



Austria



1st REPORT

under the

**Directive 2009/71/Euratom establishing a
Community framework for the
nuclear safety of nuclear installations**

July 2014

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for the nuclear safety of nuclear installations

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1st National Report of AUSTRIA

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July 2014

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A Introduction

Austria has never operated a nuclear power plant and has no intention to do so in the future. Thus, Austria's high interest in the safety of nuclear facilities, except for the domestic nuclear activities as described in chapter 7.6, relates primarily to environmental and health concerns arising from the operation of nuclear power plants in Austria's neighbourhood.

Already in 1978, the Austrian electorate decided in a referendum not to start the operation of the constructed nuclear power plant (BWR) in Zwentendorf. Shortly thereafter, on 15 December 1978, the Austrian parliament promulgated the Law on the Prohibition of the Use of Nuclear Fission for Energy Generation in Austria [BGBl. No. 676/1978: Bundesgesetz über das Verbot der Nutzung der Kernspaltung für die Energieversorgung in Österreich]. This position was strengthened by the Chernobyl accident in 1986 which substantially increased the opposition of the political parties and the public at large against nuclear power. Austria was at the time among those countries in Central Europe which were most affected by the Chernobyl accident.

In 1999, the Austrian parliament passed unanimously the Constitutional Law on a Nuclear-free Austria [BGBl. I No. 149/1999: Bundesverfassungsgesetz für ein atomfreies Österreich]. It stipulates, inter alia, that installations which serve for energy generation by nuclear power must not be constructed or, if they already exist, come on line. Furthermore, the law prohibits the transport of fissile materials for purposes of nuclear power generation or disposal unless this conflicts with international obligations.

In Austria there is just one nuclear installation - within the meaning of the Directive - in operation; a TRIGA MARK II research reactor, which went critical in 1962.

In October/ November 2012- irradiated fuel elements from the research reactor were shipped to the Idaho National Lab and replaced by 77 19.8% enriched standard TRIGA fuel elements. With this new core the TRIGA reactor Vienna went critical on 27 November 2012. These fuel elements will be returned to the USA after 2025, if the parties of the contract (the Vienna University of Technology, the US- Department of Energy and EURATOM- ESA) don't agree upon an extension of the reactor operation.

Presently, the total number of fuel elements in the core is 76 (plus 9 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 7.27×10^{13} Bq and after ten years approx. 1.5×10^{13} Bq. The Institute of Atomic and Subatomic Physics has a total spent fuel storage capacity of 168 fuel elements.

The Operator of this research reactor is the Institute of Atomic and Subatomic Physics (Atominstitut- ATI), which is an Institute of the Vienna University of Technology. The reactor is used for the production of neutrons, for education and training of students and junior professionals and for research in different fields of Physics.

Practical courses are organised. The reactor is part of the Eastern European Research Reactor Coalition and of ENEN (European Nuclear Education Network)

The operating TRIGA Mark II 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. Being the closest research reactor to the IAEA headquarters, it is also frequently used by IAEA staff for development and calibration of safeguards instruments.

Financially and legally, the Vienna University of Technology is an independent body since the year 2004.

The main law and Ordinance in the field of radiation protection is the Radiation Protection Act and the General Radiation Protection Ordinance which are amended to adopt international guidelines if required.

As the competent regulatory authority The Federal Ministry of Science, Research and Economy annually supervises this nuclear installation involving international nuclear experts, the experts of the national authority dealing with the protection of people working at the research reactor site, peer reviewers from the Austrian Agency for Food and Health Safety (AGES) monitoring the impact of the facility to the environment and controlling radioactive substances release into the environment and last but not least representatives of the employee unions of the Vienna University of Technology.

B Summary

The Directive 2009/71/ EURATOM was implemented in the General Radiation Protection Ordinance 2012.

According to the amendment of the Radiation Protection Act 2013 the competences for the TRIGA research reactor of the Institute of Atomic and Subatomic Physics in Vienna changed: The Federal Ministry of Science, Research and Economy got the sole responsibility.

C Reporting article by article

Article 4 – Legislative, regulatory and organisational framework

Article 4

1. Member States shall establish and maintain a national legislative, regulatory and organisational framework (hereinafter referred to as the 'national framework') for nuclear safety of nuclear installations that allocates responsibilities and provides for coordination between relevant state bodies. The national framework shall establish responsibilities for:

- (a) the adoption of national nuclear safety requirements. The determination on how they are adopted and through which instrument they are applied rests with the competence of the Member States;
- (b) the provision of a system of licensing and prohibition of operation of nuclear installations without a licence;
- (c) the provision of a system of nuclear safety supervision;
- (d) enforcement actions, including suspension of operation and modification or revocation of a licence.

Overview

The safety of the Research reactor, the spent fuel management regarding research reactors and the safety of radioactive waste management are mainly governed by the federal legislation on radiation protection, consisting of the following laws and ordinances:

- Radiation Protection Act,
- General Radiation Protection Ordinance,
- Ordinance on the Shipment of Radioactive Waste,
- "Sicherheitskontrollgesetz 2013" (SKG 2013)

As outlined in the Introduction, 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 requirements of the legislation are stated in detail in the relevant construction and operating licenses. Constructional and technical norms and standards designed to afford protection against radiation from spent fuel are specified also on an individual basis in the operating license.

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 constitutes a Federal State, a number of federal and provincial authorities are involved in the regulation of these matters. For example the Federal Ministry of the Interior is the competent authority for physical protection.

Moreover on 1st March of 2013 the "Sicherheitskontrollgesetz 2013" (SKG 2013) BGBl. I Nr. 42, entered into force which substitutes the "Sicherheitskontrollgesetz 1991" and updates the Austrian legal position to the new international law.

National requirements for radiation safety are established in the Radiation Protection Act, the General Radiation Protection Ordinance and the Medical Radiation Protection with the aim to protect lives and health of individuals and their descendants, as well as the environment from the hazards of ionising radiation. It implements the principles of justification of a practice, optimisation of radiation exposure and dose limitation. Detailed radiation protection measures for the handling of radioactive waste are additionally laid down in the individual operating licenses.

The **Radiation Protection Act** [BGBl. No. 227/1969: Strahlenschutzgesetz], with several amendments in 2002, 2004 and 2006 implementing recent EU legislation. The latest amendment in year 2013 entered into force on 1 July and contains optimization of the intervals of periodic inspections of the licensees by the authorities, transition of the authority from the districts to the provinces and sole responsibility of the Federal Ministry of Science, Research and Economy for nuclear installations and particle accelerators within universities and research institutions of the Austrian Academy of Sciences (formerly: Ministry of Science and Research in accordance with the Ministry of Agriculture, Forestry, Environment and Water Management).

The Radiation Protection Ordinances contain detailed provisions concerning radiation protection, installation safety and the handling of radioactive waste.

Major amendments of the Radiation Protection Act by the Radiation Protection-EU-Adaptation Act [BGBl. I No. 137/2004: Strahlenschutz- EU-Anpassungsgesetz] in 2004 (in force since January 2005) - together with the Ordinances described below - fully implement the following EU directives into national law:

- EU Council Directive 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation (OJ No. L 159 of 29 June 1996),
- EU Council Directive 90/641/EURATOM of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas (OJ No. L 349/21 of 13 December 1990),
- EU Council Directive 2003/122/EURATOM of 22 December 2003 on the control of high-activity sealed radioactive sources and orphan sources (OJ No. L 346/57 of 31 December 2003),
- EU Council Directive 2009/71/EURATOM of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations (OJ No. L 172/18 of 2 July 2009)

The **General Radiation Protection Ordinance** [BGBl. II No. 191/2006: Allgemeine Strahlenschutzverordnung] has been amended in year 2012 in order to implement Council Directive 2009/71/EURATOM into Austrian legislation. It comprises the following key issues:

- limits for the exposure for occupational exposed workers and members of the public,
- regulations of the release limits for reporting and authorisation obligations,
- regulations for the protection of outside workers and specific regulations concerning the dose passport,

- regulations concerning radioactive waste,
- regulations for the control of high activity sealed sources (HASS),
- obligation for the manufacturer to take HASS back,
- authorisation of training centres for radiation protection and nuclear safety officers,
- requirements for nuclear installation regarding nuclear safety,
- requirements for construction and operation of a research reactor,
- requirements for nuclear safety officer.

The Austrian Research Reactor

The licensee of the TRIGA Mark II research reactor is the Vienna University of Technology. Competent authority is The Federal Ministry of Science, Research and Economy.

The operation license is based on a detailed Safety Analysis Report (SAR) which has been updated several times during the past according to any modifications in the reactor systems (i.e. reactor instrumentation and control system, ventilation system, area monitoring system). The latest SAR dates to December 2013 and is currently being updated.

The SAR includes all operational limits and conditions (OLC) derived from the safety analysis and also including operational experience. Typical OLC's are i.e. excess nominal power, excess fuel or water temperature, short reactor period, any failure of PC components in the I&C system. In addition, any deviation from the nominal value is announced by an optical and acoustical alarm and thus allowing the operator to start any counteraction before an OLC is reached.

Operational experience is collected and shared among the TRIGA reactor owners and operators worldwide as well as through the IAEA to the international research reactor community. The Institute of Atomic and Subatomic Physics is 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)

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

Article 4

1. The national framework shall establish responsibilities for:

(a) the adoption of national nuclear safety requirements. The determination on how they are adopted and through which instrument they are applied rests with the competence of the Member States;

Radiation Protection and Nuclear Safety Legislation (see also Art.4 Overview):

The **Radiation Protection Act** [BGBl. No. 227/1969: Strahlenschutzgesetz], with several amendments in 2002, 2004 and 2006 implementing recent EU legislation. The latest amendment in year 2013 entered into force on 1 July and contains

- optimization of the intervals of periodic inspections of the licensees by the authorities,
- transition of the authority from the districts to the provinces and
- sole responsibility of the Federal Ministry of Science, Research and Economy for nuclear installations and particle accelerators within universities and research institutions of the Austrian Academy of Sciences (formerly: Ministry of Science and Research in accordance with the Ministry of Agriculture, Forestry, Environment and Water Management)

The Radiation Protection Ordinances contain detailed provisions concerning radiation protection, installation safety and the handling of radioactive waste.

The **General Radiation Protection Ordinance** [BGBl. II No. 191/2006: Allgemeine Strahlenschutzverordnung] has been amended in year 2012 in order to implement Council Directive 2009/71/EURATOM into Austrian legislation. It comprises the following key issues:

- limits for the exposure for occupational exposed workers and members of the public,
- regulations of the release limits for reporting and authorisation obligations,
- regulations for the protection of outside workers and specific regulations concerning the dose passport,
- regulations concerning radioactive waste,
- regulations for the control of high activity sealed sources (HASS),
- obligation for the manufacturer to take HASS back,
- authorisation of training centres for radiation protection and nuclear safety officers,
- requirements for nuclear installation regarding nuclear safety,
- requirements for construction and operation of a research reactor,
- requirements for nuclear safety officer.

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 aimed at the transformation of the following EU Council Directives into national law:

- Title IX of the EU Council Directive 96/29/EURATOM of 13 May 1996 (see above, 7.2.1),

- EU Council Directive 89/618/EURATOM of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency (OJ No. L 357/31 of 7 December 1989).

The ordinance 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 practices (see also Article 16 of this report). 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 2009

The Ordinance on the Shipment of Radioactive Waste 2009 [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 of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel was implemented in national law.

The major changes are the following:

- The existing procedure for the shipment of radioactive waste between Member States is simplified.
- The consistency with other Community and international provisions had to be guaranteed, in particular with the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management to which the Community accede on 2 January 2006.
- The scope of the council directive is also extended to shipments of spent fuel whether it is intended for disposal or for reprocessing.

Other Radiation Protection Legislations:

“Sicherheitskontrollgesetz 2013”

On 1st March of 2013 the “Sicherheitskontrollgesetz 2013” (SKG 2013) BGBl. I Nr. 42, entered into force which updates the Austrian legal position to the new international law and substitutes the “Sicherheitskontrollgesetz 1991”.

Article 4

1. The national framework shall establish responsibilities for:

(b) the provision of a system of licensing and prohibition of operation of nuclear installations without a licence;

The licensing authority for the Institute of Atomic and Subatomic Physics in Vienna is the Federal Ministry of Science, Research and Economy. The construction and the operation of installations for the handling of radioactive materials and radiation emitting devices require a license according to the Articles 5 and 6 of the Radiation Protection Act. The Radiation Pro-

tection Ordinance contains further provisions for the licensing procedure. The licensing procedure is also subject to the provisions of the General Administrative Procedures Act.

In Austria, the licensing procedure for installations consists of two stages whereby radiation protection measures are already required at the stage of their construction:

- 1) According to Article 5 of the Radiation Protection Act the design of installations with higher potential risk needs to be licensed prior to the beginning of the construction in order to save costs and facilitate the subsequent licensing procedure.

For the licensing procedure the application documents must contain

- detailed plans and description of the planned installation;
- a decommissioning concept for the closure of the facility including recycling or disposal of radioactive waste;
- a design accident analysis;
- a preliminary safety analysis with regard to the site and potential exposure during normal operation and potential emergencies, including a detailed description of measures for protecting the radioactive material against trespassers.

After the licensing authority has been provided with all necessary documents, a license is allowed to be granted if the construction is in compliance with all specific obligations of the radiation protection legislation and if the planned radiation protection measures are deemed adequate.

With due respect to the protection of accrued rights of the licensee, additional radiation protection measures may be required at any stage of the construction if new insights were gathered in the course of the construction or new scientific evidence has proven them necessary.

- 2) 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.

For the operating licensing procedure the applicant must present the following documents:

- comprehensive documentation on the construction, modification and operation,
- a comprehensive safety analysis for normal operation and for emergency cases,
- a detailed design accident evaluation and a concept for on-site emergency preparedness,
- a detailed decommissioning concept for the shut-down and closure of the facility including a waste management scheme for re-use and recycling or for disposal of radioactive waste.

An operation license further needs safety assessment, final safety analyses and a concept for emergency preparedness. Article 7 rules the licensing procedure for facilities with a lower potential risk, out of the scope of this convention. A concept for decommissioning and dis-

mantling, a concept for the recycling or reuse of radioactive substances and the management of radioactive waste are obligatory for any installation.

Regarding the licensing procedure, additional radiation protection measures can be required at any stage of the construction, if new insights were gathered in or new scientific evidence have proven them necessary in course of construction. Accrued rights of the licensee, however, must be duly respected.

According to Article 18 of the Radiation Protection Act, in case of imminent danger from an installation, the authorities have to take all appropriate measures to avert the danger. They may issue promptly enforceable provisional injunctions and, after consulting the radiation protection officer of the installation, have to proceed in compliance with Article 4 of the 1950 Act on the Enforcement of Administration Decisions [BGBl. No. 53/1991: Verwaltungsvollstreckungsgesetz].

Any malfeasance or breach of these provisions is fined according to Article 39.

Prohibition of operation without a license:

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

According to the Radiation Protection Act, anyone building or operating an installation for the handling of radioactive material without an adequate license commits a crime and is fined with an administrative penalty of up to 25 000 EURO. Anyone not fulfilling the requirement or obligation of a license is charged with an administrative penalty of up to 15 000 EURO. The range of punishment is laid down in Article 39 of the Radiation Protection Act. The enforcement procedure is laid down in the General Administration Procedures Act complemented by the Act on the Enforcement of Administration Decisions.

Article 4

1. The national framework shall establish responsibilities for:
 - (c) the provision of a system of nuclear safety supervision;

According to Article 17, the operation of all installations licensed under this law is regularly inspected by the licensing authority in order to assure that the facility keeps the state of the art. In case of endangerment of the human health and life and if the requirements of the license are not observed, the competent authority may prohibit the further operation.

The radiation protection legislation requires comprehensive documentation on the construction, modification and operation of facilities for the handling of radioactive material. Detailed specifications on documentation and reporting are set forth in the individual licenses.

Moreover there was installed the Nuclear Safety Officer. The Nuclear Safety Officer has to discharge the tasks that the license holder assigned to him to ensure the radiation safety at the research reactor.

Article 4

1. The national framework shall establish responsibilities for:

d) enforcement actions, including suspension of operation and modification or revocation of a licence.

The competent regulatory authorities are also in charge of enforcing the legislation and the regulations applicable to facilities for the use of radioactive material as well as the obligations of the licenses. They are empowered to take the necessary enforcement measures like suspension of operation, modification or revocation e.g. in the context of the annual inspection of the facility according to Art. 17 of the Radiation Protection Act when the licensee cannot demonstrate the compliances with the legal and administrative requirements of the site.

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.

According to Article 17 of the Radiation Protection Act, the licensing authorities regularly carry out inspections of the facilities, in order to control the compliance with respective laws and specific requirements from the granted license. The licensing authority for the Institute of Atomic and Subatomic Physics in Vienna is the Federal Ministry of Science, Research and Economy.

The operation license is granted if the licensee has successfully demonstrated the compliances with all legal and administrative requirements including the suitability of the site.

The safety report of the research reactor is updated regularly according to the development of technology and results of safety research.

If there are any relevant changes in operating experience based on technical development, these technical development is not only analyzed by experts but has to be licensed by the regulatory authority.

Regarding the licensing procedure, additional radiation protection measures as well as nuclear safety measures can be required at any stage of the construction respectively during the operation, if new insights were gathered in or new scientific evidence have proven them necessary in course of construction.

In case of endangerment of the human health and life and if the requirements of the license are not observed, the competent authority may prohibit the further operation.

Article 5 - Competent regulatory authority

Article 5

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

Regulatory and Supervisory Authorities

According to the amendment of the Radiation Protection Act in 2013 the competences for the TRIGA research reactor of the Institute of Atomic and Subatomic Physics in Vienna changed. The Federal Ministry of Science and Research got the sole responsibility.

The Federal Ministry of Science, Research and Economy is the competent authority for the licensing of construction, operation and also for the inspection of the nuclear installation TRIGA Mark II research reactor and of particle accelerators within in the scope of university and research institutions of the Austrian Academy of Sciences. In addition, it is responsible for the strategic orientation of energy research and development in general and nuclear research in particular.

Article 5

2. Member States shall ensure that the competent regulatory authority is functionally separate from any other body or organisation concerned with the promotion, or utilisation of nuclear energy, including electricity production, in order to ensure effective independence from undue influence in its regulatory decision making.

Austria does not operate any nuclear power plant for energy production. The Federal Minister of Science, Research and Economy is the only competent authority for the licensing of the construction and operation as well as for the inspection of university- based nuclear installations.

The licensee for the TRIGA reactor is the Vienna University of Technology, which is legally independent in its decisions but being controlled by The Federal Minister of Science, Research and Economy as the competent authority responsible for licensing and supervision according to the Radiation Protection Act.

Article 5

3. Member States shall ensure that the competent regulatory authority is given the legal powers and human and financial resources necessary to fulfil its obligations in connection with the national framework described in Article 4(1) with due priority to safety. This includes the powers and resources to:

- (a) require the licence holder to comply with national nuclear safety requirements and the terms of the relevant licence;
- (b) require demonstration of this compliance, including the requirements under paragraphs 2 to 5 of Article 6;
- (c) verify this compliance through regulatory assessments and inspections; and
- (d) carry out regulatory enforcement actions, including suspending the operation of nuclear installation in accordance with conditions defined by the national framework referred to in Article 4(1).

The Federal Ministry of Science, Research and Economy is the competent regulatory authority for the research reactor. This competent regulatory authority- included the commissioning of experts - is included in the ministerial financial calculation.

The Vienna University of Technology gets the financial resources including the operation of the reactor in the frame of the performance agreements that are signed every three years between each University on the one hand and The Federal Ministry of Science, Research and Economy on the other hand. The financing of the performance agreement is supplied by The Federal Ministry of Finance.

The University has to provide reserves for investments in the future like for the decommissioning of the reactor after the reactor shutdown.

Article 5

3. This includes the powers and resources to:

(a) require the licence holder to comply with national nuclear safety requirements and the terms of the relevant licence;

As mentioned above the licensing authority for the Institute of Atomic and Subatomic Physics in Vienna is The Federal Ministry of Science, Research and Economy.

The operation license is granted if the licensee has successfully demonstrated the compliances with all legal and administrative requirements including the suitability of the site.

According to Article 17 of the Radiation Protection Act, the licensing authorities regularly carry out inspections of the facilities, in order to control the compliance with respective laws and specific requirements from the granted license.

Regarding the licensing procedure, additional radiation protection measures can be required at any stage of the construction, if new insights were gathered in or new scientific evidence have proven them necessary in course of construction. Accrued rights of the licensee, however, must be duly respected.

In case of endangerment of the human health and life and if the requirements of the license are not observed, the competent authority may prohibit the further operation.

Article 5

3. This includes the powers and resources to:

(b) require demonstration of this compliance, including the requirements under paragraphs 2 to 5 of Article 6;

In Austria the only nuclear installation is the research reactor of the Vienna University of Technology. The legal framework contains a detailed reporting system concerning radiation protection wherefore there is installed a detailed reporting system (e.g. safety report, emergency plans, periodic safety review, report about the environmental control; reports about medical examinations, if requested by the law) about the work at this reactor and any incidents of significance.

According to Article 17 of the Radiation Protection Act the competent licensing authority supervises the license holder every year in any case.

Moreover additional radiation protection measures can be required at any stage of the construction, if new insights were gathered in or new scientific evidence have proven them necessary in course of construction.

In case of endangerment of the human health and life and if the requirements of the license are not observed, the competent authority may prohibit the further operation.

Article 5

3. This includes the powers and resources to:

(c) verify this compliance through regulatory assessments and inspections; and

The legal framework contains a detailed reporting system concerning radiation protection which has to be submitted the radiation protection officer.

According to Article 17 of the Radiation Protection Act the competent licensing authority inspects the license holder every year in any case including the reporting about the work done by the staff at this reactor to keep radiation protection guaranteed and about any incidents of significance. Further current measurements are implemented by independent experts over the whole year which results are prepared for the annual inspection.

Article 5

3. This includes the powers and resources to:

(d) carry out regulatory enforcement actions, including suspending the operation of nuclear installation in accordance with conditions defined by the national framework referred to in Article 4(1).

As mentioned above in case of endangerment of the human health and life and if the requirements of the license are not observed, the competent authority may prohibit the further operation.

The only nuclear installation in Austria is the research reactor in Vienna. The licensee for the TRIGA reactor is the Vienna University of Technology which is legally independent in its decisions but being controlled by The Federal Minister of Science, Research and Economy as the competent authority responsible for licensing and supervision according to the Radiation Protection Act within the national legal framework and regulatory infrastructure.

In the regulatory authority, The Federal Ministry of Science, Research and Economy, Department I/2, there are two to three people involved in nuclear safety affairs working together with international nuclear experts, with the Austrian Agency for Food and Health Safety (AGES) monitoring the impact of the facility of the TRIGA reactor to the environment and controlling radioactive substances release into the environment and last but not least with experts of the national authority competent for the monitoring of the compliance of the working protection rules concerning the people working at the reactor. They all have to give an expertise at least once a year on behalf of the ministerial inspection of the reactor.

The AGES and the external experts are paid by the state.

The performance agreement 2013- 2015 with the Vienna University of Technology includes the personal resources operating the reactor according to the legal requirements.

The staff of the Austrian Federal Ministry of Science, Research and Economy is paid by the state.

The money needed by the Vienna University of Technology for operating the reactor is part of the negotiated budget of the university foreseen in the performance agreements with the Ministry of Science, Research and Economy every three years.

Article 6 - Licence holders

Article 6

1. Member States shall ensure that the prime responsibility for nuclear safety of a nuclear installation rests with the licence holder. This responsibility cannot be delegated.

The Radiation Protection Act clearly states in Article 3 Para 2 that the license holder is responsible for compliance with the legal provisions of the Radiation Protection Act, the corresponding Ordinances, with regulatory and administrative requirements on that legal basis as well as with all radiation protection provisions of directly applicable EU-Law. The license holder is, hence, ultimately responsible for the safety of the facility and its operation. The specific obligations of the license holder resulting from that fundamental responsibility are listed in the Radiation Protection Act and further elaborated in the General Radiation Protection Ordinance (Article 15) supported by relevant standards and guidelines of the waste management facility.

The license holder must fulfil specific requirements, conditions and obligations laid down in connection with the operating license. The licensee is responsible for any breach towards the authority. In particular the license holder is responsible for the following issues:

- assessment and implementation of arrangements for the radiological protection of exposed persons,
- critical examination of plans for installations from the point of view of radiation protection,
- preparation of written instructions for work activities,
- information and training of exposed persons in the field of radiation protection,
- regular checks on the effectiveness of protective devices and techniques,
- periodic calibration of measuring instruments and periodic checks on the serviceability and the correct use.
- on-site emergency planning
- nuclear safety

Article 6

2. Member States shall ensure that the national framework in place requires licence holders, under the supervision of the competent regulatory authority, to regularly assess and verify, and continuously improve, as far as reasonably achievable, the nuclear safety of their nuclear installations in a systematic and verifiable manner.

Assessment and verification of nuclear safety:

According to Article 17 of the Radiation Protection Act, the licensing authorities regularly carry out inspections of the facilities, in order to control the compliance with respective laws and specific requirements from the granted license. The licensing authority for the Institute of Atomic and Subatomic Physics in Vienna is the Federal Ministry of Science, Research and Economy.

Reporting obligations regarding events in nuclear facilities are regulated by the General Radiation Protection Ordinance, respectively by the international Convention on Early Notification of a Nuclear Accident (IAEA/Emercon) and the European Council Decision 87/600/EURATOM (ECURIE).

At national level incidents and accidents in nuclear facilities have to be reported to the licensing authority and to the Federal Ministry of Agriculture, Forestry, Environment and Water Management. The reporting obligations at international level have to be fulfilled by the Federal Ministry of Agriculture, Forestry, Environment and Water Management.

Quality assurance:

According to Article 89a of the General Radiation Protection Ordinance the licensee has to install a quality management system and to guarantee the necessary reasonable financial and personal resources. The Licensee has to prepare a report about the safety system containing the emergency procedures.

A facility specific quality assurance program has already been established three decades ago and adapted and improved according to needs. This program has also been transferred to other TRIGA stations due to close cooperation.

According to the national regulations quality assurance programs are required in the licensing process and are subject to the annual inspections by the authority according to Article 17 of the Radiation Protection Act. This annual audit is controlled by independent national and international experts.

Article 5 of the General Radiation Protection Ordinance requires from each licensee the implementation of appropriate quality management systems for the safe and due operation of facilities and equipment. In particular the licensee must provide written instructions for regular inspections of security relevant facilities and regular controls of the inventory of radioactive sources, and their safe and secure storage must be carried out.

According to the Radiation Protection Act the operator has to submit a safety assessment prior to the authorization of the construction of the facility. This safety assessment has to outline the radiation risks for the installation itself and its surrounding. Furthermore an Environmental Impact Assessment (EIA) is required prior to the construction based upon the Environmental Impact Assessment Act (EIA-Act).

In the summer of 2013 the DG ENER.D.3.1 - Radiation Protection - Environmental Radioactivity - of the European Commission carried out an audit according to Art. 35 of the EURATOM- Contract (environmental impacts).

Defining and Revising Operational Limits and Conditions

The Federal Minister of Science, Research and Economy supervises the university research facilities. All inspections are based upon Article 17 of the Radiation Protection Act and include the review and approval of operational conditions for the particular installation and its emergency procedures. According to the Radiation Protection Act any changes to operational limits and conditions require a permission of the competent licensing authority which has the competence to revise operational limits and conditions as necessary for reasons of safety.

The operation license is based on a detailed SAR which has been updated several times during the past according to any modifications in the reactor systems (i.e. reactor instrumentation and control system, ventilation system, area monitoring system). The latest SAR dates to December 2013 and is currently being updated.

The SAR includes all operational limits and conditions (OLC) derived from the safety analysis and also including operational experience. Typical OLC's are i.e. excess nominal power, excess fuel or water temperature, short reactor period, any failure of PC components in the I&C system. In addition, any deviation from the nominal value is announced by an optical and acoustical alarm and thus allowing the operator to start any counteraction before an OLC is reached.

Detailed written procedures for operation, testing, maintenance and re-inspection exist and are regularly updated. These documents are available in electronic form as internal reports. Most of these reports are also available in English and have been a basis for the IAEA for implementation in overseas TRIGA type reactors through the TC Program.

Written procedures exist in the reactor operation manual for responding to operational occurrences and to accidents. Necessary engineering and technical support in safety related fields are available at the institute and through the Vienna University of Technology. Besides the in-house workshops business relations have been established with qualified institutions, companies and research institutes to respond to any technical problem which cannot be solved by the in-house facilities.

The license holder is obliged to report any incidents of safety significance to the regulatory body. In addition, the TRIGA 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 reactors through the IRSRR.

Last but not least the licensee has to implement the periodic safety reviews (PSR) any ten years and to present the issues to the competent authority which has to decide if the legal prerequisites for the granted license are still complied.

Article 6

3. The assessments referred to in paragraph 2 shall include verification that measures are in place for prevention of accidents and mitigation of consequences of accidents, including verification of the physical barriers and licence holder's administrative procedures of protection that would have to fail before workers and the general public would be significantly affected by ionizing radiations.

The Radiation Protection Act and the General Radiation Protection Ordinance form the legal basis for operational radiation protection in Austria. This legislation aims at protecting human

life and health and the environment against ionising radiation. It is based on the recommendations of the International Commission on Radiological Protection (ICRP) and implements the internationally agreed principles of justification of a practice, optimisation of radiation exposure and dose limitation. After the amendment of the Radiation Protection Act and the publication of the new Radiation Protection Ordinances, the provisions of the Basic Safety Standards Directive 96/26/EURATOM are fully implemented in Austrian national law. Further radiation protection requirements are defined in non-binding national standards and specific obligations are stated in the construction and operation licences granted to each operator of nuclear facilities. All activities must be performed in accordance with radiation protection regulations.

The Austrian radiation protection legislation requires optimisation in line with the ALARA principle as a fundamental principle for limiting the radiation exposure of the workers and the public (Article 4 of the Radiation Protection Act and Article 3 of the General Radiation Protection Ordinance). It is the responsibility of the license holder to define and implement optimisation and to implement a system for control. Depending on the level of estimated collective dose, a dose relevant job has to be controlled by a radiation safety officer. During the annual inspections according to Article 17 of the Radiation Protection Act the supervisory authority also controls how optimisation is implemented.

Relevant employee union representations, the experts of the national authority, competent for the monitoring of the compliance of the working protection rules concerning the people working at the Reactor, nuclear and environmental experts take part in the annually inspections.

The ATI installed an internal emergency plan as well as a national emergency plan which determine the measures have to be adopted in the case of nuclear incidents or accidents as well as reporting systems.

The Vienna Triga Reactor has installed an electronic key system for entering the different sections at the site.

Design and construction

The TRIGA reactor Vienna has been designed and several times upgraded for the defence-in-depth (DiD) concept to prevent accident occurrences and release of radioactivity. Since initial criticality, the I&C system has been replaced three times. The TRIGA Vienna has a fully computerised I&C system. The area monitoring system and the environmental monitoring system are fully computerised and all relevant operational data are electronically stored. Defence-in-depth was a major issue for the operation license of the TRIGA reactor Vienna.

Due to its special fuel composition (which is U-Zr-H), the TRIGA reactor is an inherently safe reactor with an ultra-prompt negative temperature coefficient of the fuel which even allows transient operation (prompt criticality) as routine operation.

These so called reactor pulses are routinely performed for special experiments within the academic research program. Presently, about 36 TRIGA reactors operate world-wide with more than 1400 reactor-years of experience and no major incident or accident has so far been experienced with any TRIGA type reactor. Nevertheless, an extensive in-service-inspection (ISI) and maintenance program is carried out at the TRIGA reactor Vienna. The overall scope of this program is summarised in a manual available at the Institute of Atomic and Subatomic Physics. Experience from this program has been transferred to other TRIGA reactors world-wide through IAEA Technical Cooperation Projects.

Preventive measures taken

The release limits for the research reactor are determined by the Federal Minister of Science, Research and Economy as the competent regulatory authority. According to Art.17 of the Radiation Protection Ordinance annual reviews ensure the compliance of the operator of the facility with the legal and administrative requirements. If the safe operation is not ensured the regulatory authority can take steps to stop immediately the operation of the facility.

There has to be implemented an environmental monitoring by the license holder as well as the competent authority assigns the Austrian Agency for Health and Food Safety (AGES) with an environmental monitoring.

Releases under normal conditions and potential releases during abnormal conditions from the facility are low enough such that transboundary emergencies cannot occur.

Limitation of Radiological Impacts

The licensing procedure for the construction of a facility for the handling with radioactive material, including waste management facilities, requires the presentation of a safety analysis, which is reviewed by the radiation protection authorities. The safety analysis must demonstrate that human life and health and the environment are protected against the hazards of ionising radiation during normal operation and possible emergencies.

Article 6

4. Member States shall ensure that the national framework in place requires licence holders to establish and implement management systems which give due priority to nuclear safety and are regularly verified by the competent regulatory authority.

As during the past 52 years of operation the Institute of Atomic and Subatomic Physics continues to apply the highest possible safety standards both to organisational and technical aspects. The safety systems are currently being upgraded and fulfil the present international safety requirements. It should be mentioned that the TRIGA reactor Vienna is the only TRIGA reactor in Europe with a digital I&C system with analogue back up. The safety of the facility is subjected to periodical inspection from daily, weekly, monthly, quarterly and annual inspections some of them in presence with an independent expert assigned by the government. The regulatory aspects are aimed at prioritising safety.

Since November 2012 there are no more high enriched fuel elements located at the Austrian research reactor, only low enriched ones.

The General Radiation Protection Ordinance establishes the requirements of the Licence holder. E.g. according to Article 89a of this Ordinance the Licence holder has to implement a specific management system.

The management system includes the organisation and the responsibilities of the staff such as the reactor manager and his deputy, the reactor operators, the radiation protection officer and his deputy and the nuclear security officer and his deputy.

Article 6

5. Member States shall ensure that the national framework in place requires licence holders to provide for and maintain adequate financial and human resources to fulfil their obligations with respect to nuclear safety of a nuclear installation, laid down in paragraphs 1 to 4.

Financial and human resources

The Austrian Radiation Protection Act requires qualified staff to manage and operate any nuclear facility and to fulfil all legal, regulatory and licence requirements. Verification of the necessary human resources is part of any licensing process as well as the annual inspections. For each licence under the Radiation Protection Act the designation of a radiation safety officer is required. The radiation safety officers are defined as qualified persons who have been designated by the licence holder to take over duties and responsibilities regarding radiation protection matters. Their formation and expertise must be approved by the competent regulatory authority. Their mental and physical ability, their reliability and aptitude for the requirements of their appointed field of activity are conditions for their designation and are regularly supervised. Further requirements, responsibilities and duties of the radiation safety officer are laid down in detail in the Radiation Protection Ordinance, the operating licence and in the technical specifications of the facility. If necessary, the applicant must provide for a radiation safety officer and a sufficient number of other safety related staff and prove for their qualifications especially the officer of the nuclear safety.

The operator's guidelines define specific requirements on the organisation, the operating staff and on the radiation protection staff and are approved by the regulatory authority. The implementation of these legal requirements is ensured in practice by review of the projects submitted to licence and by regular supervision of the operation of the facility according to Article 17 of the Radiation Protection Act.

However, the ultimate responsibility for the safety and safe operation of a facility rests within the license holder who must demonstrate its reliability during the licensing procedure. The operating license can be withdrawn in case these requirements are not or no longer met.

The TRIGA research reactor is embedded in the Institute of Atomic and Subatomic Physics of the Vienna University of Technology. Thus, the Vienna University of Technology provides funds for staff, equipment, research and safety of the facility. The regular budget plus additional third party income assure the proper financial support to operate the reactor in a safe and efficient way; overall priority is given to the safety of the TRIGA reactor.

During the past years a transition took place in the reactor management due to retirement. The continuation of knowledge was assured by several years of overlapping between the old and new management. Thus, the human resources aspect has been resolved in an optimal procedure. In 2012 the Ministry of Science and Research and the Vienna University of Technology agreed upon the renewal of the reactor instruments and the control system. In the signed performance agreement the installation in the years 2013-2015 is foreseen.

The Vienna University of Technology has to provide the financial provision for the future de-commission of the TRIGA Mark II reactor.

Article 7 – Expertise and skills in nuclear safety

Article 7

Member States shall ensure that the national framework in place requires arrangements for education and training to be made by all parties for their staff having responsibilities relating to the nuclear safety of nuclear installation in order to maintain and to further develop expertise and skills in nuclear safety.

For the licence holder, the legal requirements concerning education and training are defined in § 89 (5) and in "Anlage 13" and call for a minimum of 40 hours in a period of five years for the reactor manager and his deputy as well as for the nuclear safety officer and his deputy. For technical staff the requirement is 8 hours in 5 years.

Since the licence holder for the only nuclear facility in Austria is the Vienna University of Technology, the reactor manager and the nuclear safety officer as well as their deputies are academic staffs who also work in research in their respective areas. Thus, continuous improvement as well as further development of their expertise is guaranteed.

For the technical staff of the nuclear facility, their constant, active participation in the different practical courses and teaching efforts at the research reactor, trains their technical skills and, by the means of ongoing discussions with the other participants, establishes an environment of safety awareness in the nuclear field.

Operational experience is collected and shared among the TRIGA reactors worldwide as well as through the IAEA to the international research reactor community. The Institute of Atomic and Subatomic Physics is 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)

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

The staff of the Federal Ministry of Science, Research and Economy is working together with dedicated contract staff for nuclear assessment and authorized external experts and last but not least with experts of the national authority competent for the monitoring of the compliance of the working protection rules concerning the people working at the reactor.

Article 8: Information to the public

Article 8

Member States shall ensure that information in relation to the regulation of nuclear safety is made available to the workers and the general public. This obligation includes ensuring that the competent regulatory authority informs the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations.

The competent regulatory authority in Austria -The Ministry of Science, Research and Economy- annually inspects this nuclear installation involving employee union representations, the labour inspectorate for correct and safe working conditions, nuclear and environmental experts and potentially interested public bodies.

In case of endangerment or public environmental interest there are legally fixed rules to inform the public, on the one hand by the mentioned Federal Ministry, on the other hand by other Federal Ministries or public bodies.

Moreover the Institute of Atomic and Subatomic Physics of the Vienna University of Technology is working according to the principle of an open policy. The homepage informs about a lot of details of the reactors work and there are offered public tours for interested people (e.g. even for pupils).