THIRD

NATIONAL REPORT OF AUSTRIA

on the implementation of the obligations of the

Joint Convention on the Safety of Spent Fuel and on the Safety of Radioactive Waste Management

October 2008

Executive Summary

There is neither a nuclear power plant (NPP) nor any other fuel cycle facility in operation in Austria. One NPP was constructed in Zwentendorf in the 1970s, but, as a consequence of the negative vote in a referendum, never put into operation. Two out of three research reactors in Austria have been shut down (ASTRA Seibersdorf, SIEMENS Argonaut Graz) and were decommissioned in the meantime. The remaining TRIGA research reactor in Vienna is still in operation. Spent nuclear fuel is stored on site in dry storage facilities. All spent fuel has been and will be returned to the USA.

Austria operates one central radioactive waste management and interim storage facility – Nuclear Engineering Seibersdorf GmbH (NES) for pre-disposal management including treatment, conditioning and interim storage of all low- and intermediate level radioactive waste (LILW) of Austria. High-level radioactive waste (HLW) does not arise in Austria. LILW originates primarily from medicine, research, industry and decommissioning in Austria. There is no final repository for disposal of radioactive waste currently in operation. Austria favours an international or regional cooperation in radioactive waste management.

NEW: The dismantling works of the former ASTRA research reactor in Seibersdorf came as planned to an end in 2006. Now the reactor building will be adapted for a storehouse for inactive materials.

NEW: The interim storage time until 2030 for the existing (and future) radioactive waste requires significant investments in new buildings and machinery at Nuclear Engineering Seibersdorf. Therefore, a concept for future radioactive waste management was developed. The realisation of the concept will start in 2009.

Section A Introduction

A.1 Main Themes of the Report and Main Safety Issues

The Third Austrian National Report contains updated information on the Austrian policy and the usual practices concerning the management of spent fuel of the TRIGA research reactor in Vienna and the management of radioactive waste (see Section B). Furthermore, it contains information on the Austrian legal regime concerning the management of radioactive waste (see Section E), the national radioactive waste management policy and applicable national laws, regulations and practices. The general structure of this report is more or less identical to the previous report.

This report includes also answers to questions received and raised at country group sessions of the previous Review Meeting and especially considers plans for a future radioactive waste management concept at Nuclear Engineering Seibersdorf (NES) for the optimisation of radioactive waste treatment (for a detailed description see Section K and Annex L.1).

Section B Policies and Practices – Article 32 Paragraph 1

In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measure taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:

- ***(i) spent fuel management policy;***
- ***(ii) spent fuel management practices;***
- ***(iii) radioactive waste management policy;***
- ***(iv) radioactive waste management practices;***
- ***(v) criteria to define and categorize radioactive waste.***

B.1 Spent fuel management policy – Article 32 Para 1 (i)

In the 1970s, a nuclear power plant was constructed in Zwentendorf, but as a consequence of the negative vote in a referendum it was never put into operation. All nuclear fuel elements were removed in the late 1980s. Thus, Austria has never operated a nuclear power plant and has no intention to do so in the future. Austria's use of nuclear energy for peaceful purposes has significantly been influenced by the passing of the law prohibiting the use of nuclear fission for energy purposes in 1978 and by passing the Constitutional Law on a Non-Nuclear Austria[i] in 1999.

Currently, Austria operates only one research reactor at the Atomic Institute of the Austrian Universities situated in Vienna. Two other research reactors were shut down in 2001 and 2004. All spent fuel from the research reactors was returned to the United States Department of Energy. For reshipment of spent fuel from the remaining TRIGA research reactor Austria has valid contracts in place.

Therefore, spent fuel management in Austria is limited to the interim storage of the spent fuel elements of the TRIGA reactor.

B.2 Spent fuel management practices – Article 32 Para 1 (ii)

Spent fuel from the TRIGA research reactor is stored on site until the return shipment to the United States. The dry interim storage with a capacity of 168 fuel elements is situated in the reactor building. At present, 8 spent fuel elements are stored on site.

Storage of spent fuel is performed according to the relevant radiation protection and safeguards legislation. An appropriate license is needed for the storage. Annual inspections are

performed by the licensing authority. Shipment is performed according to the relevant transport and safeguards legislation.

B.3 Radioactive waste management policy – Article 32 Para 1 (iii)

The Austrian Federal Constitutional Law on Non-Nuclear Austria prohibits any kind of handling of nuclear weapons and related facilities (§ 1) as well as the construction and use of facilities for production of energy by nuclear fission (§ 2) on the Austrian territory. In line with Austria's attitude towards nuclear power no facilities for spent nuclear fuel and high-level radioactive waste management are operated in Austria.

Since 2003, Austria's radioactive waste management policy follows the 'polluter pays' principle. Producers of radioactive waste are legally responsible for the safe management and disposal of the waste they generate. They have to bear the costs of treatment, interim storage and, in addition, contribute to a special, separated fund, which is exclusively dedicated to the future final disposal and administered by Austrian national authorities. This final disposal fee ("Vorsorgeentgelt") comprises the costs for the future transfer to a final repository, for a possible additional treatment required by the final repository waste acceptance criteria, and for long term stewardship of the final repository. This fee is estimated based on fees assessed by several existing repositories abroad. Should the funds prove insufficient to cover the actual costs of final disposal at a later time despite of due state-of-the-art estimation, the Austrian state will provide for the needed sum. Compared to countries producing nuclear power, only very small quantities of various categories of radioactive waste arise in Austria. However, all categories of radioactive waste have to be transported, treated, conditioned, and stored applying the same safety standards and techniques used for larger quantities of waste. To keep the prices for treatment, conditioning and interim storage at an acceptable level the Austrian State provides for the technical infrastructure and state-of-the-art equipment of Nuclear Engineering Seibersdorf GmbH (NES).

Concerning sealed sources – both spent and disused – the preferred management option is the return to the manufacturer. If disused sources cannot be returned to the manufacturer and recycling (i.e. reuse by a third party) is also not possible, they have to be delivered to Nuclear Engineering Seibersdorf GmbH and disposed as radioactive waste. This includes ionisation smoke detectors.

Regarding the final disposal of the radioactive waste, the Republic of Austria is obliged to remove all conditioned radioactive waste interim stored at the site of NES to a final or long-term repository until the end of 2030 at the latest. The question regarding the location of the final storage is still open. Currently, there are no plans to construct a final repository in Austria in the near future. Austria being a small country without nuclear power plants regards an international co-operation for the disposal of radioactive waste as the most reasonable solution and is therefore interested in common, shared repositories for radioactive waste.

B.4 Radioactive waste management practices – Art. 32 Para 1 (iv)

Nuclear Engineering Seibersdorf GmbH (NES) is the only centralised waste management facility in Austria, where all conditioned low level and intermediate level radioactive waste (LILW) arising in Austria is currently interim stored. High level radioactive waste does not arise in Austria.

Austria follows the principle of minimisation of radioactive waste. For this reason radioactive waste with radionuclides with short half lives are allowed to be stored by the producers until its activity has decayed below applicable clearance levels. Subsequently, this material as inactive waste can be either released to the environment or disposed in an appropriate way.

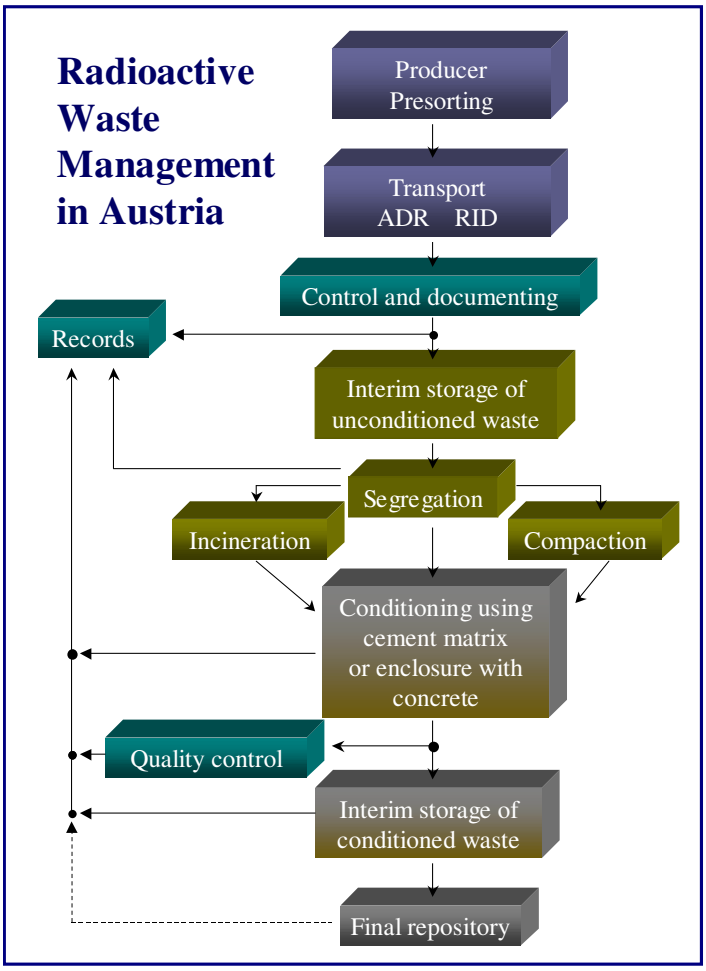
Another practise is the controlled release or discharge of very small amounts of gaseous or liquid radioactive material in line with the requirements of an appropriate license based on Article 74 of the General Radiation Protection Ordinace[ii]. All the other radioactive material which can not be used anymore must be transferred to Nuclear Engineering Seibersdorf for treatment and conditioning.

The aim of treatment and conditioning is to transform the radioactive waste into a chemically stable form and to isolate it safely from the environment. The volume reduction of the waste is also necessary to lower the future cost of interim and long term storage. At the same time procedures are established to effectively minimise and monitor the releases of radioactivity in accordance with applicable environmental regulations, i.e. HEPA filtration of gas effluents from the incinerator. A comprehensive program of environmental radiation monitoring is in place to ensure that any unexpected releases of radioactivity are detected and that the necessary actions can be taken in a timely manner.

A number of treatment and conditioning systems are operated by Nuclear Engineering Seibersdorf (see D.3 and Annex L.1).

Depending on the type of waste several treatment techniques are applied:

- Combustible waste is incinerated. In the past, the resulting incinerator ash has homogeneously been cemented. However, since 1999, ash has been stored in 100-litre-drums pending the results of a study to identify a better conditioning method. The method chosen is placing the 100-litre-drums with ash in custom made stainless steel cartridges, purging the cartridges with nitrogen and welding them shut, and placing these in 200-litre-drums. Volume reduction: > 20:1.
- Non-combustible compactable waste is supercompacted; the pellets are loaded into steel 200-litre-drums for interim storage, volume reduction: ~4:1.
- Non-combustible non compactable waste is filled into steel 100-litre-drums placed into 200-litre-drums; the gap being cemented gives a volume reduction of ~ 1:2.
- Aqueous liquids are treated by precipitation and filtration, the resulting sludge is dried, the powder supercompacted, volume reduction: >30:1; non-dryable sludge is cemented in 200-litre-drums.
- Filters are supercompacted; the pellets are loaded into 200-litre-drums for interim storage.
- Graphite blocks formerly used in the ASTRA research reactor core are stored in a Konrad Type II container.
- Higher-activity LILW originating from ASTRA research reactor decommissioning (near core construction material and in core experimental equipment) has been cut into smaller pieces and placed into appropriately shielded Mosaik and Konrad Type II containers.
- Radioactive sealed sources produced at Nuclear Engineering Seibersdorf GmbH (NES) and sold to different users are taken back after their useful life has elapsed or if there is no longer use for them; if still usable for other purposes they are stored at NES and, following tests and checks, may be reused. Before cementing for interim storage, spent sources are segregated according to their half life, i.e. ^{60}Co, ^{137}Cs, ^{241}Am.
- Radium sources are encapsulated by welding them into stainless steel capsules; they are retrievably stored in lead shielding. Other sources are collected in small steel containers and stored in shielded drums.
- High-activity sources can be handled in the hot cell facility and are stored in storage tubes in one of the hot cell boxes.



Radioactive waste management in Austria

All radioactive waste management facilities and activities in NES are duly licensed and regularly supervised by the Federal Ministry of Agriculture, Forestry, Environment and Water Management in accordance with the relevant Austrian radiation protection legislation (see Section E).

B.5 Categorisation of Radioactive Waste – Article 32 Para 1 (v)

Radioactive waste is defined as radioactive material for which no further use is foreseen. Radioactive material means any substance that contains or is contaminated with one or more radionuclides with an activity or concentration that can not be disregarded, as far as radiation protection is concerned, and unless they are exempt from regulatory control. Exemption and clearance levels are laid down in the General Radiation Protection Ordinance. The nuclide specific values for clearance are derived from the internationally accepted concept of '10 µSv/year additional dose. Clearance measurements, manually or automatically, have directly or indirectly to be certified (via approved measurement protocol) by the competent authority. Low level waste has been defined as having a dose rate of less than 100 µSv/h at a distance of 1 meter from the unshielded material. Material producing higher dose rates has been considered intermediate level waste.

Effective from 1st January 2004, Nuclear Engineering Seibersdorf GmbH (NES) adopted the Commission Recommendation of 15 September 1999 on a classification system for solid radioactive waste 1999/669/EC, Euratom. This radioactive waste classification system is

based on the IAEA classification scheme (Safety Series No 111-G-1.1) and has been accepted by the regulatory body; it is not defined in the present legislation.

- Transition radioactive waste: Type of radioactive waste (mainly from medical origin) which will decay within the period of temporary storage and may then be suitable for management outside of the regulatory control system subject to compliance with clearance levels.
  Waste in the transition phase i.e. short-lived decay waste from medical applications containing ^{125}I is left to decay at the producers' sites, i.e., hospitals, or is brought to Seibersdorf for decay storage.
- Low and intermediate level waste (LILW): In LILW, the concentration of radionuclides is such that generation of thermal power during its disposal is sufficiently low. These acceptable thermal power values are site-specific following safety assessments.
  - Short-lived waste (LILW-SL): This category includes radioactive waste with nuclides half-life less than or equal to those of ^{137}Cs and ^{90}Sr (around 30 years) with a restricted alpha long-lived radionuclide concentration (limitation of long-lived alpha emitting radio-nuclides to 4000 Bq/g in individual waste packages and to an overall average of 400 Bq/g in the total waste volume).
  - Long-lived waste (LILW-LL): Long-lived radionuclides and alpha emitters whose concentration exceeds the limits for short-lived waste.
- High level waste (HLW): Waste with such a concentration of radionuclides that generation of thermal power shall be considered during its storage and disposal (thermal power generation level is site-specific; this waste is mainly forthcoming from treatment/conditioning of sent nuclear fuel).

Material exhibiting activity concentrations below applicable clearance levels is measured in a state-of-the-art clearance monitor and released as inactive waste. This is currently applied, inter alia, to decommissioning waste from the Seibersdorf site.

Section C Scope of Application – Article 3

C.1 Reprocessing – Article 3 Para 1

This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.

There is no reprocessing facility in Austria.

C.2 Waste containing only NORM – Article 3 Para 2

This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or is declared as radioactive waste for the purpose of this Convention by a Contracting Party.

The Austrian Radiation Protection Legislation defines waste that contains only naturally occurring radioactivity as radioactive waste if the exposure to the general public would exceed legally binding limits. If such material is declared as radioactive waste (i.e. if no further use is foreseen), it is subject to the same requirements as other radioactive waste and is considered to be radioactive waste for the purpose of the Convention.

C.3 Radioactive waste from defence programs – Article 3 Para 3

This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.

The Austrian Radiation Protection Legislation applies without exception on the safety of radioactive waste management from civilian and military applications. All radioactive waste from military applications is sent to Nuclear Engineering Seibersdorf GmbH (NES) for treatment, conditioning and interim storage except for radioactive material which was damaged and/or lost in case of a military dispute.

Section D Inventories and Lists – Article 32 (2)

This report shall also include:

(i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;

(ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

(iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

(iv) an inventory of radioactive waste that is subject to this Convention that:

> ***(a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;***
>
> ***(b) has been disposed of; or***
>
> ***(c) has resulted from past practices.***

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

(v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

D.1 Spent fuel management facilities

There are no spent fuel management facilities in Austria since Austria does not operate nuclear power plants. Spent fuel elements from research reactors are sent back to the US. Some spent fuel elements are in interim storage at the Atomic Institute in Vienna (see below).

D.2 Inventory of spent fuel

Eight spent fuel elements are in interim storage at the research reactor of the Atomic Institute of the Austrian Universities in Vienna. The table below shows the relevant details:

Total number of elements	Weight of the element (grams)	Weight of fissionable Isotopes (grams)
8	**1450**	**287**

D.3 Radioactive waste management facilities

The only radioactive waste management facility existing in Austria is Nuclear Engineering Seibersdorf GmbH (NES). This limited liability company with a controlling stake owned by the Austrian Government is located at the site of the Austrian Research Centers Seibersdorf in the south of Vienna.

NES is responsible for the treatment, conditioning and interim storage of all radioactive waste generated in Austria. The following treatment, conditioning and waste handling facilities are in operation:

- LILW incinerator (40 kg/h)
- High force compactor (1100 t)
- Waste water treatment facility (precipitation, filtration)
- Sludge dryer
- Cementation equipment
- Hot-cell facility
- Buffer storage facilities for raw radioactive waste
- Interim storage facilities for conditioned radioactive waste.

For details of the NES facility see Annex L.1.

There are no radioactive waste disposal facilities in operation in Austria (see Section B.3).

D.4 Inventory of radioactive waste

As Austria has neither nuclear power plants nor Uranium mines or any other nuclear fuel cycle facilities, no HLW is produced in Austria. The main sources of LILW in Austria are the use of radioactive material in medicine, industry and research (15-20 tons/year) as well as the ongoing decommissioning and dismantling activities of nuclear research facilities (30-110 tons/year).

The following activity inventory is present at the Nuclear Engineering Seibersdorf GmbH (NES) interim storage facility:

- total activity of short-lived waste (LILW-SL): ~ 9.9E+15 Bq,
- total activity of long-lived waste (LILW-LL): ~ 4.4E+12 Bq.

The major amount of solid waste is combustible waste from the use of radioactive material in medicine. Liquid waste mainly originates from the NES incinerator operations (wet scrubber). A small fraction of liquid waste originates from medical facilities and universities.

The quantity of low and intermediate level waste resulting from the decommissioning of the ASTRA research reactor amounts to 155 tons. Sealed sources such as ^{60}Co, ^{137}Cs, ^{241}Am and others are widely used for industrial purposes. Sources containing ^{60}Co and ^{137}Cs are used for medical applications as radiation sources for high dose treatment. Such sources are few in number but their radioactivity dominates the total activity inventory in the Nuclear Engineering Seibersdorf GmbH (NES) interim storage. A special category of sources are radium sources used from around 1900 to about 1960 for medical treatment. They were produced in different qualities and some showed a tendency for leakage. Due to the high radiotoxicity of radium, their usage was discontinued and radium was replaced by safer

sources as soon as they were available. More than 14 g of radium were conditioned and are stored in the interim storage facility. Naturally Occurring Radioactive Material (NORM) originating from different industrial processes has been treated and conditioned at Nuclear Engineering Seibersdorf GmbH (NES) until 2006. Since 2008, the treatment of residues originating from handling of NORM is regulated by a radiation protection ordinance[iii] in compliance with international recommendations and regulations.

As of end of year 2007, there have been 10190 mainly 200-litre-drums containing conditioned radioactive waste in the interim storage facility, as well as five Mosaik© containers and five Konrad Type II containers with decommissioning waste from the ASTRA reactor.

D.5 Nuclear facilities in the process of being decommissioned

Two Austrian research reactors were decommissioned:

Austrian Research Centers Seibersdorf

The ASTRA research reactor at the Austrian Research Centers Seibersdorf, a 10 MW thermal water-cooled and moderated swimming-pool type reactor, was in operation from 1960 to July 1999.

All spent fuel elements were removed from the reactor and shipped back to the United States in May 2001. Decommission work was concluded in 2006. The resulting waste was treated and conditioned by NES.

A summary of the decommissioning of the ASTRA reactor is given in Annex L.2.

Reaktorinstitut Graz (Reactor Institute)

The Graz Reactor Institute had operated a nominal 10 kW Siemens ARGONAUT reactor since 1965. The reactor was mainly driven at ultra low power levels (<1 W) for training purposes within the framework of the Graz Universities' education programme.

By July 2004, the reactor was finally shut down. The fuel was returned to the United States in autumn 2005. Due to the special use of the system, the radioactive inventory of the reactor was extremely low: Only a few kilograms of LILW arose during decommissioning; the waste was transferred to NES. Decommissioning was concluded in 2006.

Section E Legislative and Regulatory System

E.1 Implementing Measures – Article 18

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

As described below in Sections E.2 and E.3, Austria has taken legislative, regulatory and administrative measures and other necessary steps for implementing its obligations under the Joint Convention.

E.2 Legislative and Regulatory Framework – Article 19

Overview – Article 19 Para 1

Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.

The safety of 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[iv] [amended in 2004 implementing EU legislation],
- General Radiation Protection Ordinance,
- Ordinance on the Transfer of Radioactive Waste[v] [in the course of amendment in compliance with the Council Directive 2006/117/EURATOM],
- Ordinance on Natural Radiation Sources.

The requirements of the legislation are in detail stated in the relevant building and operating licenses. Constructional and technical norms and standards designed to afford protection against radiation from spent fuel or radioactive waste are specified also on an individual basis in the different licenses.

Radiation Safety - Article 19 (2) i

This legislative and regulatory framework shall provide for the establishment of applicable national safety requirements and regulations for radiation safety.

National requirements for radiation safety are established in the Radiation Protection Act, the General Radiation Protection Ordinance and the Medical Radiation Protection Ordinance[vi] 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.

Important requirements regarding radioactive waste management are as follows:

- The generation of radioactive waste must be minimised. The feasibility of radioactive waste minimisation has to be evaluated prior to the handling with radioactive substances.
- Radioactive waste, which is not discharged or released in line with the legal requirements, must be delivered to an appropriate recycling or re-use facility or to an appropriate facility for conditioning, interim storage and later disposal.
- The possibility of cooperation with other EU Member States or other Contracting Parties to the Joint Convention has to be taken into account regarding radioactive waste management (pre-disposal treatment and disposal in order to follow the principles of risk balance, optimisation of radiation protection and cost minimisation).
- Radioactive waste containing radionuclides with a half-life less than 100 days has to be collected and labelled separately from waste exceeding 100 days.
- Waste containing α-nuclides must be sorted, labelled and stored separately.
- The issuance of a construction and/or operating license requires (among other prerequisites) the presentation of a site-specific safety analysis report and a decommissioning plan incl. a concept for closure and radioactive waste management (see below).

Beyond these specific regulations, the General Administrative Procedures Act of 1991[vii] and related instruments subsequently apply to the licensing procedures.

These requirements are in line with the standards on radiation protection agreed on the international level. More detailed criteria concerning radiation protection are defined in the individual licenses.

Licensing System – Article 19 Para 2 (ii)

This legislative and regulatory framework shall provide for a system of licensing of spent fuel and radioactive waste management activities.

As a result of the Austrian federal structure, there are federal and regional authorities involved in the different radiation protection licensing procedures. The distribution of responsibilities is specified in Article 41 of the Radiation Protection Act. Concerning the management of radioactive waste, the Federal Minister of Agriculture, Forestry, Environment and Water Management is the competent authority to lay down provisions for the safe management of radioactive waste. The same federal authority is also responsible for granting licenses for the construction and operation of facilities for the treatment, conditioning, interim storage and disposal of radioactive waste as well as changes to them. As there is no spent fuel or high-level radioactive waste to be handled, there is no implementing body to deal with that task (see E.3).

The process of licensing which is also applied to the management of radioactive waste is laid down in the Radiation Protection Act where the relevant provisions state that a license is required for

- the construction and test, operation or change of purpose, nature and size of any installation for the handling of radioactive material and for the use of radiation emitting devices
- any activity involving radioactive materials exceeding the exemption levels, i.e. work activities with radioactive materials: the extraction, production, storage, carriage, delivery, supply, import, export processing, handling or disposal of radioactive materials or any other activity resulting in the emission of radiation and
- the possession and operation of radiation-emitting devices.

An installation for the handling of radioactive material consists of the radioactive sources and the relevant components and assemblies, devices and accommodation which are necessary for their conventional use. Austria has no separate definition for the term nuclear installation.

Among the prerequisites for granting a license for facility like this, the protection of human health and the environment as well as the operator's aptitude for meeting all the requirements must be demonstrated.

In Austria, the licensing procedure for installations consists of two stages whereby radiation protection measures are already required at the stage of their construction (=major installations such as radioactive waste management facilities):

1. Construction license – Art. 5 Radiation Protection Act: 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 safety analysis with regard to the site and potential exposure during normal operation and potential emergencies;

- 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. Operating license – Art. 6 Radiation Protection Act: For the 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 operating license is granted if the installation has been constructed in compliance with the specified conditions and obligations, a radiation protection officer has been appointed and the regular operation of the installation entails no hazard from ionising radiation.

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.

Prohibition of operation without a license – Article 19 Para 2 (iii)

This legislative and regulatory framework shall provide for a system of licensing of spent fuel and radioactive waste management activities.

The Radiation Protection Act requires a license for the operation of a radioactive waste management facility and explicitly prohibits the construction or operation without appropriate license (concerning the process of licensing refer to Section E.2 – Licensing System). There are no exceptions to this requirement.

Control, regulatory inspection, documentation and reporting - Art 19 Para 2 (iv)

This legislative and regulatory framework shall provide for a system of appropriate institutional control, regulatory inspection and documentation and reporting.

Due to the lack of major nuclear facilities in Austria and the Austrian federal structure, there is no centralised regulatory body. All facilities which have been licensed according to the Radiation Protection Act are monitored and inspected at regular intervals by the competent

licensing authorities. In the course of these inspections, the compliance of the license holder with the applicable regulations and the terms of the licences are checked on an annual or biannual basis. If necessary, the license holder can be requested to implement additional radiation protection measures. The competent licensing and regulatory authority for the operation of installations for the management of radioactive waste is the Federal Minister for Agriculture, Forestry, Environment and Water Management.

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.

Enforcement – Article 19 Para 2 (v)

This legislative and regulatory framework shall provide for the enforcement of applicable regulations and of the terms of the licences.

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.

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.

Allocation of Responsibilities – Article 19 Para 2 (vi)

This legislative and regulatory framework shall provide for a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management.

The Austrian Federation is responsible for the disposal of the radioactive waste currently interim stored and newly produced in Austria. For this purpose, the Federal Minister for Agriculture, Forestry, Environment and Water Management has been authorised to conclude contracts on the management and disposal of radioactive waste with appropriate facilities obliging them to treat all radioactive waste arising in Austria. In addition, the contracts must contain measures for treatment and reconditioning of the conditioned radioactive waste stored at the Nuclear Engineering Seibersdorf GmbH (NES). The contracts may also contain provisions to achieve cooperation with other EU Member States having ratified the Joint Convention. The Federal Minister as contracting authority is further entitled to control the contracts comprehensively.

Hence, the Republic of Austria (represented by the Federal Minister for Agriculture, Forestry, Environment and Water Management), the municipality of Seibersdorf and Nuclear Engineering Seibersdorf GmbH (NES) concluded a Joint Agreement on the Management of Radioactive Waste. Thus, the Republic of Austria is obliged to remove all conditioned radioactive waste interim stored at the site of NES to a final or long-term repository until December 31st, 2030 at the latest. NES is obliged to accept, treat, condition and interim store all radioactive wastes arising in Austria. On the other hand the Republic of Austria guarantees NES the necessary financial funds for fulfilling their tasks, including reconditioning (if necessary) and transfer of the radioactive waste to a final repository. The Joint Agreement has been revised in 2003 and guarantees the operation of the radioactive waste treatment, conditioning and interim storage facilities in Seibersdorf until 2030.

Regulating Radioactive Materials as Radioactive Waste – Article 19 (3)

When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

According to the definition of the Radiation Protection Act and the General Radiation Protection Ordinance, radioactive waste is defined as follows:

Radioactive waste means any substance

- which contains or is contaminated with one or more radionuclides which cannot be disregarded as far as radiation protection is concerned,
- which is not exempt from regulatory control and
- for which no further use is foreseen.

Exemption and clearance levels are laid down in the General Radiation Protection Ordinance as nuclide specific values derived from the internationally accepted 10 µSv/year additional dose concept. Clearance measurements, manual or automatic, have to be certified directly or indirectly (via approved measurement protocol) by the competent authority.

E.3 Regulatory Body – Article 20

Establishment and Designation – Article 20 Para 1

Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.

The Federal Minister of Agriculture, Forestry, Environment and Water Management is the competent licensing and supervisory authority with respect to radiation protection for the construction and operation of major nuclear facilities other than for medical use. This also includes the management of radioactive waste and the only waste management facility in Austria, NES. Thus, in the field of the safety of radioactive waste management, the regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19 above (see Section E) is the Federal Minister of Agriculture, Forestry, Environment and Water Management.

Concerning the nuclear safety and the radiation protection in general, the competencies are divided between different authorities in Austria due to his federal and regional structure: The **Federal Minister of Science and Research** is the competent authority for the licensing of the construction and operation as well as for the inspection of university-based nuclear installations. The **Federal Minister of the Interior** is the competent authority for supervision of nuclear facilities with regard to physical protection and in charge of transport safety measures with regard to the carriage of nuclear materials. The **Federal Minister of Economics and Labour** is the competent authority for safeguards. The **Federal Minister of Justice** is responsible for all legal matters relating to the Nuclear Liability Act. The **Federal Ministery of Health, Familiy and Youth** is responsible for radiation matters in the medical field and with regard to foodstuff. The **Heads of Governments of the Federal Provinces** issue licenses according to the Environmental Impact Assessment Act. The locally competent **Regional or District Authorities** (99 districts in Austria) are the common radiation protection authorities and responsible for licensing and supervision according to the Radiation Protection Act.

Note: This report was written as of status October 11, 2008. As general elections took place on September 28, 2008 the competences, the names of the ministries respectively may change.

To ensure cooperation between federal and regional authorities in Austria, periodical conferences are held, bilateral exchange of opinions is conducted and administrative edicts are issued.

Independence – Article 20 Para 2

Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organisations are involved in both spent fuel or radioactive waste management and in their regulation.

Both the responsibility for the safety of management of radioactive waste and the regulatory task in this field reside within the Austrian Federal State represented by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW). BMLFUW is licensing and regulatory authority for the construction and operation of radioactive waste management facilities. The financial resources of the only waste management facility in Austria (NES) are agreed by the Federal Minister of Finance and form a separate part of the budget of the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW). These funds are administered by BMLFUW but supervised by the Minister of Finance. With regard to this special provisions taking into account the polluter-pays-principle for the regular operation of Nuclear Engineering Seibersdorf GmbH (NES). An adequate financial independence is given.

Section F Other General Safety Provisions

F.1 Responsibility of the license holder – Article 21

License Holder – Article 21 Para 1

Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

In Austria, radioactive waste management comprises treatment, conditioning, storage and later disposal. All these activities need licensing and are carried out by Nuclear Engineering Seibersdorf (NES). As an appropriate nuclear facility, NES is operated according to the corresponding licenses and supervised by the Federal Minister of Agriculture, Forestry, Environment and Water Management.

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.

In the field of the safety of radioactive waste management the Federal Ministry for Agriculture, Forestry, Environment and Water Management forms the main part of this regulatory body. The Minister has the necessary authority and competence to fulfil his enforcement functions. His Ministry carries out annual inspections to assure that the license holder of the

waste management facility meets its responsibilities and obligations and keeps the state of the art.

After 2030 all radioactive waste is to undergo final disposal in an appropriate repository. In Austria no such repository is in operation.

Unlicensed Facilities, Activities and Materials – Article 21 Para 2

If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste

In the Radiation Protection Act, orphan radioactive sources are defined as "radioactive sources which are subject to authorisation or at least registration and which are not under regulatory control either

- because they never have been under regulatory control or
- because they have been abandoned, lost, misplaced, stolen or
- because they have been transferred to a new holder, without proper notification of the competent authority, or without informing the recipient".

However, this definition does not apply to radioactive material in recycling material subject to a sales contract between individuals or corporate bodies capitalising on the trade of recycling material.

Article 26 of the Radiation Protection Act lays down the relevant provisions for the finding of orphan sources. The competent radiation protection authorities (in general the District Authorities) have to confiscate orphan sources and arrange for their recycling or disposal as radioactive waste at the expense of their pre-possessor. In case this pre-possessor can not be found under Austrian jurisdiction, the confiscating national or provincial authorities have to bear the costs for disposal themselves. Otherwise, the occurring costs can be claimed back by recourse.

F.2 Human and financial resources – Article 22

Qualified Staff – Article 22 (i)

Each Contracting Party shall take the appropriate steps to ensure that qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility.

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 the licensing process of a waste management facility as well as the annual inspections. For each license 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.

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.

Adequate Financial Resources – Article 22 (ii)

Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning.

It is Austria's policy to collect, treat, and condition all radioactive waste for safe interim storage in order to minimise the burden for future generations. Although the problem of final disposal is not yet solved, adequate financial means are being established to support any future final disposal strategy.

According to the Joint Agreement between the Republic of Austria (represented by the Federal Ministry of Agriculture, Forestry, Environment and Water Management), the Community of Seibersdorf and the Nuclear Engineering Seibersdorf GmbH (NES), the necessary financial resources for the infrastructure and equipment of the Austrian waste management facility are guaranteed by the Austrian State. The ultimate responsibility of the Austrian Federal State for the final disposal of all radioactive waste currently and in future interim stored at Nuclear Engineering Seibersdorf GmbH (NES) ensures the availability of sufficient financial resources for the decommissioning of nuclear facilities and the final disposal of radioactive waste.

According to the Radiation Protection Act, the producers of radioactive waste are responsible for its safe management including disposal. They must take care that the radioactive waste is brought into a form suitable for transport, storage and disposal (conditioning), to store it pending disposal, and eventually to dispose it at their own costs. For this reason, the treatment of radioactive waste is financed according to the polluter-pays-principle by the relevant licence holder, the holder of the waste (especially arising from recycling of scrap) and the authorities detecting and confiscating radioactive material or receiving orphan sources. When the radioactive waste is delivered to Nuclear Engineering Seibersdorf GmbH (NES) for treatment and interim storage, a charge ("Vorsorgeentgelt") taking into account a risk premium ("Risikozuschlag") has to be paid. This charge comprises the estimated costs for interim storage, pre-disposal treatment and transport to the final repository as well as for disposal and long term management of the final repository. The final disposal fee is calculated using cost estimates based upon the comparison of costs on existing foreign repositories. The tariffs are annually revised and adopted by the Federal Ministry of Agriculture, Forestry, Environment and Water Management. However, should the collected funds in spite of the state-of-the art estimations prove at a later period of time to be insufficient to pay for the real costs of final disposal, the Austrian Federation covers the difference. The contributions of the producers go into a special separated fund which is not part of the state budget and is administered by Austrian national authorities. This fund is exclusively dedicated for financing the future final disposal in an appropriate repository.

Financial Provision for Institutional Controls – Article 22 (iii)

Each Contracting Party shall take the appropriate steps to ensure that financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

Since there are no disposal facilities in operation in Austria, there are no special requirements laid down in the radiation protection legislation. However, according to the existing

legislation, a repository could only be closed, if the permanent protection of human life and health and of their descendents and of the environment is ensured.

F.3 Quality assurance – Article 23

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

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. The quality management systems are, in addition, inspected by external experts on behalf of the authority in the course of these periodic inspections. 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.

Nuclear Engineering Seibersdorf GmbH (NES) has implemented the quality management system ISO 9001, which requires regular external and internal audits. In addition, NES is running a special quality assurance program for the radioactive waste management: For single batches of treated and conditioned waste samples are taken for compressive strength tests and for leaching tests. These tests are carried out according to international standards.

F.4 Operational radiation protection – Article 24

The Radiation Protection Act and the General Radiation Protection Ordinance form the legal basis for operational radiation protection in Austria in the non-medical field. 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[viii] 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.

Radiation Exposure – Article 24 Para 1(i)

Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account.

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.

Radiation Doses – Article 24 Para 1 (ii)

Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

According to the Radiation Protection Ordinance, the dose limit for individuals of the population is set to 1 mSv per year and the dose limit for occupational exposure to 20 mSv per year. These dose limits are in line with international standards. The Ordinance defines reference values, limits and constraints for dose and activity to ensure that the set dose limits are not exceeded. The dose limits and working conditions for underage and pregnant women are laid down in Article 12 of the General Radiation Protection Ordinance. According to Article 12, the uterus dose of women of child-bearing age may not exceed 2 mSv over the period of one month. As a general rule, the Radiation Protection Act states that pregnant women may not be assigned to any work which would result in being exposed workers (Art. 30). Nursing women may not be assigned to any work that contains handling with radioactive materials subject to licensing when there is an imminent danger of incorporation.

The Nuclear Engineering Seibersdorf GmbH (NES) employees receive training in handling radioactive materials, are equipped with personal protective devices and dosimeters, and take part in a medical monitoring program. Segregation of incoming radioactive waste is performed in a specific handling box, where the staff is comprehensively equipped with protective cloths (masks, gloves, ventilated suits). Handling of spent sealed sources is carried out in a lead cell. High activated sealed sources are handled in a hot cell facility. A safety analysis required by the national authorities is periodically reviewed by the regulatory authority.

In 2007, the average effective dose for all personnel involved in radioactive waste management was 1.1 mSv including external background radiation of approximately 1.0 mSv long-term average at the Nuclear Engineering Seibersdorf site.

Preventive measures taken – Article 24 Para 1 (iii)

Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.

The release limits for the Nuclear Engineering Seibersdorf GmbH (NES) facility are determined by the Federal Minister of Agriculture, Forestry, Environment and Water Management as the competent regulatory authority. Annual inspections ensure the compliance of the operator of the facility with the legal and administrative requirements. If the regulatory authority is of the view that safe operation is not ensured the authority can take steps to immediately stop the operation of the facility.

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

Radiation Exposure and Radiation Doses Due to Discharges – Article 24 Para 2

Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited

(i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account.

(ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

In the licence application for the construction and operation of a facility for the handling with radioactive material or radiation emitting devices (radioactive waste management facilities included), the technical measures, i.e., barriers and air filters, taken to reduce exposure from radioactive discharges must comply with the ALARA principle. These measures are explicitly stated as obligations when granting the licence. The release of radionuclides from the waste

management facility to atmosphere and water bodies is monitored by the license holder and surveyed by the licensing authority. The inspection of the nuclear installations by the authorities concerning emission and immission is set up of two parts: inspection of the quality of the internal control by the operator and independent surveillance by examination of samples taken by the authority. The exposure contribution due to the operation of the nuclear installations at the Austrian Research Centers Seibersdorf and at the Atomic Institute of the Austrian Universities in 2007 was negligible. Investigative measurements by the authorities of gaseous and liquid emissions and the internal surveillance by the operators show that maximum permissible levels never were exceeded. Also environmental monitoring in the surroundings did not detect any inadmissibly high gamma dose rates or immissions.

F.5 Emergency preparedness – Article 25

Facility Emergency Plans – Article 25 Para 1

Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.

On-site Emergency Plans

The Federal Minister for Agriculture, Forestry, Environment and Water Management is the competent licensing authority for radioactive waste management facilities. Emergency planning is part of the licensing procedure according to the Radiation Protection Act, the General and the Medical Radiation Protection Ordinance.

Prior to the start of the construction the design of installations for handling of radioactive materials and radiation emitting devices with a higher potential threat, such as a radioactive waste management facility, needs to be licensed according to Article 5 of the Radiation Protection Act. This construction license facilitates the subsequent licensing procedure for operation and requires among other documentation a concept for emergency preparedness for the specific site.

In a second step the facility needs the operating license in accordance with Article 6 of the Radiation Protection Act. A final safety and accident analysis and a final on-site emergency plan is a precondition for the operating license. These emergency plans are periodically updated based on requirements of the licensing authority in the course of the periodic safety reviews.

The last re-assessment of the on-site emergency plan by Nuclear Engineering Seibersdorf GmbH (NES) was finalised in 2007 taking into account the shut-down and decommissioning of the ASTRA reactor.

In case of radiological emergency due to an accident in an installation in which radioactive material including radioactive waste is handled, the licensee has to take all appropriate measures to mitigate the consequences of the accident due to Article 6 of the Radiation Protection Act.

Off-site Emergency Plans

Based on the new Ordinance on Interventions in Case of Radiological Emergencies, which entered into force by June 2007, the existing off-site emergency plans at federal and at regional level are presently updated. The updated plans will be in accordance with the recommendations of the IAEA document EPR-METHOD 2003. The new Ordinance also provides requirements on the periodic testing of these plans by different types of emergency exercises.

Notification

In accordance with Article 6 of the Radiation Protection Act a radiological emergency has immediately to be notified to the licensing authority by the licensee. Information on the causes of the accident and the possible consequences have to be provided for by the licensee. Additional notification and information requirements for radiological emergencies on Austrian territory are part of the Ordinance on Interventions in Case of a Radiological Emergency[ix].

In case of an event which has to be notified according to the Early Notification Convention[x] and according to Council Decision 87/600/Euratom[xi] (ECURIE), BMLFUW is the competent authority for the notification to the respective international organisations.

Territory Emergency Plans – Article 25 Para 2

Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.

Emergency Planning

The Federal Minister for Agriculture, Forestry, Environment and Water Management (BMLFUW) takes action in case of any radiological emergency coming from abroad. For the different responsibilities in the field of off-site emergency preparedness for accidents in neighbouring countries and as well as in Austria see the table below:

Institution	Responsibilities
Federal Ministry of Agriculture and Forestry, Environment and Water Management (BMLFUW)	• evaluation of the consequences of radiological and nuclear emergencies • environmental monitoring for large scale radioactive contamination • recommendations on counter measures (early and late phase) • Competent Authority for transboundary information exchange (ECurie, IAEA Convention on Early Notification and bilateral agreements)
Federal Ministry of Health, Family and Youth (BMGFJ)	• food monitoring • pre-planned provisions for KI-blocking
Crisis and Catastrophy Management of the Federal Ministry of the Interior (BMI)	• federal co-ordinating institution for crisis management
Federal Alarming Centre (FAC) in the Federal Ministry of Interior (BMI)	• national information exchange centre • Contact Point for information exchange with foreign countries (ECurie, IAEA Convention on Early Notification and bilateral agreements)
Nine Austrian Provinces	• implementation of counter measures (early and late phase)

As stated previously, due to the new Ordinance on Interventions in Case of Radiological Emergencies the existing off-site emergency plans at federal and at regional level also covering radiological emergencies resulting abroad are presently updated in accordance with the requirements of the IAEA document EPR-METHOD 2003.

Radiation Early Warning Systems

The Radiation Protection Act obliges the BMLFUW to operate and maintain an automatic Radiation Early Warning System ("Strahlenfrühwarnsystem") which consists of an automatic dose rate monitoring systems and an automated air monitoring system.

The data gathered by the Radiation Early Warning System are exchanged on-line with the corresponding systems in the neighbouring countries of Slovenia, Slovakia, the Czech Republic, Hungary and Germany on the basis of bilateral agreements. It is planned to start a similar data exchange with Switzerland in the second half of 2008.

In addition, a laboratory-based monitoring network is operated together with the Austrian Ministry of Health, Family and Youth in order to comply with the requirements of rapid recognition and precise determination of radioactive contaminants; it mainly performs the radionuclide-specific monitoring of air, precipitation, surface water bodies and foodstuffs. Additional measuring data can be obtained by car-borne and air-borne dose rate measurement units by intervention teams of the Federal Ministry of the Interior and the Federal Army.

BMLFUW is also obliged to operate adequate decision support systems (i.e. RODOS) based on meteorological forecast data. The information made available by the accident country (actual source term, other release parameters, etc.) provides the basis for a prognosis of possible consequences. In case of a radiological emergency BMLFUW has to assess the radiological situation and recommend countermeasures based on the results of environmental monitoring and the results of the decision support systems. The implementation of the protective and countermeasures, however, lies within the responsibility of the Heads of the Provincial Governments.

F.6 Decommissioning – Article 26

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility.

Generally, the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) is the competent licensing authority regarding radiation protection matters for facilities outside the scope of universities. BMLFUW issued the initial operating licence for the ASTRA reactor in Seibersdorf according to the Radiation Protection Act based upon a general description and reactor specification, the operation manual, a quality control plan and a safety analysis report and emergency plan (internal and external).

According to this initial operating license, significant changes of its components were subject to licensing. Thus, all decommissioning activities during the first stage did not change the site license and did not need a separate decommissioning license. The high-level waste (HLW) and ILW could be removed under the valid operating license of the reactor and no Environmental Impact Assessment (EIA) was necessary for these activities. But as soon as the fissile materials had been removed from the reactor site, the reactor had turned into a facility without fissile materials and did not fall anymore within the responsibility of the Federal Minister of Agriculture, Forestry, Environment and Water Management. According to EU-law, for the removal of the rest of the activity (which amounts to less than 0.001% of activity one week after the final shutdown) an environmental impact assessment was required. All subsequent activities during the second stage of decommissioning required the amendment of the initial operating license according to the Radiation Protection Act. The Act on Environmental Impact Assessment of 2000[xii], recently amended in 2002, required an obligatory Environmental Impact Assessment procedure. From the time of the removal of the spent fuel the Head of the Provincial Government of Lower Austria became the competent licensing and regulatory authority. Since then the Province of Lower Austria was responsible for any modification of the original operating license, the execution of the Environmental Impact Assessment procedure and any further radiation protection measures.

As stated above, the ASTRA Research Reactor in Seibersdorf (a 10 MW pool type) was shut down in July 1999. During 2002 the EIA was prepared. The public hearing was held on December 19th, 2002 and was followed by a decommissioning license on April 8th, 2003. The decommissioning work was concluded in 2006. The decomissioned reactor building will not be used as an interim storage facility for conditioned radioactive waste as planned but to use it as a storage hall for inactive material (see Annex L.2).

Within the next 10 years the decommission of the hot-cell facility in Seibersdorf is also to be expected.

The Radiation Protection Act requires the operator of a nuclear facility to present a decommissioning plan in the application documents for the construction license. However, neither construction nor operating license is usually limited to a legal operational lifetime. Instead, the regulatory authority examines the operation of a facility being in line with the relevant legislation and the conditions and requirements of the relevant licenses. Any nuclear facility must be closed if the requirements of the legislation and of the licensing and regulatory acts are not or not longer met taking into account the state-of-the-art of science and technology.

According to the Joint Agreement between the Republic of Austria, Nuclear Engineering Seibersdorf GmbH (NES) and the Community of Seibersdorf, the waste management and interim storage facility is scheduled to be operated until 2030. From that time on the Austrian Government is responsible for transferring all interim stored waste into an appropriate final disposal facility. The radioactive waste management installations and equipment of Nuclear Engineering Seibersdorf GmbH (NES) have been subject to regular upgrading and back fitting. This process will continue until the year 2030. For this reason a licence extension is not necessary.

Staff and Financial Resources – Article 26 (i)

Such steps shall ensure that qualified staff and adequate financial resources are available.

Adequate financial resources for the decommissioning of existing R&D facilities are guaranteed by a second agreement between the Republic of Austria (represented by the Federal Minister of Transport, Innovation and Technology) and the Nuclear Engineering Seibersdorf GmbH (NES). Ultimately, the Austrian Government has taken over responsibility for the costs of decommissioning of nuclear facilities which have been and are operated and owned finally by the Austrian State (research reactors and waste management facility). For this reason and due to the lack of nuclear power plants no special decommissioning fund has been established.

Nuclear Engineering Seibersdorf GmbH (NES) has qualified staff which has experience in decommissioning. But also younger personnel, experienced in engineering and handling of radioactive materials, with knowledge in hot cell work has been trained to continue the operation of the interim storage facility after decommissioning. Together with staff group managing the industrial radioactive source service, they will be qualified to operate the new facility. However, Nuclear Engineering Seibersdorf GmbH (NES) is provided with adequate financial resources for the recruitment of qualified external staff, if necessary.

Radiation Protection – Article 26 (ii)

Such steps shall ensure that the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied.

The Radiation Protection Act and the General Radiation Protection Ordinance apply to the decommissioning of nuclear facilities as well. This legislation covers all aspects of Article 26 (ii) (see Section F.4). As the shut-down, dismantling and decommissioning are major modifications to the operation of a facility for the handling with radioactive material, these activities need a license according to Article 8 of the Radiation Protection Act. This decommissioning licence lays down complementary obligations as appropriate.

Emergency Preparedness – Article 26 (iii)

Such steps shall ensure that the provisions of Article 25 with respect to emergency preparedness are applied.

The legal requirements concerning emergency preparedness apply independently of whether a facility is in operation or under decommissioning. These requirements cover all aspects of Article 26 (iii) (see Section F.5).

Record Keeping – Article 26 (iv)

Such steps shall ensure that records of information important to decommissioning are kept.

The decommissioning license is part of the Environmental Impact Assessment procedure, which requires the facility operators to keep and to update all technical records until decommissioning is completed. After completion of decommissioning, the operator has to hand over the documentation to the regulatory authorities.

The records retained throughout the course of the decommissioning of the ASTRA reactor include: fuel and burn-up specifications, transfer papers for spent und unspent fuel elements, dosimetric records of the staff involved in reactor operation and decommissioning, a list of all materials removed from the reactor building and its auxiliaries together with all relevant information pertaining to the material's disposal as radioactive waste or its release from control, the results of all radiological and chemical sampling performed, records of the 4-step procedure for the release from control of removed material including original signatures from the operator, the operator's radiation safety officer, the external expert, and the regulatory authority, and all quality management documentation and working procedures involving the decommissioning.

The most valuable information for the decommissioning was found in the written records and oral accounts of the reactor operating staff relating to the operational history of the reactor. These information allowed for more efficient sampling of important materials and components and most sensible determination of the necessary radiation safety measures in the facility.

Section G Safety of Spent Fuel Management – Article 4-10

Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management individuals, society and the environment are adequately protected against radiological hazards.

The Atomic Institute is in constant contact with the US Department of Energy and with the Edlow Group in charge of the US spent fuel return program. The TRIGA reactor Vienna (in operation) participates also in the spent fuel return program. The latest date for spent fuel return set by US Department of Energy is presently the year 2019. The fuel at the TRIGA reactor is under EURATOM inspection.

The storage facility at the Atomic Institute (with a total capacity of 168 standard TRIGA fuel elements) allows either wet or dry storage depending on the fuel element activity; currently, it contains eight fuel elements in dry storage.

Typically for TRIGA reactors worldwide, spent fuel elements are stored right inside the reactor hall and are therefore under the safety and security management of the reactor building. There are usually several types of storage facilities available at TRIGA reactors:

- inside the reactor tank about 3 meters below the pool water surface in special designed storage racks,
- in a pool adjacent to the reactor shielding block filled with water,
- fuel storage pits embedded in the reactor hall floor which can be used either for fresh or for spent fuel storage.

At the TRIGA reactor Vienna the first and the third mentioned types of storage are in use:

- storage racks directly in the reactor tank which are suspended along the tank wall about 3 m under water and which can accommodate up to 90 fuel elements (fresh or spent),
- six storage pits in the floor of the reactor hall 3 m deep and about 30 cm in diameter where each one can accommodate up to 28 fuel elements, in total 168 fuel elements. These storage pits can either be filled with water for shielding purposes; in case of fresh fuel elements or low active spent fuel elements these pits are filled with ambient air and vertically shielded by a 25 cm thick lead plug.

As there are only eight spent fuel elements stored at the TRIGA reactor Vienna and as these elements were removed from the core more than 20 years ago, these fuel elements are stored in a dry pit to prevent corrosion. However, they are subject to regular inspections with optical devices.

Section H Safety of Radioactive Waste Management

H.1 General Safety Requirements – Article 11

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards.

The protection of individuals, society and the environment against radiological and other hazards is subject to the Austrian legislation on radiation protection, as described in Section E.2, and to the legislation on environmental protection (mainly the Environmental Impact Assessment Act and associated ordinances).

Protection of the environment from hazards other than radioactivity is verified by the Federal Minister of the Agriculture, Forestry, Environment and Water Management (BMLFUW) on the basis of the Environmental Impact Assessment Act 2000, which requires an EIA for major facilities, and on the basis of the Environmental Management Act[xiii], which implements the EU eco-management and audit scheme (EMAS).

During the operation, the protection of the workers is assured by requirements and compliance checks of the Austrian Labour Inspectorate (“Arbeitsinspektorat”) and the Occupational Health Services (“Arbeitsmedizinischen Dienste”).

Civil protection is a competence of the Federal Minister of the Interior, implemented by the Provincial Authorities. Compliance with the legislation on protection of the general population and the environment from non-radiological hazards is verified by Provincial Authorities (“Federal Länder”).

Criticality and Removal of Heat – Article 11 (i)

In so doing, each Contracting Party shall take the appropriate steps to ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed.

Criticality and removal of residual heat are not an issue for the LILW waste in the Nuclear Engineering Seibersdorf GmbH (NES) interim storage.

Generation of Radioactive Waste – Article 11 (ii)

In so doing, each Contracting Party shall take the appropriate steps to ensure that the generation of radioactive waste is kept to the minimum practicable.

Minimisation of radioactive waste is required according to the Radiation Protection Act. The feasibility of radioactive waste minimisation has to be evaluated prior to each handling with radio-active substances. The compliance is verified by the regulatory body during the licensing procedure, issuance of operation permits, and periodic inspections. Until now there has never been any reason for a regulatory enforcement action regarding minimisation of radioactive waste.

Interdependencies – Article 11 (iii)

In so doing, each Contracting Party shall take the appropriate steps to take into account interdependencies among the different steps in radioactive waste management.

Optimisation is required by the Austrian Radiation Protection Legislation at all stages of radioactive waste management, thus interdependencies among the different steps are taken into account in practice. Nuclear Engineering Seibersdorf GmbH (NES) periodically performs an optimisation study comparing the available options for the treatment, conditioning, storage and disposal of radioactive waste. The licensing procedures as well as the periodic inspections by the regulatory authority take into account interdependencies among the different steps in radioactive waste management.

Protection of Individuals, Society and the Environment – Article 11 (iv)

In so doing, each Contracting Party shall take the appropriate steps to provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards.

The Austrian Radiation Protection Legislation aims at the protection of individuals, society and the environment from the effects of ionising radiation (see Section E.2) by fully implementing the EU Basic Safety Standards Directive 96/29/Euratom based upon the ICRP system of justification, optimisation and dose limitation.

The applicable dose limits are compatible with the International Basic Safety Standards (IAEA Safety Series No. 115). In particular, a dose limit for members of the public of 1 mSv effective dose per year and a dose limit for workers of 20 mSv per year are implemented.

The protection of the environment against hazards other than radioactivity is the subject of different legal instruments.

During the operational phase compliance with the legislation is verified and enforced by regulatory supervision, mainly by annual inspections. The regulatory supervision includes monitoring of the radioactivity in the environment of the facility. Compliance with the environmental protection legislation is verified by the responsible regional authorities.

Biological, Chemical and other Hazards – Article 11 (v)

In so doing, each Contracting Party shall take the appropriate steps to take into account the biological, chemical and other hazards that may be associated with radioactive waste management.

Biological, chemical and other hazards are subject to the environmental protection legislation, which also aims at human health protection, especially with requirements concerning air and water quality. An Environmental Impact Assessment is required prior to the construction license and for the operation permit. This assessment is reviewed by the appropriate environmental protection authorities before the licence is issued. Hazards other than radiation encountered by workers during handling radioactive material are covered by the general legislation on safety at working places, enforced by the supervision by the Austrian Labour Inspectorate (Arbeitsinspektorat).

Impacts on Future Generations – Article 11 (vi)

In so doing, each Contracting Party shall take the appropriate steps to strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation.

There are currently no final disposal facilities for radioactive waste in operation or under construction in Austria.

Burdens on Future Generations – Article 11 (vii)

In so doing, each Contracting Party shall take the appropriate steps to aim to avoid imposing undue burdens on future generations.

It is Austria's policy to collect, treat, and condition all radioactive waste for safe interim storage in order to minimise the burden for future generations. Adequate financial means are being established to support any future final disposal strategy.

H.2 Existing facilities and past practices – Article 12

According to a Joint Agreement between the Republic of Austria, the Community of Seibersdorf and Nuclear Engineering Seibersdorf GmbH (NES) from 1976 (revised in 2003), all radioactive waste arising in Austria has been collected including the radioactive waste from the IAEA laboratories in Seibersdorf at NES. Since then a number of storage halls and other facilities were financed by the state and built at NES. Different categories of waste (liquid burnable, liquid non burnable, solid burnable, solid non burnable, etc.) were stored in specifically designed storage halls. At 1965 a concrete trench, separated in four boxes, was made for taking up intermediate level waste. After the installation of treatment facilities, especially the incineration plant and the high-force compactor, this "historical waste" was treated, conditioned in 1999/2000 and is currently stored in the interim storage facility (for detailed information see Annex L.1).

H.3 Siting of proposed facilities – Article 13

Safety, Impact and Information – Article 13 Para 1

Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:

(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;

(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;

(iii) to make information on the safety of such a facility available to members of the public;

(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.

Currently, Austria does not intend to build further radioactive waste management facilities, including final or long-term repositories in Austria in the near future. Hence, the Austrian legislation does not yet contain detailed provisions for the siting of radioactive waste disposal facilities.

Effects on other Contracting Parties – Article 13 Para 2

In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 11.

Even though no specific provisions for siting of disposal facilities are yet foreseen in the Austrian legislation, general rules for the construction of installations apply and must consider the safety regarding the construction site. Potential cross border effects are ruled according to international and EU legislation on environmental impact assessments.

H.4 Construction, safety assessment and operation – Article 14

Limitation of Radiological Impacts – Article 14 (i)

Each Contracting Party shall take the appropriate steps to ensure that the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases.

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 environmental are protected against the hazards of ionising radiation during normal operation and possible emergencies.

Decommissioning – Article 14 (ii)

Each Contracting Party shall take the appropriate steps to ensure that at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account.

The Radiation Protection Act requires a decommissioning concept for any major facility already when applying for a construction license (for details see Section F.6).

Closure of Disposal Facility – Article 14 (iii)

Each Contracting Party shall take the appropriate steps to ensure that at the design stage, technical provisions for the closure of a disposal facility are prepared.

There are no disposal facilities in Austria. However, the required decommissioning concept (see above) includes provisions for the shut down.

Technologies – Article 14 (iv)

Each Contracting Party shall take the appropriate steps to ensure that the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

The equipment and devices at Nuclear Engineering Seibersdorf GmbH (NES) are regularly inspected and, if required or deemed necessary, modernised and backfitted based upon the state-of-the-art.

H.5 Assessment of Safety of Facilities – Article 15

Safety Assessment – Article 15 (i)

Each Contracting Party shall take the appropriate steps to ensure that before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out.

An Environmental Impact Assessment (EIA) is required prior to the construction license based upon the Environmental Impact Assessment Act (EIA-Act).

Post-Closure Safety Assessment – Article 15 (ii)

Each Contracting Party shall take the appropriate steps to ensure that in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body.

There is no disposal facility in operation or planned. However, an EIA of radiological and non-radiological hazards is a requirement of the EIA-Act.

Update of Safety Assessment – Article 15 (iii)

Each Contracting Party shall take the appropriate steps to ensure that before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

Every year periodic safety reviews are carried out at NES by the Federal Minister of Agriculture, Forestry, Environment and Water Management as the competent regulatory authority with the support of qualified experts.

H.6 Operation of Facilities – Article 16

Each Contracting Party shall take the appropriate steps to ensure that the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements.

The operation licence for an installation for the handling of radioactive material, including radioactive waste management facilities, is granted based on a safety analysis report demonstrating inter alia the suitability of the site. In the case of radioactive waste management facilities, the Federal Minster for Agriculture, Forestry, Environment and Water Management (BMLFUW) supervises the construction of the facility and makes sure that the facility is built in accordance with the construction licence.

The Radiation Protection Act does not contain special provisions for disposal facilities; the general rules for the operation of installations for handling with radioactive material are applied. 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. Further radiation protection measures can be required by the licensing authority if findings gained during construction make them necessary for radiation protection reasons. The operation license is issued after the test operation in the framework of the construction license which has demonstrated that the facility fulfils all safety and other requirements.

Defining and Revising Operational Limits and Conditions – Article 26 (ii)

Each Contracting Party shall take the appropriate steps to ensure that operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary.

BMLFUW supervises and inspects the commissioning and operation of the only radioactive waste management facility NES, and, jointly with the Federal Minister of Science and Research, the university research facilities. In general minor facilities are inspected and supervised by the local Authorities. 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. 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.

Accordance with Established Procedures – Article 16 (iii)

Each Contracting Party shall take the appropriate steps to ensure that operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure.

Operation, maintenance and monitoring of installations for the handling of radioactive material, including radioactive waste management facilities, are specified in the operation licence. The corresponding procedures, as described in the facility operation documents, are reviewed by the competent regulatory authority. Their adequacy is a condition for the issuance of the operation license. BMLFUW is entrusted with the supervision of radioactive waste management facilities and carries out annual inspections. BMLFUW is empowered to enforce compliance with all requirements.

Engineering and Technical Support – Article 16 (iv)

Each Contracting Party shall take the appropriate steps to ensure that engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility.

According to the Radiation Protection Act, the fulfilment of requirements regarding the staff and the organisation is a prerequisite for the granting of the operation licence for an installation for the handling with radioactive material. The requirements concerning staff and organisation are outlined in the Radiation Protection Ordinance (Article 42).

Characterisation and Segregation of Radioactive Waste – Article 16 (v)

Each Contracting Party shall take the appropriate steps to ensure that procedures for characterisation and segregation of radioactive waste are applied.

Since conditioning of radioactive waste is handling with radioactive material it is subject to the licensing process. The approval depends, among other things, on the measures taken to ensure that the properties of the waste and its characterisation are optimal in view of the further waste management steps. The producer of radioactive waste is obliged to segregate and label the waste according to the following categories: liquid-combustible, liquid-non-combustible, solid-combustible, solid-non-combustible, gaseous, biogenous waste, sealed radioactive sources considered waste, bulky waste, composed waste and different hazardous wastes.

Reporting of Incidents – Article 16 (vi)

Each Contracting Party shall take the appropriate steps to ensure that incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body.

During the annual inspections according to Article 17 of the Radiation Protection Act incidents which have occurred, are to be reported. In addition the Radiation Protection Act requires that the licensing holder immediately reports any incident that could have led to a non negligible exposure to a radiation worker.

Collection and Analysis of Operating Experience – Article 16 (vii)

Each Contracting Party shall take the appropriate steps to ensure that programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate.

During the annual inspections conducted by the regulatory authority all relevant operating experiences are analysed. If the experience during operation or new scientific evidence reveals that additional radiation protection measures are required, the licensing holder can be obliged by the regulatory authority to fulfil these additional requirements taking into account acquired rights.

Decommissioning Plans and Closure of Disposal Facility – Article 16 (viii)-(ix)

Each Contracting Party shall take the appropriate steps to ensure

(viii) that decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

(ix) that plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

The general requirements for the operation of an installation for the handling with radioactive material, including radioactive waste management facilities are applied. Annual inspections of the regulatory authority (BMLFUW in case of radioactive waste management facilities) ensure that the decommissioning plans including a shut-down and radioactive waste management scheme are updated and revised during the operation of the facility.

The closure and decommissioning of the radioactive waste management facility Nuclear Engineering Seibersdorf GmbH (NES) is scheduled for 2030 and is regulated by the Joint Agreement between the Republic of Austria, the Community of Seibersdorf and Nuclear Engineering Seibersdorf GmbH (NES).

H.7 Institutional measures after closure – Article 17

Keeping Records – Article 17 (i)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility records of the location, design and inventory of that facility required by the regulatory body are preserved.

In Austria no disposal facility is in operation. Therefore the Austrian legislation does not yet contain specific legal requirements for a closure of such a disposal facility. There are currently no plans for closure of the existing Nuclear Engineering Seibersdorf GmbH (NES) interim storage and pre-disposal management facilities.

Institutional Controls – Article 17 (ii)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility active or passive institutional controls such as monitoring or access restrictions are carried out, if required.

Specific regulations of the institutional controls after closure have not been decided yet since there are no disposal facilities operated. The Radiation Protection Act allocates the corresponding decisions to the federal government.

Intervention Measures – Article 17 (iii)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

Austria has implemented a national monitoring programme of the radioactivity in the environment. This monitoring is performed by the Federal Minister for Agriculture, Forestry, Environment and Water Management. The intervention measures to be taken in the case of increased environmental radiation are established by the radiation protection legislation. The responsibility for such potential intervention measures lies with the Federal State.

Section I Transboundary Movement – Article 27

I.1 General Requirements - Article 27 Para 1

Each Contracting Party involved in a transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provision of this Convention and relevant binding international instruments.

Authorisation by State of Destination – Article 27 Para 1 (i)

In so doing, a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination.

Transboundary movement of radioactive sources above the exemption limits laid down in the Radiation Protection Ordinance are subject to the Council Regulation (EURATOM) No 1493/93 on shipments of radioactive substances between Member States[xiv] which is directly applicable.

The import, export and transit of radioactive waste (including spent fuel declared as waste) are subject to an authorisation issued under the Ordinance on the Supervision and Control of Shipments of Radioactive Waste into, out of or through the Austrian Federal Territory, which implements the Council Directive 92/3/EURATOM[xv]. As a general rule, the import of radioactive waste for final disposal or interim storage is generally prohibited. Any transportation of fissionable material on Austrian territory is prohibited unless under an international agreement. Fissionable material for the purpose of peaceful use if not for the production of nuclear power can be transported. The transport of fissionable material arising from the nuclear energy production is also prohibited if the purpose is final disposal.

According to this Ordinance, every crossing of the Austrian border by radioactive waste needs consent or approval by the competent Austrian authority. The Annexes to the Ordinance define, inter alia, the form of the applicable standard documentation and the list of quantities and concentration levels for radioactive waste. The Standard Document according to the Council Directive 92/3/Euratom has to be used. In addition general safety requirements are laid down in the revised Radiation Protection Act and the General Radiation Protection Ordinance.

Export of radioactive waste for recycling, treatment, conditioning, storage or disposal is possible but requires authorisation according to a specific system of approval and notification. According to Article 8 Para 1 of the Ordinance on the Supervision and Control of Shipments of Radioactive Waste[xvi] an approval can be granted if

- there is no indirect or imminent danger for the human life or health including human descendants from ionising radiation, and
- if the State of Destination and the States of Transit, if any, have agreed to the import for the stated purposes within the framework of an international agreement or within the applicable European Community or EURATOM Law, and
- if the exporter has entered into a binding written agreement with the importer of the radioactive waste which stipulates that the exporter shall take back the waste if the shipment cannot be completed according to the relevant legal provisions or the conditions attached to the approval.

According to Article 11 of Ordinance on the Supervision and Control of Shipments of Radioactive Waste it is also relevant that there are no reasons for the refusal of an approval: If Austria is the State of Origin and a third country (non-EU Member State) is the State of Destination, which in view of the competent Austrian authorities does not have the administrative or technical capacity, or the appropriate regulatory structure to treat,

condition, interim store or dispose imported radioactive waste in a manner consistent with the Convention, Austria has to refuse the approval.

In November 2006, the Council of the European Union has adopted the Council Directive 2006/117/EURATOM as an amendment of the Council Directive 92/3/EURATOM. 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.

Member states have to implement this directive into their national legislation to comply with it before 25 December 2008. According to this provision, the Austrian Ordinance on the Supervision and Control of Shipments of Radioactive Waste is to be replaced at the end of the year 2008 by the new Ordinance on the Supervision and Control of Shipments of Radioactive Waste and Spent Fuel 2009.

Movements through States of Transit – Article 27 Para 1 (ii)

In so doing, transboundary movement through states of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized.

Austria is a party of the following international conventions and therefore applies the relevant annexes concerning the transport of dangerous goods:

- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR); Annexes A and B;
- Convention concerning International Carriage by Rail (COTIF); Appendix C - Regulation concerning the International Carriage of Dangerous Goods by Rail including its Annex (RID);
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN); Annexed Regulations (as from 1 March 2009);
- Convention on International Civil Aviation; Annex 18 and the ICAO-Technical Instructions for the Safe Transport of Dangerous Goods by Air implemented by the Act on the Carriage of Dangerous Goods;
- International Convention for the Safety of Life at Sea; International Maritime Dangerous Goods Code.

These provisions apply either directly or as referenced by the Act on the Carriage of Dangerous Goods[xvii].

This Act also implements several directives of the European Union concerning the carriage of dangerous goods by road, rail and inland navigation, which also refer to, implement and complete the international agreements mentioned above.

Since the Annexed Regulations to the ADN have not yet come into effect, until spring 2009 the transport of radioactive material on inland waterways is subject to the provisions of an ordinance based on the 1997 Federal Act[xviii] on Inland Navigation and to the provisions of the Act on the Carriage of Dangerous Goods, as far as they are common to all modes of transport.

As far as the international legal instruments mentioned in this item (RID/COTIF, ADR, ICAO-TI, ADN, IMDG-Code) relate to the transport of radioactive materials, they are mainly based on provisions published by the IAEA (TS-R-1).

Licences for export are not issued unless the international obligations relevant to the modes of transport used are fulfilled.

Requirements for State of Destination – Article 27 Para 1 (iii)

In so doing, a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention.

According to Article 7 of the Radioactive Waste Shipment Ordinance the approval of a shipment of radioactive waste into the Austrian territory has to be refused in cases

- of an imminent or indirect danger for the human health or life including human descendants from ionising radiation, or
- where no licence for the intended or predicted use or handling has been issued according to the radiation protection legislation, or
- the competent national authorities have not been supplied with a takeover agreement between the licensee and an appropriate facility for the storage of radioactive waste, or
- the capacity for conditioning or processing of radioactive waste is too low in Austria and the proper management of radioactive waste arising is a risk in Austria,
- the route of transport causes impacts infringing the radiation protection legislation, especially not justifiable exposure to individuals of the population,
- a take-back declaration of the holder of the waste is missing in case the transportation procedure cannot be completed,
- the data and specifications or the comments of the competent authorities in the standard document are apparently missing or incomplete and
- there is no guarantee that the shipment into the Austrian territory is not carried out for the purpose of final disposal or interim storage, unless the interim storage is only a part of the necessary preparation of the timely treatment or conditioning, and the radioactive waste is transferred back out of the Austrian territory.

The Radioactive Waste Shipment Ordinance prohibits any import of radioactive waste not originating from Austria for final disposal or interim storage purposes (unless under an international agreement). Austria has no final repository for disposal of radioactive waste.

On the basis of the Austrian Federal Constitutional Act on a “Non-Nuclear Austria” Austria explicitly prohibits any transport of fissile material from the production of nuclear energy except binding international law can be applied. Therefore Austria allows for example for the transport of fissile material from research reactors is allowed.

Meeting the Requirements for State of Destination – Article 27 Para 1 (iv)

In so doing, a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement.

According to the Article 8 of the Radioactive Waste Shipment Ordinance, a licence is required for the export of radioactive waste. The conditions are explained in detail therein (see above Article 27 Para 1 (i)). They ensure that the respective requirements of the Convention are fulfilled.

Re-entry in case of non-conformity – Article 27 Para 1 (v)

In so doing, a Contracting Party which is a State of origin shall take the appropriate steps to permit a re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.

In case of a shipment of radioactive waste from Austria to a destination out of the Austrian territory the Radioactive Waste Shipment Ordinance explicitly requires a written and legally binding agreement between the holder and the consignee obliging the holder to take back the radioactive waste in case the shipment procedure cannot be accomplished or the conditions attached to the approval of the shipment are not fulfilled.

The competent national authorities which approved the transit for a shipment may not refuse to approve the reshipment if the initial shipment was approved for treatment or reprocessing purposes and if the reshipment concerns radioactive waste or other products equivalent to the original material after treatment or reprocessing when all relevant legislation is respected. In case of a shipment failure, the national authorities must allow for the reshipment, if a transboundary movement cannot be completed in conformity with the relevant legislation and the reshipment is undertaken in a safe manner on the same conditions and with the same specifications as stated in the initial application.

I.2 Shipments south of Latitude 60 – Article 27 Para 2

A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees south for storage or disposal.

According to Article 11 of the of the Ordinance on the Supervision and Control of Shipments of Radioactive Waste the competent authorities have to refuse granting of a license for shipments

- to a destination south of latitude 60 degrees south or
- to a State Party to the Cotonou ACP-EC Agreement which is not a member of the European Community, taking into account reshipments
- to a third country, which does not have the technical, legal or administrative resources to safely manage the radioactive waste in the opinion of the competent authorities of the country of origin. (The provisions and criteria for reshipment must be taken into account.)

Section J Disused Sealed Sources – Article 28

J.1 Possession, Remanufacturing and Disposal – Article 28 Para 1

Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.

In Austria anyone who envisages handling with radioactive sources exceeding the exemption limits must apply for a license according to Article 10 of the Radiation Protection Act. The relevant regional authorities (“Bezirkshauptmannschaften”) of each Austrian Province are the competent licensing authorities in this respect.

The Radiation Protection Act obliges the Federal Minister of Agriculture, Forestry, Environment and Water Management (BMLFUW) to implement, maintain and update the centralised register for all radioactive sources exceeding the exemption levels. Exemptions from the requirement to report are made i.e. in case the radioactive material is below given activity limits or in case of transports of radioactive material in compliance with the relevant transport regulations. This register which was put into operation in 2006 contributes to estimate future amounts of radioactive waste. The register requires information regarding source specifications, such as nuclide, activity, etc., manufacturer, licence holder, and details regarding the intended use of the source. License holders are granted a grace period for filing the necessary reports for existing sources.

Since Austria is a Member State of the European Union, the Council Directive 122/2003/Euratom on High Activity Sealed Sources and Orphan Sources[xiv] is applied. The Directive defines high activity sealed sources (=HASS) on the basis of their total activity. In line with the Directive the licensee of a HASS has to notify the purchase, possession, storage and any kind of transfer (remanufacture or disposal) to the Central Source Register.

Regarding the import of other sealed radioactive sources it depends on the country of origin or destination (EU Member State or a third country):

- For all shipments of radioactive substances within the European Community the import and exports are quarterly notified and, in addition, in the case of sealed sources notified in advance to the competent authority (see Council Regulation 1493/93/Euratom on the shipments of radioactive substances between Member States).
- Each import or export of radioactive sources from or into third countries has to be notified prior to the shipment to the Central Register.

Annually each licensee has to notify any purchase, transfer and actual inventory of radioactive material including radioactive waste.

Regarding the financial security the applicant for a license must provide the licensing authority with a specific third-party liability insurance or bank guarantee in order to ensure the safe disposal of the source also in case of bankruptcy. Instead of such an insurance or bank guarantee, the Federal State, the Federal Provinces or any local authority can issue a declaration of liability.The possession of such sources is subject to certain obligations. It is therefore in the interest of the owner to return disused sources as soon as possible to the manufacturer or to deliver them to Nuclear Engineering Seibersdorf GmbH (NES). The costs for this process are borne by the owner. For the case of failure, the holder is required to present a liability insurance or bank guarantee. Otherwise a license for the possession of a radioactive source will not be issued. The holder is strictly liable. In case of the loss and finding of an “orphan” source the competent authority secures, recovers and stores the source at the cost of the owner of the source with recourse.

The use of sealed radiation sources is regulated by the Radiation Protection Act and the corresponding Ordinances. The radiation protection legislation requires minimisation of radioactive waste. The preferred radioactive waste management option concerning sealed sources, both spent and disused, is the return to the manufacturer. In cases of disused sources where this is not possible, recycling, i.e., reuse by a third party is encouraged. According to this requirement, disused sealed sources shall, as far as possible, be stored on the site of the former user pending recycling for further use. If not possible, disused sealed sources shall be transported to Nuclear Engineering Seibersdorf GmbH (NES) for temporary storage pending reuse. Then non-recyclable sources have to be returned to the manufacturer. If sealed sources are declared radioactive waste they have to be transferred to NES for conditioning and interim storage. Some sources, for instance those containing Radium, have been conditioned in accordance with IAEA recommendations. Sources containing short-lived isotopes (LILW-SL), e.g., ^{60}Co or ^{137}Cs, are slated for near-surface disposal, while those containing

^{226}Ra, ^{241}Am etc. (LILW-LL) will most likely end up in a geological repository. In any case the storage must take place according to applicable legal radiation protection regulations.

J.2 Re-entry into Territory – Article 28 Para 2

A Contracting Party shall allow for re-entry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed source.

In Austria the re-entry of disused sealed sources into its territory is allowed. Import and export of all radioactive sources need prior licensing if their activity is above the exemption limit set in the Radiation Protection Ordinance implementing the Basic Safety Standards Directive 96/29/Euratom. The requirements for a shipment of radioactive sources are laid down in the EU Council Regulation No 1493/93/Euratom of 8 June 1993 on the shipment of radioactive substances between Member States which is directly applicable for the import and export of radioactive sources. In connection with an export licence it is required that the consignee holds an appropriate licence for handling this radioactive material. Nuclear Engineering Seibersdorf GmbH (NES) is the only manufacturer of sealed sources in Austria. Most of the produced sources are distributed to domestic users and some are used abroad by Austrian companies. In any case all of these sources are taken back by Nuclear Engineering Seibersdorf GmbH (NES) if no longer used or spent.

Section K Planned Activities to Improve Safety

As shown in the present report, the safety of radioactive waste management in Austria complies with the obligations of the Convention. However, Austria strives for continuing improvements of safety. In compliance with the Joint Agreement between the Republic of Austria, Nuclear Engineering Seibersdorf GmbH (NES) and the Community of Seibersdorf, long-term interim storage ("transfer-storage") of radioactive waste has to be assured until 2030.

This extension of the storage time for the existing (and future) radioactive waste requires

- significant investments in new buildings and machinery
- additional measures for the stored containers with radioactive waste (additional- and re-conditioning)

at Nuclear Engineering Seibersdorf.

Therefore, a concept for future radioactive waste-management at Nuclear Engineering Seibersdorf was developed. The realisation of the concept (see Annex L.1) will start with the year 2009.

Additional to the above mentioned extensive renewal and investment project several minor projects will be carried out, for example:

For optimisation of the decontamination of aqueous liquids and minimisation of resulting radioactive waste a new filtration unit will be installed in the water treatment plant based on ultrafiltration with ceramic membrane filters.

The costs for the modernisation of the waste treatment facilities in Seibersdorf will be borne by the Austrian State according to the Joint Agreement between the Republic of Austria, the Community of Seibersdorf and Nuclear Engineering Seibersdorf (NES) which is based on the Radiation Protection Act. These budgetary means are agreed by the Federal Minister of Finance and form a separate part of the budget of the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW).

Section L Annexes

L.1 Nuclear Engineering Seibersdorf GmbH (NES)

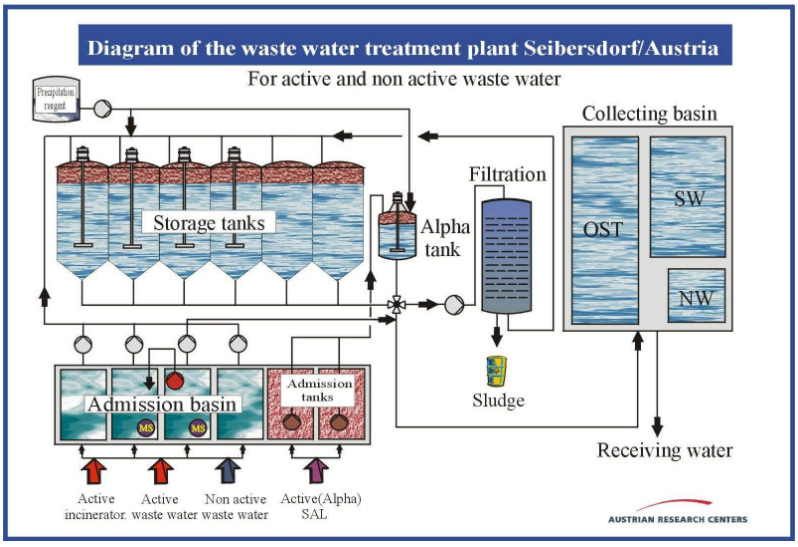
The following chapters describe in short the existing radioactive waste management facilities of the Austrian centralized pre-disposal and interim storage facility Nuclear Engineering Seibersdorf GmbH (NES).

Segregation

Pre-sorting of radioactive waste is required from the waste producers. For specific tasks, such as dismantling of larger equipment, a special room ("sorting box") equipped with a negative pressure ventilation system is used. Depending on the hazards involved, work is carried out in supplied-air suits or full-face masks.

Waste water treatment facility

In this facility, waste water from the Nuclear Engineering Seibersdorf GmbH (NES) site in Seibersdorf is treated. The four waste water sources include incinerator operations, laboratories working with radioactive material, all other laboratories on site (theoretically inactive waste water), and the IAEA Safeguards Analytical Laboratory (SAL) delivering potentially α-contaminated waste water.



Waste water treatment plant Seibersdorf

The Figure shows a schematic depiction of the facility. As a first step, waste water is delivered via direct pipeline connections from the point of origin into separate admission basins. Then Measurements are performed to determine the activity of the waste water. If below the regulatory limits, the water is transferred directly into the collecting basin and, after repeated measurements, discharged into the environment. In the opposite case, the water is pumped into the storage tanks, some equipped with stirrers, where a precipitation is performed by addition of a suitable reagent, i.e., $[Fe(CN)_6]^{4-}$ for Cs^+ precipitation. The active precipitate is separated from the liquid in a Filtrox® filtration unit. The resulting sludge is dried and conditioned in the high force compactor. The liquid is pumped back into the storage tanks, re-

checked for activity, and transferred into the collecting basin. Occasionally, a second precipitation may be called for to comply with the regulatory limits.

At present a modification is carried out to use diaphragm-techniques (ultrafiltration) in waste water treatment. By implementation of a new membrane-filtration a considerable reduction of the secondary waste generated at the Waste water Treatment Plant is expected.

High-force compactor

Non burnable solid radioactive waste can be treated using the high-force compactor. This unit is of horizontal design. Steel 100-litre-drums containing solid waste are fed into an opening from top into the channel of the ram. When operating the ram, the content in the channel is compressed into the compaction station with a compaction force of 12 MN. Pellets formed in this way are ejected after opening the compaction station and transferred into 200-litre-drums for storage.

Depending on the waste characteristics, a volume reduction factor of 2 to 10 can be reached.

Supercompactor

Cementation equipment, types of storage containers

Cementation (grouting) is a conditioning and immobilisation method which is currently in use at Nuclear Engineering Seibersdorf GmbH (NES).

Homogeneous cementation is carried out in-drum or by mixing waste with cement and water in a separate mixer and filling the mixture into 200-litre-drums. This method is used rather seldom.

Heterogeneous cementation is performed by placing 100-litre-drum with waste into 200-litre-drums and filling the annular cavity with cement.

Pellets from the high force compactor are also placed in 200-litre-drums. The voids are filled with quartz sand.

Cementation equipment

With some exceptions (a small number of pre-cemented containers and a few Mosaik and Konrad Type II –containers), only steel 200-litre-drums are in use as storage containers.

Interim storage

All conditioned radioactive waste is stored within two dry engineered construction storage facilities (storage facilities no. 12 and 12A). At present the capacity is limited to 15000 200-litre-drums. As of end of 2007, 10190 drums were in interim storage.

A new storage facility (no.13) is under construction. The erection will be finished in autumn 2008. The capacity of storage facility no.13 is approx. 2300 200-litre-drums. This storage facility is equipped with a thermal insulation and a heating- and dehumidification-system in order to reduce the risk of corrosion for the steel drums.

Storage facilities

Conditioned waste in interim storage facility 12A

Incinerator

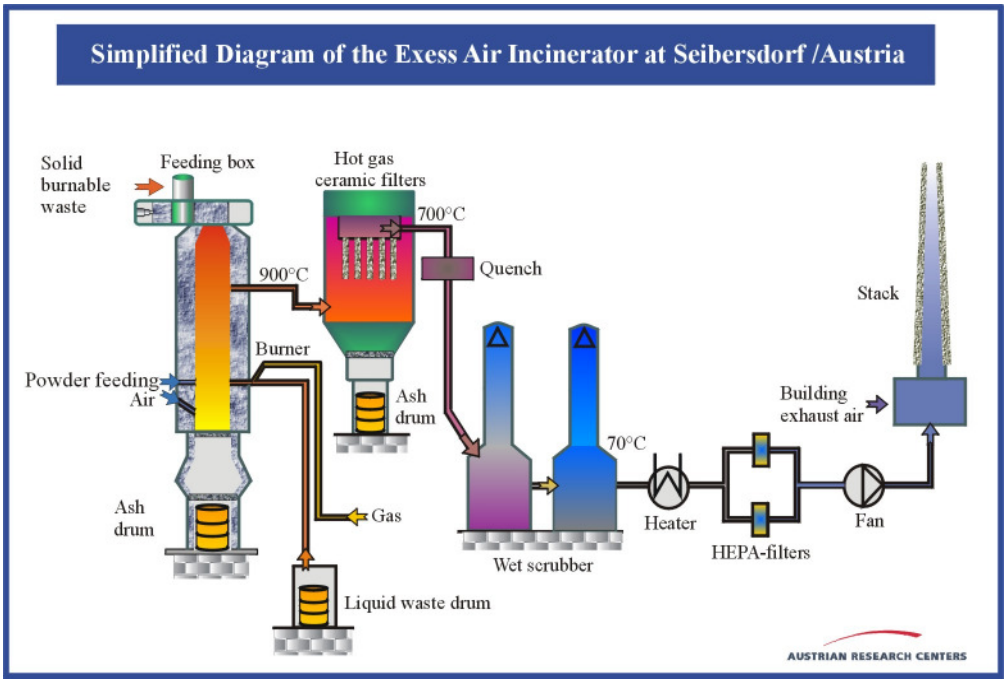
The shaft incinerator of the “Karlsruhe” type is an excess air unit having a capacity of about 40 kg per hour and a combustion volume of 1 m diameter and 5 m height. The off-gas cleaning system consists of a set of ceramic hot gas filters, quench, two stage wet scrubber and HEPA-Filters.

Over the years a number of modifications to the original design have been carried out in order to improve safety, to keep up the technical standard and to meet requirements of changing regulations. Especially the off-gas cleaning system has been changed considerably compared to the original design.

In addition, modifications to the shaft have been carried out too, where for example additional openings were introduced in order to facilitate effectively the incineration of powdery mate-

rial. A project of incinerating about 1000 tons of ion-exchange resin had been successfully carried out, where the dried material was transferred into the combustion chamber via a screw and a blowing system. After completion of the project, the conditioned ash was sent back to the country of origin.

In 2007 a modern, online-monitoring-system for the exhaust-air of the incinerator-building was installed. The system consists of an isokinetic sampling-system installed in the stack, an aerosol-monitor as well as separate monitors for tritium and iodine.



Simplified Diagram of the Excess Air Incinerator

Technical data of the incinerator:

- Excess air incinerator
- Shaft type, single chamber
- Combustion chamber: 1 m diameter, 5 m high
- Combustion temperature: 1000 °C
- Capacity : ~ 40 kg / h solid burnable waste
  (calorific value: average 21×10^6 J/kg = 5000 kcal/kg)
- Negative pressure in the combustion chamber: 10^3 Pascal = 10 mbar
- Air flow: 300-600 m³ variable, depending on negative pressure in combustion chamber
- Feeding from top batch wise (2-3 kg) through airlock, liquids through burner
- Feeding of powdery material by blowing system into combustion chamber
- Hot gas filter, in brick-lined filter box, Silicon-carbide candles, mean porosity : 20 µm
- Quench, spray cooler with nozzles, decreases off-gas temperature from 700 °C to 70 °C
- Two stage scrubber (one trickle flow, one spray) using caustic soda solution to pH 8.1
- Heater, raises off-gas temperature to ~ 100 °C
- HEPA filters
- Off-gas draft fan, radial blower, regulated by negative pressure of combustion chamber
- Mixing chamber
- Stack, 35m high

Operational experience

During 25 years of operation the following amount of waste has been treated:

- liquid waste 72 t
- solid waste 823 t
- ion exchange resins 535 t (after drying)

The ash of that resins were conditioned and sent back to the country of origin.

By the end of 2007 a total of about 1430 tonnes were combusted.

Depending on the amount of radioactive waste to be combusted the incinerator was operated to the number of shifts necessary for the planned quantity every year. It is operated in two shifts a day, i.e. from 6h00 till 22h00 6 days a week, with two operators in one shift.

The treatment of these wastes resulted in a volume reduction of about 50:1 comparing row material to ashes. But operating such a facility creates secondary waste, changing the picture of volume-reduction significantly. Apart from operational waste as hot gas- and HEPA-filters, contaminated parts from maintenance and repairs, a number of replacements have to be included.

Activity releases to the atmosphere

Radioactive releases to the atmosphere are checked by analyses of samples collected in a sampling system connected to the stack. Release limits are radio nuclide specific and set by the authority.

In total the following radioactive releases have been determined during 25 years of incinerator operation:

α [MBq]	β [MBq]	^{60}Co [MBq]	^{137}Cs [MBq]
11,8	78,3	< 25,2	< 25,6

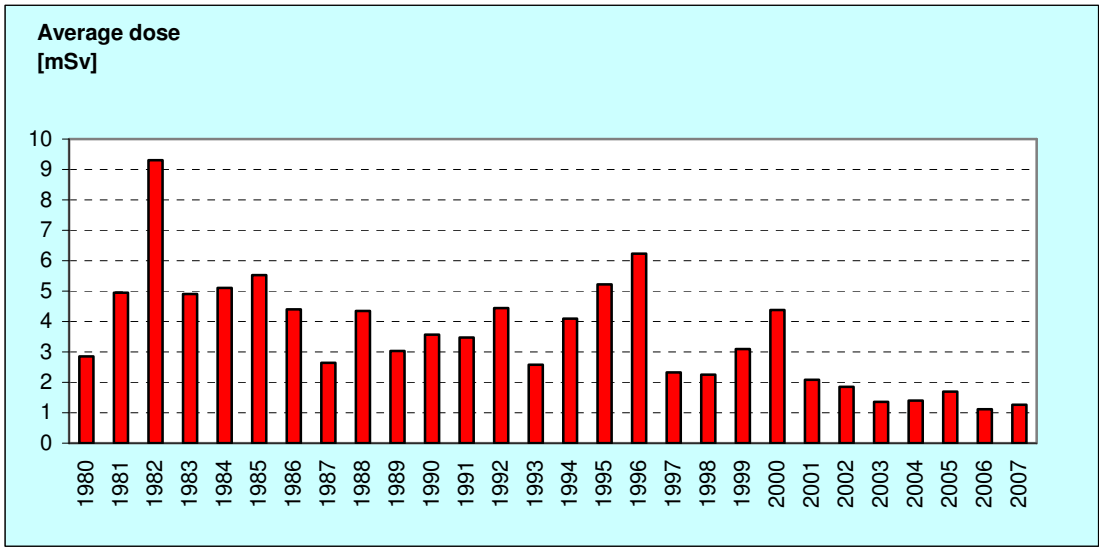
Activity throughput

Apart from specific experiments, when waste with known radionuclides and known activity was fed to the incinerator in order to find out retention factors, it was not possible to obtain an activity balance or a decontamination factor at treating institutional wastes by activity measurements of ashes, hot-gas filter, HEPA filter and waste water.

The activity of institutional waste is very low. Due to the characteristics of that waste, routine measurements and reported activity values of the row waste are very inaccurate. So, the activity of waste fed into the incinerator is badly known and, cross contamination within the incinerator unit causes an additional problem, i.e. the surfaces of the plant exposed to the off-gas adsorbs radioactive particles from the passing off-gas and simultaneously releases such particles into it. These factors together indicate that activity balancing is nearly impossible.

Radiation exposure to staff

Staff working at the incinerator is not only acting as operators during incineration campaigns but also responsibly for maintenance checks and repairs at the incinerator system. In addition it is partly engaged in handling and segregation of radioactive waste prior to its combustion. This must be taken into account, when considering radiation doses to personnel.



Average dose to the staff of the Seibersdorf waste treatment facilities

All readings are derived from Thermo-Luminescence Dose meters (TLD).

No single person of the staff involved in handling and incinerating of radioactive waste ever had a radiation dose in excess of the limits set in the relevant regulations.

Measuring facility

Low-level measurement facility

To minimise waste, NES carries out release measurements of slightly radioactive materials like concrete and soil by using a modern, automatic measurement facility. Thus, low-level materials can be disposed of as inactive waste as long as the activities measured are below the legally stipulated clearance thresholds.

Low-level measurement facility

Waste assay system

The waste assay system consists of a Tomographic Gamma Scanner System (TGS) that combines High Resolution Gamma Spectrometry (HRGS) for net full energy peak determination, with three-dimensional single photon emission images. Three-dimensional transmission and emission images are generated by scanning the object with three degrees of freedom (rotation, translation and elevation).

The TGS uses high purity germanium detection (HPGe) and low spatial resolution transmission and emission imaging to obtain improved measurement accuracy over non-imaging gamma-ray techniques. The material to be examined is thought to be divided into a number of vertical and radial volume elements. The activity is quantified in each of these voxels ("volume pixels") using matrix correction techniques based on the activity content and matrix properties of each voxel.

The TGS system consists of the following components:

- Collimated, coaxial p-type HPGe detector mounted on a vertical detector lift assembly
- Digital Signal Processor (DSP), a reference pulser as well as an acquisition interface board providing a full featured Multi-Channel Analyzer.
- A highly collimated Co-60 transmission source (9.25 GBq nominal activity) with tungsten shutter and lead storage shield atop a vertical lift assembly.
- Drum rotator and translation assembly and conveyor system for automated measurement of up to six 200 l drums.

Waste Assay System in the measuring facility at Seibersdorf

New concept for future radioactive waste-management at Nuclear Engineering Seibersdorf

In compliance with the Joint Agreement between the Republic of Austria, Nuclear Engineering Seibersdorf GmbH and the Community of Seibersdorf, long-term interim storage ("trans-

fer-storage") of radioactive waste has to be assured until 2030. This extension of the storage time for the existing (and future) radioactive waste requires

- significant investments in new buildings and machinery
- additional measures for the stored containers with radioactive waste (additional- and re-conditioning)

at Nuclear Engineering Seibersdorf. In the following section the main items of this renewal concept are described.

Drum Drying system (pre-project)

A drum drying system for 32 200-liter-drums will be installed. Intended purpose is the stabilisation of the drums' content to minimize/avoid corrosion and aerosols in the drums.

New Manipulation Centre including equipment

The existing Workshop Building will be extended to a New Manipulation Centre (NMC). In this new building Nuclear Engineering Seibersdorf will concentrate most of its conditioning facilities for radioactive waste. The NMC will also provide for radiation safety according state of the art and for an optimized flow of material.

In the new building the following equipment will be installed:

- two Caissons ("sorting/manipulation boxes") made of stainless steel: One caisson will be used for the additional- and re-conditioning works (as described thereinafter), the second caisson will be used for conditioning and decontamination of bulky materials
- a new, vertical High-Force-Compactor (2000 tons)
- a new Hot Cell (with underground storage) to replace the existing Hot Cells at Seibersdorf, which will be de-commissioned
- a centre for manipulation of radiation sources
- laboratories for measurement and quality assurance

Storage concept

A new storage concept for the 200-litre-drums will be implemented: All drums will be stored horizontally in a way that will enable individual drum inspection during the whole time of storage.

Another new storage facility (no.14) for approx. 7.000 200-litre-drums will be installed, which is equipped – similar to the new facility no.13 – with heating and dehumidification-system. Later on the existing storage facilities no.12 and 12A will be refurbished in the same way.

Storing the drums following the new concept (with possibility for individual inspection of each drum) will require more space compared to today's storing-practise. The future storage capacity at Nuclear Engineering Seibersdorf will be:

- storage facilities no.12 and 12A: totally 4.600 drums
- storage facility no.13: 2.300 drums
- storage facility no.14: 7.000 drums

in total: 13.900 drums

Reconstruction of existing Sorting Box and Incineration plant

Both facilities will be refurbished to further reduce the risk of contamination-carryover and to achieve an improved flow of material and works.

Additional- and Re-Conditioning

The extended storage time (at least up to 2030) requires measures to be taken for the waste in stock:

- Additional conditioning:
  The drums will be taken from the storage facilities and will be inspected. Corroded drums will be removed and the content will be put to new 200-litre-drums. The new drums will be of flange-type and equipped with a liner made of reinforced plastic on their interior. After drying and preparation of the documentation for each container, the drums will be put back to the storage facilities, where they will be arranged such, that each drum can be inspected individually over the whole time of storing.
- Re-conditioning:
  The content of very old containers, which partly even lack an appropriate documentation, will be conditioned according state of the art before putting the waste into new drums. By conditioning the very old waste with modern facilities, a reduction of totally approx. 1350 200-litre-drums at Nuclear Engineering Seibersdorf is expected.

Further Safety Measures:

The erection of a new Materials Reception Building and a new Central Access Building will allow a clear separation between active and inactive areas and minimize the risk of contamination-carryover.

The Materials Reception Building will be arranged next to the Waste Water Treatment Facility. In the future all deliveries of materials to and from Nuclear Engineering Seibersdorf will be carried out via this building. Hence one part of the building is foreseen as a large air lock for trucks. The second part of the Materials Reception Building will replace the obsolete storage facility no.1 and will be used for pre-classification and buffering of incoming waste.

The Central Access Building will connect the Incineration Plant and the Waste Water Treatment Facility. It will act as central air lock for all personnel entering or leaving the premises of Nuclear Engineering Seibersdorf. The first floor of the building will accommodate offices.

In addition an improved perimeter security system for the fence around the premises of Nuclear Engineering Seibersdorf will be installed to ensure physical- and/or video-detection of potential intruders.

L.2 Summary of the Decommissioning of the ASTRA reactor

The decommissioning of the ASTRA research reactor was initiated in 1999 after the conditions of transition were clarified, anticipating IAEA recommendations released in 2004. The project's final goal was the release of the buildings for re-use, immediate dismantling of the activated and contaminated structures was chosen to be the optimum strategy in decommissioning. Decommissioning work followed IAEA's recommendations starting with the removal of HLW, immediately followed by decommissioning by ILW and LLW until clearance of the buildings was achieved.

Summarizing the contents of the decommissioning of the ASTRA-reactor on the Seibersdorf site considering the full period of the project, it can be stated, that in general the dismantling works advanced according to plan. Finally the project's goal of release of the reactor building and the buildings connected to the reactor to the standards of unrestricted reuse was achieved by the end of 2006.

Regarding the reuse of the now empty building the former strategy was changed. The building will now be adapted for a storehouse for inactive materials. For 'transfer' storage (long-time interim storage until maximally 2030) of conditioned waste, new storehouses will be built, where individual drum inspection and retrieval will be possible (see Annex L.1).Additional works not covered by the original decommissioning project but essential for future re-use of the structures, like e.g. the demolition of the pump room, were initiated in due course. At present (autumn 2008) the rebuilding of the remaining structures is under way. The buildings and rooms are to be adapted for inactive work according to the needs of NES.

Final Licenses and Procedures

October 11th 2006: License RU4-U-78/091 by the Government of Lower Austria, recognizing the unrestricted radiological release of the internal surfaces of the reactor building for demolition

April 3rd 2007: Information to the European Commission, DG TREN, Directorate I, about the change of the Basic Technical Characteristics (BTC) of the Seibersdorf nuclear installations due to the decommissioning of the ASTRA reactor

June 6th 2007: License UW.1.8/0210-V/7/2007 by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, cessation of the ASTRA Reactor operating license

June 26th 2006: License RU4-U-78/098 by the Government of Lower Austria, recognizing the unrestricted release of the internal surfaces of the pump room for demolition

August 29th 2007: License RU4-U-78/099 by the Government of Lower Austria, recognizing the unrestricted radiological release of the reactor building for re-use

February 11th 2008: Application by NES to the Government of Lower Austria for technical approval of project completion of the decommissioning project according to the EIA

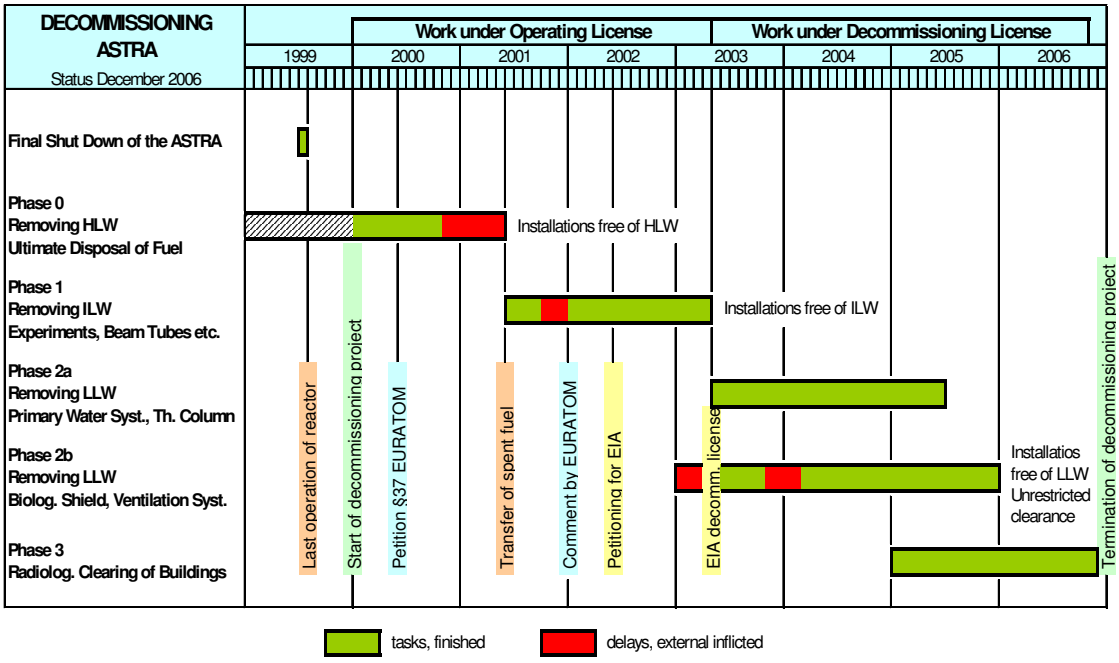
September 1st 2008: Technical inspection according to the EIA

Timetable

The timetable of the project is based on original planning according to a comprehensive study for the decommissioning of the ASTRA-Reactor dating from 1999. For the period of six years, the removal of the fuel, the dismantling of the reactor, the decontamination of the remaining structures, e.g. the reactor building, the conditioning of the radioactive waste, and the disposal of the conventional materials as well as all matters related to health physics and

radiological survey were included. After financial support was finally granted by the end of December 1999, the project officially started with January 2000.

Unforeseen delays due to the process of disposal of the spent fuel (7 months), the notification to Euratom according to article 37 (3 months), the process of putting in force the decommissioning license (4 months), and some administrative problems while preparing the building for release measurements (4 months) were counteracted by project management by parallel work using external workers on some of the tasks. Finally, work on the project was completed by the end of October 2006 with the formal acceptance of the cleared building by the authorities, 10 month behind schedule. The project according to the plans generated prior to 1999 was officially completed by the end of 2006.



Materials Management

One of project management's main goals was the minimisation of waste, especially were expensive radioactive waste was involved, but also including conventional waste, where unrestricted release and reusability had top priority.

Project management's major achievements in the reduction of radioactive waste were the external use of innovative technologies concerning the smelting of metals with very low levels of contamination (roughly 60 tons) and the successful characterisation of the activated areas within the biological shield with a reduction of the estimated 60 to 70 tons to a final 25 tons.

Developing and applying different techniques to establish clearance of uncontaminated materials and taking initiatives to find new applications for still usable materials and units was rewarded by a rather high percentage in unrestrictedly released and re-used equipment. Therefore, of a total mass of approximately 2300 metric tons that were removed from the ASTRA reactor during the decommissioning process, only 155 tons were transferred to the Department of Radioactive Waste Management. From this amount, approximately 60 tons, as mentioned above, were designated for recycling by the process of smelting. Taking this into consideration, approximately 95% of the total mass removed could be released, either for re-use or for disposal at a conventional waste dump. Only approximately 5 % had to be treated as radioactive waste.

Radiation Protection

The work on decommissioning of the ASTRA was started with 8 former members of the reactor operating crew. Due to retirement of colleagues, some functions had to be filled with personnel new to the project, usually from members of the Austrian Research Centers. All together 16 NES staff were involved in the task between 2000 and 2006. After completion of the project, only 2 people of the original team were still short of retirement age.

Between February 2004 and November 2006, workers from external contractors, mainly employed for specialised tasks e.g. concrete cutting, joined the group part-time. In all, 55 years of manpower went into the dismantling work. Another 25 years of manpower were employed in radiological survey and safety, amounting to a total of 80 years of manpower with 23 people employed full- or part-time.

Apart from standard procedures for entering and leaving controlled areas like changing work garments, 10667 measurements on the installed whole-body-monitor were performed with 195 minor contaminations detected.

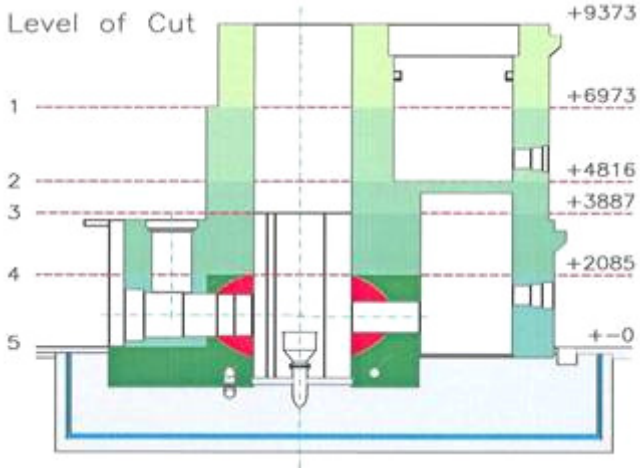
The results of the regular annual medical examinations do not indicate any adverse health effects by the work related to decommissioning. Regular control measurements at monthly intervals on a whole-body-counter gave no cause to alter established working procedures. The sum of the readings of the personal dosimeters over the entire project amounted to a total 85.6 mSv, averaging to 1.07 mSv per year and person. The maximum dose encountered for one person was 11.6 mSv over the total time period from 1999 to 2006, amounting to approximately 9% of the maximum permissible dose of 120 mSv for this time period.

The following table provides an overview of the doses in relation to the theoretical maximum permissible dose for the time period from 2000 to 2006 (transition phase excluded):

Company	Labor [manyears]	Maximum Permissible Dose [mSv]	Actual Dose[1)] [mSv]	Dose Relative to Maximum Permissible [%]
NES	66.8	1337	75,8	**5,7**
External Contractors	13.3	269	9,8	**3,6**
Total	**80.1**	**1606**	**85,6**	**5,3**

[1)] Total accumulated internal and external dose

Deducting from the table above, the radiation protection measures in NES were adequate and taken seriously and followed conscientiously by all members of the team. An extensive internal paper covering the details of the radiological surveys was prepared for the project's final presentation.



Dismantling of the biological shield:
Layers designated for cutting *Removing of blocks*

L.3 References to National Laws and Regulations

Legislation (Acts and Ordinances)

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[i] **Constitutional Law on a Non-Nuclear Austria** ("Bundesverfassungsgesetz für ein Atomfreies Österreich") of August 13th, 1999, Federal Law Gazette I no. 149/1999.

[ii] **General Radiation Protection Ordinace 2006** („Allgemeine Strahlenschutzverordnung"), Federal Law Gazette no. 191/2006 of 22. May 2006.

[iii] **Ordinance on Natural Radiation Sources** 2008 ("Natürliche Strahlenquellen-Verordnung"), Federal Law Gazette no. 2/2008 of 7. January 2008.

[iv] **Radiation Protection Act** ("Strahlenschutzgesetz - StrSchG") of June 11th, 1969, Federal Law Gazette no. 227/1969, as amended by the Radiation Protection EU-Adaptation-Act 2002 of August 20th, 2002, Federal Law Gazette I no. 146/2002 and by the Radiation Protection EU-Adaptation-Act 2004 of December 10th, 2004, Federal Law Gazette I no. 137/2004.

[v] **Ordinance on the Supervision and Control of Shipments of Radioactive Waste into, out of and through Austria** ("Radioaktive Abfälle-Verbringungsverordnung") of March 1st, 1997, Federal Law Gazette No. 44/1997, implementing Council Directive 92/3/EURATOM of 3 February 1992 on the Supervision and Control of Shipments of Radioactive Waste into, out of and through the Community".

[vi] **Medical Radiation Protection Ordinance 2004** ("Medizinische Strahlenschutzverordnung-MedStrSchV"), Federal Law Gazette II no. 409/2004.

[vii] **General Administrative Procedures Act 1991** („Allgemeines Verwaltungsverfahrensgesetz 1991 - AVG"), Federal Law Gazette no. 51/1991.

[viii] **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 ionising radiation,** Official Journal no. L 159/1 of 29 June 1996.

[ix] **Ordinance on Interventions in Case of Radiological Emergencies or in Case of Lasting Exposure** ("Interventionsverordnung"), federal Gazette no. 145/2007 of 26. June 2007.

[x] **Convention on Early Notification of a Nuclear Accident**, INFCIRC/335, 18 November 1986.

[xi] **Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency** of 14 December 1987, Official Journal no. 371/79 of 30 December 1987

[xii] **Environmental Impact Assessment Act 2000**, („Bundesgesetz über die Prüfung der Umweltverträglichkeit, Umweltverträglichkeitsprüfungsgesetz 2000 - UVP-G 2000"), Federal Law Gazette no. 697/1993, as amended.

[xiii] **Environmental Management Act**, ("Umweltmanagementgesetz"), Federal Law Gazette I Nr. 96/2001 as amended by I no. 99/2004.

[xiv] **Council Regulation (EURATOM) No. 1493/93 of 8 June 1993 on shipments of radioactive substances between Member States**, Official Journal of 19 June 1993 No L 148/4.

[xv] **Council Directive 92/3/EURATOM of 3 February 1992 on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community**, Official Journal of 12 February 1992 No L 35/24.

[xvi] **Ordinance on the Supervision and Control of Shipments of Radioactive Waste into, out of and through Austria** ("Radioaktive Abfälle-Verbringungsverordnung") of March 1st, 1997, Federal Law Gazette No. 44/1997, implementing Council Directive 92/3/EURATOM of 3 February 1992 on the Supervision and Control of Shipments of Radioactive Waste into, out of and through the Community".

[xvii] **Act on the Transport of Dangerous Goods** ("Bundesgesetz über die Beförderung gefährlicher Güter und über eine Änderung des Kraftfahrtgesetzes 1967 und der Straßenverkehrsordnung 1960 - Gefahrgutbeförderungsgesetz – GGBG"), Federal Law Gazette I no. 145/1998.

[xviii] **Inland Navigation Act** („Bundesgesetz über die Binnenschifffahrt – Schifffahrtsgesetz"), Federal Law Gazette I no. 62/1997, as amended.

[xiv] **Council Directive 2003/122/EURATOM on the control of high-activity sealed radioactive sources and orphan sources**, Official Journal of 31.12.2003 No L346/57.