IAEA-NS-IRRS-2023-06
ORIGINAL: English

INTEGRATED REGULATORY REVIEW SERVICE (IRRS)

FOLLOW-UP MISSION

TO

THE FEDERAL REPUBLIC OF GERMANY

Bonn, Germany

10-16 October 2023

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

IAEA

Integrated Regulatory Review Service

IRRS

Integrated
Regulatory
Review Service

IAEA | IRRS

REPORT OF THE
INTEGRATED REGULATORY REVIEW SERVICE (IRRS)
FOLLOW-UP MISSION TO
THE FEDERAL REPUBLIC OF GERMANY

Integrated Regulatory Review Service

IAEA IRRS

REPORT OF

THE INTEGRATED REGULATORY REVIEW SERVICE (IRRS) FOLLOW-UP MISSION TO

THE FEDERAL REPUBLIC OF GERMANY

Mission dates:	*10-16 October 2023*
Regulatory body visited:	*Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMUV)*
Location:	*Bonn, Germany*
Regulated facilities, activities, and exposure situations in the mission scope:	*Nuclear power plants, research reactors, fuel cycle facilities, waste management facilities, decommissioning, emergency preparedness and response, occupational radiation protection.*
Organized by:	*IAEA*

IRRS TEAM	
DORMAN Daniel Huntington	Team Leader
SCHWARZ Georg Frédéric	Deputy Team Leader
KRS Petr	Reviewer (Czech Republic)
JAERVINEN Marja-Leena	Reviewer (Finland)
JOHANSSON Jan Barck-Holst	Reviewer (Sweden)
GRAY Louise Anne	Reviewer (United Kingdom)
ZIMMERMAN Jacob	Reviewer (United States)
SHAH Zia Hussain	IAEA Team Coordinator
HAILU Teodros Gebremichael	IAEA Deputy Team Coordinator
REBIKOVA Olga	IAEA IRRS Administrative Assistant

IAEA-2023

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 IRRS reports from different countries should not be attempted.

CONTENT

EXECUTIVE SUMMARY

At the request of the Government of Germany, an international team of senior nuclear and radiation safety experts met with representatives of the Government of the Federal Republic of Germany from 10 October to 16 October 2023 to conduct an Integrated Regulatory Review Service (IRRS) follow-up mission.

Participating authorities included the Federal Ministry for Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV); the Ministry of Environment, Climate Protection and the Energy Sector Baden-Wuerttemberg (UM BW); the Ministry for Energy Transition, Climate Protection, Environment and Nature of the State of Schleswig-Holstein (MEKUN); the Bavarian State Ministry of the Environment and Consumer Protection (StMUV); the Ministry for the Environment, Climate Protection, Agriculture and Consumer Protection of the State of Hesse (HMUKLV); the Ministry for Climate Protection, Agriculture, Rural Areas and the Environment of the State of Mecklenburg-Western Pomerania (LM MV); the Ministry for the Environment, Energy, and Climate Protection of the State of Lower Saxony (MU); the Ministry of Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia (MWIKE); and the Federal Office for the Safety of Nuclear Waste Management (BASE).

The mission took place in Bonn. The purpose of the IRRS follow-up mission was to review Germany' progress against the recommendations and suggestions identified in the initial IRRS mission, which was carried out in April 2019. The scope of the IRRS follow-up mission remained the same as the scope of the initial mission in 2019, i.e. all facilities and activities with the exception of transport, radiation sources, public and medical exposure and the optional module on interfaces with nuclear security. Within this scope, the review compared the German regulatory framework for safety against IAEA safety standards as the international benchmark for safety. The mission was also used to exchange information and experience between the IRRS team members and the German counterparts in the areas covered by the IRRS.

The IRRS team consisted of 7 senior regulatory experts from 6 IAEA Member States, 2 IAEA staff members and 1 IAEA administrative assistant. The IRRS team carried out the review of the progress made on each recommendation and suggestion that were documented in the 2019 IRRS mission report. These recommendations and suggestions covered the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities and processes of the regulatory body including authorization, review and assessment, inspection, enforcement and the development and content of regulations and guides; emergency preparedness and response; occupational radiation protection; fuel cycle and radioactive waste management facilities and decommissioning. The IRRS mission included discussion of one policy issue: 'Changing the way of working – on the way to the "new normal"'.

The IRRS team conducted interviews and discussions with the staff of BMUV, BASE, BfS and the above mentioned Länder authorities. The IRRS team concluded that Germany has been responsive to the recommendations and suggestions made in 2019 and continues to place appropriate focus on implementing a framework that provides for effective nuclear safety and radiation safety for workers, the public and the environment.

The IRRS team noted that Germany has shown a strong commitment to nuclear and radiation safety. Progress made since 2019 include the following:

- Harmonizing the supervisory approaches among all regulatory bodies
- Conducting self-assessment and creating awareness on safety culture within the regulatory bodies
- Establishing a national strategy for competence building and the development of future talent for nuclear safety.
- Enhancing involvement of staff in all organizations in international regulatory experience feedback activities
- Strengthening emergency preparedness and response with the adoption of a federal general emergency response plan and full functioning of the new Federal Radiological Situation Centre.
- Enhancing conformity of the regulatory framework with the IAEA safety standards.

The IRRS team concluded that all 6 recommendations and 23 out of 25 suggestions identified in the 2019 mission have been closed. Germany is encouraged to continue its efforts to:

- Complete the integrated management system in some Länder authorities.
- Revise the safety requirements/guidance documents for the development, operation and closure of disposal facilities for radioactive waste.

Two new suggestions were formulated on the basis of the transition of German nuclear power program after shutting down all 35 nuclear power plants and highlighting important aspects to be accomplished for the effective oversight of decommissioning including development of harmonized integrated management system.

Throughout the mission, the IRRS team was extended full cooperation in the regulatory, technical, and policy issues by all parties in an open and transparent manner. The IRRS team acknowledges all the support received and the excellent hospitality and assistance from the participating federal and Länder authorities to engage in the IRRS follow-up mission and this helped the team to develop a broad understanding of the German regulatory system.

The IRRS team findings are summarized in Appendix V.

An IAEA press release was issued at the end of the IRRS follow-up mission.

I. INTRODUCTION

At the request of the Government of the Federal Republic of Germany, an international team of senior safety experts met representatives of the Federal Ministry for Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV); the Ministry of Environment, Climate Protection and the Energy Sector Baden-Wuerttemberg (UM BW); the Ministry for Energy Transition, Climate Protection, Environment and Nature of the State of Schleswig-Holstein (MEKUN); the Bavarian State Ministry of the Environment and Consumer Protection (StMUV); the Ministry for the Environment, Climate Protection, Agriculture and Consumer Protection of the State of Hesse (HMUKLV); the Ministry for Climate Protection, Agriculture, Rural Areas and the Environment of the State of Mecklenburg-Western Pomerania (LM MV); the Ministry for the Environment, Energy, and Climate Protection of the State of Lower Saxony (MU); the Ministry of Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia (MWIKE); and the Federal Office for the Safety of Nuclear Waste Management (BASE, formerly BfE), from 10 to 16 October 2023 to conduct an Integrated Regulatory Review Service (IRRS) follow-up mission. The purpose of this peer review was to review Germany's progress against the recommendations and suggestions identified in the initial IRRS mission which was carried out from 1 to 12 April 2019.

The review mission was formally requested by the Government of Germany in August 2021. A preparatory meeting was conducted on 25 to 26 April 2023 in Bonn, Germany, to discuss the purpose, objectives, and detailed preparations of the follow-up review in connection with regulated facilities, activities and exposure situations in Germany and their related safety aspects, and to agree the scope of the IRRS follow-up mission.

The IRRS team consisted of 7 senior regulatory experts from 6 IAEA Member States, 2 IAEA staff members and 1 IAEA administrative assistant. The IRRS team carried out the review in the areas covered by the initial mission in April 2019. In addition, a policy issue was discussed on 'Changing the way of working – on the way to the "new normal"'.

In preparation for the IRRS follow-up mission, Germany conducted a self-evaluation of the status of recommendations and suggestions set out in the initial IRRS mission report and prepared a follow-up self-assessment report accordingly. This report and supporting documentation were provided to the IRRS team as advance reference material (ARM) for the mission. During the mission, the IRRS team performed a systematic review of all topics by reviewing the advance reference material, additional information provided, and by conducting interviews and discussions with the staff of BMUV, BASE and Länder authorities.

Throughout the mission, the IRRS team received full cooperation in regulatory and technical areas by all parties in a very open and transparent manner.

II. OBJECTIVE AND SCOPE

The purpose of this Integrated Regulatory Review Service (IRRS) follow-up mission was to conduct a review of the 6 recommendations and 25 suggestions that were given to Germany during the IRRS initial mission conducted in 2019 and to exchange information and experience in the areas covered by the IRRS, including on the regulatory implications of pandemic situations.

The IRRS follow-up mission scope was the same as the scope of the initial mission covering the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities and processes of the regulatory body including authorization, review and assessment, inspection, enforcement and the development and content of regulations and guides; and emergency preparedness and response. The scope of authorized facilities and activities included nuclear power plants; fuel cycle facilities; research reactors; occupational radiation protection; waste management facilities; and decommissioning.

The review was carried out by comparison of existing arrangements against the IAEA safety standards.

It is expected that the IRRS follow-up mission will facilitate regulatory improvements in Germany and other Member States from the knowledge gained and experiences shared between the German Counterparts and IRRS reviewers, and through the evaluation of the effectiveness of Germany's regulatory infrastructure for safety.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IRRS TEAM

At the request of the Government of Federal Republic of Germany, a preparatory meeting for the Integrated Regulatory Review Service (IRRS) follow-up mission was conducted from 25 to 26 April 2023. The preparatory meeting was carried out by the appointed Team Leader Mr Daniel Dorman, Deputy Team Leader Mr Georg Schwarz and the IRRS IAEA team representatives, Mr Zia Shah and Mr Teodros Hailu.

The IRRS follow-up mission preparatory team had discussions regarding regulatory programmes and policy issues with the senior management of BMUV represented by Mr Thomas Elsner, Head of Directorate S l, Safety of Nuclear Installations, other senior management and staff. The discussions resulted in agreement that the review will cover the areas covered by the initial mission conducted in April 2019.

Mr Elsner made presentations on the national context and the self-assessment results to date.

IAEA staff presented the IRRS principles, follow-up mission process and methodology. This was followed by a discussion on the tentative work plan for the implementation of the IRRS follow up mission in Germany in October 2023.

The proposed composition of the IRRS team was discussed and tentatively confirmed. Logistics of the mission, including meetings and workplaces, counterparts and Liaison Officers, lodging and transportation arrangements were also addressed.

The Liaison Officer for the IRRS follow up mission to Germany was confirmed as Mr Thomas Elsner, and the Deputy Liaison Officer as Mr Christoph Ditsche.

Germany provided IAEA with the advance reference material (ARM) for review at the beginning of August 2023. In preparation for the mission, the IAEA review team members reviewed Germany's advance reference material and provided their initial impressions to the IAEA Team Coordinator prior to the commencement of the IRRS follow-up mission.

B) REFERENCES FOR THE REVIEW

The relevant IAEA safety standards were used as review criteria. The complete list of IAEA publications used as the references for this mission is provided in Appendix VII.

C) CONDUCT OF THE REVIEW

The initial IRRS Team meeting took place on Monday 9 October 2023 in the Dorint Hotel, directed by the IRRS Team Leader and the IAEA Team Coordinator. Discussions encompassed the general overview, the scope and specific issues of the mission, clarification of the bases for the review and the background, context and objectives of the IRRS programme. The understanding of the methodology for review was reinforced. The agenda for the mission was presented to the team. As required by the IRRS Guidelines, the reviewers presented their initial impressions on the ARM and highlighted significant issues to be addressed during the mission.

The host Liaison Officers were present at the initial IRRS team meeting, in accordance with the IRRS Guidelines, and presented logistical arrangements planned for the mission.

The IRRS entrance meeting was held on Tuesday 10 October 2023 at the Headquarters of BMUV with the participation of senior management and staff of BMUV and other relevant regulatory authorities. Opening remarks were made by Mr Gerrit Niehaus, Director General S, BMUV, and Mr Daniel Dorman, IRRS Team Leader. Mr Thomas Elsner gave an overview of the German context, and the current status of the recommendations and suggestions provided during the initial mission as a result of the pre-mission self-assessment.

During the IRRS follow-up mission, a review was conducted for all areas within the agreed scope with the objective of reviewing Germany's response to the recommendations and suggestions identified during the initial mission. An overview of the nuclear and radiation safety regulation in Germany and the major changes since 2019 were presented.

The review was conducted through meetings, interviews and discussions. The IRRS team performed its review according to the mission programme given in Appendix II.

The IRRS exit meeting was held on 16 October 2023. The opening remarks at the exit meeting were given by Mr Thomas Elsner and were followed by the presentation of the results of the mission by the IRRS Team Leader, Mr Daniel Dorman. Closing remarks were made by Mr Zia Shah, the IAEA Team Coordinator, on behalf of Ms Anna Bradford, Director, Division of Nuclear Installation Safety, IAEA.

An IAEA press release was issued at the end of the mission.

1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

1.1. NATIONAL POLICY AND STRATEGY FOR SAFETY

There were no findings in this area in the initial IRRS mission.

1.2. ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There are no requirements concerning organization and management of the project delivery organization (BGE) carrying out the site selection process.*	
(1)	**BASIS: GSR Part 1 Requirement 2, para. 2.5 (6) states that** *"The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:* *...* *(6) Provision for assigning legal responsibility for safety to the persons or organizations responsible for the facilities and activities, and for ensuring the continuity of responsibility where activities are carried out by several persons or organizations successively;"*
(2)	**BASIS: SSR 5 Requirement 25, para. 5.22 states that** *"An appropriate management system that integrates quality assurance programmes will contribute to confidence that the relevant requirements and criteria for site selection and evaluation, design, construction, operation, closure and safety after closure are met. The relevant activities, systems and components have to be identified on the basis of the results of systematic safety assessment. The level of attention assigned to each aspect has to be commensurate with its importance to safety. The management system is required to comply with the relevant IAEA Safety Standards on management systems [13, 14]."*
S1	**Suggestion: BfE should consider requiring the project delivery organization (BGE) to have adequate organizational requirements including a management system to ensure high quality of site selection process, site assessment and confidence for future activities.**

Changes since the initial IRRS mission

Suggestion 1: Since the implementation of the IRRS mission in 2019, the BMUV and BASE have initiated a process that enables BASE, in coordination with the BMUV, to draw up a regulatory framework in the field of disposal facilities and to specify the requirements for an integrated management system for BGE.

Based on this process, BASE has prepared a draft of requirements for an integrated management system for BGE. This draft takes into account that a management system always addresses the entire organisation. It takes into account that BGE already has requirements for a management system in areas of the existing disposal projects and additionally specifies how a management system has to be designed in the area of site selection as well. This covers all areas of BGE's business, including site selection.

The draft requirements were coordinated with BMUV and presented in the ESK for consultation, followed by a hearing of the operator BGE. Based on consultation and hearing feedback the requirements were finalized by BASE and are currently under publication. After the publication, they are expected to enter into force by the end of the year.

Status of Suggestion 1

Suggestion 1 (S1) is closed as BASE finalized requirements for an integrated management system for BGE.

1.3. ESTABLISHMENT OF A REGULATORY BODY AND ITS INDEPENDENCE

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Under the Site Selection Act Article 19 BfE is required to examine the proposal of BGE including the underlying site comparison of at least two sites taking into account all private and public interests as well as the results of public participation, BfE shall assess which is the site with the best possible safety.* *The responsibility for BfE to submit a reasoned proposal for siting and take account of interests other than safety, might compromise or conflict with the responsibility of BfE for regulating the safety of facilities and activities.*	
(1)	**BASIS: GSR Part 1 Requirement 4, para. 2.9 states that** *"No responsibilities shall be assigned to the regulatory body that might compromise or conflict with its discharging of its responsibility for regulating the safety of facilities and activities."*
S2	**Suggestion: BMU should consider making clear in the regulatory framework how the Site Selection Act will be implemented in a manner that will not compromise or conflict with BfE discharging its responsibility for regulating the safety of facilities and activities.**

Changes since the initial IRRS mission

Suggestion 2: To address Suggestion S2 BMUV and BASE drafted an amendment to the description of the "site selection and participation process" in the waste management part of the Handbook on Cooperation between the Federation and the Länder in Nuclear Law (Handbook - AHB). A new paragraph clarifies that, if the assessment of BASE comes to another result than BGE, the BASE requests BGE to revise the proposal. If the proposal complies with the requirements, BASE forwards the proposal to BMUV for submittal to the federal legislator. Thus it is clear that BASE only examines the BGE proposal but does not submit its own.

The proposed amendment is not controversial and will be forwarded to the competent technical committee of the LAA this November. The final adoption by the LAA is expected by June 2024.

Status of Suggestion 2

Suggestion 2 (S2) is closed on the basis of progress made and confidence in effective completion in due time as it was clarified in the AHB how the Site Selection Act is implemented in a manner that does not compromise or conflict with BASE discharging its responsibility for regulating the safety of facilities and activities. The final adoption of the amendment is expected by June 2024.

1.4. RESPONSIBILITY FOR SAFETY AND COMPLIANCE WITH REGULATIONS

There were no findings in this area in the initial IRRS mission.

1.5. COORDINATION OF AUTHORITIES WITH RESPONSIBILITIES FOR SAFETY WITHIN THE REGULATORY FRAMEWORK

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The scope of the Handbook does not cover all regulated facilities and activities and regulatory functions. Also, BfE is not reflected in the Handbook (for example, coordination of the transition of licensing of the disposal facility for radioactive waste with negligible heat generation from the Land authority to BfE at commissioning is not included).*	
(1)	**BASIS: GSR Part 1 Requirement 7, states that** *"Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make*

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
	provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties."
S3	**Suggestion: BMU should consider extending the Handbook in order to cover all regulated facilities and activities and regulatory functions as well as all parts of the regulatory authority.**

Changes since the initial IRRS mission

Suggestion 3: The Handbook was developed after the IRRS follow-up mission in 2011 to describe and document the cooperation between the federal government and the Länder in connection with power reactors with operating licences and the cooperation between the Federal Government and the Länder in nuclear regulation procedures.

To address Suggestion S3 the AHB has been amended. Six new processes have been added and some of the existing processes were expanded to include nuclear power plants in decommissioning and research reactors in operation and decommissioning. Four additional processes have been added as part of the response to the Suggestions S10, S11, S12, S13 and S16.

To cover the field of waste management, BMUV commissioned BASE with coordinating the development of the processes for the waste management part of the AHB. A total of eleven new processes were developed, five of which were also part of the response to the Suggestions S10, S11, S12, S13, S15 and S16. All except one have been adopted by the LAA or one of its technical committees. The last process is expected to be adopted in one of the next meetings.

Beyond the scope of the present Suggestion BASE started to map the generic processes without a clear interface between the Federal Government and the Länder. The waste management section of the AHB will be expanded to include responsibility assignment matrices to clearly show the responsibilities of the various involved organizations.

Status of Suggestion 3

Suggestion 3 (S3) is closed as the AHB has been extended to cover all regulated facilities and activities and regulatory functions as well as all parts of the regulatory authority.

1.6 SYSTEM FOR PROTECTIVE ACTIONS TO REDUCE EXISTING OR UNREGULATED RADIATION RISKS

There were no findings in this area in the initial IRRS mission.

1.7. PROVISIONS FOR THE DECOMMISSIONING OF FACILITIES AND THE MANAGEMENT OF RADIOACTIVE WASTE AND OF SPENT FUEL

There were no findings in this area in the initial IRRS mission.

1.8. COMPETENCE FOR SAFETY

2019 MISSION RECOMMENDATIONS, SUGGESTIONS
Observation: *BMU has initiated a project on competence and financing needs during future decades. A comprehensive plan (including resources, milestones, planning, deliverables etc.) for this project is not available. In the ARM action plan this topic is partially addressed.*

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
(1)	**BASIS: GSR Part 1 Requirement 11, para. 2.34 states that** *"As an essential element of the national policy and strategy for safety, the necessary professional training for maintaining the competence of a sufficient number of suitably qualified and experienced staff shall be made available"*
(2)	**BASIS: GSR Part 1 Requirement 18, para. 4.13 states that** *"A process shall be established to develop and maintain the necessary competence and skills of staff of the regulatory body, as an element of knowledge management. This process shall include the development of a specific training programme on the basis of an analysis of the necessary competence and skills. The training programme shall cover principles, concepts and technological aspects, as well as the procedures followed by the regulatory body for assessing applications for authorization, for inspecting facilities and activities, and for enforcing regulatory requirements"*
S4	**Suggestion: The Government should consider establishing a comprehensive plan, in consultation with relevant parties, for the project on German competence and financing needs during future decades.**

Changes since the initial IRRS mission

Suggestion 4: To address the suggestion, the project "Perspective maintenance of expertise and capacities in the field of nuclear safety and radiation protection" was set up at the BMUV with experts from all relevant parties.

The project team analysed the needs of the federal administration as well as of the Länder, advisory bodies, expert organisations and associations by means of questionnaires.

The results of the project are concrete needs analyses and recommendations for actions in the fields of "Safety of nuclear installations", "Radiation protection" and "Safety in nuclear waste management" which were published between February 2020 and July 2021. Länder, BASE, BfS, expert organisations, BMUV advisory bodies, operators and training institutions were involved in the development.

In parallel to this process, in spring 2019 the BMUV and the Federal Ministry of Economic Affairs (BMWi, now BMWK) began to coordinate the drafting of an overall strategy covering the fields of career prospects, training, research and development, knowledge management, networks and cross-border activities. The "Strategy for Competence Building and the Development of Future Talent for Nuclear Safety" was adopted by the Federal Government on 26 August 2020.

Measures are taken by the BMUV, the BMWK and the Federal Ministry of Education and Research (BMBF) within their respective scope of responsibility and financial and personnel resources to promote the implementation of this strategy by relevant stakeholders.

Status of Suggestion 4

Suggestion 4 (S4) is closed as the Government adopted a concept on German competence needs during future decades.

1.9. PROVISION OF TECHNICAL SERVICES

There were no findings in this area in the initial IRRS mission.

2. THE GLOBAL SAFETY REGIME

2.1. INTERNATIONAL OBLIGATIONS AND ARRANGEMENTS FOR INTERNATIONAL COOPERATION

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Participation of Germany in international activities is mainly achieved through representatives from the BMU, and to a lesser extent from the BfE, the BfS, and the Länder. This has been partially recognized in the ARM and is part of the Action Plan.*	
(1)	**BASIS: GSR Part 1 Requirement 14, states that** *"The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation and assistance to enhance safety globally."*
(2)	**BASIS: GSR Part 1 Requirement 15, states that** *"The regulatory body shall make arrangements for analysis to be carried out to identify lessons to be learned from operating experience and regulatory experience, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the regulatory body and other relevant authorities."*
S5	**Suggestion: The BMU should consider increasing international participation and involvement of staff from BfE, BfS and Länder to improve the regulatory experience and feedback to Germany and to the international community.**

Changes since the initial IRRS mission

Suggestion 5: To ensure adequate representation and involvement of BASE, BfS and the Länder administration or their TSOs in international cooperation activities, the relevant organisational units of the BMUV provide information on corresponding vacancies in standing international groups/committees or information on relevant international events using in particular specific e-mail distribution lists for seeking nominations. The final list of participants is selected and communicated to the corresponding international organizations through the BMUV.

According to detailed statistical data presented to the IRRS team during the follow-up mission, staff of BASE, BfS and the Länder administration or their TSOs are represented in about 50% of the standing international groups/committees where Germany is to be represented or involved. During the period from the years 2020 to 2021 the participation rate is even higher i.e. up to more than 70% for technical meetings or conferences of the IAEA specifically.

The established process and practice of representation of Federal and Länder representatives in international events, described above, will be further formalized through amendment of AHB by adding the following sentence to the relevant processes: *"The Federal Ministry for the Environment regularly informs about relevant events via the distribution lists of BASE, BfS and the Länder administration or TSOs of the Länder administration and accepts nominations."* These changes will be made at the earliest opportunity when the amendment procedure for this documentation is opened.

Status of Suggestion 5

Suggestion 5 (S5) is closed as an effective selection and nomination process is used to ensure the presence of BASE, BfS and the Länder administration or their TSOs in international cooperation activities.

2.2. SHARING OF OPERATING EXPERIENCE AND REGULATORY EXPERIENCE

There were no findings in this area in the initial IRRS mission.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

3.1. ORGANIZATIONAL STRUCTURE OF THE REGULATORY BODY AND ALLOCATION OF RESOURCES

There were no findings in this area in the initial IRRS mission.

3.2. EFFECTIVE INDEPENDENCE IN THE PERFORMANCE OF REGULATORY FUNCTIONS

There were no findings in this area in the initial IRRS mission.

3.3. STAFFING AND COMPETENCE OF THE REGULATORY BODY

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Key elements of the Federal authorities have a limited number of qualified staff with engineering expertise.*	
(1)	**BASIS: GSR Part 1 Requirement 18, states that** *"The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its responsibilities."*
(2)	**BASIS: GSG-12, para. 6.4 states that** *"In addition to depending on the employment of sufficient staff with suitable qualifications and expertise, the effectiveness of the regulatory body will also depend on the status of its staff in comparison with those of the authorized parties and other involved organizations. Staff of the regulatory body should be appointed at such grades and with such salaries and conditions of service as would facilitate their interactions with authorized parties and reinforce the independence and authority of the regulatory body staff in conducting their work."*
(3)	**BASIS: GSR Part 1 Requirement 20, para 4.22 states that** *"The obtaining of advice and assistance does not relieve the regulatory body of its assigned responsibilities. The regulatory body shall have adequate core competence to make informed decisions. In making decisions, the regulatory body shall have the necessary means to assess advice provided by advisory bodies and information submitted by authorized parties and applicants."*
S6	**Suggestion: The Federal authorities should consider measures to ensure there is a sufficient number of qualified staff with engineering expertise.**

Changes since the initial IRRS mission

Suggestion 6: A legal obligation was introduced with the amendment of § 23 AtG in December 2020 to ensure the staffing needs of the federal authorities, where it is stipulated that the authorities responsible for the execution of the Act have to have adequate staffing and financial resources to fulfil their statutory tasks.

Furthermore, needs analyses, which included staffing needs, were conducted during the years 2020-2021 in parallel to the development of the Strategy for Competence Building and the Development of Future Talent for Nuclear Safety. The scope of analysis included the needs analysis for the safety of nuclear facilities, needs analysis for the safety of nuclear waste management and the needs analysis for the maintenance and expansion of radiation protection competence in Germany and included the results for the staffing needs in the respective areas. Above mentioned needs analyses are now being used as a basis for support for ensuring the sufficient number of qualified staff in federal authorities responsible for safety.

For the purpose of the IRRS follow-up mission review, the example of BMUV as one of the federal authorities was used in this area.

Needs analysis for the safety of nuclear facilities explicitly refer to competence fields of the staff that are also relevant to the BMUV, focusing also on the engineering disciplines. Accordingly, new recruitment statistics show that in recent years, BMUV has been able to recruit some more staff with engineering background.

In accordance with the rules and procedures of the civil service in Germany, fulfilment of the professional requirements is a prerequisite for filling a vacant position. Where applicable, BMUV has been able to specify requirements for engineering expertise in the advertised vacancies. During the IRRS follow-up mission, one of the recent examples from BMUV open post advertisements were provided as evidence.

However, ensuring availability of sufficient staff with engineering experience is a continuous challenge which the federal authorities should address considering the long term needs of the organizations.

Status of Suggestion 6

Suggestion 6 (S6) is closed on the basis of progress made and confidence in effective completion in due time as the amendment of the AtG was promulgated to ensure adequate human and financial resources of the federal authorities. Staffing needs analyses were conducted for different areas at a general level and specific examples were shown.

3.4. LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

There were no findings in this area in the original IRRS mission.

3.5. LIAISON BETWEEN THE REGULATORY BODY AND AUTHORIZED PARTIES

There were no findings in this area in the initial IRRS mission.

3.6. STABILITY AND CONSISTENCY OF REGULATORY CONTROL

There were no findings in this area in the initial IRRS mission.

3.7. SAFETY RELATED RECORDS

There were no findings in this area in the initial IRRS mission.

3.8. COMMUNICATION AND CONSULTATION WITH INTERESTED PARTIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *After completion of decommissioning, the release of facility and site from regulatory controls is formalized by an administrative act issued by the Länder without any additional public consultation.*	
(1)	**BASIS: GSR Part 6 Requirement 15 states that** *"On the completion of decommissioning actions, the licensee shall demonstrate that the end state criteria as specified in the final decommissioning plan and any additional regulatory requirements have been met. The regulatory body shall verify compliance with the end state criteria and shall decide on termination of the authorization for decommissioning."*
(2)	**BASIS: GSR Part 6 Requirement 15, para. 9.6 states that** *"Inputs from the public shall be addressed before authorization for decommissioning is terminated."*

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
(3)	**BASIS: SSG 47, para 7.44. states that** *"In accordance with paras 7.16 and 9.6 of GSR Part 6 [1], interested parties are required to be involved in the licensing process for decommissioning, as well as in the process for termination of the authorization for decommissioning, and are required to be given an opportunity to provide comments before decisions are taken by the regulatory body and prior to the granting or termination of an authorization for decommissioning."*
R1	**Recommendation: BMU should include requirements for addressing public inputs during the process of termination of the decommissioning license.**

Changes since the initial IRRS mission

Recommendation 1: The lack of a requirement for public consultation on the termination of decommissioning was addressed by amending the Decommissioning Guide. The BMUV has drafted a proposal to supplement the Decommissioning Guide, which was approved in the LAA technical committees and adopted in the LAA-HA in July 2021. Accordingly, the amendment in Chapter 4.3 of the Decommissioning Guide reads:

"In addition, the authority shall work towards ensuring that the licensee informs the public concerned at the end of decommissioning about the decommissioning actions carried out, the radioactive waste produced and the condition of the facility at the time of release from regulatory control under nuclear and radiation protection law."

This addition to the Decommissioning Guide, together with the existing legislation, provides a framework for BMUV to work with Länder authorities to develop more detailed arrangements for appropriate involvement of interested parties in the process for termination of a decommissioning licence.

Status of Recommendation 1

Recommendation 1 (R1) is closed as the pre-requisites exist for developing the detailed arrangements for appropriate involvement of interested parties in the process for termination of a decommissioning licence.

New observations from the follow-up mission

Public involvement or consultations should be organized by the regulatory authorities with participation of the licensee to provide an opportunity for interested parties to be consulted prior to the decision on termination of a decommissioning licence. Detailed arrangements for this consultative process need to be developed before the next decommissioning project approaches this phase.

FOLLOW-UP MISSION RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Detailed arrangements that will give opportunity to interested parties (e.g. public) to provide comments before decisions are taken by authorities on termination of a licence for decommissioning are not yet developed.*	
(1)	**BASIS: SSG 47, para 7.44., states that** *"In accordance with paras 7.16 and 9.6 of GSR Part 6 [1], interested parties are required to be involved in the licensing process for decommissioning, as well as in the process for termination of the authorization for decommissioning, and are required to be given an opportunity to provide comments before decisions are taken by the regulatory body and prior to the granting or termination of an authorization for decommissioning".*
SF1	**Suggestion: BMUV, in cooperation with the Länder authorities, should consider developing detailed arrangements to ensure that opportunity is given to interested parties (e.g. public)**

FOLLOW-UP MISSION RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	to provide comments before a decision is taken on termination of a licence for decommissioning.

4. MANAGEMENT SYSTEM OF THE REGULATORY BODY

4.1. RESPONSIBILITY AND LEADERSHIP FOR SAFETY

There were no findings in this area in the initial IRRS mission.

4.2. RESPONSIBILITY FOR INTEGRATION OF SAFETY INTO THE MANAGEMENT SYSTEM

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The regulatory authorities strategic plan and supporting documents include most of the elements of a safety policy. The applicable fundamental safety principles and approach to their implementation, leadership and management for safety as well as commitment to continuous improvement are however not explicitly defined.*	
(1)	**BASIS: GSR Part 1 Requirement 1, para. 2.3 states that "***In the national policy and strategy, account shall be taken of the following: "…* *(a)The fundamental safety objective and the fundamental safety principles established in the Fundamental Safety Principles [1];* *(g) The promotion of leadership and management for safety, including safety culture".*
(2)	**BASIS: GSR Part 2 Requirement 4, states that** *"Senior management shall establish goals, strategies, plans and objectives for the organization that are consistent with the organization's safety policy".*
S7	**Suggestion: BMU should consider improving documentation of its safety policy by explicitly referring to applicable fundamental safety principles and approach to their implementation, leadership and management for safety, as well as commitment to continuous improvement. BfE, BfS and the Länder should consider whether similar improvements to their safety policies are needed.**

Changes since the initial IRRS mission

Suggestion 7: The licensing and supervisory authorities of the Federal Government and the Länder have developed the National Policy Paper "Nuclear Safety". The LAA-HA adopted the document in 2021.The National Policy Paper "Nuclear Safety" describes the applicable fundamental safety principles and approach to their implementation, leadership, and management for safety, as well as commitment to continuous improvement. In the safety policy, the culture for safety is a fundamental principle of working responsibly.

Federal and Länder authorities have referenced or adopted this National Policy Paper "Nuclear Safety" in their management systems where necessary. As an example, BASE reviewed the topical area of safety policy and added it to the management system manual. The management system of UM BW supervision concept already presents the principles and strategies in detail and concretely. UM BW also added a reference to the National Policy paper into its' management system documentation.

Status of Suggestion 7

Suggestion 7 (S7) is closed as the National Policy Paper "Nuclear Safety" has been developed, adopted and implemented into the management systems of the Federal and Länder authorities.

4.3. THE MANAGEMENT SYSTEM

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *BfE has not yet completed the establishment and implementation of its integrated management system.*	
(1)	**BASIS: GSR Part 1 Requirement 19 states that** *"The regulatory body shall establish, implement, and assess and improve a management system that is aligned with its safety goals and contributes to their achievement."*
(2)	**BASIS: GSR Part 2 Requirement 3. states that** *"Senior management shall be responsible for establishing, applying, sustaining and continuously improving a management system to ensure safety."*
R2	**Recommendation: BfE should complete the establishment and implementation of its integrated management system.**

Changes since the initial IRRS mission

Recommendation 2: BASE has developed and implemented a management system. In the BASE management system, the reference standards DIN EN ISO 9001, DIN EN ISO 14001 and ISO 19600 have been explicitly presented. However, there is only a generic reference to the relevant IAEA safety standards. The management system was initially developed based on the referenced standards due to BMUV requirements. BASE presented to the IRRS team the mapping of the requirements and recommendations of GSR Part 2, GSG-12 and GSG-13 that have been considered in the development process.

Status of Recommendation 2

Recommendation 2 (R2) is closed as BASE has developed and implemented a management system.

New observations from the follow-up mission

BASE has chosen a two-tiered approach for establishing the management system. The generic management parts of the system are the responsibility of BASE Division PB3 and those related to the regulatory core functions are the responsibility of the relevant departments. BASE presented to the IRRS team the set of management processes. However, BASE could not present the complete set of core processes of the regulatory body, an overall view of the processes (a process map) as well as overview of the management system. BASE demonstrated the licensing process and related documentation. The age of the management system documentation varies depending on the novelty of the department or the activity. At the present form of the BASE management system, it is difficult to get a holistic view of the regulatory activities of BASE and access to relevant documentation of the regulatory core functions is difficult to those not actually working with each departments regulatory core functions. However, the consistency of the core processes of the management system with the requirements and recommendations in GSR Part 2, GSG-12 and GSG-13 was not demonstrated.

FOLLOW-UP MISSION RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *A two-tiered approach has been selected for establishing the management system. The generic, management parts of the system are the responsibility of BASE Division PB3 and those related to the regulatory core functions are the responsibility of the relevant departments. The set of management processes could be presented. The consistency of the core processes of the management system with the requirements and recommendations in GSR Part 2, GSG-12 and GSG-13 was not demonstrated.*	
(1)	**BASIS: GSR Part 1 Requirement 8 states that** *"The management system shall be documented. The documentation of the management system shall be controlled, usable, readable, clearly*

FOLLOW-UP MISSION RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	identified and readily available at the point of use".
(2)	**BASIS: GSR Part 2 Requirement 4.19 states that** *"Records shall be specified in the management system and shall be controlled. All records shall be readable, complete, identifiable and easily retrievable".*
(3)	**BASIS: GSG-12 para. 5.65 states that** "*The integrated management system of a regulatory body should be described in a set of documents that need to be applied in order for the regulatory body to achieve its goals. This set of documents typically includes the following:* *- A structured overview (a 'process map') of all processes that illustrates the integrated management system as a whole and the interrelation and interactions of the processes; …".*
SF2	**Suggestion: BASE should consider further developing its management system to be consistent with the IAEA safety standards.**

4.4. MANAGEMENT OF RESOURCES

There were no findings in this area in the initial IRRS mission.

4.5. MANAGEMENT OF PROCESSES AND ACTIVITIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The internal management system process for licensing of research reactors is not available in a documented form. The Land (StMUV) is developing a "Handbook for the Land supervision on high flux neutron sources of Munich Garching (FRM-II)" which includes, amongst others, all regulatory supervision processes e.g., licensing, review and assessment, inspections, etc.*	
(1)	**BASIS: GSR Part 2 Requirement 8, states that** *"The management system shall be documented. The documentation of the management system shall be controlled, usable, readable, clearly identified and readily available at the point of use".*
(2)	**BASIS: GSR Part 2 Requirement 8, para 4.16, states that** *"The documentation of the management system shall include as a minimum: policy statements of the organization on values and behavioural expectations; the fundamental safety objective; a description of the organization and its structure; a description of the responsibilities and accountabilities; the levels of authority, including all interactions of those managing, performing and assessing work and including all processes; a description of how the management system complies with regulatory requirements that apply to the organization; and a description of the interactions with external organizations and with interested parties".*
(3)	**BASIS: GSR Part 2 Requirement 10, para. 4.28 states that** *"Each process shall be developed and shall be managed to ensure that requirements are met without compromising safety. Processes shall be documented and the necessary supporting documentation shall be maintained".*
(4)	**BASIS: GSG-13, para. 161 states that** "*In order to provide assurance that all topics significant to safety will be covered consistently with submissions for similar facilities or activities, review and assessment should be carried out by means of a systematic and formalized process implemented through specific procedures".*
S8	**Suggestion: The Land (StMUV) should consider finalizing the handbook as a priority. The other Länder should consider developing similar documents as appropriate.**

Changes since the initial IRRS mission

Suggestion 8: The StMUV has developed a "Handbook for the Land supervision on high flux neutron sources of Munich Garching (FRM-II)" with the description of the supervision of the research reactor which could, for example, be suitable as training material for newcomers. However, StMUV did not consider GSR Part 2, GSG-12 and GSG-13 in the development of this handbook. Moreover, the supervision handbook does not completely reflect all the features of the Integrated Management System described in GSG-12.

The IRRS team noted that StMUV is working on its integrated management system, but the system has not been finalized yet. There are various types of nuclear facilities and activities under StMUV supervision that are yet to be covered by the integrated management system. The IRRS team was informed that the StMUV is planning to have a management system review by an external commercial provider and ensure that the new management system is in line with the relevant IAEA safety standards.

The IRRS team was also informed that all the Länder authorities are further developing their management systems to address the IRRS mission 2019 recommendations on independent auditing (see also R4).

Status of Suggestion 8

Suggestion 8 (S8) is open as although the StMUV handbook has been completed, other documents needed for the Integrated Management System in line with the IAEA safety standards are still under development (including for other Länder).

4.6. CULTURE FOR SAFETY

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The regulatory body has started a process for the development and strengthening of a common understanding of safety culture within the supervisory and licensing authorities, however, assessment of leadership for safety and of safety culture has not yet been conducted covering all regulatory authorities.*	
(1)	**BASIS: GSR Part 2 Requirement 14, states that** *"Senior management shall regularly commission assessments of leadership for safety and of safety culture in its own organization".*
R3	**Recommendation: The regulatory body should regularly commission assessments of leadership for safety and of safety culture.**

Changes since the initial IRRS mission

Recommendation 3: The Federation and the Länder have developed two documents to enhance common understanding of the culture for safety in a regulatory body. The "Policy paper on the safety culture in nuclear licensing and supervisory authorities" was published in 2019 and the National Policy "Nuclear Safety" was published in 2021. BMUV has organized seminars on safety culture for other authorities in 2021 and 2023.

UM BW has conducted a pilot self-assessment of the regulatory safety culture in December 2021. In the online questionnaire, the staff indicated the extent to which the statements in the "Policy paper on the safety culture in licensing and supervisory authorities" were perceived as important and as well implemented. The staff discussed the survey results and based on the discussions UM BW organized a workshop on a learning organization in 2023. The experience from the pilot self-assessment was considered in developing the Federal and the Länder process for the self-assessment of the safety culture of the regulatory body.

BMUV engaged the top management of the Länder for the self-assessment of the regulatory body in the kick-off meeting in 2022. Since then, an ad-hoc Federal-Länder working group "Self-assessment of the regulatory safety culture in Germany" developed tool/methodology based on IAEA and OECD documentation on the safety culture in regulatory bodies.

The core of the modular set of instruments is a list of 40 relevant statements on regulatory safety culture, which were extracted from the "Policy paper on the safety culture in nuclear licensing and supervision authorities". The modules include quantitative and qualitative methods of self-assessment. The actual and ideal implementation of the safety culture principles are surveyed, and the staff discusses the results in groups. The LAA-HA meeting discussed the set of instruments in 2023 and after that BMUV made the instruments available to all authorities via a National Nuclear Safety Portal. The size of the authority may vary so that there may be only 5 persons working in the smallest authority. Therefore, the group discussion tools are also available for small organizations where surveys are not feasible. BMUV invited all the authorities to conduct a self-assessment of safety culture based on the set of instruments. BMUV is planning to conduct a self-assessment in 2024.

Status of Recommendation 3

Recommendation 3 (R3) is closed on the basis of progress made and confidence in effective completion in due time as BMUV and Länder have raised awareness of the safety culture in regulatory authorities, developed tools for the self-assessment of the safety culture, the methodology has been piloted and there are plans for next steps.

4.7. MEASUREMENT, ASSESSMENT AND IMPROVEMENT

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Independent assessment of the management system of the regulatory body is not conducted to evaluate its effectiveness and to identify opportunities for its improvement.*	
(1)	**BASIS: GSR Part 1 Requirement 3, states that** *"Independent assessments and self-assessments of the management system shall be regularly conducted to evaluate its effectiveness and to identify opportunities for its improvement. Lessons and any resulting significant changes shall be analysed for their implications for safety".*
R4	**Recommendation: The regulatory body should conduct independent assessments of the management system regularly to evaluate its effectiveness and to identify opportunities for its improvement.**

Changes since the initial IRRS mission

Recommendation 4: BMUV has organized a kick-off event at management level on independent assessment of the federal and Länder nuclear licensing and supervisory authorities' management systems. The implementation is the responsibility of the individual authority and the different options for independent assessment are used. At the federal and Länder level a pool of trained auditors has been established and a framework paper on the options for independent assessment of the management systems in the licensing and supervisory authorities was finalized in 2023. The framework paper and related rules of procedures were presented to the LAA-HA in 2023. Following the LAA-HA meeting, BMUV has invited in writing all nuclear licensing and supervisory authorities to participate in the audit pool. Now there are eight auditors and seven experts nominated into the audit pool. The first pilot audit was carried out at UM BW on supervision of event managements. The independent auditing pool within the federal and Länder authorities and the independent audits also serves as a tool for harmonizing the regulatory activities and sharing the regulatory experience.

Internal audits are also carried out in larger organizations. For example, four experts working in BASE Division PB3 carry out internal audits. An auditing plan for BASE Division PB3 was established for years 2022 to 2024. The audits follow the DIN EN ISO 19011 "Guidance for internal auditing of managements system".

During the years 2020 – 2023 three UM BW experts have attended the auditing qualifications (DIN EN ISO 19011) to be able to plan and conduct internal audits. UM BW experts have observed the Swiss regulatory body ENSI internal audits. The intention of the UM BW authority is to conduct an independent audit on the most important management processes every 5 years. This implies that annually two independent audits should be carried out. However not all regulatory authorities of the Länder have established the system of independent auditing.

Status of Recommendation 4

Recommendation 4 (R4) is closed on the basis of progress made and confidence in effective completion in due time as a pool of trained auditors within the regulatory body has been established, a pilot audit has been carried out and there are plans in place for next steps.

5. AUTHORIZATION

5.1. GENERIC ISSUES

There were no findings in this area in the initial IRRS mission.

5.2. AUTHORIZATION OF NUCLEAR POWER PLANTS

There were no findings in this area in the initial IRRS mission.

5.3. AUTHORIZATION OF RESEARCH REACTORS

There were no findings in this area in the initial IRRS mission.

5.4. AUTHORIZATION OF FUEL CYCLE FACILITIES

There were no findings in this area in the initial IRRS mission.

5.5. AUTHORIZATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES

There were no findings in this area in the initial IRRS mission.

5.6. AUTHORIZATION OF DECOMMISSIONING ACTIVITIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The decommissioning regulations do not establish requirements for the identification of all the relevant data that needs to be preserved after the termination of the license, neither the process for their collection and retention.*	
(1)	**BASIS: GSR Part 6 Requirement 5, para 3.3 states that** *"Establishing requirements for the collection and retention of records and reports relevant to decommissioning, and for preserving information about the activities that have been conducted at the site".*
(2)	**BASIS: GSR Part 6 Requirement 9 Para 9.7. states that** *"A system shall be established to ensure that all records are maintained in accordance with the requirements for retention of records specified in the integrated management system and with the regulatory requirements. This system shall ensure that the new users of the site after its release from regulatory control are informed about the presence of a facility on the site in the past, and about the nature of the activities that were conducted at the site".*
(3)	**BASIS: SSG 47, para. 3.19 states that** *"Certain records developed during the decommissioning project will be important for legal purposes after the facility's licence has been terminated. Such records should be identified and preserved, and the responsibility for their retention should be assigned clearly".*
S9	**Suggestion: The regulatory body should consider updating decommissioning guidance to identify and maintain all relevant data which must be preserved after termination of the licence.**

Changes since the initial IRRS mission

Suggestion 9: To address this Suggestion, an update to section 5.2 of the Decommissioning Guide (Guide to decommissioning, the safe enclosure and the dismantling of facilities or parts thereof as defined in §7 of the Atomic Energy Act) has been adopted by the LAA-HA in July 2021. As part of the final decommissioning report, the operator is now required to identify the relevant data that needs to be retained alongside the final decommissioning report. The information is to be retained for at least 30 years, which is comparable to the requirements of the Radiation Protection Ordnance. The supervisory authority will determine where the final decommissioning report and associated documentation is to be stored, based on regional arrangements.

In terms of implementing this update, it is noted that the decommissioning licenses for some NPP have now been amended to include this updated requirement.

Status of Suggestion 9

Suggestion 9 (S9) is closed as the Decommissioning Guide has been updated to identify and maintain all relevant data which must be preserved after termination of the licence.

5.7. AUTHORIZATION ISSUES FOR OCCUPATIONAL EXPOSURE

There were no findings in this area in the initial IRRS mission.

6. REVIEW AND ASSESSMENT

6.1. GENERIC ISSUES

There were no findings in this area in the initial IRRS mission.

6.1.1. MANAGEMENT OF REVIEW AND ASSESSMENT

There were no findings in this area in the initial IRRS mission.

6.1.2. ORGANIZATION AND TECHNICAL RESOURCES FOR REVIEW AND ASSESSMENT

There were no findings in this area in the initial IRRS mission.

6.1.3. BASES FOR REVIEW AND ASSESSMENT

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Neither Federation nor Länder authorities have developed internal guidance for their review and assessment process.*	
(1)	**BASIS: GSG 13, para. 3.72. states that** *"In order to ensure a systematic and consistent approach, the regulatory body should develop internal guidance on the processes and procedures to be followed to carry out the regulatory functions in an effective and efficient manner as well as on the safety objectives to be met".*
(2)	**BASIS: GSG 13, para. 3.192. states that** *"The regulatory body should provide internal guidance for its own staff on the procedures to be followed in the review and assessment process and on the safety objectives to be met. Internal guidance on specific topics for review and assessment should also be provided, as necessary".*
(3)	**BASIS: GSG 13, para. 3.193. states that** *"The regulatory body should develop internal guidance on reporting on its review and assessment activities and on how it reaches its regulatory decisions. The regulatory body's internal guidance on review and assessment should be made available to other regulatory authorities worldwide".*
S10	**Suggestion: The Federation and the Länder authorities should consider developing internal guidance for the review and assessment process.**

Changes since the initial IRRS mission

Suggestion 10: Under national action plan, Action 5.4 "Internal Guidance for the review and assessment process", a new "Process 23, Review and assessment in the licensing and supervisory procedure" was developed and adopted by the LAA-HA in June 2023 and incorporated into the AHB. It describes in detail the following:

- Purpose and objectives
- Basic fundamentals
- Working steps (preparation, implementation, documentation, communication, evaluation, conclusion of the procedure)
- Relation to other Processes of the AHB.

The documents to be submitted by the applicant in licensing and supervisory procedures are defined by the legal provisions and sub statutory regulations as well as the respective licence under nuclear law or radiation protection law. These include, e.g., licensing documents, documents on the fulfilment of obligations, applications for

modifications and maintenance, (safety) analyses, test instructions, preliminary inspection documents, reports and notifications.

The licensing and supervisory authorities of the Länder systematically review and evaluate the documents on the basis of the legal, sub statutory and assessment standards specified in the licence. As a rule, the licensing and supervisory authorities of the Länder call in authorised experts pursuant to § 20 of the AtG for the technical review of the submitted documents and, in particular, also for the verification of the technical conditions in the facility. The basic principles of cooperation between the authority and the authorised experts are usually regulated in detail in framework agreements. If necessary, competent (technical) authorities are involved.

The licensing and supervisory authorities of the Länder regularly conduct supervisory or technical discussions with the applicant/operator and thereby receive feedback on the review and assessment carried out as well as on the success of the implementation of the regulatory review and assessment results. If necessary, the licensing and supervisory authorities of the Länder and the applicant/operator determine how to optimise future procedures.

For the section of the AHB on waste management, another process has already been approved by the Technical Committee for Nuclear Fuel Cycle (FA VE) in September 2023, "Review and assessment in the supervisory procedure for licences for storage facilities pursuant to § 6 of the AtG", which covers the topic of the storage of spent nuclear fuel pursuant to § 6 of the AtG. This process is yet to be finalised. In the meantime, according to the decision in the LAA-HA from June 2023, the process "Review and assessment in the licensing and supervisory procedure" in the AHB applies analogously and with due regard to the respective specifics also for storage facilities pursuant to § 6 of the AtG.

The adoption of process 23 and draft process on review and assessment for licenses for storage facilities will serve as an internal guidance for review and assessment of facilities and their adoption by LAA-HA ensures uniform application by all Länder authorities.

Status of Suggestion 10

Suggestion 10 (S10) is closed on the basis of progress made and confidence in effective completion in due time as finalizing the internal guidance for the review and assessment process is yet to be completed.

6.1.4. PERFORMANCE OF REVIEW AND ASSESSMENT

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There is no formal written process or guidance on how to confirm the safety assessment in an integrated and systematic manner.*	
(1)	**BASIS: GSR Part 1 Requirement 26, para. 4.46. states that** *"For an integrated safety assessment, the regulatory body shall first organize the results obtained in a systematic manner. It shall then identify trends and conclusions drawn from inspections, from reviews and assessments for operating facilities, and from the conduct of activities where relevant. Feedback information shall be provided to the authorized party. This integrated safety assessment shall be repeated periodically, with account taken of the radiation risks associated with the facility or activity, in accordance with a graded approach".*
S11	**Suggestion: The Federation and Länder authorities should consider developing a process for integrated safety assessment in a systematic manner for all facilities and activities.**

Changes since the initial IRRS mission

Suggestion 11: Under National Action Plan, Action 5.4 "Drawing up internal guidance for the review and assessment process", a new process 24 "Supervisory process integrated safety assessment" was adopted by the LAA-HA and incorporated into the AHB. This describes how a systematic and comprehensive safety assessment is planned, carried out and documented, taking into account the following inputs:

- Condition of the installation and its function, including in-service inspection, maintenance, implementation of modifications etc.
- Installation's operating history (operational records, events, corrective actions taken)
- Control of operation management and compliance with regulations (organizational aspects, qualification of personnel, compliance to regulations and applicable requirements)
- Implementation of external experience (national and international operating experience feedback)
- Others (radiation protection, emergency planning and preparedness, physical protection).

The process description for an integrated safety assessment shows how an independent, systematic and comprehensive assessment of the safety of a facility leads to a conclusion on the overall safety level and, if necessary, regulatory measures. The supervisory authorities of the Länder obtain a more complete picture through the integral assessment than through the assessment of individual operations. The focus of the integrated safety assessment is on identifying overarching developments and changes in the facility and in the safety culture. Based on the results of this assessment, the supervisory authorities of the Länder can also, if necessary, adapt or further develop their supervisory planning. For the waste management part of the AHB, another process was approved in September 2023 by the FA VE, "Supervisory process integrated safety assessment for storage facilities according to § 6 AtG", which covers the topic of the storage of spent nuclear fuel according to § 6 AtG (see S3). This process is to be adopted in the LAA-HA. In the meantime, according to the decision in the LAA-HA from June 2023, the process "Supervisory process integrated safety assessment" in the AHB applies also for storage facilities pursuant to § 6 of the AtG.

With the adoption of process 24, federal and Länder authorities have a process and detailed procedures on integrated safety assessment for nuclear installations, taking into account necessary input and assessment of overall safety of facilities and activities in a systematic manner.

Status of Suggestion 11

Suggestion 11 (S11) is closed as the Regulatory authorities have developed a process for integrated safety assessment of research reactors.

6.2. REVIEW AND ASSESSMENT FOR NUCLEAR POWER PLANTS

There were no findings in this area in the initial IRRS mission.

6.3. REVIEW AND ASSESSMENT FOR RESEARCH REACTORS

There were no findings in this area in the initial IRRS mission.

6.4. REVIEW AND ASSESSMENT FOR FUEL CYCLE FACILITIES

There were no findings in this area in the initial IRRS mission.

6.5. REVIEW AND ASSESSMENT FOR WASTE MANAGEMENT FACILITIES

There were no findings in this area in the initial IRRS mission.

6.6. REVIEW AND ASSESSMENT FOR DECOMMISSIONING ACTIVITIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There is no requirement for periodic re-assessment of safety during immediate dismantling.*	
(1)	**BASIS: GSR Part 1 Requirement 26, para. 4.39A states that** *"The regulatory body shall ensure, adopting a graded approach, that authorized parties routinely evaluate operating experience and periodically perform comprehensive safety reviews of facilities, …".*
(2)	**BASIS: GSR Part 4 Requirement 24 states that** *"The safety assessment shall be periodically reviewed and updated".*
(3)	**BASIS: GSR Part 4 Requirement 12 states that** *"The safety assessment shall cover all the stages in the lifetime of a facility or activity in which there are possible radiation risks".*
(4)	**BASIS: WS-G-5.2, para. 2.4 states that** *"The safety assessment for decommissioning should be reviewed and updated, as appropriate, to ensure that it remains an accurate representation of the physical, chemical and radiological state of the facility as the decommissioning activities proceed".*
R5	**Recommendation: The regulatory body should establish requirements for the periodic review and update of safety assessments during immediate dismantling.**

Changes since the initial IRRS mission

Recommendation 5: The BMUV initiated a proposal to supplement the Decommissioning Guide, which was adopted by the LAA-HA in July 2021. The corresponding addition to Chapter 5 of the Decommissioning Guide stipulates that in the case of immediate dismantling, the supervisory authority conducts safety reviews at least every ten years depending on the hazard potential of the nuclear facility. In this context, the results of reviews within the framework of nuclear licensing or supervisory procedures of the last ten years are taken into account. The authority will also determine the scope of the safety review depending on the condition of the facility. Since the revised Decommissioning Guide was adopted by the LAA it is mandatory to be followed by the supervisory authorities and binding on the licensees to periodically review and update safety assessments during decommissioning including immediate dismantling. It was also explained during the follow-up mission that the decommissioning stage includes residual operation, dismantling and associated radioactive waste management activities, therefore periodic review and update of safety assessment is ensured under the reviewed Decommissioning Guide with defined frequency.

Status of Recommendation 5

Recommendation 5 (R5) is closed as the regulatory body has established requirements for periodic review and update of safety assessment during dismantling.

6.7. REVIEW AND ASSESSMENT FOR OCCUPATIONAL EXPOSURE

There were no findings in this area in the initial IRRS mission.

7. INSPECTION

7.1. GENERIC ISSUES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Arrangements for distributing of all results of inspections in inspection reports to the authorised party are not in place.*	
(1)	**BASIS: GSR Part 1, para. 4.51 states that** *"The regulatory body shall record the results of inspections and shall take appropriate action (including enforcement actions as necessary). Results of inspections shall be used as feedback information for the regulatory process and shall be provided to the authorized party".*
(3)	**BASIS: GSG-13, para. 3.287 states that** *"Inspection reports should be distributed, or made available electronically, in accordance with established procedures in order to provide the following:* *(a) A basis for future regulatory action;* *(b) A means of passing information to interested parties or governmental bodies;".*
S12	**Suggestion: The supervisory authorities should consider modifying internal guidance to ensure that all results of inspections are forwarded to the authorised party.**

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Content of inspection reports provided to the IRRS team does not fully follow the guidance given in the IAEA GSG-13, references to applicable requirements and criteria used for the assessment are missing in the reports.*	
(1)	**BASIS: GSR Part 1, para. 4.51 states that** *"The regulatory body shall record the results of inspections and shall take appropriate action (including enforcement actions as necessary). Results of inspections shall be used as feedback information for the regulatory process and shall be provided to the authorized party".*
(2)	**BASIS: GSG-13, para. 3.286 states that** *"The inspection report should typically contain:* *c) reference to applicable requirements* *d) criteria used for assessment of safety performance".*
S13	**Suggestion: Supervisory authorities should consider completing guidance on the content of inspection reports.**

Changes since the initial IRRS mission

Suggestions 12 (S12) and 13 (S13): A new "Process 25. On-site Inspection" was developed by UM BW, adopted by the LAA-HA in June 2023 and incorporated into the AHB.

For Suggestion S12, the process step "Execution" includes the stipulation that "If there are any findings, they will be communicated to the operator no later than at the end of the inspection." In addition, the process step "Communication of the results" includes the stipulation that "The results of the on-site inspection are communicated to the licensee."

As a general practice, all inspection findings are communicated orally to the licensee at the end of the inspection. In cases where safety significant findings are identified in the licensee's activities, an official letter from the Land Authority is issued to the licensee.

The process with the stipulations and practice of the Land Authority is consistent with the expectations in GSG-13, section 3.289 which states that "Inspection findings should be forwarded to the authorized party for its information and records, as well as for necessary corrective actions. Whenever corrective action is necessary a formal communication including the findings from inspection reports should be sent to the authorized party. In some Member States the full inspection report is forwarded to the authorized party."

For Suggestion S13, the process describes the generic specifications for preparation, execution, documentation, communication of the results and periodic evaluation as well as for the follow-up of findings identified in the process which are in line with the GSG-13. In addition, the process step "Documentation" includes the stipulation that "The content should include, in particular, the object of inspection, the method used (interview, workplace monitoring, inspection of documents) and the assessment criteria used, before proceeding with the assessment of the inspection and any necessary measures in the event of findings (see GSG-13 para. 3.286)."

Status of Suggestion 12

Suggestion 12 (S12) is closed as internal guidance has been adopted to ensure that all results of inspections are forwarded to the authorised party.

Status of Suggestion 13

Suggestion 13 (S13) is closed as guidance on the content of inspection reports was adopted.

7.2. INSPECTION OF NUCLEAR POWER PLANTS

There were no findings in this area in the initial IRRS mission.

7.3. INSPECTION OF RESEARCH REACTORS

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *StMUV inspections at FRM-II research reactors are performed on ad-hoc basis. Inspection plans and a comprehensive inspection programme for FRM-II research reactor inspections are in preparation.*	
(1)	**BASIS: GSR Part 1 Requirement 28 states that** *"Inspection of facilities and activities shall include programmed inspections and reactive inspections both announced and unannounced".*
(2)	**BASIS: GSR Part 1 para. 4.50 states that** *"The regulatory body shall develop and implement a programme of inspection of facilities and activities to confirm compliance with regulatory requirements and with any conditions specified in the authorization, In this program, it shall specify the types of regulatory inspections(including scheduled inspections and unannounced inspections), and shall stipulate the frequency of inspections and the areas and the programmes to be inspected, in accordance with the graded approach".*
R6	**Recommendation: StMUV should develop a comprehensive inspection programme for FRM II research reactor by specifying inspection items, frequency for inspections and provisions for announced, unannounced and reactive inspections in accordance with the graded approach.**
S14	**Suggestion: BMU should consider developing a programmed approach to inspections for all research reactors in Germany.**

Changes since the initial IRRS mission

Recommendation 6: The StMUV developed an inspection programme which is included in Chapter XII.4, "On-site inspections/walkdowns – Inspection programme" of the "Handbook for state supervision on the high flux neutron source Munich in Garching (FRM II) – Supervision Manual." Chapter XII.4 is divided into 4.a. Inspections/walkdowns by the supervisory authority and 4.b. Inspections/ walkdowns by the authorised expert/subordinate authority. The completion of the Supervision Manual, including Chapter XII.4, establishes a comprehensive and well-documented inspection programme for the FRM II research reactor, including inspection items, frequency of inspections and provisions for announced, unannounced and reactive inspections.

Suggestion 14: The BMUV developed an approach to inspections for all research reactors in Germany in collaboration with the Supervisory Authorities of the Länder in the LAA Working Group on Research Reactors. The approach is documented in a new document titled "Common understanding between the Federation and the Länder on inspection programmes for research and teaching reactors in Germany." The BMUV and the Länder agreed on the document during the Working Group on Research Reactors meeting in autumn 2022 and it is expected to be approved by the Technical Committee for Nuclear Safety and then adopted by the LAA-HA in 2024.

This document defines the types of the regulatory inspections (including scheduled and unannounced inspections) and 14 areas to be inspected, including operational management, maintenance, technical qualification of the personnel, quality assurance, physical protection, documentation, radiation protection, modifications, in-service inspections, ageing management, events, fire protection, civil engineering, and emergency preparedness.

The document allows for a graded approach to implementation based on the respective type of installation, its nuclear-specific hazard potential, and the activities conducted. In addition, the document has considered GSG-13, "Functions and Procedures of the Safety Oversight Authorities" with respect to inspection programs. Additionally, Process 25 "On-site inspection" was adopted in June 2023 by the LAA-HA and incorporated into the AHB and addresses the contents of an inspection programme applicable to inspections for research reactors.

Status of Recommendation 6

Recommendation 6 (R6) is closed as StMUV has developed a comprehensive inspection programme for the FRM II research reactor.

Status of Suggestion 14

Suggestion 14 (S14) is closed on the basis of progress made and confidence in effective completion in due time as BMUV developed a programmed approach to inspections for all research reactors in Germany to be adopted by LAA-HA in 2024.

7.4. INSPECTION OF FUEL CYCLE FACILITIES

There were no findings in this area in the initial IRRS mission.

7.5. INSPECTION OF WASTE MANAGEMENT FACILITIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There are no provisions for the transmission of the outcomes and findings from inspections of dry cask spent fuel storage facilities from the supervising authority to the licensing authority.*	
(1)	**BASIS: GSR Part 1, para. 4.51 states that** *"The regulatory body shall record the results of inspections and shall take appropriate action (including enforcement actions as necessary). Results of inspections shall be used as feedback information for the regulatory process and shall be provided to the authorized party".*
(2)	**BASIS: GSR Part 1 Requirement 7 states that** *"Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties".*
(3)	**BASIS: GSG-13, para 3.287 states that** *"Inspection reports should be distributed, or made available electronically, in accordance with established procedures in order to provide the following:*

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
	a) A basis for future regulatory action; *d) Information to other staff of the regulatory body, for example those staff responsible for the development of regulations and guides, for review and assessment, and for the development of requirements for authorization".*
S15	**Suggestion: The BMU should consider revising the regulatory framework to ensure that the supervisory authorities (Länder) provide results of inspections to the licensing authority (BfE) for dry cask spent fuel storage facilities.**

Changes since the initial IRRS mission

Suggestion 15: The following three new processes were developed concerning licensing procedures for storage facilities for spent nuclear fuel in the waste management part of the AHB.

- Procedure for new licences pursuant to § 6 AtG for the storage of nuclear fuel (storage facilities)
- Procedure for modification licences pursuant to § 6 AtG for the storage of nuclear fuel (storage facilities)
- Communication between licensing authority and nuclear supervisory authorities on the storage of nuclear fuel pursuant to § 6 AtG.

These procedures were approved by the LAA-HA in June 2023.

The procedures describe standards for cooperation between BASE and Länder, serve to specify interfaces about exchange of information on issues with relevance for the storage facilities, and communications between the licensing authority and nuclear supervisory authorities on the storage of nuclear fuel.

The process "Communication between licensing authority and nuclear supervisory authorities on the storage of nuclear fuel pursuant to § 6 AtG" describes, beyond the formal procedural requirements, supplementary communication steps between the supervisory and licensing authorities as already established in the practice of the procedures. These serve to provide information and the exchange of experience on matters relevant to the procedures of the other authority, including invitations to procedural and technical discussions related to the issues. The respective content to be forwarded is specified by the authorities involved according to what information is needed.

Status of Suggestion 15

Suggestion 15 (S15) is closed as BMUV has implemented the revision of the regulatory framework to ensure that the supervisory authorities (Länder) provide results of inspections to the licensing authority (BASE) for dry cask spent fuel storage facilities.

7.6. INSPECTION OF DECOMMISSIONING ACTIVITIES

There were no findings in this area in the initial IRRS mission.

7.7. INSPECTION OF OCCUPATIONAL EXPOSURE

There were no findings in this area in the initial IRRS mission.

8. ENFORCEMENT

8.1. ENFORCEMENT POLICY AND PROCESS

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There is no overall enforcement policy for all regulatory authorities to ensure consistency in application of enforcement actions to different licensees.*	
(1)	**BASIS: GSR Part 1 Requirement 30 states that** *"The regulatory body shall establish and implement an enforcement policy within the legal framework for responding to non-compliance by authorized parties with regulatory requirements or with any conditions specified in the authorization".*
(2)	**BASIS: GSG-12, para 3.26 states that** *"The regulatory body is required to establish a regulatory system for safety that includes:* *(d) Enforcement of regulatory requirements; the regulatory body should adopt clear administrative procedures and guidelines governing the use and implementation of enforcement actions".*
S16	**Suggestion: The BMU should consider measures to ensure promoting the consistency in the enforcement policies and practices at the various regulatory authorities.**

Changes since the initial IRRS mission

Suggestion 16: Process 26 on the enforcement of measures was adopted by LAA-HA in 2023 and incorporated into the AHB. It describes an overarching common enforcement strategy with the generic specifications on types, selection and application of enforcement practices.

For the section of the AHB on waste management, another process is being worked on by FA VE, "Enforcement of measures for storage facilities pursuant to § 6 AtG," which covers the topic of spent fuel storage. This process was approved by FA VE in 2023 and is expected to be adopted by the LAA-HA in 2024. In the meantime, according to the decision in the LAA-HA from June 2023, the process "Enforcement of measures" in the AHB applies analogously and with due regard to the respective specifics also for storage facilities.

The adoption of Process 26 and the draft process on enforcement measures for storage facilities will serve as an internal guidance for enforcement measures of storage facilities and their adoption by the LAA-HA should ensure uniform application by all Länder authorities.

Status of Suggestion 16

Suggestion 16 (S16) is closed as BMUV established measures for promoting the consistency in the enforcement policies and practices at the various regulatory authorities.

8.2. ENFORCEMENT IMPLEMENTATIONS

There were no findings in this area in the initial IRRS mission.

9. REGULATIONS AND GUIDES

9.1. GENERIC ISSUES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *In general, the Länder authorities implemented most of the safety factors in their review and assessment process of the PSR. However, the BMU guidance for implementation of periodic safety does not explicitly address some factors such as safety performance, organization, management system and safety culture.*	
(1)	**BASIS: SSG-25, para. 2.12. states that** *"A PSR should provide a comprehensive assessment of the safety of the nuclear power plant. Since the complex process of conducting a PSR can be aided by appropriate subdivision of tasks, this Safety Guide sets out these tasks in accordance with 14 safety factors".*
S17	**Suggestion: BMU should consider updating its PSR guidance to address all safety factors with a graded approach in view of its future application for all nuclear facilities.**

Changes since the initial IRRS mission

Suggestion 17: A draft guideline for periodic safety review of research reactors was developed by the working group on research reactors in collaboration with the Länder by taking into account the existing PSR guidelines for nuclear power plants and IAEA safety standards SSG-25 and IAEA safety report series 99 "Periodic Safety Review for Research Reactors" by considering graded approach. The draft guidelines specify how to conduct PSR and include contents of PSR to be considered for the safety review. The guideline specifies the scope of application for research reactors for the following three classes:

i. Class 1: High flux reactors, MTR
ii. Class 2: TRIGA reactors
iii. Class 3: Teaching reactors

Further, specific factors to be considered as per guidelines also include equipment qualification, ageing management, human and organizational factors and safety culture. The guideline recommends that for class 1 research reactors detailed assessment including probabilistic safety assessment is required. Similarly, the guidelines will be applicable for different safety factors of research reactors according to actual structures, systems and components of research reactors such as reactor core, safety functions and safety barriers. Similarly, requirements for emergency planning and preparedness for each class of research reactors are different reflecting the consideration of graded approach for research reactor types. However, the draft guidelines will be submitted to nuclear safety committee and for formal adoption in the next LAA-HA meeting.

In the field of waste management, with ESK recommendation "ESK guidelines for the performance of periodic safety reviews and on technical ageing management for storage facilities for spent fuel and heat-generating radioactive waste" of 2022, the guidelines of 2014 previously applicable to these facilities have been updated.

According to guidelines, the nuclear supervisory authority presents the results of its review in a summary report, which is made available to the nuclear licensing authority. The forwarding of information by the nuclear supervisory authorities to BASE as the licensing authority is regulated in the AHB for the field of waste management in the processes related to storage facilities pursuant to § 6 of AtG.

These draft guidelines will be submitted for adoption at the next LAA-HA meeting. With the formal adoption of draft PSR guidelines for research reactors and ESK guidelines for the performance of periodic safety reviews and on technical ageing management for storage facilities for spent fuel and heat-generating radioactive waste at the next LAA-HA meeting, the action against Suggestion S17 is considered to be implemented.

Status of Suggestion 17

Suggestion 17 (S17) is closed on the basis of progress made and confidence in effective completion in due time as the BMUV has updated guidance for conducting periodic safety review for research reactors and the guidance for the radioactive waste management facilities to be adopted by LAA-HA in 2024.

9.2. REGULATIONS AND GUIDES FOR NUCLEAR POWER PLANTS

There were no findings in this area in the initial IRRS mission.

9.3. REGULATIONS AND GUIDES FOR RESEARCH REACTORS

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There are no specific written regulations or guides on how to apply a graded approach to design, operation, authorization, review and assessment for research reactors. This issue is identified in the advanced reference material and is part of the Action Plan.*	
(1)	**BASIS: GSR Part 1 Requirement 32, para. 4.61 states that** *"The regulations and guides shall be kept consistent and comprehensive, and shall provide adequate coverage commensurate with the radiation risks associated with the facilities and activities, in accordance with a graded approach".*
(2)	**BASIS: SSR-3 Requirement 12 states that** *"The use of the graded approach in application of the safety requirements for a research reactor shall be commensurate with the potential hazard of the facility and shall be based on safety analysis and regulatory requirements".*
(3)	**BASIS: SSG-22 para. 2.7 states that** *"The individual characteristics, or attributes, to be considered in deriving the category of the facility in accordance with its hazard are typically as follows:* *(a)The reactor power (for pulsed reactors, energy deposition is typically used, while for accelerator driven subcritical systems, thermal power is typically used);* *(b)The radiological source term;* *(c)The amount and enrichment of fissile material and fissionable material;…".*
S18	**Suggestion: The regulatory authority should consider specifying the aspects in the regulations and/or guides on how to apply a graded approach to design, operation, authorization, review and assessments for research reactors.**

Changes since the initial IRRS mission

Suggestion 18: For specifying the aspects of graded approach in regulatory requirements related to design, operation, review and assessment of research reactors, BMUV developed a guideline which was adopted by LAA-HA. This guideline stipulates the application of regulations and technical standards for nuclear power plants to research reactors by taking into account relevant designs and safety aspects of research reactors. Accordingly, all Länder authorities will be using this document for their supervisory role for research reactors. For applying this document, the following three perspectives are mentioned:

- Unmodified application (this includes factors which will remain unchanged from the previous practice such as personal qualification, radiation protection, emergency planning and preparedness)
- Protection goal-oriented application taking into account the existing hazards and potential hazards.
- No-applicability of rules to research reactors (for example for the structures, systems and components which are not part of research reactors but only valid for nuclear power plants)

KTA standards applicable to research reactors are also part of the guideline adopted by LAA-HA. Information exchange between BMUV and Länder authorities for implementation of the guideline was already in place and now

as part of implementation of action plan this has been further developed and adopted by the LAA-HA. Accordingly, the research reactors are subject to periodic safety review to be carried out after every ten years which ensures implementation of regulatory oversight requirements for design, operation, review and assessment by consideration of a graded approach under different safety factors of PSR, according to revised guidelines adopted by LAA-HA. Therefore, BMUV along with Länder authorities have specified the regulatory requirements on applying a graded approach to design, operation, authorization, review and assessments for research reactors in line with the intent of suggestion of the initial mission.

Status of Suggestion 18

Suggestion 18 (S18) is closed as the regulatory authority has specified the aspects in the guidance for applying a graded approach to design, operation, authorization, review and assessments for research reactors.

9.4. REGULATIONS AND GUIDES FOR FUEL CYCLE FACILITIES

There were no findings in this area in the initial IRRS mission.

9.5. REGULATIONS AND GUIDES FOR WASTE MANAGEMENT FACILITIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There are no specific safety requirements/guidance documents for the disposal of radioactive waste with negligible heat generation, other than requirements specified in the plan approval for the planned disposal facility. Current standards are applied by the regulatory body during oversight of compliance with the plan approval.*	
(1)	**BASIS: SSR 5 Part 5 Requirement 2 states that** *"The regulatory body shall establish regulatory requirements for the development of different types of disposal facility for radioactive waste and shall set out the procedures for meeting the requirements for the various stages of the licensing process. It shall also set conditions for the development, operation and closure of each individual disposal facility and shall carry out such activities as are necessary to ensure that the conditions are met".*
S19	**Suggestion: The regulatory body should consider the revision of safety requirements/guidance documents for the development, operation and closure of disposal facilities for radioactive waste with negligible heat generation, taking account of the state of the art in science and technology.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *In the light of the transition of all remaining operational NPPs into decommissioning in 2022, the existing guidance and regulations for predisposal management of all radioactive waste do not adequately reflect the interdependences of the various steps of predisposal management, and the possibility of extended storage periods.*	
(1)	**BASIS: GSR Part 5 Requirement 6 states that** *"Interdependences among all steps in the predisposal management of radioactive waste, as well as the impact of the anticipated disposal option, shall be appropriately taken into account".*
(2)	**BASIS: GSR Part 5 Requirement 11 states that** *"Waste shall be stored in such a manner that it can be inspected, monitored, retrieved and preserved in a condition suitable for its subsequent management. Due account should be taken if the expected period of storage, and, to the extent possible, passive safety features shall be applied. For long term storage in particular, measures*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	shall be taken to prevent degradation of the waste containment".
(3)	**BASIS: GSR Part 6 Requirement 14 states that** *"Radioactive waste shall be managed for all waste streams in decommissioning".*
S20	**Suggestion: The regulatory body should consider updating the guidance on the predisposal of radioactive waste to ensure they reflect the interdependences between the steps of predisposal management and the possibility of extended storage periods.**

Changes since the initial IRRS mission

Suggestion 19: The BMUV and BASE have initiated a process that in principle enables BASE (as a regulatory authority in the waste management sector) to draw-up sub-statutory regulations in consultation with the BMUV. This will enable BMUV to specify the safety requirements and BASE, in consultation with BMUV, to develop technical safety standards for radioactive waste disposal facilities with negligible heat generation as well as for heat generating waste. After entry into force, application of these regulations by the BGE can be made mandatory, unless other regulations have already been approved in the licence. The approach to the development of these sub-statutory regulations has been agreed and is currently being tested in pilot projects. To support the development of the regulations, ESK has been and will be requested for advice.

The topics requiring regulation are being identified on a step by step basis taking into account the state of the art in science and technology regularly. It is expected that BASE will complete this analysis at the end of 2023. The results will be submitted to the BMUV for consideration. The ESK is mandated to advise on this topic.

Up to now the following topics have been identified: "Periodic safety reviews for disposal facilities for non-heat-generating waste", "Transfer of the KTA safety standards into an independent program of standards specific to disposal", "Calculation basis for dose assessment in the disposal of high-level radioactive waste" and "Framework requirements for the management system of the BGE".

It is recognised that to develop the safety standards, as well as to develop and update the sub-statutory regulations for the development, operation and closure of disposal facilities for radioactive waste with negligible heat generation, taking account of the state of the art in science and technology, is a significant and complex piece of work. The work is necessary to provide updated structure of regulations and guidance to reflect the change in focus of Germany's nuclear challenges.

Good progress has been made to identify the structure of regulations and guidance required and undertake pilot projects to test the process. Two pilot projects could be completed (See Suggestion S1, and "Calculation basis for dose assessment in the disposal of high-level radioactive waste"). However, more work is needed to fully implement the Suggestion.

Suggestion 20: ESK has produced updated Conditioning Guidelines (Guidelines for the conditioning of radioactive waste with negligible heat generation). The purpose of these Conditioning Guidelines is to summarise the requirements for the conditioning facilities (design and operation) and the requirements for the waste forms or packages to be produced. This updated guidance considers the interdependencies of the various steps, in particular the requirements for the waste forms or waste packages to be produced are based on the boundary conditions for transport, storage and disposal.

The ESK has also revised the Storage Facilities Guidelines (Guidelines for the storage of radioactive waste with negligible heat generation). These guidelines formulate the requirements for safe storage, including extended storage over several decades. These guidelines recognise the importance of long-term inherent stability of the radioactive waste and waste forms in combination with the containers to support extended storage periods. The requirement for inspection of waste packages is also included.

These two updated guidelines have now been adopted by the LAA-HA. It is also noted that the Federation and Länder have agreed to consolidate these guidelines and produce the Guideline for Radioactive Waste, which is intended to create a set of rules that covers all aspects of the handling of radioactive waste with negligible heat generation, starting

with waste flow control, through conditioning to storage with the aim of disposal. A draft version of the guidelines is currently being reviewed.

Status of Suggestion 19

Suggestion 19 (S19) remains open as the revision of safety requirements/guidance documents for the development, operation and closure of disposal facilities for radioactive waste with negligible heat generation, taking account of the state of the art in science and technology is still ongoing.

Status of Suggestion 20

Suggestion 20 (S20) is closed as the guidance on the predisposal of radioactive waste to ensure they reflect the interdependences between the steps of predisposal management and the possibility of extended storage periods has been updated.

9.6. REGULATIONS AND GUIDES FOR DECOMMISSIONING ACTIVITIES

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The Decommissioning Guide (2016) does not address interdependences among multiple facilities and authorised parties at the same site which may affect the implementation of the dismantling project and the sequence and planning of dismantling phases.*	
(1)	**BASIS: GSR Part 6 Requirement 8 para. 5.1 states that** *"The preferred decommissioning strategy shall be immediate dismantling. However, there may be situations in which immediate dismantling is not a practicable strategy when all relevant factors are considered".*
(2)	**BASIS: GSR Part 6 Requirement 8 states that** *"The licensee shall select a decommissioning strategy that will form the basis for the planning for decommissioning. The strategy shall be consistent with the national policy on the management of radioactive waste".*
(3)	**BASIS: GSR Part 6 Requirement 8, para. 5.5 states that** *"For sites with more than one facility, a site strategy for decommissioning shall be developed to ensure that interdependences between the facilities are taken into account in the planning for individual facilities that will lead to final decommissioning plans for each facility (e.g. by means of release of parts of the site from regulatory control, if justified)".*
S21	**Suggestion: The regulatory body should consider revising decommissioning guidance to address interdependences among multiple facilities and authorised parties at the same site when implementing dismantling projects.**

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *There is no guidance on decommissioning for facilities regulated under the Radiation Protection Act.*	
(1)	**BASIS: GSR Part 6 Requirement 5 states that** *"The regulatory body shall regulate all aspects of decommissioning throughout all stages of the facility's lifetime, from initial planning for decommissioning during the siting and design of the facility, to the completion of decommissioning actions and the termination of authorization for decommissioning".*
S22	**Suggestion: The regulatory body should consider developing guidance on decommissioning for facilities which are regulated under the Radiation Protection Act.**

Changes since the initial IRRS mission

Suggestion 21: An update to the Decommissioning Guide was adopted by the LAA-HA in 2021. An example implementing the revised decommissioning guidance was given at the NPP Biblis, in the federal state of Hessen, where there is now legal separation of the NPP buildings and storage buildings, with two separate companies operating these facilities. E.g., licences of storage facilities at the site of Biblis include the interdependencies.

Suggestion 22: As far as licensing is concerned, facilities in Germany are regulated either under AtG or under the Radiation Protection Act. The Decommissioning Guide addresses facilities regulated under AtG §7. Activities that are not linked to a specific facility and where no nuclear fuel is involved, for example the activity of handling radioactive waste packages for storage, can be regulated under the Radiation Protection Act. These so called radiological activity-related licences are mainly issued in the area of handling radioactive waste with negligible heat generation.

Depending on the situation at sites, similar storage facilities are regulated either under the Atomic Energy Act or under the Radiation Protection Act.

To obtain a radiological activity-related licence, the competent authority examines the respective conditions under the radiation protection law with regard to safe handling of the respective radioactive material and its protection against accidents, malevolent disruptive acts or other third-party intervention. As part of the application for a radiological activity-related licence, the operator must demonstrate that at the end of the activity the facility associated with the activity can be safely dismantled and contamination can be easily removed to achieve clearance levels. The ESK guidelines for the waste conditioning and storage are applicable to these activities. These guidelines have been updated since the previous mission (Guidelines for the conditioning of radioactive waste with negligible heat, Guidelines for the storage of radioactive waste with negligible heat generation).

These guidelines include design and safety requirements to be considered, including the requirements for the facility to be safely decontaminated and dismantled once the activity has finished. Given the safety significance of activities under a radiological activity-related license, a specific decommissioning guidance for these types of licenses has not been produced. The IRRS team concluded that this approach is in line with the graded approach.

Status of Suggestion 21

Suggestion 21 (S21) is closed as the decommissioning guidance to address interdependences among multiple facilities and authorised parties at the same site when implementing dismantling projects has been updated and implemented.

Status of Suggestion 22

Suggestion 22 (S22): is closed as updated guidance for facilities which are regulated under the Radiation Protection Act is available through the ESK guidelines for waste conditioning and storage.

9.7. REGULATIONS AND GUIDES FOR OCCUPATIONAL EXPOSURE

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Workers that are employed by a licensee do not have a radiation passbook and receive their exposure records only upon request to the radiation protection executive (§64 (3) of the Radiation Protection Ordinance) or upon request to the national dose register (§170 (6) of the Radiation Protection Act).*	
(1)	**BASIS: GSR Part 3 Requirement 25, para. 3.106 states that** *"Employers, registrants and licensees:* *(a) Shall provide workers with access to records of their own occupational exposure;".*
S23	**Suggestion: The regulatory body should consider establishing regulatory requirements to mandate provision of relevant exposure records to workers employed by a licensee, not only upon request.**

Changes since the initial IRRS mission

Suggestion 23: The Radiation Protection Ordinance (StrlSchV) requires the radiation protection executive to ensure that each occupationally exposed person under their supervision is notified in writing, upon request, of the occupational exposure received during their employment. The IRRS team was informed that in practice depending on the need of the exposed person, the request could be a one-time request on preference of how and when information on radiation exposure should be provided to the individual radiation worker, or a request for a specific radiation exposure data.

The ordinance further requires the radiation protection executive to ensure that a person to be monitored is provided, at their request, with a dosimeter with which the personal dose can be measured and determined at any time.

The Radiation Protection Act (StrlSchG) includes provisions that data on occupational exposure be recorded in a register for the purpose of monitoring dose limits, and a national dose register has been established by BfS. The national dose register (SSR) website indicates that individuals may informally request information related to their personal exposure by stating their appropriate personal data.

StrlSchV includes provisions that the radiation protection executive should ensure that the personal dose is measured for determination of the body dose, and if there is a suspicion that dose limits have been exceeded, the radiation protection executive should immediately communicate to the concerned exposed person about the determined body dose.

The radiation protection act is also implemented in parallel with other national laws in relation to exposed workers. In accordance with the German workers health and safety legislation, employers are obliged to inform their employees about relevant issues concerning health and safety, including provision of information related to radiation protection.

The BMUV has planned to further clarify and provide guidance on the existing legislative provisions related to responsibilities of employers for providing, and rights of employees for obtaining, dose records in regulatory and other documentation as appropriate, such as in the radiation protection instruction and in the certificate issued by BfS to each radiation worker when they get registered in the SSR.

Status of Suggestion 23

Suggestion 23 (S23) is closed on the basis of progress made and confidence in effective completion in due time as requirements are in place and BMUV will further clarify or provide guidance related to workers' access to radiation exposure records in relevant documentation.

10. EMERGENCY PREPAREDNESS AND RESPONSE REGULATORY ASPECTS

10.1. AUTHORITY AND RESPONSIBILITIES FOR REGULATING ON-SITE EPR OF OPERATING ORGANIZATIONS

There were no findings in this area in the initial IRRS mission.

10.2. REGULATIONS AND GUIDES ON ON-SITE EPR OF OPERATING ORGANIZATIONS

There were no findings in this area in the initial IRRS mission.

10.3. VERIFYING THE ADEQUACY OF ON-SITE EPR OF OPERATING ORGANIZATIONS

There were no findings in this area in the initial IRRS mission.

10.4. ROLES OF THE RB IN A NUCLEAR OR RADIOLOGICAL EMERGENCY

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *Provisional general and special emergency plans have been issued, but they are not yet based on the reference scenarios defined according to the Radiation Protection Act. This has been recognized in the ARM and is part of the Action Plan.*	
(1)	**BASIS: GSR Part 7 para. 6.17 states that** *"Each response organization shall prepare an emergency plan or plans for coordinating and performing their assigned functions as specified in Section 5 and in accordance with the hazard assessment and the protection strategy. An emergency plan shall be developed at the national level that integrates all relevant plans for emergency response in a coordinated manner and consistently with an all-hazards approach. Emergency plans shall specify how responsibilities for managing operations in an emergency response are to be discharged on the site, off the site and across national borders, as appropriate. The emergency plans shall be coordinated with other plans and procedures that may be implemented in a nuclear or radiological emergency, to ensure that the simultaneous implementation of the plans would not reduce their effectiveness or cause conflicts".*
S24	**Suggestion: The regulatory body should consider developing general and special emergency plans based on the reference scenarios defined according to the Radiation Protection Act (to replace the existing provisional plans).**

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
Observation: *The extent of resources needed after the phase out to prepare for and respond to emergencies at foreign nuclear power plants affecting Germany or emergencies at other nuclear facilities in Germany and the means of funding those resources have not been fully evaluated.*	
(1)	**BASIS: GSR Part 7 para. 4.8 states that** *"The government shall ensure that response organizations, operating organizations and the regulatory body have the necessary human, financial and other resources, in view of their expected roles and responsibilities and the assessed hazards, to prepare for and to deal with both radiological and non-radiological consequences of a nuclear or radiological emergency, whether the emergency occurs within or beyond national borders".*
S25	**Suggestion: BMU should consider evaluating the extent of resources needed to prepare for**

2019 MISSION RECOMMENDATIONS, SUGGESTIONS	
	and respond to emergencies at foreign nuclear power plants affecting Germany or emergencies at other nuclear facilities in Germany and, if necessary, secure funding of those resources after the phase out.

Changes since the initial IRRS mission

Suggestion 24: The Federal Government has adopted a federal general emergency response plan as general administrative provisions with the consent of the Bundesrat in 2023. The plan has been developed under the leadership of the BMUV and coordinated with other concerned ministries. Länder, scientific experts and other stakeholders have been given the opportunity to provide comments.

Federal special emergency response plans for seven subject areas (Disaster control; General hazard prevention; Medical treatment; Drinking water supply; Food and feed; Non-food products; Traffic and transportation of goods; Contaminated areas; Waste management) are being developed under the leadership of the ministries responsible for each respective subject area. The development of these plans is at different stages of progress, but work to complete the federal special emergency response plan is ongoing in all seven subject areas.

Work is also underway by the Länder to develop general and special emergency response plans to supplement the federal plans. This work is being performed in parallel with the work performed at the federal level.

The disaster control authorities of the Länder develop and update external emergency response plans for the surroundings of installations with special hazard potential. These plans specify the general and special emergency response plans of the Federation and the Länder with consideration of the local conditions and on-site emergency preparedness. These will need to be revised to reflect changes in the emergency response plans of the Federation and the Länder. However, changes are expected to be minor with respect to the existing emergency response plans for installations with special hazard potential.

Significant progress concerning the development and adoption of general and special emergency response plans at both federal and Länder levels has been made since the IRRS mission in 2019. The remaining steps to complete the revisions of all emergency response plans are outlined in the updated action plan. The IRRS team is confident that the complete review of the emergency response plans at both federal and Länder level will be completed in due time.

There is a legal obligation (Radiation Protection Act, 103 §) to regularly review the emergency response plans at both federal and Länder level taking lessons learned from exercises, findings from emergencies in Germany or abroad as well as changes in the underlying science or legal situation into account. This will ensure that the emergency response plans at both federal and Länder level will be kept up to date.

Suggestion 25: According to the Radiation Protection Act, the BMUV is responsible for evaluating possible emergency exposure situations that may arise in Germany and abroad. Based on the hazard assessment performed by the BMUV, reference scenarios are defined in the federal general emergency response plan adopted by the Federal Government in 2023. The reference scenarios include emergencies at nuclear power plants abroad as well as emergencies at nuclear facilities in Germany. The reference scenarios are to be used by authorities at federal and Länder level as a basis for developing necessary arrangements needed to efficiently handle nuclear and radiological emergencies. This ensures that the necessary resources to prepare for and respond to nuclear emergencies occurring both in Germany and abroad are identified.

The First Act Amending the Radiation Protection Act includes a paragraph requiring that the competent authorities to have at their disposal the financial and human resources necessary for the fulfilment of their statutory tasks. This statuary provision applies to all authorities involved in the emergency management system at both Länder and federal level on the basis of the sector interlinking concept as outlined in the explanatory memorandum in Bundestag printed paper 19/26943. This ensures that funding of emergency preparedness and response in Germany for nuclear emergencies occurring both in Germany and abroad is secured also after the phase out.

Status of Suggestion 24

Suggestion 24 (S24) is closed on the basis of progress made and confidence in effective completion in due time as a federal general emergency response plan based on the reference scenarios defined according to the Radiation Protection Act has been adopted and the ongoing work to complete the federal special emergency response plans as well as the general and special emergency response plans of the Länder.

Status of Suggestion 25

Suggestion 25 (S25) is closed as the extent of resources needed to prepare for and respond to emergencies at foreign nuclear power plants affecting Germany or emergencies at other nuclear facilities in Germany has been evaluated and funding of these resources after the phase out has been ensured.

POLICY DISCUSSION. CHANGING THE WAY OF WORKING – ON THE WAY TO THE 'NEW NORMAL'

The Covid-19 pandemic has posed unprecedented challenges to the work environment worldwide. Discussion during IRRS follow-up mission revealed that in Germany, the pandemic resulted in initiation and adoption of new ways of working ('new work') and accelerated the digitalisation of general work environment in all regulatory authorities. The new ways of working at the beginning were only thought of a temporary solution, but have now become established and thus part of the 'new normal' constituting a mix of physical/traditional and virtual/new ways of working. The new ways of working have many associated opportunities such as increased flexibility, greater motivation, and possibility for meetings at short notice. However, the new work emerged many challenges such as increased personal responsibility, social cohesion, reliability in communication, cooperation among groups, the integration and onboarding of new employees, and leadership at a distance – important aspects of particular importance for the regulatory safety culture. A policy issue discussion on changing the way of working on the way to the new normal was identified and discussions were made on the change of working in regulatory bodies in the course of the pandemic with particular emphasis on adaptation of existing regulations or developing new working concepts and experiences gained with new ways of working; ensuring regulatory safety culture in the face of increasing flexibility in place and time of working; and methods used to share impressions from supervision.

The IRRS team gave an overview of different approaches in their respective countries during the discussions as summarized below:

- For some regulatory bodies, there was already an extensive experience of working remotely before the pandemic and mobile computers along with communication tools were introduced. However, in others, changing to a mobile working environment was introduced due to the need to work remotely because of the pandemic.
- Working remotely has continued as the new normal after the pandemic with different requirements for staff to be in the office. For most of the regulatory bodies, staff are now spending about 40% of their time working from home. Remote working has resulted in optimal use of resources such as office spaces.
- There were challenges during and after the pandemic such as staff's preference to work from home and competition with the private sector some of which allows working remotely; continuous communication with staff and difficulty of remote supervision of performance; challenges to establish connection and collaboration between staff and impossibility for remote team building; multitasking with several communication tools; non-verbal communication during physical presence being replaced with remote communication; and lack of unintentional and informal engagement during working remotely.
- Different actions were taken by regulatory bodies during and after the pandemic. Offices were assigned only to staff who work more than 40% of their time in the office which resulted in more staff coming to the office if they would like to keep their offices. When working remotely, managers got connected intentionally at certain times to foster engagement with their staff. Virtual lunches and happy hours, and virtual coffee times are among some new activities introduced in some organizations. Flexibility in working hours were helpful to support employees working from the home office to manage family commitments, for instance for working parents.
- Training was provided to staff on how to organize themselves at their home office and to managers in relation to assessing and ensuring the mental health of their staff. How to remotely get support and advice from experienced staff after retirement is under consideration to retain knowledge and experience. Assessment by external experts of the safety culture of the regulatory body after the pandemic has been arranged.
- A guidance on 'Presence with Purpose' was developed that guides staff on who should necessarily come to work in person and who can work remotely and gives guidance to supervisors on how to assess performance of staff working remotely.
- New emergency preparedness and response structures and procedures were introduced for effective response to incidents during the pandemic including continuous testing and exercises, and different ways of communication when working from home.

- Public meetings were made either virtual or hybrid, but it was a challenge to organize and reach out to different people. Announcements were made in newspapers or individual invitation cards were prepared.

APPENDIX I – LIST OF PARTICIPANTS

INTERNATIONAL EXPERTS:		
DORMAN Daniel Huntington	U.S. Nuclear Regulatory Commission (USNRC)	dan.dorman@nrc.gov
SCHWARZ Georg Frédéric	Federal Nuclear Safety Inspectorate (ENSI)	georg@georgschwarz.ch
KRS Petr	State Office for Nuclear Safety of the Czech Republic (SUJB)	pet.kr@seznam.cz
JAERVINEN Marja-Leena	Radiation and Nuclear Safety Authority (STUK)	marja-leena.jarvinen@STUK.fi
JOHANSSON Jan Barck-Holst	Swedish Radiation Safety Authority (SSM)	jan.johansson@ssm.se
GRAY Louise Anne	Office for Nuclear Regulation (ONR)	louise.gray@onr.gov.uk
ZIMMERMAN Jacob	U.S. Nuclear Regulatory Commission (USNRC)	jacob.zimmerman@nrc.gov
IAEA STAFF		
SHAH Zia Hussain	Division of Nuclear Installation Safety	z.h.shah@iaea.org
HAILU Teodros Gebremichael	Division of Radiation, Transport and Waste Safety	t.g.hailu@iaea.org
REBIKOVA Olga	Division of Nuclear Installation Safety	o.rebikova@iaea.org
LIAISON OFFICER		
ELSNER Thomas	Liaison Officer	thomas.elsner@bmuv.bund.de
DITSCHE Christoph	Deputy Liaison Officer	christoph.ditsche@bmuv.bund.de

GROUP PHOTO

APPENDIX II – MISSION PROGRAMME

<table>
<tr><th>Time</th><th>MON</th><th>TUE</th><th>WED</th><th>THU</th><th>FRI</th><th>SAT</th><th>SUN</th><th>MON</th></tr>
<tr><td>9:00-10:00</td><td rowspan="4">Arrival of Team Members</td><td rowspan="2">Entrance Meeting</td><td rowspan="3">Interviews</td><td>TM write Report
TL and DTL review introductory part</td><td rowspan="2">Discussion Counterpart/Expert

Finalisation</td><td></td><td rowspan="2"></td><td rowspan="2">Exit Meeting

Press release
Farewell</td></tr>
<tr><td>10:00-11:00</td><td rowspan="2">Written comments by the Host</td></tr>
<tr><td>11:00-12:30</td><td>Interviews</td><td>Draft text to TL</td><td rowspan="6">Social Event</td></tr>
<tr><td>12:30-13:30</td><td>Lunch</td><td>Lunch</td><td>Lunch</td><td colspan="2">Lunch</td><td>Lunch</td><td>Lunch</td></tr>
<tr><td>13:30-14:00</td><td rowspan="5">Initial IRRS Team Briefing (Attended by the LO)</td><td rowspan="4">Interviews</td><td rowspan="3">Interviews</td><td rowspan="2">Cross-reading</td><td colspan="2">Submission of the Draft to the Host</td><td rowspan="2">Team meeting to discuss and resolve Host comments</td><td rowspan="4">Departure of IRRS Team Members</td></tr>
<tr><td>14:00-15:00</td><td rowspan="3">Host reads Draft and prepares written

TL finalises the presentation

TC drafts the Press Release</td></tr>
<tr><td>15:00-16:00</td><td>Secretariat edits the report</td><td>Plenary (Team + Host) to discuss Host comments and finalize the report</td></tr>
<tr><td>16:00-17:00</td><td>Written preliminary findings delivered</td><td>Preliminary Draft Report Ready</td><td colspan="2">Discussion of Executive Summary</td><td>Presenting the final Draft of the Report to the Host</td><td rowspan="2">Finalisation of the Report</td></tr>
<tr><td>17:00-18:00</td><td>Daily Team Meeting</td><td>Daily Team Meeting: Discussion of findings</td><td>Daily Team Meeting</td><td colspan="2">Team discusses the Mission and provides IAEA with feedback</td><td></td></tr>
<tr><td>18:00-20:00</td><td rowspan="2">Dinner</td><td>Dinner</td><td>Dinner</td><td>Dinner</td><td colspan="2" rowspan="2">Dinner</td><td>Dinner</td><td>Dinner</td></tr>
<tr><td>20:00</td><td>Writing of the report</td><td>Secretariat edits Report. TM write Report</td><td>TM Read Draft</td><td>Dinner</td><td>Dinner</td></tr>
</table>

APPENDIX III – LIST OF COUNTERPARTS

	IRRS EXPERTS	Lead Counterpart	Co-Counterparts
1.	**LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES**		
	SCHWARZ Georg	KUHN Sebastian	GRGIC-PALAND Tomislav PFAFF Markus WILD Volker KRAUSE Anke RUPPERT Jörg
2.	**GLOBAL NUCLEAR SAFETY REGIME**		
	KRS Petr	STOPPA Gisela	
3.	**RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY**		
	KRS Petr	STOPPA Gisela	RUPPERT Jörg ULITZSCH Jens
4.	**MANAGEMENT SYSTEM OF THE REGULATORY BODY**		
	JÄRVINEN Marja-Leena	HOBURG Carolin	RUPPERT Jörg GRGIC-PALAND Tomislav MALLICK Ronzon
5.	**AUTHORIZATION**		
	GRAY Louise	KRAUSE Anke	BÜTTNER Jens Uwe
6.	**REVIEW AND ASSESSMENT**		
	SHAH Zia	VON RACZEK Hubertus	ULITZSCH Jens
7.	**INSPECTION**		
	ZIMMERMAN Jacob	WILDERMANN Thomas	MILDENBERGER Oliver MALLICK Ronzon SCHMIDT Claudia PALMES Julia
8.	**ENFORCEMENT**		

	IRRS EXPERTS	Lead Counterpart	Co-Counterparts
	ZIMMERMAN Jacob	WILDERMANN Thomas	MILDENBERGER Oliver
9.	**REGULATIONS AND GUIDES**		
	SHAH Zia GRAY Louise HAILU Teodros	SCHMIDT Claudia KRAUSE Anke BÜTTNER Jens Uwe	
10.	**EMERGENCY PREPAREDNESS AND RESPONSE**		
	JOHANSSON Jan	STEGEMANN Ralf	SCHLUMMER Tobias

APPENDIX IV – RECOMMENDATIONS (R) AND SUGGESTIONS (S) FROM THE INITIAL 2019 IRRS MISSION THAT REMAIN OPEN

Module	Section	R/S	Recommendations/Suggestions
4.	**4.5**	**S8**	**Suggestion: The Land (StMUV) should consider finalizing the handbook as a priority. The other Länder should consider developing similar documents as appropriate.**
9.	**9.5**	**S19**	**Suggestion: The regulatory body should consider the revision of safety requirements/guidance documents for the development, operation and closure of disposal facilities for radioactive waste with negligible heat generation, taking account of the state of the art in science and technology.**

APPENDIX V - RECOMMENDATIONS (RF), SUGGESTIONS (SF) AND GOOD PRACTICES (GPF) FROM THE 2023 IRRS FOLLOW UP MISSION

Module	Section	RF/SF/GPF	Recommendation, Suggestion or Good Practice
3	3.8	SF1	**Suggestion: BMUV, in cooperation with the Länder authorities, should consider developing detailed arrangements to ensure that opportunity is given to interested parties (e.g. public) to provide comments before a decision is taken on termination of a licence for decommissioning.**
4	4.3	SF2	**Suggestion: BASE should consider further developing its management system to be consistent with the IAEA safety standards.**

APPENDIX VI – COUNTERPART'S REFERENCE MATERIAL USED FOR THE REVIEW

Law and conventions

Act on the peaceful utilisation of nuclear energy and the protection against its hazards (Atomic Energy Act – AtG) of 23rd December 1959, as amended and promulgated on 15th July 1985, last amendment of 4th December 2022

Act on the Protection against the Harmful Effects of Ionizing Radiation (Radiation Protection Act – StrlSchG), of 27th June 2017, last amendment of 3rd January 2022, (in German)

- Excerpt §§167, 169, 179 StrlSchG
- Excerpt §193a StrlSchG

Act on the Search for and Selection of a Site for a Disposal Facility for High-Level Radioactive Waste (Site Selection Act – StandAG) of 5th May 2017, last amendment of 20 July 2017 (in English),

- last amendment of 7th December 2020 (in German)

Convention on Nuclear Safety, Report by the Government of the Federal Republic of Germany for the Combined 8th/9th Review Meeting in March 2023

Convention on Nuclear Safety, Country Review Report (CRR) for the Federal Republic of Germany, Combined 8th/9th Review Meeting in March 2023

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, Report of the Federal Republic of Germany for the Seventh Review Meeting in May 2021

Ordinances

Ordinance on Safety Requirements for the Disposal of High-Level Radioactive Waste (Disposal Facility Safety Requirements Ordinance – EndlSiAnfV), 6th October 2020 (in German)

Ordinance on Requirements for the Performance of Preliminary Safety Analyses in the Site Selection Procedure for the Disposal of High-Level Radioactive Waste (Disposal Facility Safety Analyses Ordinance – EndlSiUntV), 6th October 2020 (in German)

Ordinance on the Protection against Damage and Injuries Caused by Ionizing Radiation (Radiation Protection Ordinance – StrlSchV), 29th November 2018, amended by Article 1 of the ordinance of 8th October 2021 (in German)

- Excerpt §§64, 65, 66, 69 StrlSchV

Ordinance on the Procedure for Licensing of Installations under § 7 of the Atomic Energy Act (Nuclear Licensing Ordinance – AtVfV), of 18th February 1977, as amended and promulgated on 3rd February 1995, amended by Article 3 of the ordinance of 11th November 2020

Ordinance on the Nuclear Safety Officer and the Reporting of Incidents and other Events (Nuclear Safety Officer and Reporting Ordinance – AtSMV), of 14th October 1992, last Amendment of 8th June 2010

Modification of the Nuclear Safety Officer and Reporting Ordinance, 29th November 2018

BMUV publications

Safety Requirements for Nuclear Power Plants, promulgated on 3 March 2015 (in English), promulgated on 25th January 2022 (in German)

Guideline for the Periodic Safety Review of Research Reactors, draft as at 21th June 2023

Guide to the decommissioning, the safe enclosure and the dismantling of facilities or parts thereof as defined in § 7 of the Atomic Energy Act as at 16th September 2021

Guideline for the application of the nuclear rules and regulations for nuclear power plants to research reactors by means of a graded approach, adopted 29 June 2023

Ministry draft of the Federal Emergency Plan of the Federation (ANoPl-Bund) (in German)

Guides and recommendations

ESK Guidelines for the conditioning of radioactive waste with negligible heat generation of 10th December 2020;

Application of the ESK guidelines for the conditioning of radioactive waste with negligible heat generation of 25th March 2021

ESK Guidelines for the storage of radioactive waste with negligible heat generation of 9th December 2021; publication together with decision for application in licensing and supervisory procedures in the Federal Gazette: BAnz AT 19.08.2022 B4 (in German)

RSK Statement (532nd meeting of the Reactor Safety Commission (RSK) on 11th November 2022), Continued operation of German nuclear power plants until 15th April 2023 (in German)

ESK guidelines for the performance of periodic safety reviews and on technical ageing management for storage facilities for spent fuel and heat-generating radioactive waste of 3rd March 2022

BMUV references

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, National Policy Paper "Nuclear Safety", 17.05.2021

Federal Government Strategy for Competence Building and the Development of Future Talent for Nuclear Safety (August 2020)

Handbook on Cooperation between the Federation and the Länder in Nuclear Law (as at June 2023) (in German)

- Excerpt chapter 0. Introduction
- Excerpt process 23 Review and assessment in the licensing and supervisory procedure
- Excerpt process 24 Supervisory process integrated safety assessment
- Excerpt process 25 On-site inspection
- Excerpt process 26 Enforcement of measures

Handbook on Cooperation between the Federation and the Länder in Nuclear Law (as at June 2018)

Handbook on Cooperation between the Federation and the Länder in Nuclear Law – Waste Management Part (June 2023)

- Excerpt process 1. Procedure for new licences pursuant to § 6 AtG for the storage of nuclear fuel (storage facilities)
- Excerpt process 2. Procedure for modification licences pursuant to § 6 AtG for the storage of nuclear fuel (storage facilities)
- Excerpt process 3. Communication between licensing authority and nuclear supervisory authorities on the storage of nuclear fuel pursuant to § 6 AtG (storage facilities)
- Excerpt process 4. Reportable events pursuant to the Nuclear Safety Officer and Reporting Ordinance (AtSMV) during storage pursuant to § 6 AtG and their classification according to INES (International Nuclear and Radiological Event Scale) (storage facilities)
- Excerpt process 5. Technical Committee for Nuclear Fuel Cycle (FA VE)

Needs analysis for the safety of nuclear facilities (in German)

Needs analysis for the maintenance and expansion of radiation protection competence in Germany (in German)

Needs analysis for the safety of nuclear waste management (in German)

Policy paper Safety culture in nuclear licensing and supervisory authorities, 14.03.2019

Framework paper on the set of instruments for the self-audit of the regulatory safety culture

- Lists of 40 practices for the self-assessment of the regulatory safety culture
- Questionnaire on regulatory safety culture

Framework paper on the independent assessment of the management system of licensing and supervisory authorities under nuclear and radiation protection law at federal and supreme Land level (contents and sections A – C)

Rules of procedure for the auditing pool for licensing and supervisory authorities under nuclear and radiation protection law at federal and supreme Land level

Common understanding between the Federation and the Länder on inspection programmes for research and teaching reactors in Germany

Advisory request to the ESK – Review of existing KTA safety standards for the disposal sector and transfer into a separate set of rules and regulations of 3rd February 2023 (in German)

BASE references

BASE draft on framework requirements for the management system of the Bundesgesellschaft für Endlager mbH (BGE) (in German)

Excerpt from the BASE Management System Manual (BASE-MMH) (in German)

BASE mandate to the ESK on the subject of periodic safety reviews dated 16th September 2022 (in German)

Länder references

Bavarian State Ministry of the Environment and Consumer Protection, Handbook for state supervision on the high flux neutron source Munich in Garching (FRM II) – Supervision Manual, 15.06.2023 (in German)

- Excerpt table of content, chapter XI. enforcement strategy, chapter XII. Supervisory activities at FRM II

Excerpt (contents and introduction) from the supervision concept of the Ministry of the Environment, Climate Protection and the Energy Sector Baden-Württemberg

UM BW, Inspection report, Inspection preventive maintenance during operation (PMO) and 72 h test run NSD XJ10

Other references

Report of the Integrated Regulatory Review Service (IRRS) mission to Germany 2019, IAEA-NS-IRRS-2019/02

Report of the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS) mission to Germany 2019, IAEA-2019

Report of the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning and Remediation (ARTEMIS) Follow-up mission to Germany 2022, IAEA-NS-ARTEMIS, 2022

APPENDIX VII – IAEA REFERENCE MATERIAL USED FOR THE REVIEW

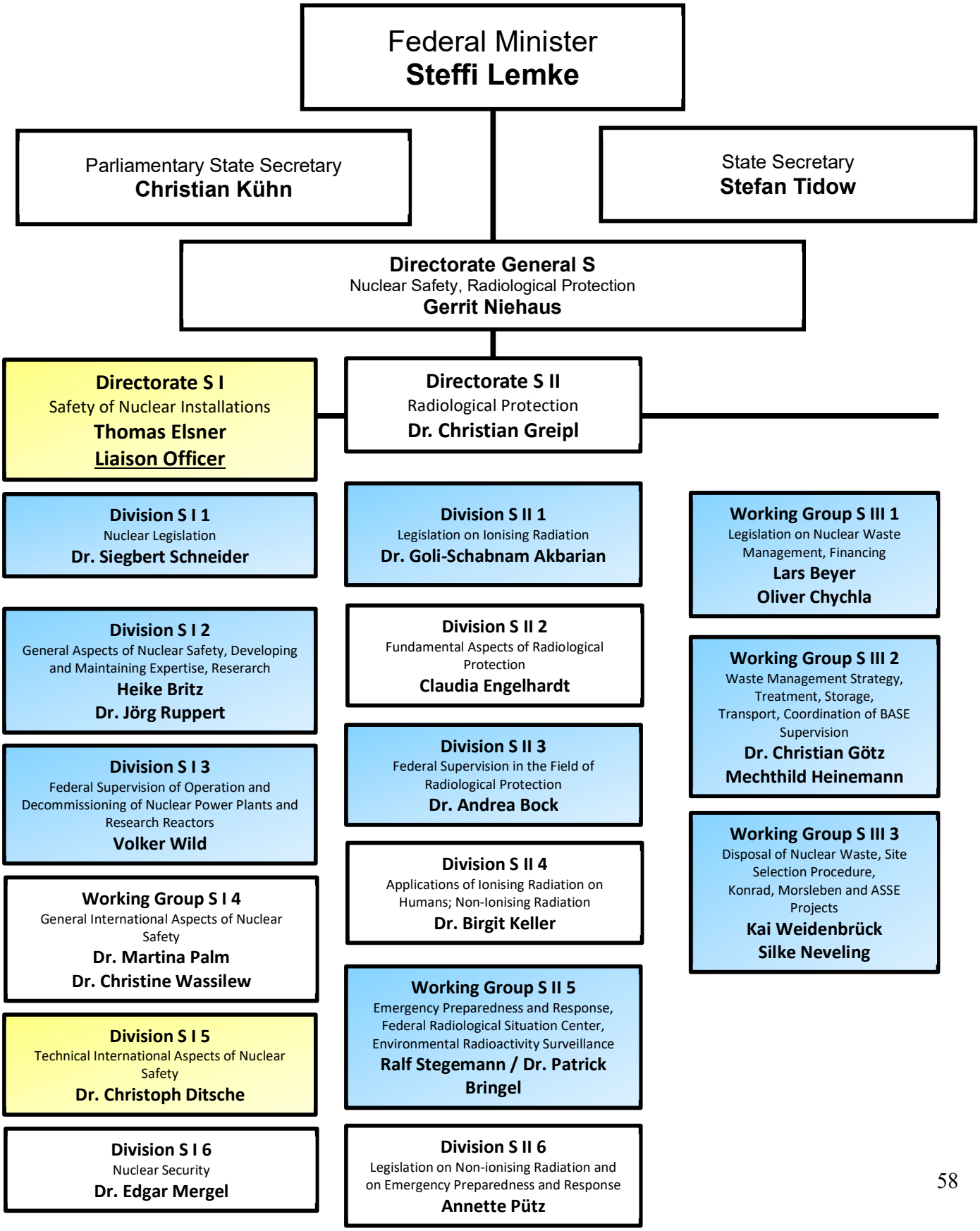
1.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Fundamental Safety Principles, No SF-1, IAEA, Vienna (2006)
2.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Governmental, Legal and Regulatory Framework for Safety, General Safety Requirements Part 1, No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016)
3.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Leadership and Management for Safety, General Safety Requirements Part 2, No. GSR Part 2, IAEA, Vienna (2016)
4.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3, No. GSR Part 3, IAEA, Vienna (2014).
5.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety assessment for facilities and activities, General Safety Requirements Part 4, No. GSR Part 4 (Rev. 1), IAEA, Vienna (2016)
6.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Predisposal Management of Radioactive Waste, General Safety Requirement Series Part 5, No. GSR Part 5, IAEA, Vienna (2009)
7.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Decommissioning of Facilities, General Safety Requirement Series No. GSR Part 6, IAEA, Vienna (2014)
8.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Preparedness and Response for Nuclear or Radiological Emergency, General Safety Requirement Series No. GSR Part 7, IAEA, Vienna (2015)
9.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Site Evaluation for Nuclear Installations, Specific Safety Requirement Series No. SSR-1, IAEA, Vienna (2003)
10.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Power Plants: Design, Specific Safety Requirements Series No. SSR-2/1 (Rev. 1), IAEA, Vienna (2016)
11.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements Series No. SSR-2/2 (Rev. 1), IAEA, Vienna (2016)
12.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Research Reactors, Specific Safety Requirements Series No. SSR-3, IAEA, Vienna (2016)
13.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Fuel Cycle Facilities, Specific Safety Requirements Series No. SSR-4, IAEA, Vienna (2017)
14.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Disposal of Radioactive Waste, Specific Safety Requirements Series No. SSR-5, IAEA, Vienna (2011)
15.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Regulations for the Safe Transport of Radioactive Material, Specific Safety Requirements Series No. SSR-6, IAEA, Vienna (2012)
16.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Regulations for the Safe Transport of Radioactive Material, 2018 Edition, Specific Safety Requirements Series No. SSR-6 (Rev. 1), IAEA, Vienna (2018)
17.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Classification of Radioactive Waste, General Safety Guide No. GSG-1, IAEA, Vienna (2009)
18.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, Safety Guide Series No GSG-2, IAEA, Vienna (2012)
19.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Communication and Consultation with Interested Parties by the Regulatory Body, General Safety Guide Series No. GSG-6, IAEA, Vienna (2017).
20.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Occupational Radiation Protection, Safety Guide Series No. GSG-7, IAEA, Vienna (2018)
21.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Regulatory Control of Radioactive Discharges to the Environment, Safety Guide Series No GSG-9, IAEA, Vienna (2018)

22.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Organization, Management and Staffing of the Regulatory Body for Safety, General Safety Guide Series No. GSG-12, IAEA, Vienna (2018).
23.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Functions and Processes of the Regulatory Body for Safety, General Safety Guide Series No. GSG-13, IAEA, Vienna (2018).
24.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide Series No. GS-G-2.1, IAEA, Vienna (2007)
25.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - The Management System for the Disposal of Radioactive Waste, Safety Guide Series No GS-G-3.4, IAEA, Vienna (2008)
26.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Criteria for use in Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Guide Series No. GSG-2, IAEA, Vienna 2011)
27.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - A System for the Feedback of Experience from Events in Nuclear Installations, Safety Guide Series No. NS-G-2.11, IAEA, Vienna (2006)
28.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Modifications to Nuclear Power Plants, Safety Guide Series No NS-G-2.3, IAEA, Vienna (2001)
29.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, Safety Guide Series No NS-G-2.8, IAEA, Vienna (2002)
30.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Environmental and Source Monitoring for Purposes of Radiation Protection, Safety Guide Series No. RS-G-1.8, IAEA, Vienna (2005)
31.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Radiation Generators and Sealed Radioactive Sources, Safety Guide Series No. RS-G-1.10, IAEA, Vienna (2008)
32.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Borehole Disposal Facilities for Radioactive Waste, Safety Guide Series No SSG-1, IAEA, Vienna (2009)
33.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Deterministic Safety Analysis for Nuclear Power Plants, Specific Safety Guides Series No. SSG-2, IAEA, Vienna (2010)
34.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide Series No. SSG-3, IAEA, Vienna (2010)
35.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide Series No. SSG-4, IAEA, Vienna (2010)
36.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Conversion Facilities and Uranium Enrichment Facilities, Specific Safety Guide Series No. SSG-5, IAEA, Vienna (2010)
37.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Uranium Fuel Fabrication Facilities Specific Safety Guide Series No. SSG-6, IAEA, Vienna (2010)
38.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities, Specific Safety Guide Series No. SSG-7, IAEA, Vienna (2010)
39.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Licensing Process for Nuclear Installations, Specific Safety Guide Series No. SSG-12, IAEA, Vienna (2010)
40.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Geological Disposal Facilities for Radioactive Waste Specific Safety Guide Series No. SSG-14, IAEA, Vienna (2011)
41.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Storage of Spent Nuclear Fuel, Safety Guide Series No SSG-15 (Rev. 1), IAEA, Vienna (2020)
42.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Periodic Safety Review for Nuclear Power Plants, Safety Guide Series No SSG-25, IAEA, Vienna (2013)
43.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, Specific Safety Guide No SSG-26, IAEA, Vienna, (2014)
44.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Commissioning for Nuclear Power Plants, Safety Guide Series No. SSG-28, IAEA, Vienna (2014)

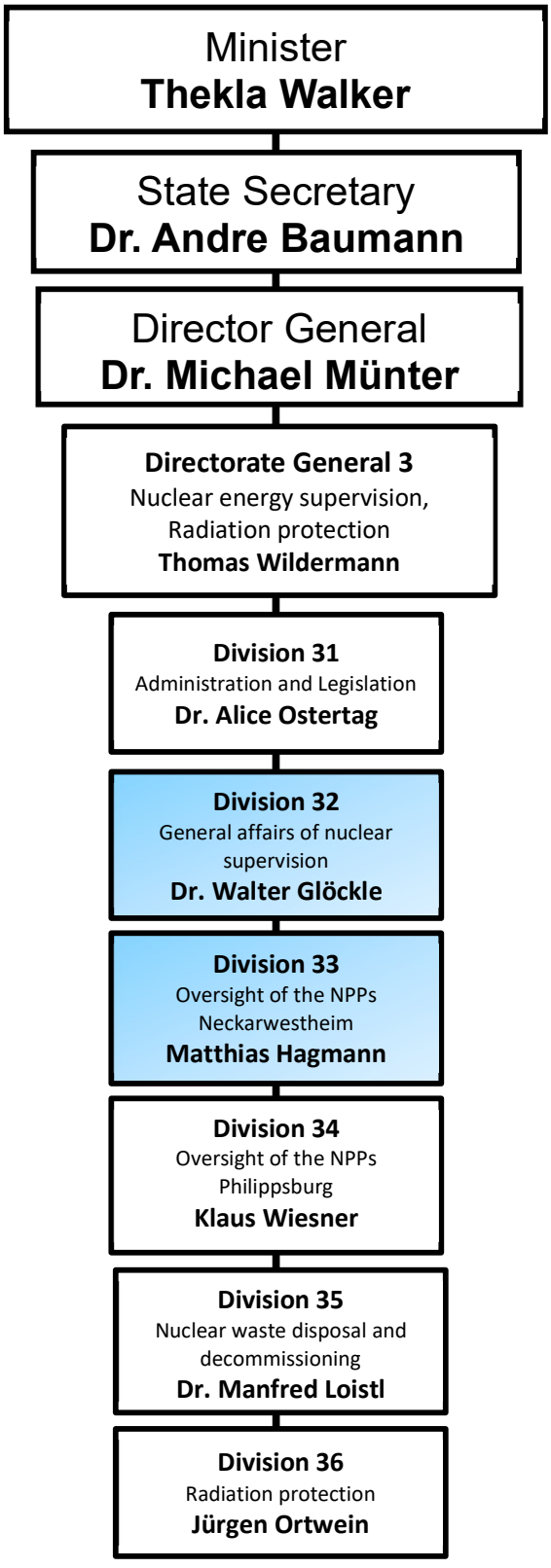
45.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Predisposal Management of Radioactive Waste from Nuclear Power Plants and Research Reactors, Safety Guide Series No SSG-40, IAEA, Vienna (2016)
46.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Predisposal Management of Radioactive Waste from Nuclear Fuel Cycle Facilities, Safety Guide Series No SSG-41, IAEA, Vienna (2016)
47.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Management of Waste from the Use of Radioactive Material in Medicine, Industry, Agriculture, Research and Education, Safety Guide Series No SSG-45, IAEA, Vienna (2019)
48.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiation Protection and Safety in Medical Uses of Ionizing Radiation, Safety Guide Series No SSG-46, IAEA, Vienna (2018)
49.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities, Safety Guide Series No SSG-47, IAEA, Vienna (2018)
50.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants, Safety Guide Series No SSG-48, IAEA, Vienna (2018)
51.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Decommissioning of Medical, Industrial and Research Facilities, Safety Guide Series No SSG-49, IAEA, Vienna (2019)
52.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Operating Experience Feedback for Nuclear Installations, Safety Guide Series No SSG-50, IAEA, Vienna (2019)
53.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Accident Management Programmes for Nuclear Power Plants, Safety Guide Series No SSG-54, IAEA, Vienna (2019)
54.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material, Safety Guide No TS-G-1.2 (2002)
55.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiation Protection Programmes for the Transport of Radioactive Material, Safety Guide No TS-G-1.3, IAEA, Vienna, (2007)
56.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - The Management System for the Safe Transport of Radioactive Material Safety Guide No TS-G-1.4, IAEA, Vienna, (2008)
57.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Compliance Assurance for the Safe Transport of Radioactive Material, Safety Guide No TS-G-1.5, IAEA, Vienna, (2009)
58.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material (2009 Edition), Safety Guide No TS-G-1.6 (Rev.1), IAEA, Vienna, (2014)
59.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Storage of Radioactive Waste, Safety Guide Series No WS-G-6.1, IAEA, Vienna (2006)
60.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, Safety Guide Series No.WS-G-5.2, IAEA, Vienna (2009)
61.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Storage of Radioactive Waste, Safety Guide Series No. WS-G-6.1, IAEA, Vienna (2006)

APPENDIX VIII – ORGANIZATIONAL CHART

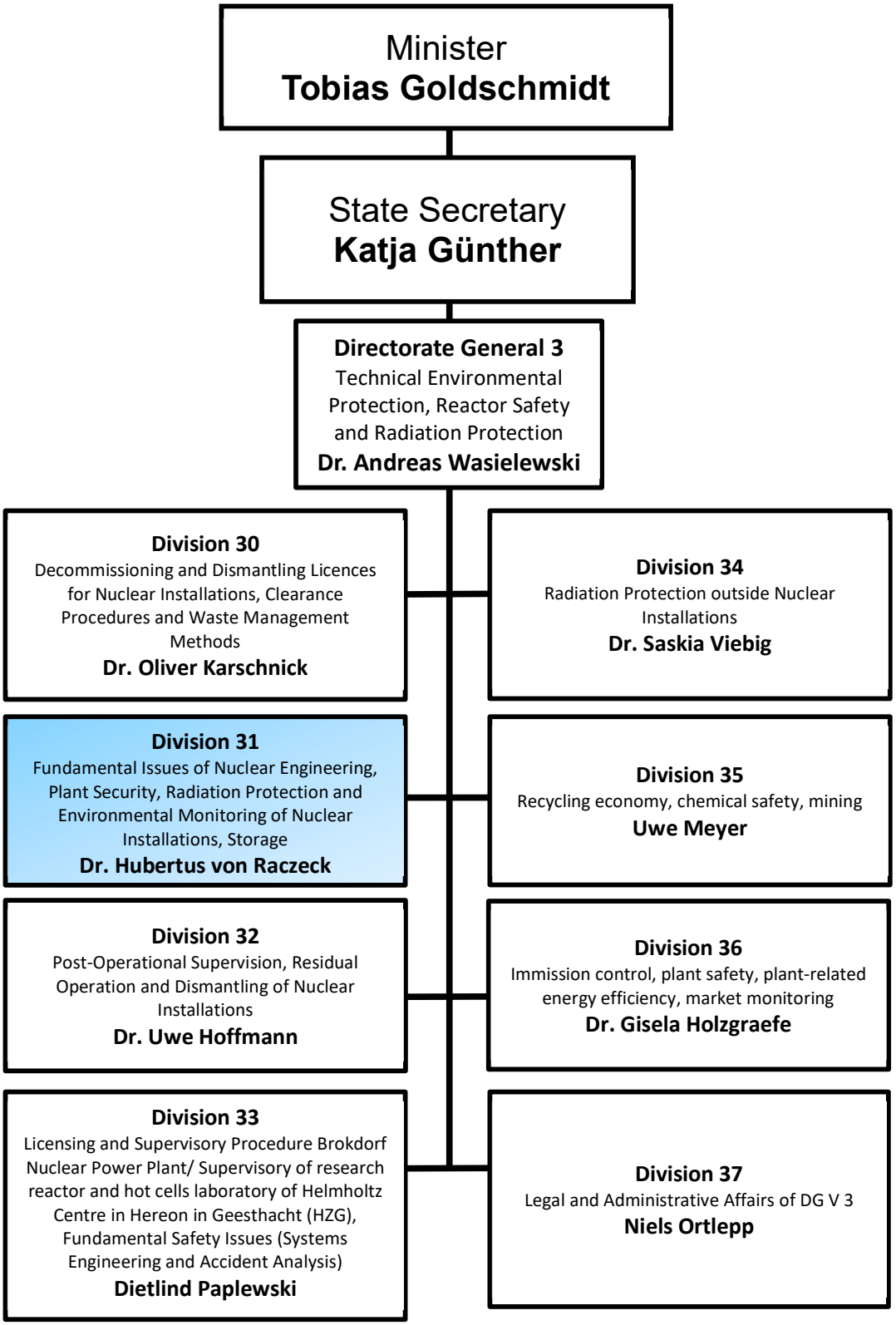
Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection



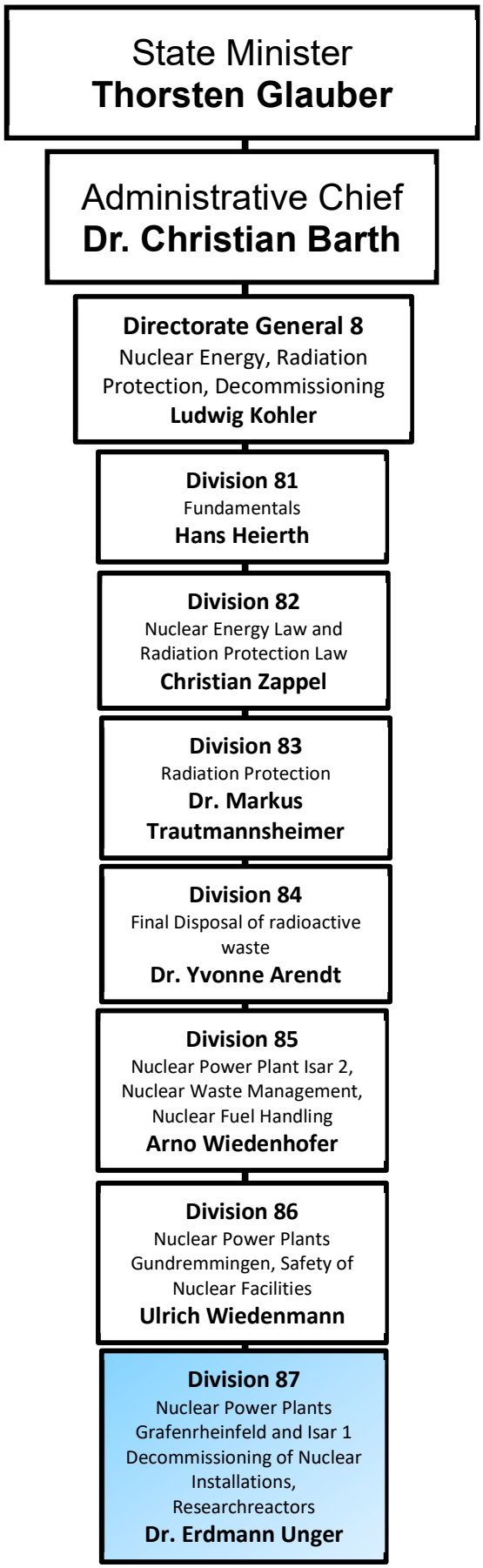
Baden Württemberg Ministry of the Environment, Climate Protection and the Energy Sector

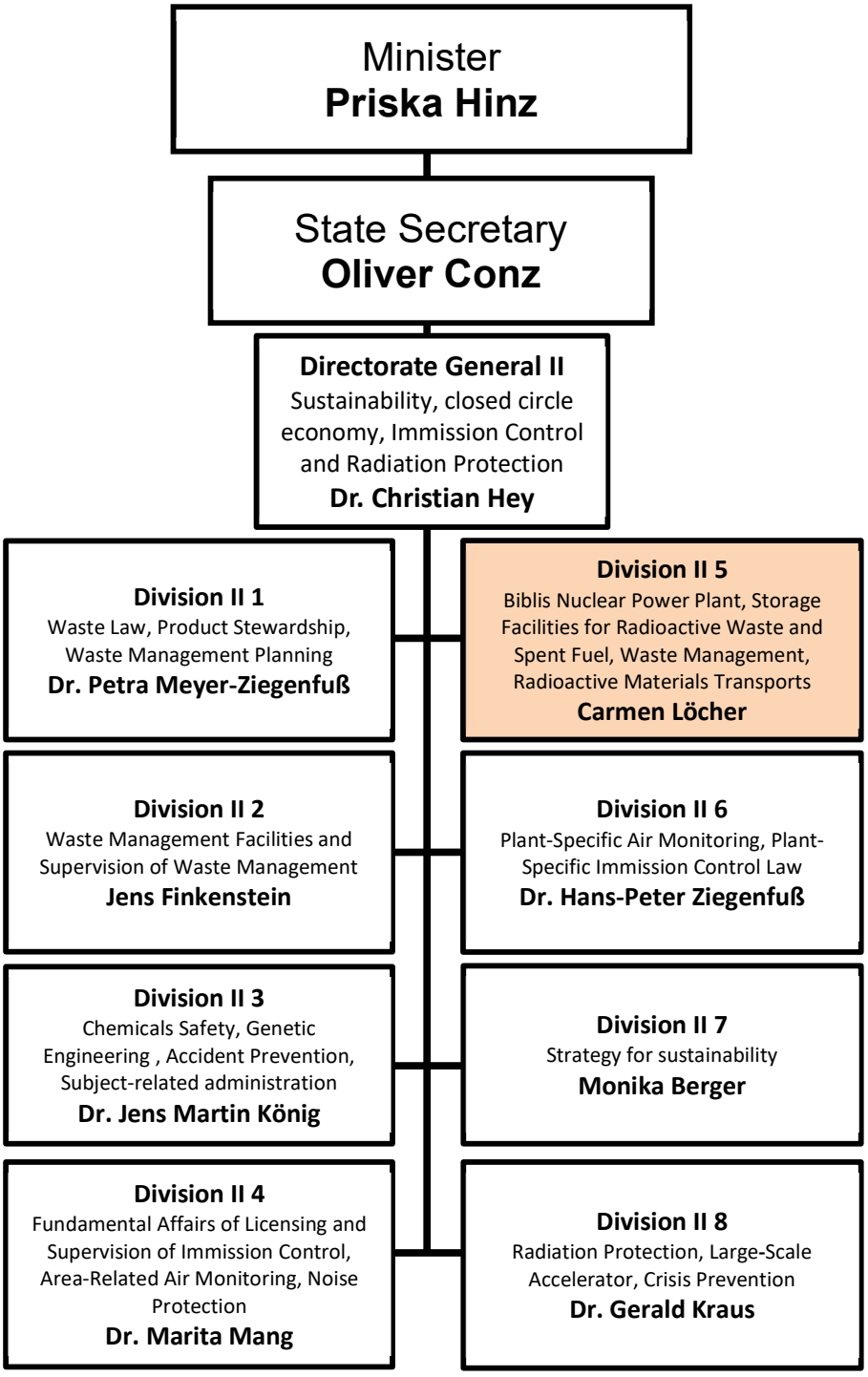


Schleswig-Holstein Ministry for Energy Transition, Climate Protection, Environment and Nature

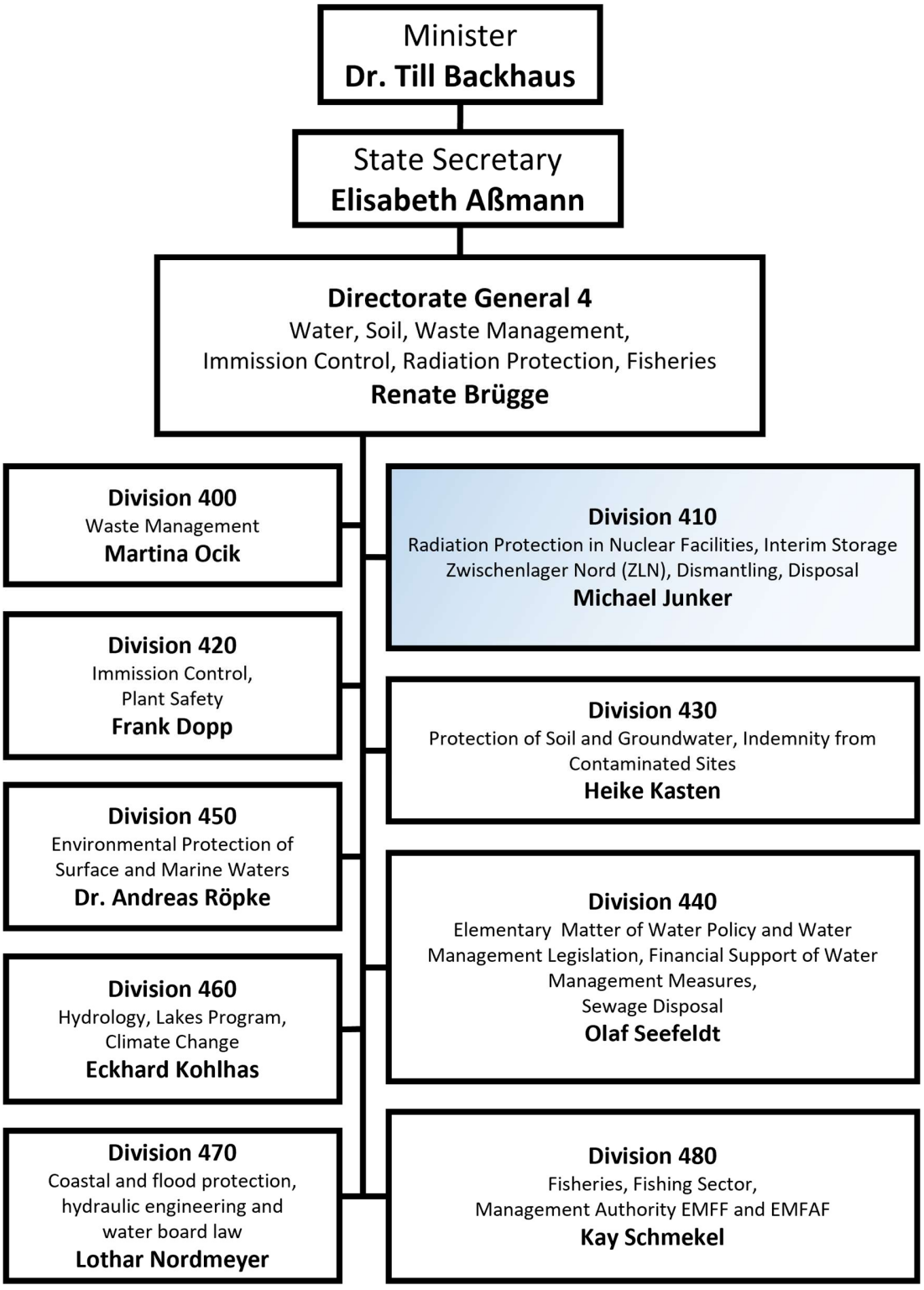


Bavarian State Ministry of the Environment and Consumer Protection

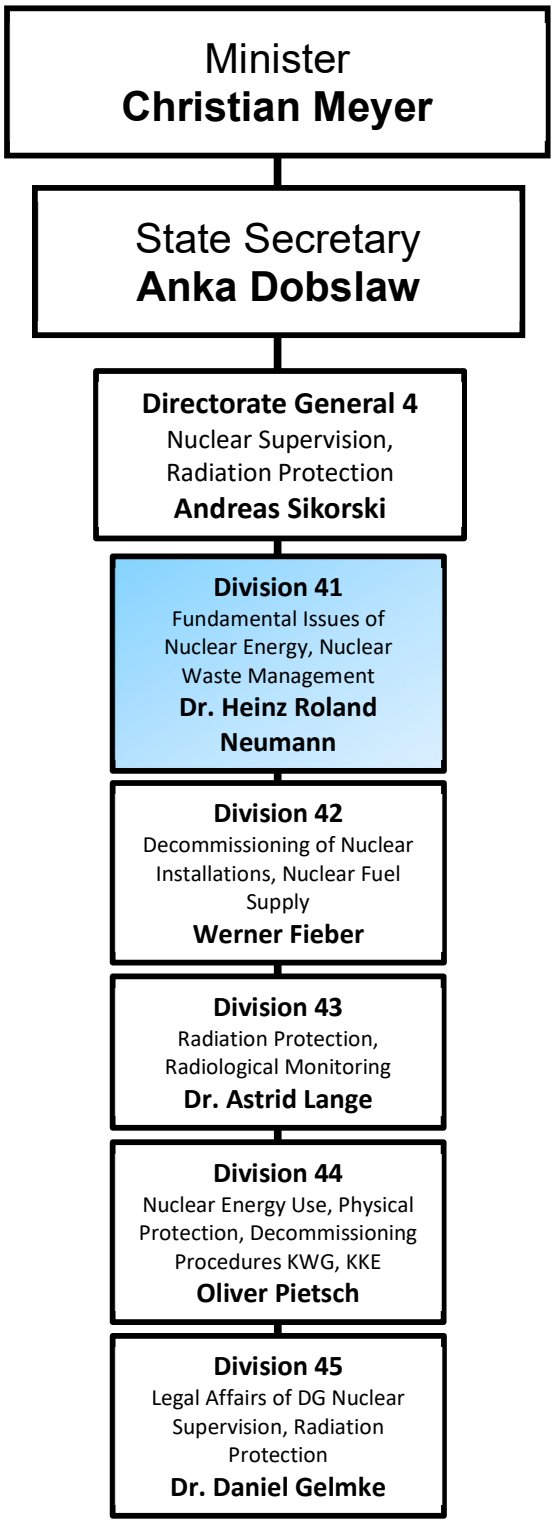



Minister
Priska Hinz
State Secretary
Oliver Conz
Directorate General II
Sustainability, closed circle economy, Immission Control and Radiation Protection
Dr. Christian Hey
Division II 1
Waste Law, Product Stewardship, Waste Management Planning
Dr. Petra Meyer-Ziegenfuß
Division II 5
Biblis Nuclear Power Plant, Storage Facilities for Radioactive Waste and Spent Fuel, Waste Management, Radioactive Materials Transports
Carmen Löcher
Division II 2
Waste Management Facilities and Supervision of Waste Management
Jens Finkenstein
Division II 6
Plant-Specific Air Monitoring, Plant-Specific Immission Control Law
Dr. Hans-Peter Ziegenfuß
Division II 3
Chemicals Safety, Genetic Engineering , Accident Prevention, Subject-related administration
Dr. Jens Martin König
Division II 7
Strategy for sustainability
Monika Berger
Division II 4
Fundamental Affairs of Licensing and Supervision of Immission Control, Area-Related Air Monitoring, Noise Protection
Dr. Marita Mang
Division II 8
Radiation Protection, Large-Scale Accelerator, Crisis Prevention
Dr. Gerald Kraus

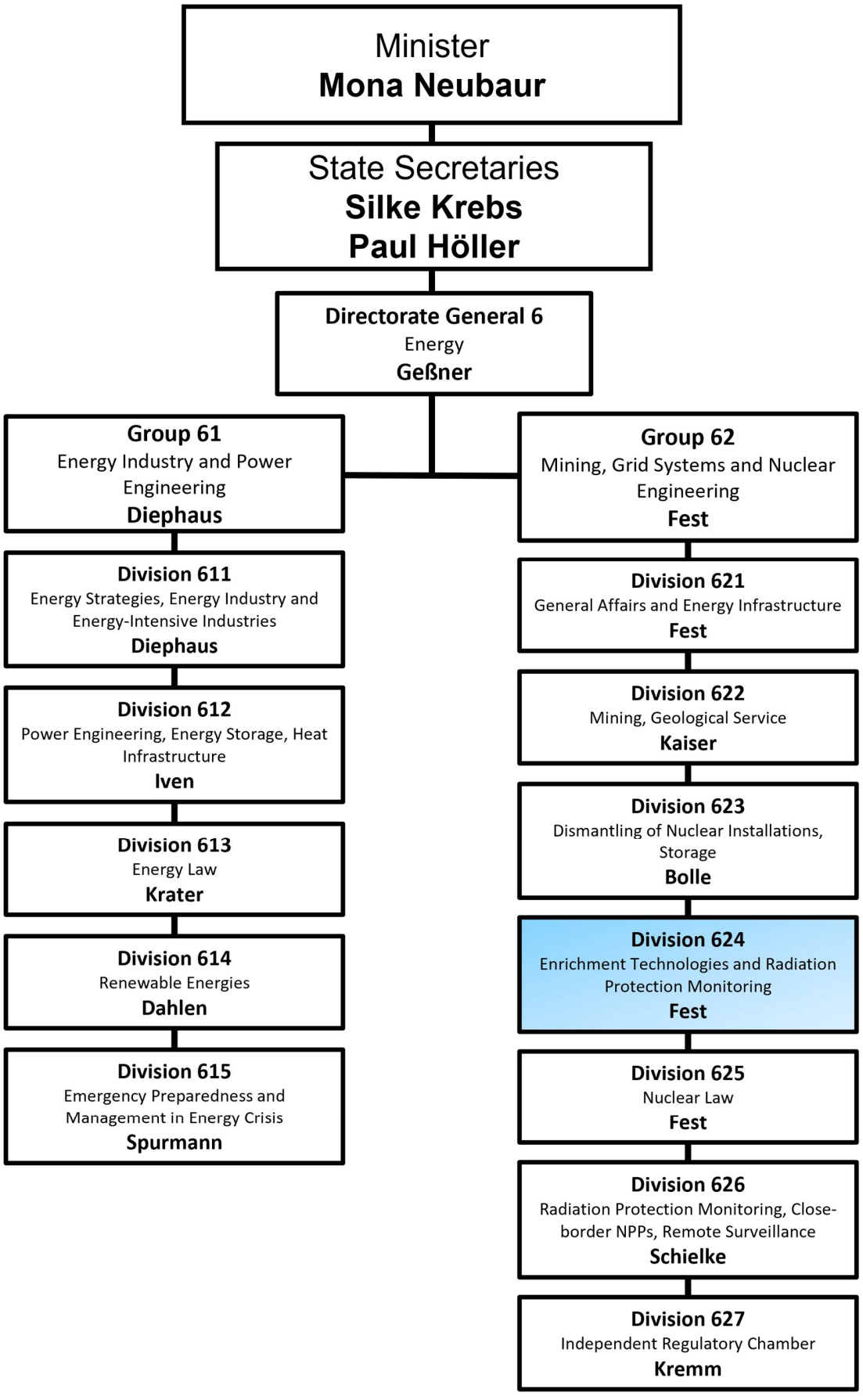
Mecklenburg-Vorpommern Ministry for Climate Protection, Agriculture, Rural Areas and the Environment



Ministry for the Environment, Energy and Climate Protection of the State of Lower Saxony



Ministry of Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia



Federal Office for the Safety of Nuclear Waste Management