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INTEGRATED REVIEW SERVICE FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT, DECOMMISSIONING AND REMEDIATION (ARTEMIS)

MISSION

TO

AUSTRIA

Vienna, Austria

20-30 November 2022

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY
DEPARTMENT OF NUCLEAR ENERGY

IAEA

Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation

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REPORT OF THE

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REPORT OF THE

INTEGRATED REVIEW SERVICE FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT, DECOMMISSIONING AND REMEDIATION (ARTEMIS) MISSION

TO

AUSTRIA

Mission dates: *20-30 November 2022*
Location: *Vienna, Austria*
Organized by: *IAEA*

ARTEMIS REVIEW TEAM	
Mr Jussi Heinonen	ARTEMIS Team Leader (Finland)
Mr Paul McClelland	Reviewer (Canada)
Mr Igor Sguario	Reviewer (France)
Mr Karl Littlewood	Reviewer (UK)
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Ms Merle Lust	IAEA Deputy Team Coordinator
Ms Kristina Nussbaum	IAEA Admin. Assistant

IAEA-2022

The number of recommendations, suggestions and good practices is in no way a measure of the status of the national infrastructure for nuclear and radiation safety. Comparisons of such numbers between ARTEMIS reports from different countries should not be attempted.

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EXECUTIVE SUMMARY

On 4 July 2019, the Permanent Mission of Austria to the United Nations, requested the International Atomic Energy Agency (IAEA) to organize and carry out, in the second half of 2022, an Integrated Review Service for Radioactive Waste and Spent Fuel, Decommissioning and Remediation (ARTEMIS) review.

The objective of the ARTEMIS Peer Review Service was to provide independent expert opinion and advice on the radioactive waste and spent nuclear fuel management programme in Austria, based on the relevant IAEA Safety Standards and proven international practice and experiences, following the guidelines of the ARTEMIS review service, requested in line with the obligations under Article 14.3 of the Council Directive 2011/70/Euratom of 19 July 2011 establishing a *Community Framework for the Responsible and Safe Management of Spent Fuel and Radioactive Waste*.

The review was organized by the Department of Nuclear Safety and Security and the Department of Nuclear Energy, and performed by a team of four senior international experts in the field of management of spent fuel and radioactive waste, supported by three IAEA staff providing coordination and administrative assistance.

The Preparatory meeting was held in March 2022. The review of the Advance Reference Material (ARM) was carried out in September and October 2022. The ARTEMIS review mission was conducted from 20 to 30 November 2022.

Austria does not have any nuclear power plants and the Austrian Federal Constitutional Act for a Nonnuclear Austria prohibits any kind of handling of nuclear weapons and related facilities as well as the construction and use of facilities for production of energy by nuclear fission in Austria. Austria has one research reactor in the TRIGA Center Atominstitut of the TU Wien. Two research reactors have been decommissioned. Austria utilizes radiation sources in medical and industrial applications. Thus, Austria has a small amount of radioactive waste to be managed, mainly including waste from decommissioning and institutional waste from medical, industry and research activities. Waste is treated and stored by Nuclear Engineering Seibersdorf (NES), Austria's central waste management organisation. Spent fuel used in the 250 kV TRIGA Mark II Research Reactor is planned to be returned to the supplier.

During the ARTEMIS mission the team comprised of senior international experts in the field of radioactive waste management and decommissioning from Canada, Finland, France and the United Kingdom held discussions with the representatives of the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), the Federal Ministry of Social Affairs, Health, Care and Consumer Protection (BMSGPK) the Federal Ministry of Finance (BMF), NES, the TRIGA Center Atominstitut of the TU Wien, as well as the Austrian Agency for Health and Food Safety (AGES).

The ARTEMIS Review Team very much appreciated additional information presented by the Austrian counterparts to address the experts' questions during the mission, continuous and open discussions and commitment to understand the background of ARTEMIS Review Team findings to best inform the process of continuous improvement of radioactive waste management in Austria.

Based on these exchanges, covering subjects such as the Austrian national policy for waste, the waste inventory, and safety assessments, as well as a visit to the facilities at the NES site in Seibersdorf, the ARTEMIS Review Team noted that Austria has developed and implemented a comprehensive strategy for pre-disposal management of radioactive waste. Austria has

modernised radioactive waste treatment and storage facilities in Seibersdorf to fulfil requirements up to and beyond year 2045, when waste is planned to be disposed. To this end Austria established the Austrian Board for Radioactive Waste Management (Advisory Board). The preliminary outcomes of this work indicate that Austria is making significant progress towards the establishment of a detailed roadmap for the development of disposal options, setting out key milestones and for how the public are to be involved in future decisions.

The ARTEMIS Review Team concludes that management of radioactive waste inventory forming the basis for waste management technical solutions development and safety assessment is comprehensive. NES has a mature and well thought out segregation process with appropriate treatment and packaging systems for each type of waste they receive. The ARTEMIS Review Team agrees with the view of NES that these facilities represent 'state of the art' in radioactive waste management for the radioactive wastes produced in Austria. The storage arrangements for the prepared waste at NES are robust and to modern standards. In the framework of the trilateral agreement between the Republic of Austria, the Municipality of Seibersdorf and NES ("Disposal Agreement"), both the BMK representing the Republic of Austria and NES have been receptive to feedback from the municipality and have implemented storage racking arrangements that permit the ability to visually inspect any waste package at all times. The BMK and NES are to be commended for being responsive to the concerns of the community. Radioactive waste inventory management, 'state of the art' treatment and robust storage facilities are viewed as an area of good performance for Austria.

The Team prepared recommendations (R) and suggestions (S) into a draft report which was handed over at the official exit meeting held on 30 November 2022. These are aimed at enhancing the Austrian regulatory framework and implementation of National Programme for radioactive waste and spent fuel management. The ARTEMIS Review Team provided the following advice:

- to enhance the functional separation of responsibility for regulatory oversight of safety from co-ordination, financial oversight and implementation of the National Programme for the Management of Radioactive Waste;
- to update the national strategy in order to include a consolidated implementation plan for disposal;
- to clarify, in regulation, the minimum frequency and content of periodic safety review and review of the decommissioning plan for waste management facilities;
- to clarify, in regulatory requirements, that submission of a decommissioning plan should form part of a license application for construction;
- to provide additional guidance on the licensing process for decommissioning of a waste management facility especially concerning decommissioning strategy and participation of interested parties;
- to issue guidance outlining regulatory expectations regarding the process and content of documentation to be submitted for disposal licensing;
- to include in the National Programme a contingency plan for the management of spent fuel.

The ARTEMIS Review Team suggests that a follow-up mission in around 3-4 years from now could bring value to Austria's efforts to improve its waste management. The ARTEMIS Review Team considers that combined follow-up together with IRRS mission would enable effective way to address overlapping areas, recommendations and suggestions.

I. INTRODUCTION

At the request of the Permanent Mission of Austria to the United Nations, the International Atomic Energy Agency organized an Integrated Review Service for Radioactive Waste and Spent Fuel, Decommissioning and Remediation (ARTEMIS) review of the Austrian Policy on Spent Fuel and Radioactive Waste Management. The objective of the ARTEMIS Peer Review Service is to provide independent expert opinion and advice on radioactive waste and spent nuclear fuel management, decommissioning and remediation, based upon the IAEA Safety Standards and technical guidance, as well as international good practice. Austria requested this review to fulfil its obligations under Article 14.3 of the Council Directive 2011/70/Euratom of 19 July 2011 establishing a *Community Framework for the Responsible and Safe Management of Spent Fuel and Radioactive Waste* ("*Waste Directive*").

The review was performed by a team of four senior international experts in the field of decommissioning and radioactive waste and spent fuel management, from multiple IAEA Member States, with IAEA staff providing coordination and administrative support. Subsequent to a preparatory meeting in March 2022, and the receipt and review of the Advance Reference Material (ARM) in September 2022, in November 2022 the ARTEMIS Review Team evaluated the Austrian national framework, competent regulatory authority, national programme and its implementation for safe management of radioactive waste, including the following:

- The Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), which is the rule making and coordinating body and the competent licensing and regulatory authority for research reactors and waste management facilities;
- Nuclear Engineering Seibersdorf (NES), which is the central waste management facility in Seibersdorf, Austria, and its modernisation project for the waste management.

IAEA facilities in Seibersdorf were not included in the scope of the ARTEMIS review.

II. OBJECTIVE AND SCOPE

The ARTEMIS review provided an independent international evaluation of the Radioactive Waste and Spent Fuel Management Strategy of Austria, requested in line with the obligations of the *Waste Directive*.

The ARTEMIS review, organized by the Department of Nuclear Safety and Security and the Department of Nuclear Energy of the IAEA, performed against the relevant IAEA Safety Standards and proven international practice and experiences with the combined expertise of the international peer review team selected by the IAEA.

The ARTEMIS review assessed, as requested by the *Waste Directive*, the overall strategy for the management of all types of radioactive waste in Austria.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IAEA REVIEW TEAM

At the request of the Government of Austria, a preparatory meeting for the ARTEMIS Review mission, was conducted on the 25th of March 2022 online. The preparatory meeting was carried out by the appointed Team Leader Mr Jussi Heinonen, the IAEA coordinator and deputy coordinator Ms Mathilde Prevost and Ms Merle Lust, and the team of National Counterparts led by Ms Verena Ehold from the BMK, Head of Department V/8 – Radiation Protection with participation of representatives of the BMSGPK, Department VII/A/2 – Radiation Protection, Environment and Health; the BMF, Department II/9 – Budget – Agriculture, Regions, Tourism, Climate, Environment and Energy, the AGES, Department for Radiation Protection, the NES and the TRIGA Center Atominstitut of the TU Wien.

The ARTEMIS mission preparatory team had discussions regarding:

- the Terms of Reference for the ARTEMIS review of the Austrian strategy to fulfil obligations from article 14(3) of the Waste Directive; and
- the relevant detailed aspects for organization and conduct of the review.

IAEA staff presented the ARTEMIS principles, process and methodology. This was followed by a discussion on the work plan for the implementation of the ARTEMIS review in Austria in November 2022.

Mr Roman Zoechling was appointed as the National Liaison Officer for the ARTEMIS mission and designated IAEA point of contact.

Austria provided IAEA with the ARM for the review on 1 September 2022.

B) REFERENCES FOR THE REVIEW

The articles of the *Waste Directive*, the draft guidelines for the ARTEMIS review service and the responses to the self-assessment questionnaire were used as the basis for the review together with the ARM and materials presented during the mission and associated discussions. The complete list of IAEA publications used as the basis for this review is provided in Appendix E.

C) CONDUCT OF THE REVIEW

The initial Review Team meeting took place on Sunday, 20 November 2022 in Vienna, directed by the ARTEMIS Team Leader Mr Jussi Heinonen, the ARTEMIS Team Coordinator Ms Mathilde Prevost and the Deputy Team Coordinator, Ms Merle Lust. The ARTEMIS entrance meeting was held on Monday, 21 November 2022, with the participation of senior management and staff from the BMK, Directorate General V, Department V/8 – Radiation Protection, and Department VI/8 – General Coordination of Nuclear Affairs; the BMSGPK, Department VII/A/2 – Radiation Protection, Environment and Health; the BMF, Department II/9 – Budget – Agriculture, Regions, Tourism, Climate, Environment and Energy; the AGES, Department for Radiation Protection, NES and the TRIGA Center Atominstitut of the TU Wien. Opening remarks were made by Ms Waltraud Petek, Deputy Head of Directorate General V for the Environment and Circular Economy of the BMK, and Mr Jussi Heinonen, ARTEMIS Team Leader.

During the ARTEMIS mission, a review was conducted for all review topics within the agreed scope, with the objective of providing Austrian authorities with recommendations and suggestions for improvement and, where appropriate, identifying good practice.

The ARTEMIS Review Team performed its review according to the mission programme given in Appendix B.

The ARTEMIS Exit Meeting was held on Wednesday, 30 November 2022. Opening remarks were made by Mr Christian Holzer, Head of Directorate General V – Environment and Circular Economy of the BMK. A presentation of the results of the Review Mission was given by the ARTEMIS Team Leader Mr Jussi Heinonen. Closing remarks were made by Mr Peter Johnston, Director of the Division of Radiation, Transport and Waste Safety, Department of Nuclear Safety and Security.

An IAEA press release was issued.

1. NATIONAL POLICY AND FRAMEWORK FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT

The ARTEMIS Review Team considered the national policy and framework for radioactive waste and spent fuel management, including the national policy, governmental, legal and regulatory framework, as well as the responsibilities for the radioactive waste and spent fuel management, decommissioning and remediation. The ARTEMIS Review Team considered the approach to relevant policy making and the whole national framework for radioactive waste and spent fuel management, including decommissioning, for all the recognized radioactive waste streams and activities in Austria.

The ARTEMIS Review Team was provided with extensive advance reference material and during the mission was provided with detailed presentations on the topic of national policy and framework.

1.1. NATIONAL POLICY

Austrian position

The legally binding framework for safety in Austria includes the Federal State administration laws, as well as specific nuclear safety and radiation protection legislation and regulations. In addition to the binding legislation, policies and strategies are an inherent part of the state governance. The Austrian national policy for spent fuel and radioactive waste management is not compiled in a single, stand-alone document, and this was acknowledged in the ARTEMIS self-assessment prior to the review.

The national policy for Austria is largely embedded through legislative Acts that implement aspects of the international framework – notably including the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, which was ratified and entered into force for Austria on 18 June 2001 – and relevant European directives in relation to spent fuel management and radioactive waste management.

In Austria, most of these provisions are transposed principally through the Radiation Protection Act 2020, the General Radiation Protection Ordinance 2020, the Radioactive Waste Shipment Ordinance 2009 and some other legal instruments.

The provisions of the Radiation Protection Act 2020 places specific obligations on ‘licensees and the authorities’ in relation to radioactive waste management, including the principles of waste minimisation, taking a risk-based approach, taking account of interdependencies and passive safety and the polluter pays principle.

Further aspects of Austrian national policy regarding spent fuel and radioactive waste are outlined in the Federal Constitutional Act for a Nonnuclear Austria, the Radiation Protection Act 2020, the National Waste Management Programme, including the National waste inventory and through the establishment of the Advisory Board. The national waste inventory takes account of all radioactive waste produced in Austria, including from TU Wien, decommissioning works at NES and institutional waste from medicine, industry and research, as well as disused sealed sources and naturally occurring radioactive material, if declared as radioactive waste.

Spent fuel

The Austrian policy for spent fuel management prohibits disposal in Austria. Austria does not have any nuclear power plants and the Austrian Federal Constitutional Act for a Nonnuclear Austria prohibits any kind of handling of nuclear weapons and related facilities as well as the construction and use of facilities for production of energy by nuclear fission in Austria.

The only nuclear reactor, in Austria, is a 250 kV TRIGA Mark II Research Reactor in Vienna operated by the TRIGA Center Atominstitut of the TU Wien. As the disposal of spent fuel in Austria is prohibited by law, the spent fuel from the Research Reactor is subject to a return agreement with the USA's Department of Energy (US DOE).

Radioactive Waste

The Austrian national inventory is maintained by NES, and consists only of low and intermediate level radioactive waste, and comprising both operational and decommissioning arisings.

All radioactive waste in Austria is transferred to NES, the only licensed waste management facility in Austria, for characterisation, treatment, segregation and storage until future final disposal.

Based on the order of the Board of Directors of the Austrian Institute of Technology – AIT, the owner of NES, NES is only allowed to accept radioactive waste generated in Austria and shipments to the Austrian Federal territory are only permitted if the imported waste originates from material previously exported from Austria for treatment.

In Austria, the management policy for disused high-activity sealed sources is to return them to the supplier and only for cases where this is not possible to transfer these to NES for management.

ARTEMIS observation

The ARTEMIS Review Team notes comprehensive arrangements for the national policy and framework for Radioactive Waste and Spent Fuel Management are in place in Austria including in national legislation, the national inventory, the National Programme and through the establishment of the Advisory Board. The ARTEMIS Review Team considers these arrangements overall allow for the effective implementation of relevant policy and framework requirements of the IAEA Safety Standards.

The ARTEMIS Review Team considers it is essential to maintain effective on-going co-ordination of future needs to support the development of the Austrian policy and framework in relation to the long term approach for disposal of radioactive waste. In particular, consideration should be given to maintaining appropriate radioactive waste facilities, the capacity of the regulatory function, accurate evaluation of costs to support allocation of adequate funding, appropriate engagement with the public and interested parties to meet the needs of the policy and programme and take account of their interdependencies.

1.2. LEGAL, REGULATORY AND ORGANISATIONAL FRAMEWORK

The ARTEMIS Review Team has taken account of the conclusions of the IRRS mission 2018 report, for regulatory frameworks of radioactive waste management, noting that there have been some changes made to the national arrangements since 2018 in response to the IRRS review. In 2018, the IRRS review findings were, in summary, that:

> *'Austria has established a legal framework that in great majority fully meets requirements set forth by IAEA safety standards. However, there are some areas where further improvements are possible. The Government has not promulgated a national policy and strategy on nuclear safety, although some elements are embedded into the existing legislation. At the federal level three ministries perform the regulatory functions. There is a potential conflict of interest in each of them as the same ministry also takes care about the operational aspects of some of their authorized parties. In addition, for the facilities and activities in Austria, the existence of three different regulatory authorities may be counterproductive from the perspective of efficient use of available resources. The prime responsibility for safety is not reflected fully in the legislation. The regulatory body should consider further harmonizing regulatory practices among all authorities involved in regulatory control. A national policy and strategy for radioactive waste management was not promulgated yet.'*

Since the IRRS mission already reviewed the entire regulatory framework, the ARTEMIS Review Team limited review to the effectiveness with respect to waste management and decommissioning.

Effective Independence of Regulatory Functions

Austrian position

The legally binding framework for licensing in Austria is set out in binding legislation (in Acts and ordinance), which include specification of regulatory expectations.

The financial resources, and staffing resources, for the regulatory functions are subject to approval, as for all other state administration in Austria, in accordance with the budget law.

The ARTEMIS Review Team notes the arrangements in place, in Austria, for a regulatory body to utilise specialist external technical support, in relation to the support of regulatory safety functions. The ARTEMIS Review Team considerations on this are set out in greater detail within the capacity topic.

The IRRS mission in 2018 made the following observation and recommendation, that:

> *"Observation: At the federal level three ministries are performing most of the regulatory functions. There are potential conflicts of interest in all of them as the same ministries also take care about the operational aspects of some of their authorized parties. In addition, existence of three different regulatory authorities is counterproductive from the perspective of efficient use of available resources.*

Recommendation 2: The Government should review the regulatory framework at the federal level to avoid any potential conflict of interest and to ensure the appropriate independence in the discharge of safety related regulatory functions."

In response to the IRRS observation, effective from 1 January 2021, Austria transferred the regulatory oversight over research reactors from the Ministry for Education, Science and Research to the BMK, which includes responsibilities for radiation protection, nuclear safety and the safe management of radioactive waste and spent fuel from the reactor. The primary regulatory roles for radioactive waste management facilities continue to rest with the BMK.

ARTEMIS observation

The ARTEMIS Review Team identified regulatory independence and the potential for a conflict of interest to arise as a recurring theme currently arising in a number of areas and hence suitable for further consideration.

The following are examples of responsibilities that were observed to currently belong to the regulatory authority that could put the regulatory authority in a position of conflict:

- The co-ordinating role of the national programme, while not in principle is influencing the output of the Advisory Board, does have a role in setting the mandate for the Board, selecting the Board membership, and drafting the future steps of the national programme. This role also includes financial and performance oversight of the delivery of the activities of the national programme and could result in a conflict in decision making regarding requirements for safety.
- Performance and financial oversight of delivery of the "disposal agreement".
- The accountability of reporting progress to the Minister of Finance on the agreement pertaining to modernization of NES facilities.
- Reporting to the Municipality of Seibersdorf on plans for disposal.
- The approval of calculations for the "disposal fee" and the resultant cost prescribed for disposal.

It was observed that procedures regarding "autonomous rights"[1] were being used to guarantee independence for such activities. It was explained that due to the history of the individuals involved and personnel expertise it was efficient to have these activities performed by individuals reporting within the regulatory authority. Independence of the regulatory safety authority is a fundamental requirement and situations of potential conflict must be avoided. This is not to say that the regulatory safety authority would have no input into such topics. The regulatory safety authority is an important stakeholder that should be consulted. The potential conflict pertains to the responsibility for performance and financial oversight of the delivery of the National Programme.

A review of the regulatory oversight system could support elimination of the potential for conflict of interest, through clear segregation of authorities with regulatory safety functions from those with any responsibility for delivery. Such a review should additionally enhance public acceptability and confidence in the regulatory arrangements. The ARTEMIS Review Team considers that the suitability of autonomous performance provisions should be further considered as part of this broader review of arrangements maintaining regulatory independence

[1] The Federal Ministries Act 1986, Section 10, para. 4.

and segregation of the regulatory safety function from those with responsibilities for radioactive waste management.

It is the advice of the ARTEMIS Review team that as the National Programme develops there is time for the Federal Government of Austria to move to a position where such responsibilities can be assigned to a different entity from the regulatory authority for safety. This need not be an entirely separate organization. The ARTEMIS Review Team observes that performance and financial oversight of the delivery of the Agreement on the decommissioning of facilities from 45 years of R&D activities ("Decommissioning Agreement") reports to a different department within the Ministry. The ARTEMIS Review Team notes that there is the intent to formalize governance in an upcoming revision of the national programme. This would represent an opportunity to correct the potential for conflict that has been identified.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The regulatory authority within BMK has been observed to have several roles in co-ordination, administration and performance and financial oversight of the implementation of the National Programme. This could put the regulatory authority in a position of conflict in decision making between safety and implementation of the national programme.* *The regulator should maintain an oversight role over the safety of delivery of National Programme (and review of adequacy of human and financial resources for delivery of national programme). Responsibilities associated with co-ordination, financial oversight and implementation of the National Programme should rest with another entity.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 4 states that** *"The Government shall ensure that the regulatory body is effectively independent in its safety related decision making and that it has functional separation from entities having responsibilities or interests that could unduly influence its decision making."*
(2)	**BASIS: GSR Part 1 (Rev. 1) Requirement 17 states that** *"The regulatory body shall perform its functions in a manner that does not compromise its effective independence."*
R1	**Recommendation: The Federal Government should take steps to ensure functional separation of responsibility for regulatory oversight of safety from co-ordination, financial oversight and implementation of the National Programme for RWM. These activities should be assigned to a different entity from those of the regulatory safety authority.**

Licensing Framework

Austrian position

The current licensing arrangements are primeraly set out in the Radiation Protection Act 2020, the General Radiation Protection Ordinance 2020 and other legal provisions.

The current licensing arrangements require the preparation and submission of a decommissioning plan at various stages. The specific requirements in the Radiation Protection

Act 2020 relating to licensing for construction of a waste management facility do not include explicit reference to the requirement for a decommissioning plan. However, it is noted that a decommissioning plan for a waste management facility, would be required as per the General Radiation Protection Ordinance 2020 in an application for a construction licence as part of licensing for the practice.

The licensing arrangements relating to decommissioning do not set out expectations for the review and approval of final decommissioning plan, the basis for selection of the decommissioning strategy, and for how interested parties and the public will be given the opportunity to provide comment.

The licensing arrangements required for a radioactive waste disposal facility would trigger both licensing requirements and provincial level decision making, which is likely to entail environmental impact assessment and consultation with the public and interested parties.

ARTEMIS observation

For the maximum benefit early consideration of the approach to decommissioning should be considered at the design stage. Therefore, the ARTEMIS Review Team considers there is scope for clarifying the regulatory expectations for submission of a decommissioning plan during application for construction.

The ARTEMIS Review Team considers current licensing arrangements for the final decommissioning plan should reference regulatory expectations in relation to the regulatory review, the selection of decommissioning strategy and for public engagement.

The ARTEMIS Review Team considers that these regulatory expectations could be equally set out in the form of regulatory guidance as an alternative to relevant legal requirements.

The ARTEMIS Review Team considers the licensing arrangement for a radioactive waste disposal facility would be improved by preparation of guidance that takes account of the framework as a whole and sets out how these arrangements are comprehensive and co-ordinated through the licensing process recognising interactions, and interdependencies between the current licensing arrangements and with other associated approvals, including those at provincial level, environmental impact assessment(s) and for engagement with the public and interested parties.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The requirements for preparation and submission of initial decommissioning plan for application for construction license are not fully clarified in the legislation.* *This could limit effectiveness of decommissioning principles consideration during design.* *The preparation and submission of initial decommissioning plan should be explicitly required as part of consideration of licence to construct.*	
(1)	**BASIS: GSR Part 6 Requirement 10 para. 7.3 states that** *"For a new facility, planning for decommissioning shall begin early in the design stage and shall continue through to termination of the authorization for decommissioning."*
S1	**Suggestion: The Federal Government should consider clarifying regulatory requirements that submission of a decommissioning plan should form part of**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	a license application for construction.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Requirements for the regulatory review do not appear to refer to how decommissioning strategy selection and engagement with the public are considered as part of the licensing step for decommissioning.*	
(1)	**BASIS: GSR Part 6 Requirement 5, para. 3.3 states that** *"The responsibilities of the regulatory body shall include:* *- Establishing requirements for planning for decommissioning, including:* *Establishment of the review process for decommissioning plans and supporting documents (as prescribed in national regulations and the timeframe for such reviews […]* *Review of the initial decommissioning plan and updates, review and approval of the final decommissioning plan and supporting documents, and review and approval of updates after the final decommissioning plan has been approved; […]* *- Providing interested parties with an opportunity to comment on the final decommissioning plan and supporting documents before their approval, on the basis of national regulations […]".*
(2)	**BASIS: GSR Part 6 Requirement 8, para. 5.2 states that** *"The selection of a decommissioning strategy shall be justified by the licensee."*
(3)	**BASIS: GSR Part 6 Requirement 11, para. 7.16 state that** *"Interested parties shall be provided with an opportunity to examine the final decommissioning plan and, as appropriate and subject to national regulations, supporting documents, and to provide comments prior to its approval."*
S2	**Suggestion: The regulatory safety authority should consider providing additional guidance on the licensing process for decommissioning of a waste management facility with respect to selection of the decommissioning strategy and how interested parties are provided the opportunity to participate in the licensing process.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The regulatory framework does not yet contain any specific provision regarding the licensing procedure of a disposal facility.*	
(1)	**BASIS: SSR-5, Requirement 2, para. 3.8 states that** *"[…] The regulatory body has to develop regulatory requirements specific to each type of disposal facility […]".*
(2)	**BASIS: SSR-5, Requirement 2, para. 3.10 states that** *"The regulatory body has to document the procedures that it uses to evaluate the safety of each type of disposal facility, the procedures that operators are expected to follow in the context of licensing, important decisions prior to licensing and licence applications. It also has to document the procedures that it follows in reviewing submissions from operators to assess compliance with regulatory requirements".*
S3	**Suggestion: The regulatory safety authority should consider issuing guidance outlining regulatory expectations regarding the process and content of documentation to be submitted for disposal licensing.**

2. NATIONAL STRATEGY FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT

The ARTEMIS Review Team considered the national strategy for spent fuel and radioactive waste management from cradle to grave, how this strategy is implemented and what attention is given to public involvement.

2.1. SCOPE OF THE NATIONAL STRATEGY

Austrian position

The national strategy is set out in the so-called National Programme for the Management of Radioactive Waste which describes the Austrian national strategy for radioactive waste and spent fuel management up to 2045. This programme covers all stages of radioactive waste and spent fuel management. The Federal Government is responsible for establishing the National Programme which shall be reviewed and updated at an appropriate frequency. The BMK has a coordinating function.

The Federal Government established and adopted the first version of the National Programme in 2018, after the completion of a strategic environmental assessment, public and transboundary consultations. An updated version was approved in May 2022 which does not include any substantial update, except for the update of the inventory and adaptations to the current legislation. Further modifications will be made at a later date to include the recommendations of the Advisory Board.

The Austrian Federal Constitutional Act for a Nonnuclear Austria prohibits any kind of handling of nuclear weapons and related facilities as well as the construction and use of facilities for production of energy by nuclear fission on the Austrian territory. Spent fuel can therefore only be generated in the TRIGA Research Reactor in Vienna, operated by the TRIGA Center Atominstitut of the TU Wien. The management policy for spent fuel consists in sending it back to the supplier, as such the operator of a research reactor has to conclude a take-back agreement with the manufacturer or supplier of the fuel elements. For the TRIGA Research Reactor, which is the only facility concerned in Austria, such an agreement has been concluded in 2012 with the US DOE. This agreement states that the 91 low enriched uranium spent fuel elements will be taken back by US DOE in 2025. A potential extension of this agreement is currently being negotiated, which could allow to operate the reactor until 2035, provided that the conclusions of the next periodic safety review of the TRIGA Research Reactor are positive.

Radioactive waste originates mainly from medicine, industry, education and research (hereafter referred to as “institutional waste”) and decommissioning. Only low and intermediate level waste are produced in Austria. Institutional waste account for a continuous small volume of waste, which is expected to decrease over time. Decommissioning waste mainly comes or is expected to come from old facilities in Seibersdorf and from the future decommissioning of the TRIGA Research Reactor and NES facilities. The management policy for radioactive waste consists in sending them to NES where they are collected, sorted, treated, conditioned and stored, and then dispose of them later in Austria or in a multinational disposal facility in a Member State of the European Union or in a Contracting Party to the Joint Convention.

Interdependencies between the different management steps have to be taken into account. Waste producers are responsible for the radioactive waste that arises when performing a practice, including their collection, taking in consideration of the acceptance conditions of the

waste management facility and temporary storage. Depending on the activity and half-life of the radioactive waste, several routes can be implemented: clearance when it can be demonstrated that the exposure of members of the public will not exceed 10 µSv per year, decay storage for radionuclides with a half-life of less than 100 days, return to the manufacturer or supplier, treatment in foreign facilities and handover to NES. When handed over to NES, the responsibility is also transferred to NES which is entrusted by the Republic of Austria with the predisposal management of the radioactive waste arising in Austria, which includes acceptance, collection, sorting, treatment, conditioning and storage. Waste treatment and interim storage at the Seibersdorf location is currently contractually secured until 2045 (as per the "Disposal Agreement" between the Republic of Austria, the Municipality of Seibersdorf and NES).

As far as disposal is concerned, in agreement with the Federal Government, NES is obliged to elaborate concepts for scientific and technical requirements and conditions for the future disposal ("Disposal Agreement"). To date NES has not been asked to do any studies for disposal. The Federal Government will make the necessary arrangements to transfer the conditioned radioactive waste stored at NES to a disposal facility or long term storage facility not located in the Municipality of Seibersdorf by 31 December 2045. As of now no decision has been made regarding the future disposal facility nor any contract have been concluded between Austria and another country for the disposal of radioactive waste. A decision-making process is to be defined in the coming years in order to determine the type and location of one or more disposal facilities for Austrian waste, in a transparent process. Therefore a specific task-force constituted with ministerial representatives, representatives for the Federal Provinces and Municipalities, independent experts, NGOs and other stakeholders, the Advisory Board has been mandated to provide recommendations in 2024 for the Austrian Federal Government.

ARTEMIS observation

The ARTEMIS Review Team notes that the National Programme describes all spent fuel and radioactive waste management activities and the interactions between all management steps in a comprehensive and detailed manner.

The interdependencies between the different management steps are taken into account, the waste producers being responsible to ensure that the waste collected is compatible with the acceptance conditions of NES, and the waste acceptance criteria defined by NES, which takes into account international experience regarding the waste acceptance criteria of surface disposal facilities. Furthermore, NES is attaching great importance to ensure a high level of flexibility with regard to any future additional conditioning for the disposal of the waste.

The ARTEMIS Review Team notes that a special Advisory Board has been formed whose mission is to make recommendations regarding the development of a future disposal facility to the Federal Government to decide upon. The preliminary outcomes of this work indicate that Austria is making significant progress towards the establishment of a detailed roadmap for the development of disposal options, which will detail key milestones and how the public will be involved in future decisions. The creation of this Advisory Board therefore provides an appropriate response to move forward in an efficient and transparent manner on the development of a disposal solution, which is considered by the ARTEMIS Review Team as a good performance.

The current National Programme has been approved in 2018 and updated in 2022. It describes the actions taken to move forward on the development of a disposal solution. In the meantime, it specifies that the service contract with NES has been revised in order to ensure the availability of the storage capacity until 2045. In the event this deadline is not met, an extension of the

contract until e.g. 2060 or a later date could be negotiated between the Republic of Austria, the Municipality of Seibersdorf and NES. The ARTEMIS Review Team notes that in any case, the storage capacity available at NES is sufficient based on worst-case estimates.

A take-back agreement for spent fuel used in the TRIGA Research Reactor has been concluded with US DOE to ensure that the spent fuel will be transferred by 2025. The return of the fuel elements could be postponed through a common agreement to e.g. 2035. The ARTEMIS Review Team nevertheless observes that no contingency plan has been studied in the event that this route for spent fuel is not available when required. Although it is considered very unlikely that the take-back agreement concluded with US DOE could not be implemented, studying contingency solutions would allow potential actions to mitigate the need to extend the storage period of the spent fuel on the Austrian territory and that ongoing safety-related arrangements for their management remain in place. Such a contingency solution as an example could be to mandate the operator of the TRIGA Research Reactor, in the framework of the National Programme, to provide the demonstration that storage of the spent fuel could be extended onsite on a determined period, taking into account safety relevant issues such as ageing and additional costs.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *No contingency plan is available for the management of spent fuel currently used in TRIGA Research Reactor in the event that the foreseen outlet is not available within the expected timeframe.*	
(1)	**BASIS: GSR Part 1 (Rev.1) Requirement 10 states that** *"The government shall make provision for […] the safe management of spent fuel".*
S4	**Suggestion: The Federal Government should consider including in the National Programme a contingency plan for the management of spent fuel in case of an impossibility to implement the take-back agreement concluded with US DOE.**

2.2. IMPLEMENTATION OF THE NATIONAL STRATEGY

Austrian position

The regulatory framework has the BMK, embodied by the Department for Radiation Protection, as the coordinating entity for the implementation of the National Programme.

The mandate of the Advisory Board covers the period 2021-2024. A second mandate could be granted for another three years. In parallel, a working group composed of representatives from the Federal Government, Provinces and communities has an informal role in following-up the progress of the National Programme.

The National Programme sets out the following key milestones:

- Return of spent fuel to the United States by 2025;
- Modernisation of treatment facilities in NES by 2022;
- Decommissioning of facilities from past R&D activities by 2033;
- Reconditioning of historic conditioned waste by 2035;

- Storage of radioactive waste in NES until 2045.

Additional milestones regarding disposal development will be introduced once the Advisory Board has submitted its recommendations to the government. Moreover, in parallel, several studies related to waste management have been launched by the Advisory Board or are or have been conducted by other stakeholders such as NES or AGES.

There are no key performance indicators to monitor the progress of the National Programme yet, but there is intention to develop.

ARTEMIS observation

The National Programme defines the overall goals for the management of spent fuel and radioactive waste. However, it contains no in-between milestones and progress indicators which would be useful for monitoring the status of actions and reporting that progress to stakeholders. Furthermore, the National Programme does not yet contain the activities beyond the current contract with NES, up to and including disposal.

The National Programme is not accompanied with analysis of the risks that could lead to the non-achievement of milestones and the actions that could mitigate their effects. This analysis will be valuable in establishing a schedule with realistic milestones and will help identify actions that could be taken early in the programme to mitigate against potential delays.

The ARTEMIS Review Team notices that part of the mission entrusted to the Advisory Board is to define a timetable and a road map for radioactive waste management in Austria which should include, where possible, relevant intermediate stages (‘milestones’), key performance indicators, and clear timelines for achieving those intermediate stages. The ARTEMIS Review Team also acknowledges that there are other initiatives related to radioactive waste management carried out in parallel by other organizations. It considers that it would be beneficial to have a consolidated implementation plan with appropriate interim targets, progress indicators and risks analysis, which could be used for monitoring the progress of its implementation and increase stakeholders’ support.

Furthermore, there is not yet a documented process of governance of the tracking of delivery of the milestones in the national plan. The ARTEMIS Review Team takes note of the intent expressed by Austria to identify roles and responsibilities for tracking and oversight of the national strategy. It considers that formalizing the governance is key to improving the visibility of the actions undertaken and to encourage political and public support for the programme. Moreover, to maintain independence the implementing role should not be held by the regulatory safety authority.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The National Programme defines the overall goals for the management of radioactive waste. However, it does not contain the following key elements:* - *in-between milestones on the path to disposal,* - *progress indicators,* - *the activities beyond the current contract with NES, up to and including disposal,* - *analysis of the risks that could lead to the non-achievement of milestones and the actions that could mitigate their effects,* - *necessary human and financial resources.* *Moreover there is not a documented process of governance of the tracking of delivery of the milestones in the national plan, although there is intent to develop such process. Such process should identify roles and responsibilities for tracking, oversight and stakeholder participation.*	
(1)	**BASIS: GSR Part 1 (Rev.1) Requirement 10, para. 2.28 states that** *"[…] The strategy shall include appropriate interim targets and end states. Radioactive waste generated in facilities and activities necessitates special consideration because of the various organizations concerned and the long timescales that may be involved. The government shall enforce continuity of responsibility between successive authorized parties."*
(2)	**BASIS: GSR Part 1 (Rev.1) Requirement 10, para. 2.32 states that** *"The government shall make provision for appropriate research and development programmes in relation to the disposal of radioactive waste, in particular programmes for verifying safety in the long term."*
(3)	**BASIS: GSR Part 5 Requirement 2, para. 3.6 states that** *"The national strategy for radioactive waste management has to outline arrangements for ensuring the implementation of the national policy. It has to provide for the coordination of responsibilities. It has to be compatible with other related strategies such as strategies for nuclear safety and for radiation protection."*
R2	**Recommendation: The Federal Government should update the national strategy to include a consolidated implementation plan for disposal with appropriate interim targets, progress indicators and risks analysis, as well as a documented process including roles and responsibilities for tracking implementation of milestones.**

3. INVENTORY OF SPENT FUEL AND RADIOACTIVE WASTE

An established, well recognized national inventory of radioactive waste and spent fuel is a prerequisite for developing both the policy and strategy for waste management. It shall be compiled according to an established national waste classification.

Austrian position

Extensive reference material was prepared by the Austrian counterparts and shared in advance of the mission. In addition, detailed presentations on the topic of national inventory were delivered to the ARTEMIS Review Team. No high level waste is produced in Austria, and the information presented focused on low and intermediate level wastes. The Austrian inventory includes only waste put into storage. Radioactive waste at the producers' sites is either stored until it decays, released, discharged or handed over to NES. The waste collected by NES is treated in a timely manner, so that no raw waste accumulates at the site.

The inventory of waste in storage is managed by the operator NES using the waste inventory information database DOKURAD. The ARTEMIS Review Team enquired about detailed aspects of the radioactive waste inventory. All waste received and processed at NES facilities is entered in the DOKURAD database and the database records are kept under quality control and are subject to regulatory inspections. The entire history of paper records is maintained with the file for each drum.

Information on potential sources of legacy radioactive wastes were explored. For example, AGES undertook extensive investigations into the potential for legacy situations such as from radium processing or dial painting. NORM wastes from oil extraction or fertilizer industry are not significant in Austria. Consumer products (e.g. smoke detectors) and orphan sources are included in the inventory.

Concerning forecasts of wastes to be generated in the future from institutional sources and from decommissioning activities, the estimates on future volumes are generally worst case and conservative. Estimates are based on extensive experience with the wastes being generated from institutional sources and decommissioning in Austria.

ARTEMIS observation

The completeness and adequacy of the national inventory of spent fuel and radioactive waste (including legacy waste and future estimates), as well as methodologies of its compilation and update were reviewed in detail.

Through presentation and questioning, NES demonstrated a fully mature understanding of all the complexities involved in management of radioactive waste data, and demonstrated rigorous quality management principles are applied to this work, including independent verification of data entry. NES has the knowledge and level of sophistication needed to be able to run reports on the inventory of waste requiring disposal that will be needed as key inputs into disposal planning and post closure safety assessment. NES is aware that all data concerning a radioactive waste package is needed to be preserved in a records history file for that package (and are maintaining these records), and have a good understanding of how to utilize all of that data to derive an official record of the activity for that package. NES has a robust understanding of radioactive waste characterization (including non-radioactive waste characteristics) and the

ARTEMIS Review Team is confident that the inventory information from NES can be relied upon for disposal planning.

The ARTEMIS Review Team was satisfied that Austria has a very good understanding of its inventory and that there were no gaps observed. Quality management system controls are in place ensuring accuracy of the records. Concerning future forecasts, it was demonstrated that Austria has a good understanding of all of the sources of generation of radioactive wastes and that estimates are developed with a high degree of certainty and are conservative. Planning for future capacity needs is therefore supported with a sound basis.

The ARTEMIS Review Team also notes that the regulatory safety authority does include in its inspections oversight of the inventory management performed by NES as well as checks on performance of NES quality management systems.

The ARTEMIS Review Team concludes that for the topic of Inventory of Spent Fuel and Radioactive Waste can be viewed overall as an area of good performance for Austria.

4. CONCEPTS, PLANS AND TECHNICAL SOLUTIONS FOR SPENT FUEL AND RADIOACTIVE WASTE MANAGEMENT

The ARTEMIS Review Team considered the concepts, plans and technical solutions that are intended for implementation of spent fuel and radioactive waste management facilities and activities, including national planning for all facilities and activities needed to manage the spent fuel and radioactive waste from generation to disposal.

Austrian position

Extensive reference material was prepared by the Austrian counterparts and shared in advance of the mission. In addition, detailed presentations on the topic of concepts, plans and technical solutions were delivered to the ARTEMIS Review Team. In addition, the ARTEMIS Review Team was given a tour of many of the NES radioactive waste management facilities. No high level waste is produced in Austria, and the information presented focused on low and intermediate level wastes.

The preferred options of the Member State shall be determined in its policy for all phases of spent fuel and radioactive waste management. It is recognized that for low and intermediate level radioactive wastes the preferred options are identified up to and including storage, but that the strategy for disposal is under development awaiting recommendations of the Advisory Board.

NES is the organization responsible for collecting, treating and storing all radioactive wastes in Austria, and they have robust criteria for receipt and management of radioactive waste. Until a disposal decision is taken, the strategy is to segregate and appropriately package the wastes in a passively safe state for interim storage, while not precluding possible future options for conditioning.

NES has familiarized themselves with typical waste acceptance criteria (WAC) for disposal for other international repositories (in particular the Konrad facility in Germany) and have adopted criteria that in their view their WAC for storage is 99% good for disposal. Their criteria includes such things as:

- No gas generation
- No pyrophoric or reactive materials
- No explosive materials
- No free liquids
- Compatibility with transport requirements

NES has a structured segregation process with specific treatment and packaging systems for each type of waste they receive. Furthermore, NES has minimized stabilization practices such as cementation in favour of drying followed by supercompaction in order to keep options open for final conditioning, although cementation is still available to be used if necessary for some liquid wastes. The principle of minimization of radioactive waste is incorporated at every step in the processes implemented by NES.

ARTEMIS observation

Although Austria does not yet have mature concepts, plans and technical solutions for disposal, the concepts, plans and technical solutions up to and including interim storage are fully mature

and implemented. The ARTEMIS Review Team agrees that the concepts, plans and technical solutions for the treatment and storage of Austria's radioactive waste are 'state of the art'.

The ARTEMIS Review Team challenged the WAC for storage and agrees with NES' conclusion that the wastes being prepared and put in storage at NES facilities will be able to be demonstrated to be suitable for disposal. The ARTEMIS Review Team notes that Austria has started a process to determine disposal solutions and that the arrangements implemented for storage of radioactive waste will ensure safe storage for decades while the solution for disposal is being decided and implemented.

During the tours of NES facilities, the ARTEMIS Review Team noted that the condition of each facility is excellent and robust control of operations fully evident and commendable. The high level of competence and attention to safe operation and quality management was evident at every location. The NES staff and leadership are to be commended and have a right to be proud of their accomplishments. The ARTEMIS Review Team agrees with the view of NES that these facilities now represent 'state of the art' in radioactive waste management for the radioactive wastes being produced in Austria. The operations of the facilities at NES can be viewed as an area of good performance for Austria.

The ARTEMIS Review Team noted a number of key goals being implemented at NES:

- Treatment and repackaging of legacy waste drums;
- Robust minimization of radioactive wastes;
- Robust interim storage arrangements for radioactive wastes.

The goals of the treatment and repackaging of legacy waste drums include addressing degrading conditions of legacy stored waste by repackaging the waste in a more stable and robust form to ensure integrity in storage until a disposal decision is taken, as well as bringing the state of characterization up to modern standards. NES has implemented 'state of the art' methods to perform this achieving a high quality waste package with safety of workers assured. Following completion of this work NES can be assured that all waste in storage meets modern 'state of the art' quality and will be stable and maintain integrity until disposal is available.

NES demonstrates a clear passion for radioactive waste minimization, having incorporated this into every activity. NES has implemented many methods to ensure they can maximize diversion of non-radioactive wastes from their radioactive waste streams and in a way that does not increase risk to the public. Every NES employee met by the ARTEMIS Review Team clearly shared the goal of minimization of radioactive waste. They are to be commended in their efforts to achieve their set goal of reducing the amount of radioactive wastes requiring storage so much as is practicable.

The storage arrangements for the prepared waste at NES are robust and to modern standards. The storage buildings are kept at an appropriate temperature and humidity to ensure integrity, and there is a regular program of inspection to visually confirm integrity of every package in storage. The NES has been receptive to feedback from the municipality and have implemented storage racking arrangements that permit the ability to visually inspect any waste package at all times. NES is to be commended for being receptive to the concerns of the community. The robust storage arrangements for radioactive waste at NES radioactive waste management facilities can be viewed as an area of good performance for Austria.

5. SAFETY CASE AND SAFETY ASSESSMENT OF RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT ACTIVITIES AND FACILITIES

The ARTEMIS Review Team considered the safety demonstration of facilities conducting waste management related activities throughout their whole lifecycle, from design to decommissioning.

Austrian position

The Radiation Protection Act 2020 specifies the general licensing requirements as well as specific requirements for practices involving the use of dangerous radioactive sources, for a research reactor and for a facility conducting waste management activities. The documents for license application are specified in greater detail in the General Radiation Protection Ordinance. The operator of such facility has notably to provide a safety analysis and an emergency response plan to obtain a construction license, which documents have to be further developed to obtain an operating license. As for the establishment of a decommissioning concept, it has to be first presented in the application to obtain a construction license.

The specification for information that is to be provided in the safety report for an operating license include a general description of the waste management facility, aspects of facility planning, particularly regarding technical design and safety, site characteristics, an updated description of the waste management facility and its installations, a presentation of operation and operating safety, an overview of the current status of the decommissioning concept, a presentation of the security status of the waste management facility, a presentation of the results of the safety/accident analysis in consideration of internationally recognised safety standards (particularly publications of the IAEA), an overview of emergency preparedness, especially on-site emergency preparedness, including emergency response plan, and a safety evaluation as proof of having fulfilled all the safety requirements and the regulatory specifications.

The content of the decommissioning concept of a waste management facility has in particular to include a description of the facility and its environment, the operating history, the decommissioning safety and radiation protection related provisions, the decommissioning techniques, an estimation of the contaminated components and of the radioactive waste to be produced during the operations and their management routes, and the internal organization of the operator.

The licence of a waste management facility is assessed by the BMK embodied by the Department for Radiation Protection as regulator. In the framework of a licensing procedure the law requires the competent authority to involve qualified experts, whom are either from the AGES or from other competent entities and provide the authority with recommendations that are intended to shape the decision.

The legal and regulatory framework defines safety requirements that apply to all waste management facilities, the definition of which include disposal facilities. The accident analysis made by NES is based on the General Safety Guide 3 of IAEA which also constitutes the basis on which the technical assessment is conducted by AGES on behalf of the Department for Radiation Protection. There are no binding safety requirements that specifically apply to disposal facilities, e.g. for closure or post-closure safety of a disposal facility. The Radiation Protection Act 2020 nonetheless specifies that the publications of IAEA on processing, interim storage and final disposal shall be used as a reference for the design, construction and operation of a waste management facility.

The regulatory framework does not set the graded approach as a requirement for waste management facilities. However the risk analysis takes into account the specific issues presented by the various facilities operated by NES.

The safety report shall be reviewed by the licensee at appropriate intervals, updated as appropriate and brought to the attention of the competent authority without undue delay in the event of any material changes. As far as the decommissioning concept is concerned, the operator has to update it as appropriate and bring it to the attention of the authority without undue delay in the event of any material changes. The compliance with the above-mentioned regulations is checked during the annual inspections conducted by the regulatory safety authority, which has the possibility to step-in and impose additional requirements if necessary.

ARTEMIS observation

The ARTEMIS Review Team observed that the regulatory requirements for the safety case of waste management facilities are adequate.

The licensing procedure requires a decommissioning plan to be established in the design stage although the regulatory expectations could be more clearly set out in regulations (ARTEMIS suggestion 1). The ARTEMIS Review Team moreover notices that the probabilistic approach to the safety analysis (GSR Part 4. Requirement 15) is not currently implemented by NES.The ARTEMIS Review Team acknowledges that this requirement can consider the graded approach.

As no specific requirement apply yet to disposal facilities, the ARTEMIS Review Team considered that it would be beneficial for the regulatory safety authority to issue guidance outlining regulatory expectations regarding the process and content of documentation to be submitted for disposal licensing (ARTEMIS suggestion 3). This guidance should in particular take into account long term issues that are specific to disposal facilities and should set out regulatory expectations for this to be considered as early as possible in the design of such facility.

The ARTEMIS Review Team also observed that safety performance data such as personnel doses received, events and near misses, evaluation of operating experience from other similar facilities, maintenance of safety related systems, environmental discharges, etc. is regularly reported to the regulatory safety authority.

The operator of a waste management facility has to review its safety analysis in adequate timeframes and update it as necessary in the event of material changes. However, the ARTEMIS Review Team did not see evidence of regular periodic evaluation and update of the safety case, as a whole, or the decommissioning plan during the operations phase of the NES waste management facilities. The regulatory requirements do not contain a specific requirement to review and update the safety case or decommissioning plan other than when a change to the facility has occurred, or there is to be a change in life-cycle phase for the facility (e.g. from construction to operations, or from operations to decommissioning).

Following completion of the modernization of facilities at NES there is a planned period of decades of operations where there are no further facility modifications foreseen. The operator should summarize and review their safety performance data, on a consolidated basis, at an appropriate frequency (e.g. 10 years) and compare the actual data with assumptions in the safety analysis, and the safety case can be confirmed to be still valid or updated as necessary. This would also be a good time to review the decommissioning plan and update as necessary as required by GSR Part 6.

The ARTEMIS Review Team notes that recommendations 8 and 12 of the IRRS mission identified similar issues pertaining to research reactor and radiations sources facilities. The ARTEMIS Review Team observes that these issues also pertain to waste management facilities and the requirements in GSR Parts 5 and 6.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Regulatory requirements for periodic safety review of waste management facilities and review and update of the decommissioning plan during operation are not defined and regulatory expectations are not clear.*	
(1)	**BASIS: GSR Part 4 Requirement 24 states that** *"The safety assessment shall be periodically reviewed and updated".*
(2)	**BASIS: GSR Part 5 Requirement 16, para. 5.11 states that** *"The safety assessment has to be reviewed periodically to confirm that any input assumptions that need to be complied with remain adequately controlled within the overall safety management controls."*
(3)	**BASIS: GSR Part 5 Requirement 16, para. 5.12 states that** *"The safety assessment and the management systems within which it is conducted have to be periodically reviewed at predefined intervals in accordance with regulatory requirements."*
(4)	***BASIS: GSR Part 6 Requirement 5, para. 3.3 states that*** *"The responsibilities of the regulatory body shall include:* *- Establishing requirements for planning for decommissioning, including: […]* *- Review of the initial decommissioning plan and updates[…]."*
(5)	**BASIS: GSR Part 6 Requirement 10, para. 7.5 states that** *"The decommissioning plan shall be updated by the licensee and shall be reviewed by the regulatory body periodically (typically every 5 years or as prescribed by the regulatory body), or when specific circumstances warrant, such as if changes in an operational process necessitate significant changes to the plan. The decommissioning plan shall be updated as necessary in the light of relevant operational experience gained, available lessons learned from the decommissioning of similar facilities, new or revised safety requirements, or technological developments relevant to the selected decommissioning strategy."*
R3	**Recommendation: The regulatory safety authority should clarify in regulation the minimum frequency and content of periodic safety review and review of the decommissioning plan for waste management facilities.**

6. COST ESTIMATES AND FINANCING OF RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT

The ARTEMIS Review Team considered the cost estimates for spent fuel and radioactive waste management and its financing. The ARTEMIS Review Team considered the adequacy of national arrangements for establishment and maintenance of secure funding mechanisms for the purpose of radioactive waste and spent nuclear fuel management.

The ARTEMIS Review Team considered how funding provisions take into account cost estimates based on the national inventory and its estimates on changes, and volume and type of the waste inventory and the cost assessment methods at the national level.

The ARTEMIS Review Team was provided extensive advance reference material and during the mission was provided with detailed presentations on the topic of cost estimates.

Austrian position

The Federal Government in Austria provides financing in connection with all the activities in connection with the disposal agreement, the decommissioning agreement, regulatory activities associated with spent fuel and radioactive waste management and public information and involvement.

The fees charged by NES for radioactive waste management, include a 'precautionary' component and a 'treatment' component. The 'precautionary fee' allocation is intended to cover future radioactive waste management costs up to and including disposal. This fee goes to the BMF, in lieu of these associated costs that will subsequently be bourne by the Federal Government. In any cases where the fees prescribed by NES do not cover the costs, these are funded by the Federal Government.

NES periodically reviews the basis of their fees. Current fees were set following review in 2014/15. These drew comparative analysis from projected costings used for disposal costs in other countries (Germany, Spain and Switzerland), and in light of potential differences in the scale of these national programmes. In addition to establishment of current fees, these provided an indication of potential vulnerabilities for the adequacy of the funding provision to cover all of the needs of the National Programme, including development of radioactive waste disposal facility.

The Advisory Board is developing recommendations on plans for the disposal of radioactive waste in Austria. Until a decision is finalised for the long term plan for disposal of radioactive waste in Austria, the National Programme does not include a costs assessment that takes account of all the associated activities. Austria has provided an overview of indicative projected costs up to and beyond 2045. This includes an assessment of costs for the activities of the Advisory Board, the return of spent fuel, decommissioning of the TRIGA Research Reactor, decommissioning of radioactive waste management facilitites, and disposal of radioactive waste.

Austrian law prohibits disposal of spent fuel on Austrian territory. Costs associated with spent fuel management comprise allocations for transportation of the spent fuel to the US and for the storage of spent fuel in the US, based on transportation costs from the transfer of fuel elements to the US in 2012 and an allocation for storage specified in the return agreement.

ARTEMIS observation

The ARTEMIS Review Team notes that the Federal Government accepts responsibility for costs associated with the management, including disposal of radioactive wastes in Austria, where there is no other provision in place. On this basis, the ARTEMIS Review Team is satisfied that the national arrangements for establishment and maintenance of funding mechanisms for the purpose of radioactive waste and spent nuclear fuel management are adequate and secure.

The ARTEMIS Review Team notes that Austria recognises a number of uncertainties relating to future costs arising, associated with uncertainties in the potential size of the national inventory, including projections for future arisings, and depending on the detail of the preferred approach and programme adopted for the long term management (disposal) of Austrian radioactive waste. The ARTEMIS Review Team observes further potential uncertainty concerning the disposal cost benchmarks due to the scale of the National Programme being compared (i.e. impact of significant capital infrastructure costs in relation to the relatively small scale of the national inventory).

The ARTEMIS Review Team accepts the funding provisions take into account the cost estimates based on the national inventory and its estimates on changes, noting the waste inventory, which is well characterised in terms of volume and type.

The ARTEMIS Review Team notes that more significant elements of uncertainty in the likely costs arising from future radioactive waste management, in Austria's case relate less to uncertainties associated with the waste inventory, and more to those associated with the development of the future National Programme, including the selection of the option for long term management (the nature of disposal and development of a disposal facility).

The ARTEMIS Review Team considers that more accurate cost assessments can and should be done as disposal planning progresses. Updating cost estimates and financing should be part of the development of the implementation plan for disposal (ARTEMIS recommendation 2). This is also important so that the Federal Government can be informed more precisely about its future financial liabilitites.

7. CAPACITY BUILDING FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT – EXPERTISE, TRAINING AND SKILLS

Competence provisions of different organizations having responsibilities in safe management of radioactive waste and spent fuel are established in legislation. The Austrian Radiation Protection Act 2020 mandates BMK to issue ordinance concerning radiation protection officers, nuclear safety officers, members of reactor management, reactor operators and for staff in radioactive waste management facilities. Competence requirements for regulatory authority civil servants are established through general federal legislation and also the Radiation Protection Act 2020, which requires the competent authority to ensure that individuals involved in regulatory activities have relevant education and training. The regulatory framework for competence for safety was evaluated as part of Austria IRRS mission in 2018.

The General Radiation Protection Ordinance sets the requirements on education and training in the medical field, in the non-medical sector, in the field of waste management facilities, in the field of research reactors and on the recognition of training. The ordinance also contains stipulations on retraining. In general radiation protection and nuclear safety officers must have successfully completed relevant scientific or technical university studies and radiation protection training in accordance with the ordinance. Waste management facility staff directly involved with management activities must comply with ordinance competence requirements.

At the national level the responsibility for the provision of basic education requirements is placed on universities. Austrian universities provide bachelor and master courses that offer prerequisite skills for commencing duty in licensed facilities or activities. A few national training centers provide more specialized training in radiation safety and radioactive waste management.

Austrian counterpart provided detailed information about waste management expert resources, staff turnover and competence development practises. There are, in totall, about 50-60 radioactive waste management experts working in the main national organisations. Austria has not performed a consolidated national evaluation of existing national competences or future needs.

NES has adequate human resources for their current radioactive waste management activities. NES faced peak retirement of staff 10-15 years ago and current staff age profile does not raise any major challenges for competence or knowledge management. For key technical experts NES aims to establish redundancy and ensure adequate back-up capacity. NES performs specific activities, where there is limited availability of experienced staff externally. Therefore, NES aims for early recruitment to ensure an adequate overlap period in the case of the retirement of key-staff. Personnel competence management is part of NES integrated management system and for example, individual education plans are defined for each staff member.

The Regulatory safety authority has in total, around 20 person staff of which about 5 have duties related to radioactive waste management. Resource and competence development needs are evaluated through annual workforce planning and staff performance reviews. General administrative procedure and Radiation Protection Act 2020 define that authorities shall involve necessary experts in licensing procedures. In cases where the regulatory body does not have its own experts, it contracts national or international technical expertise to support the execution of relevant regulatory functions. Austrian legislation differentiates technical experts to official and non-official roles. For official experts there are stringent approval processes and liabilities established by legislation.

General criteria for qualified experts is provided in the radiation protection act and ordinance. According to regulations qualified experts supporting the regulatory authority in the oversight of waste management facilities must, as a minimum, fulfil the same requirements for education and training as waste management facilities staff. Further competence requirements are specified in contractual agreements between the regulatory authority and qualified experts.

AGES is the main technical support organisation for BMK. Its position is established in the Austrian health and food safety act, which defines AGES duties to include support to the Federal minister in matters of the enforcement of radiation protection act. AGES experts function as official experts for regulatory authority. AGES experts are providing technical support, but regulatory actions are taken by BMK. AGES expert competence management forms part of their integrated management system.

ARTEMIS observation

The ARTEMIS Review Team notes that Austrian radioactive waste management and decommissioning capabilities are mostly adequate and, in some areas good considering the scale of the needs for current facilities and activities. Organisations have arrangements in covering place resource planning, competence evaluation and training procedures through their integrated management systems.

Austrian organisations involved in management of decommissioning and radioactive waste are evaluating existing capacities and future expectations separately. The ARTEMIS Review Team notes that national evaluation of competences and future needs would be useful and for example provide information to government and universities about future education needs.

A key part of future capacity development is self-evidently related to disposal. The ARTEMIS Review Team has recommended the Federal Government develops a disposal implementation plan as part of national waste management strategy. Capacity building should be considered as part of the plan and related national R&D. Austria has acknowledged this future challenge, and competences of future operator of disposal facility is identified as a consultation task of the Advisory Board. The ARTEMIS Review Team notes that capacity building in relevant ministries, regulatory safety authority and technical support organisations is equally important.

Regulatory Safety Authority staffing, competence and use of technical support organizations were evaluated as part of IAEA IRRS mission in 2018. ARTEMIS mission reaffirms the same observations by in this areas by the IRRS. The regulatory body should take into account also radioactive waste management and decommissioning when addressing the following IRRS recommendations and suggestion:

- *IRRS R5: The regulatory body should develop and systematically use formal processes to assess sufficiency and competence of staff and to ensure long term human resource and succession planning and recruitment, appropriate training and knowledge management.*
- *IRRS R10: The regulatory body should establish written criteria and procedures for the formal recognition of qualified experts providing advice to authorized parties.*
- *IRRS S6: The regulatory body should consider establishing criteria and process for selection, approval or accreditation of external experts assuring their expertise.*

The ARTEMIS Review Team has made observations and recommendations concerning the regulatory safety authority's current role, independence and national implementation plan for

disposal. Developments in these areas should be considered when addressing the above mentioned IRRS observations.

APPENDIX A: TERMS OF REFERENCE

1. Introduction

On 4 July 2019, Permanent Mission of Austria to the United Nations, requested the International Atomic Energy Agency (IAEA) to organize and carry out, in the second half of 2022, an Integrated Review Service for Radioactive Waste and Spent Fuel, Decommissioning and Remediation (ARTEMIS) review. Austria requested the ARTEMIS review to satisfy its obligations under Article 14(3) of the European Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (hereinafter the EU Waste Directive).

The review will be organized by the Department of Nuclear Safety and Security and the Department of Nuclear Energy of IAEA. It will be performed by an independent, international peer review team selected by the IAEA.

2. Objective

The ARTEMIS review will provide an independent, international evaluation of Austrian national framework, competent regulatory authority, national programme and its implementation for safe management of radioactive waste.

The review will be performed by an international peer review team selected by the IAEA.

3. Scope

The ARTEMIS review will evaluate the Austrian national framework, competent regulatory authority, national programme and its implementation for safe management of radioactive waste, including the following:

- The Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK), which is the rule making and coordinating body and the competent licensing and regulatory authority for research reactors and waste management facilities;
- Nuclear Engineering Seibersdorf GmbH, which is the central waste management facility in Seibersdorf, Austria, and its modernisation project for the waste management.

Results from the IAEA Integrated Regulatory Review Service (IRRS) mission to Austria conducted in June 2018 will be taken into account, where relevant and appropriate to avoid unnecessary duplication.

4. Basis for the review

The ARTEMIS review will be based on the relevant IAEA Safety Standards and proven international practice and experiences, following the guidelines of the ARTEMIS review service.

5. Reference material

The review will cover all documentation submitted by National Counterpart for the considered scope of the review, including the results of a national self-assessment, which should be based on the ARTEMIS self assessment questionnaire provided by the IAEA.

All documents for the purpose of the ARTEMIS review shall be submitted in English.

Reference material for the purpose of the ARTEMIS review shall be submitted to the ARTEMIS mission webpage on the Global Nuclear Safety and Security Network (GNSSN) of the IAEA.

6. Modus operandi

The working language of the mission will be English.

The National Counterpart is the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology of Austria, Directorate General V – Environment and Circular Economy, Department 8 – Radiation Protection. The National Counterpart Liaison Officer for the review is Mr Roman Zoechling.

The ARTEMIS review mission will be conducted from **20 to 30 November 2022** in **Vienna**, Austria. The provisional schedule for the review mission is provided in **Annex 2**.

The timeline for the key steps of the review process is provided below:

- Self-assessment questionnaire: available to Austria as of **October 2021**
- Preparatory Meeting: **25 March 2022** (WebEx meeting)
- Notification by IAEA to the Counterparts on the review team composition: by **1 June 2022**
- Submission of reference material: by **1 September 2022** (including the completed self-assessment)
- Submission of questions from the review team to the Counterpart based on preliminary review of the reference material: by **21 October 2022**

7. International peer review team

The IAEA will convene a team of international experts to perform the ARTEMIS review according to the ARTEMIS Guidelines and these Terms of Reference. The team will consist of:

- Four qualified and recognized international experts from government authorities, regulatory bodies, waste management organizations, or technical support organizations with experience in the safe management of radioactive waste.
- Two IAEA staff to coordinate the mission. The Coordinator of the ARTEMIS review is Ms Mathilde Prevost from the Waste and Environmental Safety Section of the Department of Nuclear Safety and Security of IAEA. The Deputy Coordinator is Ms Merle Lust from the Waste Technology Section of the Department of Nuclear Energy of IAEA;
- One IAEA staff for administrative support.

A senior staff member from the Department of Nuclear Safety and Security of IAEA will oversee the closure of the review.

The peer review team will be led by a Team Leader from the review team, Mr Jussi Heinonen from STUK, Finland. The IAEA will inform the National Counterpart regarding the composition of the proposed review team prior to submission of reference material. The review mission may include the presence of up to two observers, including the possibility of an observer from the EC. The National Counterpart will be notified of any proposed observers; the presence of any observers must be agreed in advance of the mission.

8. Reporting

The findings of the peer review will be documented in a final report that will summarise the proceedings of the review and contain any recommendations, suggestions and good practices. The report will reflect the collective views of the review team members and not necessarily those of their respective organization or Member State or the IAEA.

Prior to its finalization, the ARTEMIS Review Report will be delivered to the National Counterpart for fact-checking, being the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology of Austria, Directorate General V – Environment and Circular Economy, Department 8 – Radiation Protection.

9. Funding of the ARTEMIS review

The peer review will be funded by Austria. The costs for the services will be limited to the travel costs and per diem of the peer review team (external experts and IAEA staff) in line with IAEA Financial Regulations and Rules.

The cost of the ARTEMIS review were paid to the IAEA as voluntary contribution before the start of the mission. Austria is aware that the review cost includes 7% programme support costs.

If the actual cost of the ARTEMIS review exceeds the estimated voluntary contribution, Austria agrees to cover such additional cost to the IAEA. Similarly, if the actual cost is less than the estimated voluntary contribution, any excess will be refunded to Austria through the Counterpart.

These Terms of Reference were agreed on 5 April 2022 between the IAEA and the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, on behalf of the Government of Austria, during the preparatory meeting held on-line.

Annex 1: List of reference material

- Responses to the ARTEMIS Self-assessment Questionnaire
- Laws, regulations and regulatory guidelines (including waste classification, concept of clearance, radiation sources categorization)
    - Federal Constitutional Law for a Non-Nuclear Austria 1999
    - Atomic Liability Act 1999
    - Radiation Protection Act 2020
    - General Administrative Procedures Act 1991
    - Administrative Enforcement Act 1991
    - Administrative Penal Act 1991
    - Federal Ministries Act 1986
    - Safeguards Act 2013
    - Carriage of Dangerous Goods Act 1998
    - Waste Management Act 2002 (§§ 8a, 8b)
    - Penal Code (§§ 177b, 177c)
    - Environmental Impact Assessment Act 2000
    - General Radiation Protection Ordinance 2020
    - Radioactive Waste Shipment Ordinance 2009
- Overview of the constitutional and legal framework in Austria
- National Programme for Radioactive Waste Management
- 7th National Report of Austria on the implementation of the obligations of the Joint Convention
- Questions and answers to the 7th JC National Report
- IRRS Mission Report (2018)
- 3rd National Report on the implementation of Council Directive 2011/70/Euratom (2021)
- Explanatory Notes
    - to the Radiation Protection Act 2020
    - to the General Radiation Protection Ordinance 2020
    - to the Ordinance on the Shipment of Radioactive Waste 2009
- Mandate of the Austrian Board for Radioactive Waste Management
- Relevant reports of the Austrian Board for Radioactive Waste Management
- Price List (Waste Acceptance Criteria) for 2022 of Nuclear Engineering Seibersdorf

Any other relevant laws, regulations and additional information

APPENDIX B: MISSION PROGRAMME

Time	Sun, 20 Nov	Mon, 21 Nov	Tue, 22 Nov	Wed, 23 Nov	Thurs, 24 Nov	Fri, 25 Nov	Sat, 26 Nov	Sun, 27 Nov	Mon, 28 Nov	Tue 29 Nov	Wed 30 Nov
9h00 – 10h00	Arrival of Team Members	**Opening** General presentation	Inventory Concepts, Plans and technical solutions	Concepts, Plans and technical solutions (disposal)	Session reserved for further discussions if required/ drafting of the report	**Presentation of Suggestions and Recommendations to Counterparts**	Drafting of the report	**Draft report to be sent to the Counterparts** ***by 13h00***	Counterparts review the draft report	**Internal reflection of comments**	Delivery of final draft report **EXIT MEETING**
10h00 - 12h00		National Policy and Framework		Safety case and safety assessment						**Discussions with the Counterparts on the draft report**	
12h00 - 13h00		Lunch	Lunch	Lunch	Lunch	Lunch		Lunch	Lunch	Lunch	Departure of Team Members
13h00 – 16h00		National Strategy	SITE VISIT Nuclear Engineering Seibersdorf	Cost estimates and financing Capacity building	**Finalisation of Suggestions and Recommendations to Counterparts**	Drafting of the report		Counterparts review the draft report	Counterparts review the draft report Social event	Finalising draft report	
16h30 - 17h30	Artemis team meeting	Team meeting	Team meeting	Team meeting							
		Drafting of the report	Drafting of the report	Drafting of the report							

APPENDIX C: RECOMMENDATIONS AND SUGGESTIONS

Area		R:Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
1.	**NATIONAL POLICY AND FRAMEWORK FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT**	R1	The Federal Government should take steps to ensure functional separation of responsibility for regulatory oversight of safety from co-ordination, financial oversight and implementation of the National Programme for RWM. These activities should be assigned to a different entity from those of the regulatory safety authority.
		S1	The Federal Government should consider clarifying regulatory requirements that submission of a decommissioning plan should form part of a licence application for construction.
		S2	The regulatory safety authority should consider providing additional guidance on the licensing process for decommissioning of a waste management facility with respect to selection of the decommissioning strategy and how interested parties are provided the opportunity to participate in the licensing process.
		S3	The regulatory safety authority should consider issuing guidance outlining regulatory expectations regarding the process and content of documentation to be submitted for disposal licensing.

Area		R:Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
2.	**NATIONAL STRATEGY FOR RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT**	S4	The Federal Government should consider including in the National Programme a contingency plan for the management of spent fuel in case of an impossibility to implement the take-back agreement concluded with US DOE.
		R2	The Federal Government should update the national strategy to include a consolidated implementation plan for disposal with appropriate interim targets, progress indicators and risks analysis, as well as a documented process including roles and responsibilities for tracking implementation of milestones.
5.	**SAFETY CASE AND SAFETY ASSESSMENT OF RADIOACTIVE WASTE AND SPENT FUEL MANAGEMENT ACTIVITIES AND FACILITIES**	R3	The regulatory safety authority should clarify in regulation the minimum frequency and content of periodic safety review and review of the decommissioning plan for waste management facilities.

APPENDIX D: LIST OF ACRONYMS USED IN THE TEXT

Advisory Board	Austrian Board for Radioactive Waste Management
AGES	Austrian Agency for Health and Food Safety
ARM	Advance Reference Material
BMF	Federal Ministry of Finance
BMK	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology
BMSGPK	Federal Ministry of Social Affairs, Health, Care and Consumer Protection
IAEA	International Atomic Energy Agency
IRRS	Integrated Regulatory Review Service
NES	Nuclear Engineering Seibersdorf
US DOE	the United States Department of Energy

APPENDIX E: IAEA REFERENCE MATERIAL USED FOR THE REVIEW

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Fundamental Safety Principles, Safety Fundamentals No. SF-1, Vienna (2006).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, General Safety Requirements No. GSR Part 1 (Rev. 1), Vienna (2016).

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, General Safety Requirements No. GSR Part 2, IAEA, Vienna (2016).

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014).

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4, IAEA, Vienna (2009).

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Predisposal Management of Radioactive Waste, IAEA Safety Standards Series No. GSR Part 5, IAEA, Vienna (2009).

[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Facilities, IAEA Safety Standards Series No. GSR Part 6, IAEA, Vienna (2014).

[8] INTERNATIONAL ATOMIC ENERGY AGENCY, Disposal of Radioactive Waste, IAEA Safety Standards Series No. SSR 5, IAEA, Vienna (2011).

[9] INTERNATIONAL ATOMIC ENERGY AGENCY, The Safety Case and Safety Assessment for the Predisposal Management of Radioactive Waste, IAEA General Safety Guides GSG-3, IAEA, Vienna (2013).

[10] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Fuel Cycle Facilities, IAEA Safety Standards Series No. NS-R-5 Rev. 1, IAEA, Vienna (2014).

[11] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Energy Basic Principles, Nuclear Energy Series, NE-BP, Vienna (2008).

[12] INTERNATIONAL ATOMIC ENERGY AGENCY, Radioactive Waste Management and Decommissioning Objectives, Nuclear Energy Series, NW-O, Vienna (2011).

[13] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Fuel Cycle Objectives, Nuclear Energy Series, NF-O, Vienna (2013).

[14] INTERNATIONAL ATOMIC ENERGY AGENCY, Policies and Strategies for Radioactive Waste Management, IAEA Nuclear Energy Series No. NW-G-1.1, IAEA, Vienna (2009).

[15] INTERNATIONAL ATOMIC ENERGY AGENCY, Policies and Strategies for the Decommissioning of Nuclear and Radiological Facilities, IAEA Nuclear Energy Series No. NW-G-2.1, IAEA, Vienna (2012).

[16] INTERNATIONAL ATOMIC ENERGY AGENCY, Policy and Strategies for Environmental Remediation, IAEA Nuclear Energy Series No. NW-G-3.1, IAEA, Vienna (2015).

[17] INTERNATIONAL ATOMIC ENERGY AGENCY, Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, IAEA International Law Series No. 1, IAEA, Vienna (2006).

[18] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Glossary – Terminology used in Nuclear Safety and Radiological Protection, IAEA, Vienna (2018).

[19] Official Journal of the European Union No. L 199/48 from 2nd Aug 2011, COUNCIL DIRECTIVE 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, Brussels (2011).