information.

### **Article 8c (b)**

**the licence holder under the regulatory control of the competent regulatory authority, re-assesses systematically and regularly, at least every 10 years, the safety of the nuclear installation as laid down in Article 6(c). That safety reassessment aims at ensuring compliance with the current design basis and identifies further safety improvements by taking into account ageing issues, operational experience, most recent research results and developments in international standards, using as a reference the objective set in Article 8a.**

Pursuant to section 89a(10) General Radiation Protection Ordinance AllgStrSchV the license holder has to conduct a periodic safety review every 10 years. The contents of this review are determined in Annex 14 letter C of said ordinance and results of this review have to be

submitted to the BMBWF, with the first-time submission having taken place in December 2014.

The SAR has been updated several times in the past. The last update took place in 2017 necessitated by relevant modifications to the reactor systems (i.e. reactor instrumentation and control system, ventilation system, area monitoring system). A periodic update of the report is mandated by the legal framework.

Aside from a high technical standard of the research reactor and reliable and qualified staff, events that have occurred must be systematically documented and analysed in order to learn from them and to continue improving safety.

The process of event analysis and experience feedback ensures that all events relevant for the TRIGA Research Reactor in Vienna with regard to the development of contributing factors from humans, technology and organisation are analysed and that something is learned from them and, if necessary, that measures are initiated for the TRIGA Research Reactor in Vienna. Instruments for event analysis and experience feedback include the repeat test plan, which also defines the daily rounds and the routine inspections related to radiation protection, and the regular meetings at the TRIGA Research Reactor in Vienna.

The performance of event analyses and of the measures derived from them is subject to regulatory review through analysis of the annual operator report.

## **Article 8d: On-site emergency preparedness and response**

### **Article 8d.1.**

**Without prejudice to the provisions of the Directive 2013/59/Euratom, Member States shall ensure that the national framework requires that an organisational structure for on-site emergency preparedness and response is established with a clear allocation of responsibilities and coordination between the licence holder, and competent authorities and organisations, taking into account all phases of an emergency.**

Although not explicitly prescribed in the Austrian legislation, the responsibilities of the competent authorities to regulate on-site EPR reside from the relevant provisions of the legal and regulatory documents, as described below.

In establishing regulations and guides for EPR for operating organizations of regulated facilities or activities that could necessitate emergency response actions:

- according to the Radiation Protection Act, the authority shall establish by ordinance detailed provisions regarding the content of the emergency response plan, which shall include in particular internal and external measures to address the emergency;
- the necessary content of the on-site emergency response plan for Research Reactors (RR) and for Radioactive Waste Management (RWM) facilities is established in Annexes of the General Radiation Protection Ordinance; for other facilities, there are guidelines published on the Federal Minister of Agriculture, Forestry, Environment and Water Management website;
- according to the Radiation Protection Act, the Federal Ministry of Agriculture, Forestry, Environment and Water Management is entitled to establish by ordinance requirements on details related to EPR (e.g. appropriate intervention levels; the content, scale and review of national and local action plans; the type, content and scale of exercises; the reporting obligations; the minimum requirements for special action teams for technical, medical and health interventions and for the training of intervention teams; the rules for emergency occupational exposures in connection with interventions; for the physical and medical surveillance of individuals who become active in connection with interventions as well as related reporting and provision-of-proof requirements; who and to what extent shall assess emergency situations and their consequences as well as the efficiency of the interventions initiated).

Note that in the course of the current revision of the Radiation Protection Act it is planned to introduce all the requirements by the IAEA GSR Part 7 safety standard with regards the national emergency management system. A new ordinance is also planned to be issued, giving the (on-site) EPR requirements for all category III and IV facilities.

For more information about EPR see the information to Article 6.1 (e).

### **Article 8d.2**

**Member States shall ensure that there is consistency and continuity between the on-site emergency preparedness and response arrangements required by the national framework and other emergency preparedness and response arrangements required under Directive 2013/59/Euratom**

This has been addressed under Article 6.1 (e).

## **Article 8e Peer Reviews**

### **Article 8e.1**

**Member States shall, at least once every 10 years, arrange for periodic self-assessments of their national framework and competent regulatory authorities and invite an**

**international peer review of relevant segments of their national framework and competent regulatory authorities with the aim of continuously improving nuclear safety. Outcomes of such peer reviews shall be reported to the Member States and the Commission, when available.**

The first IRRS mission to Austria took place from June 25<sup>th</sup> to July 3<sup>rd</sup>, 2018. Overall, the thorough analysis identified 20 recommendations and 9 suggestions on how to improve the regulatory framework and regulatory practices. The report has been notified with the EC and may be downloaded from <https://www.bmlrt.gv.at/umwelt/strahlen-atom/antiakwpolitik/euroatom-internat/IRRS-Mission-Austria-2018.html>

#### **Article 8e. (2)**

**Member States shall ensure that, on a coordinated basis:**

- (a) a national assessment is performed, based on a specific topic related to nuclear safety of the relevant nuclear installations on their territory;**
- (b) all other Member States, and the Commission as observer, are invited to peer review the national assessment referred to in point (a);**
- (c) appropriate follow-up measures are taken of relevant findings resulting from the peer review process;**
- (d) relevant reports are published on the above mentioned process and its main outcome when results are available.**

As the last topical peer review on ageing management was compulsory for nuclear power plants and research reactors with a thermal output of more than 1 MW only, Austria decided not to participate in that peer view, not least as the reactor has been overhauled extensively between 2014 and 2018.

#### **Article 8e.3.**

**Member States shall ensure that arrangements are in place to allow for the first topical peer review to start in 2017, and for subsequent topical peer reviews to take place at least every six years thereafter.**

No reporting required.

**Article 8e.4.**

**In case of an accident, leading to situations that would require off-site emergency measures or protective measures for the general public, the Member State concerned shall ensure that an international peer review is invited without undue delay.**

No accidents have occurred during the period covered by this report.

## Abbreviations

AllgStrSchV	General Radiation Protection Ordinance
BGBI	Federal Law Gazette
BMBWF	Federal Ministry for Education, Science and Research
BMK	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology
Bq	Becquerel
BVG	Federal Constitutional Law
ENSREG	European Nuclear Safety Regulators Group
EPR	Emergency Preparedness and Response
EU	European Union
GSR	General Safety Requirements
IAEA	International Atomic Energy Agency
INES	International Nuclear Event Scale
IRRS	Integrated Regulatory Review Service
kW	Kilowatt
MW	Megawatt
NSD	Council Directive 2009/71/Euratom of 25 June 2009 establishing a community framework for the nuclear safety of nuclear installations, as amended by the Council Directive 2014/87/Euratom of 8 July 2014
OLC	Operational limits and conditions
SAR	Safety Analyses Report
SSR	Specific Safety Requirements
StrSchG	Radiation Protection Act
TRIGA	Training, Research, Isotopes, General Atomics
TU Wien	Vienna University of Technology - Technische Universität Wien

## **Imprint**

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