ILK
INTERNATIONALE
LÄNDERKOMMISSION
KERNTECHNIK
Baden-Württemberg · Bayern · Hessen




ILK Report

on the Assessment of Nuclear Oversight Activities of the Ministry of Environment, Baden-Württemberg

Für deutsche Fassung bitte umdrehen!

December 2006
No.: ILK-28 E

Foreword

The International Committee on Nuclear Technology (Internationale Länderkommission Kerntechnik, ILK) was established by the three German states of Baden-Württemberg, Bavaria and Hesse in October 1999. It currently consists of 11 scientists and experts from Finland, France, Germany, Sweden, Switzerland and USA. The ILK acts as an independent and objective advisory body to the three German states on issues related to the safety of nuclear facilities, radioactive waste management and the risk assessment of the use of nuclear power. In this capacity, the Committee's main goal is to contribute to the maintenance and further development of the high, internationally recognised level of safety of nuclear power plants in the southern part of Germany.

One of the goals pursued by the ILK is to compare the German safety philosophy and concept with the internationally acknowledged practice. The ILK thus has performed an assessment of the nuclear oversight activity of the Ministry of the Environment Baden-Württemberg taking into account prevailing international regulatory approaches and the relevant IAEA requirements. In the current publication, which was adopted after the 44th ILK meeting held on November 15th, 2006 in Stuttgart, the ILK presents the results of this assessment, points out good practices and gives recommendations for the further improvement of regulatory activity.

The chairman

Dr.-Ing. Erwin Lindauer

ILK - Geschäftsstelle beim Bayerischen Landesamt für Umwelt

Bürgermeister-Ulrich-Str. 160
D-86179 Augsburg
Telefon: +49-173-65 707-11/-10
Telefax: +49-173-65 707-98/-96
E-Mail: info@ilk-online.org
http://www.ilk-online.org

Executive summary

The International Committee on Nuclear Technology (ILK) was asked to assess the oversight activities regarding nuclear power plants undertaken by the Ministry of the Environment (UM, "Umweltministerium") of the state of Baden-Württemberg. In Germany, the Federal Government as well as the federal states have responsibilities in licensing and oversight of nuclear installations. The focus of this investigation was on the adequacy of the practical oversight work performed by the federal state. Its goals were to

- compare the practices to internationally accepted approaches
- identify possible improvements and good practices.

The example of Baden–Württemberg was chosen in order to have a well defined reference. The two other states intend to utilize the results by transferring them as appropriate to their own practice.

The assessment was performed by studying relevant UM documentation and answers to questions forwarded by ILK members to UM, by interviews with UM staff and a discussion with managers of the licensee. Standards of the International Atomic Energy Agency (IAEA) as well as experiences derived from the international composition of the group of ILK members performing the assessment were used as a reference for international practices. The IAEA standards are also used as a reference by the Western European Nuclear Regulators' Association (WENRA) in its project on the harmonization of reactor safety.

In the opinion of the ILK, UM is a competent organization with motivated staff and it has the capability to deal with the oversight areas for which it is responsible. It has appropriate processes in place to cover the various areas of oversight over the nuclear power plants; these processes are applied and they are consistent with the requirements of the IAEA standards. This results in an effective oversight over the nuclear power plants in Baden-Württemberg. During the different stages of the assessment the UM staff displayed very good cooperation, openness in the discussion of their work and a great interest in its further improvement.

The group identified a number of good practices which have been recorded for the benefit of other nuclear regulatory authorities. They are as follows:

Relations between the regulatory body and the operator (chapter 2.3)

The annual meetings with licensees to discuss the annual inspection results, findings of TSOs, KOMFORT, the SMS report, safety performance indicators (even

Report

though these are at an early stage of development) and other observations as well as the regular meetings with the management of the licensee on strategic issues,

Staffing and training (chapter 3.2)

The way the present UM staffing level was determined through a detailed evaluation by an external consultant in 2002,

Organizational management of the regulatory body (chapter 3.3)

The manual for government oversight as a very precise and comprehensive document that reflects the licensing and oversight activities performed by UM,

Review and assessment of operational experience feedback (chapter 5.3)

The set up of a clearing group within UM in charge of the fast assessment of the safety significance of reportable events,

Publishing reportable events along with the UM's assessment of their safety significance on the UM website.

Performance of regulatory inspection (chapter 6.4)

The newly established "KOMFORT" inspection instrument, based on the experience of UM gathered in several workshops for setting it up, is good practice for assessing licensee's safety culture in routine plant activities.

The group made two suggestions to the UM:

Organizational management of the regulatory body (chapter 3.3)

A formal audit of the review and assessment process and of inspection and enforcement activities should be performed at appropriate intervals to draw lessons learned from the implementation of the oversight manual. This would also serve to better harmonize the practical work within and between UM and TSOs.

The UM should proceed in its efforts towards a more formal management system, e.g. by setting measurable performance objectives for its activities, by self-assessment and improving its quality management. The decision-making process concerning the processing of its findings should be described.

There are also recommendations by the group of ILK members:

Relations between the regulatory body and the public (chapter 2.4):

Since public communication is a key to public trust in the regulatory body, UM should become more proactive with direct contacts with the public.

Staffing and training (chapter 3.2)

UM should assure that it has continuously sufficient knowledge of results of research and developments (R&D) in the field of nuclear safety technology and radiation protection.

In addition to participating in cross-inspections or regulatory practice discussions in France or Switzerland, the UM should exchange its practices with the other federal state authorities.

UM should look for a more intensive involvement in the international exchange of information by

- *Participation in the development of IAEA safety standards and other IAEA activities,*
- *Taking an active part in the preparation of the German national report under the nuclear safety convention (CNS) and also participate at the review meeting,*
- *Continuing their involvement in WENRA and learning from the harmonization process.*

Safety culture of the regulatory body (chapter 3.4)

In order to harmonize the safety culture concept and application within the UM, it is recommended to develop a formal and systematic training course and have all UM staff attend it.

UM should check that safety culture is addressed in the same way in the training of their TSO's experts.

UM should start preparing its intended self-assessment after the training of the whole staff has been performed. The in-house expertise should be used for both the training course and the preparation for the self-assessment.

Report

Advisory bodies and technical support organizations (TSO) to the regulatory body (chapter 3.5)

The UM should strengthen the responsibility of the operator by

- *Increasing the amount of activities which the operator is allowed to do on his own.*
- *Rely to a larger extent on the operator's quality assurance instead of having it assured by the TSOs, thereby reducing the number of expert reviews and inspections requested from the TSOs.*

Performance of regulatory inspection (chapter 6.4)

UM should formalize courses for UM inspectors aiming at using KOMFORT indicators in a consistent way. In addition, it is recommended to include bottom-up communication in the tasks which are inspected in the indicator "seizing of leadership functions" and thereby extend it.

Emergency preparedness (chapter 7)

As already realized by the UM on their list of priority issues, emergency planning/ preparedness should be further improved by increasing the frequency of exercises between UM and each plant under its supervision and including from time to time a larger exercise involving one NPP, the UM and the regional board.

The good practices noted and the suggestions and recommendations given are intended to support the UM in assessing and further improving their work. Their number is in no way a measure of the status of the UM's oversight activities.

Introduction

The International Committee on Nuclear Technology (ILK) was asked to assess the oversight activities regarding nuclear power plants undertaken by the Ministry of the Environment (UM, *"Umweltministerium"*) of the state of Baden-Württemberg. The request according to the specification was *"to subject the performance of nuclear oversight of the state of Baden-Württemberg to an assessment. The assessment will essentially focus on the nuclear oversight concept as well as on practical oversight activity. The assessment is to take into account prevailing international regulatory approaches and also the relevant IAEA requirements."* In order to confine the scope of the assessment, the topics waste management and decommissioning, transport of radioactive waste, physical protection and facilities other than nuclear power plants were not part of this assessment.

The ILK charged a working group with the performance of the assessment. The group studied the relevant UM documentation [1] and received a large amount of written answers to questions put to the UM by the ILK members [1.4], as well as answers provided by the UM on parts of the IRRT questionnaire[1]. A subgroup of 5 ILK members performed interviews with UM staff from September 27 to 29, 2006, and held a discussion with managers of the licensee on September 30, 2006. The interviews with the UM staff took 2.5 days and involved 13 of the 52 staff members. In line with the international orientation of the assessment, IAEA Safety Requirements and Safety Guides [2] were used as much as possible as a reference, i.e., it was checked whether and how the requirements by the IAEA had been implemented in UM practice. IAEA Standards are also used as a reference by the WENRA project on the harmonization of reactor safety. In addition the members brought in their knowledge of the approaches in their countries and experiences from IRRT missions of the IAEA.

The assessment covered a large number of specific topics which are part of the oversight activity of the UM. Unless the working group identified procedures of the UM as either good practice and outstanding or made a recommendation on some of these areas, these topics will only be briefly mentioned in order to outline the scope of the assessment. The reader should bear in mind that this can lead to a seeming under-representation of important areas appropriately covered by the practices of UM.

[1] questionnaire used for interviews of authorities by the International Regulatory Review Teams (IRRT) of the IAEA

Report

1 Legislative and governmental responsibilities

1.1 Principal laws and other legal provisions

The constitution of the Federal Republic of Germany bestows the responsibility for regulation regarding "production and utilization of nuclear energy for peaceful purposes, construction and operation of facilities serving such purposes" [Art. 74(1) GG] on the Federal Government. The Atomic Energy Act (AtG, *"Atomgesetz"*) [3.1] comprises the general national regulations for the safety of nuclear installations in Germany and constitutes the basis for the associated ordinances. It stipulates the requirements for licensing and oversight of nuclear facilities. Since 2002 the licensing is restricted to modifications of existing plants, whereas new facilities for the commercial production of electricity will no longer be licensed. Ordinances based on the AtG include the Ordinance on Radiation Protection [3.2] and the Ordinance on the Nuclear Safety Officer and the Reporting of Accidents and other Events [3.3].

According to section 24 of the AtG, nuclear oversight is implemented by the individual federal states on behalf of the Federal Government, i.e., in Baden-Württemberg by the Ministry for the Environment (UM, *"Umweltministerium"*). The nuclear regulatory authority of the state has to comply with directives issued by the Federal Ministry for the Environment (BMU, *"Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit"*).

Nuclear regulatory regulations below the legal level were issued by the BMU after having consulted the states and with their consent. Presently the BMU, who is in charge of promoting regulations in Germany, has initiated a process of revision of the existing regulations. The experts recognized that it is certainly a major undertaking and that all competencies should be gathered for achieving such an objective in a timely manner. Although this report is directed at the UM and considering that the main experience from oversight lies with the regulatory authorities of the federal states, the experts made the recommendation in accordance with IAEA GS-R-1 (para 5.28 [2.1]) to the BMU, that the BMU should involve the UM more in the development of the new regulations in order to transfer its long experience in licensing and oversight into this development.

1.2 Position and resources of the regulatory body

The oversight over all nuclear facilities in Baden-Württemberg is assigned to the UM. The UM is answerable to the BMU and the BMU has the right to supervise the activities of the UM and to issue directives.

The AtG stipulates that costs are to be charged to the licensees for oversight activities. In addition, external expert's fees are to be reimbursed. The Ordinance on Cost under the Atomic Energy Act [3.4] gives further details. In Baden-Württemberg, a public-law contract between the UM and the licensees has been concluded which fixes a lump sum for each unit and year which, in total, covers almost all the related costs of the UM.

1.3 Independence of the regulatory body

In Baden-Württemberg, the UM is in charge of nuclear oversight and, since mid-2006, for licenses of nuclear installations. It has no activities related to the promotion of nuclear energy. UM staff does not participate in bodies or organizations that have the objective of promoting nuclear energy.

If experts from external organizations are enlisted, they have to confirm that their technical expertises are free from technical directives and the organizations have to be independent economically and with regard to their assessments.

2 Authority, responsibility and functions of the regulatory body

2.1 Authority and power assigned to the regulatory body

The authority and power assigned to the UM, as the nuclear regulatory body in the state of Baden-Württemberg, is based on the stipulations of the AtG [3.1], specifically in section 19. According to this section, the supervisory body shall assure compliance with the provisions of the AtG, related ordinances, orders and directives and terms and conditions of the license. The supervisory body and the authorized experts shall at all times have access to the plants, carry out all necessary examinations and request any necessary information. Furthermore, the supervisory authority may order protection measures and suspend operations. However, the UM has no authority to issue general guidelines or regulations.

2.2 The role of the regulatory body and the operator

The operator's legal position entails the fundamental obligation to ensure the safe operation of their facilities at their own responsibility. The government task of protecting life, health and property is fulfilled by licensing the operation of NPPs under certain conditions and overseeing that these conditions are respected.

Report

2.3 Relations between the regulatory body and the operator

According to its mission statement [1.3], the UM intends to cultivate a factual and open relationship and to conduct a constructive, yet critical dialog with the licensee. This relationship in the oversight process is also the subject of the continuous strategic dialog and meetings at management level between the UM and the licensee. The discussions by the ILK members with the UM management regarding the interface with its licensees showed that these regular meetings and the annual meeting at which the global evaluation of the installations' safety is discussed with the licensee management are particularly appreciated. The fact that the operators in their meeting with ILK members confirmed this approach and its usefulness lead to conclude the following good practice:

Basis: IAEA GS-R-1 (para 4.10, [2.1]):

"Mutual understanding and respect between the regulatory body and the operator, and a frank, open and yet formal relationship shall be fostered."

Good practice:

The annual meeting with licensees to discuss the annual inspection results, findings of TSOs, KOMFORT, the SMS report, safety performance indicators (even though these are at an early stage of development) and other observations as well as the regular meetings with the management of the licensee on strategic issues.

2.4 Relations between the regulatory body and the public

The mission statement [1.3] states that the UM intends to *"inform the general public in an objective, open and timely way"* and sees itself *"as a service provider for the general public"*. Accordingly, the UM publishes its oversight concept, monthly reports on its activities and notifiable events, along with its own safety assessment (see also chapter 5.4 for a related good practice), amongst other things, on its Internet website. While this approach is appreciated, the experts think the UM should look for more direct contact and communication with the general public to improve public trust in the work of the UM.

Basis: IAEA GS-G-1.1 (para 3.39, [2.3]):

"The regulatory body should be organized to provide public information concerning its activities, both on a regular basis and in relation to abnormal events. Information provided to the public should be factual and as objective as possible, reflecting the regulatory body's independence. The regulatory body should be

as open as possible while complying with national legislation on confidentiality. Public information should be managed by individuals with expertise in the field so as to ensure that the information provided is clear and comprehensible. In a large regulatory body, the establishment of a specialized public information unit should be considered."

Recommendation:

Since public communication is a key to public trust in the regulatory body, UM should become more proactive with direct contacts with the public.

3 Organization of the regulatory body

3.1 The organization of the regulatory body

The department responsible for nuclear oversight in the UM is the department 3 "Nuclear Oversight, Environmental Radioactivity" which consists of six divisions (see appendix 2). Division 33 deals with the oversight of nuclear power plants GKN I and GKN II and Obrigheim and division 34 covers KKP 1 and KKP 2. This organization concentrates the knowledge and the experience related to the plants in the responsible divisions. The tasks of the other divisions, i.e., administration and law (division 31), general matters of nuclear oversight (division 32), radioactive waste management and decommissioning (division 35) and environmental radioactivity and radiation protection (division 36), are partly applicable across divisions and thus also relate to oversight of the operational plants by division 33 and 34. This ensures that the same procedures are performed in a comparable way for all NPPs and unnecessary duplication of work is avoided. To support activities needed in different divisions, a clearing group for reportable events and coordinators who acquire special know-how for specific areas have been implemented permanently and temporary project groups are formed as needed.

3.2 Staffing and training

An actual examination of the task performance and staffing of the UM was undertaken in 2002 by management consultants. They identified tasks that should be given more attention. New positions were created, overlapping manning for several positions allowed for, and adjustment made by means of internal department transfers during the definition of new oversight activities, changes to the oversight program and set up of oversight priorities. Over 80% of the currently 52 employees are scientists and engineers. With regard to the increasing importance of organizational and personnel issues UM has appointed an organizational scientist and an industrial psychologist.

ILK considers a thorough analysis of the tasks and structure of an organization as the basis for staffing decisions as a good approach to implement the relevant IAEA requirements:

Basis: IAEA GS-R-1 (para 2.2 and 4.6, [2.1]):

(4) "The regulatory body shall be provided with adequate authority and power, and it shall be ensured that it has adequate staffing and financial resources to discharge its assigned responsibilities."

"The regulatory body shall employ a sufficient number of personnel with the necessary qualifications, experience and expertise to undertake its functions and responsibilities."

Good practice:

The way the present UM staffing level was determined through a detailed evaluation by an external consultant in 2002.

However, during the interviews, the experts were told that due to a general reduction of financial resources for the ministries by the state, staff cuts might be envisioned in the coming years. Based on IAEA GS-R-1, mentioned above, these envisioned staff cuts at the level of the UM should not be decided for department 3 without carefully examining the potential consequences on the functioning of the department, taking into account the evaluation from 2002.

Department 3 has an organized initial training program for new employees and a continuous training for the whole staff. The UM does not have its own R&D program in the field of nuclear energy and does not participate in other R&D programs. Also, the German government does not participate in advanced reactor research and development. To keep themselves informed on research results and recent developments in reactor safety and radiological protection the staff of department 3 utilizes conferences, the participation in meetings of ILK and RSK and literature, especially GRS reports. ILK is of the opinion that in order to stay informed on the latest state-of-the-art, special efforts are required.

Basis: IAEA GS-G-1.1 (para 3.33 and 3.34, [2.3]):

"The regulatory body may need to conduct or commission research and development work in support of its regulatory functions in such areas as inspection techniques and analytical methods or in developing new regulations and guides."

"The organizational structure of the regulatory body should reflect these needs for research and development, either by the establishment of a research unit or by recruiting staff who can define research and development needs, initiate, coordinate and monitor the necessary work, and evaluate the results. Regardless of how the research is carried out, the regulatory body should ensure that it is focused on regulatory needs, whether in the short or long term, and that the results are disseminated to the appropriate organizational units."

Recommendation:

UM should assure that it has continuously sufficient knowledge of results of research and developments (R&D) in the field of nuclear safety technology and radiation protection.

The information exchange with other organizations and especially the international cooperation are important means to maintain the knowledge of an authority at a high level [2.1], [3.5]. The UM cooperates in bilateral commissions with the neighboring countries France and Switzerland and has occasionally practiced cross-inspections[2]. One staff member was assigned to a national preparatory group for WENRA meetings. Following the discussion held on the topic of international cooperation, the experts found that UM to date had little contact to other regulators´ work, practices etc. and recommended:

Basis: IAEA GS-G-1.1 (para 3.41 to 3.43, [2.3]):

"International cooperation by the regulatory body, arranged by means of multilateral or bilateral agreements, may include exchange of information, mutual assistance in regulatory activities, staff training and regular staff meetings on specific subjects and other matters. Multilateral cooperation may involve different approaches, for example, regional approaches, multilateral approaches based on the design or type of the facilities concerned and approaches on the basis of common problems concerning safety."

"The regulatory body may also assist in fulfilling national obligations under international conventions. These obligations may require follow-up actions on the part of the regulatory body as appropriate."

"The regulatory body should participate in the preparation of international standards and may also serve as the contact body for international systems for the exchange of safety related information (such as the Incident Reporting System of the IAEA and the Nuclear Energy Agency of the Organization for Economic

[2] reciprocal participation of oversight staff at inspections in the respective other country

Co-operation and Development) in order to ensure the quality of information provided to these systems and to ensure the communication of information to and from operators and other governmental organizations."

Recommendation:

In addition to participating in cross-inspections or regulatory practice discussions in France or Switzerland, the UM should exchange its practices with the other federal state authorities.

UM should look for a more intensive involvement in the international exchange of information by

- Participation in the development of IAEA safety standards and other IAEA activities,
- Taking an active part in the preparation of the German national report under the nuclear safety convention (CNS) and also participate at the review meeting,
- Continuing their involvement in WENRA and learning from the harmonization process.

3.3 Organizational management of the regulatory body

Department 3 has laid down its perceived role and the execution of its oversight tasks in several documents [1]. Based on the mission statement of the department 3, the oversight concept [1.1] describes the legal framework of government oversight activities as well as the underlying safety philosophy and the methodological approach taken by the UM. The specific criteria and procedures for the oversight activity are the subject of the oversight manual [1.2]. The oversight activities are specified with process description, planned items and procedural instructions. There are graphical process illustrations available to assist many activity areas. The experts identified this as good practice:

Basis: IAEA GS-G-1.2 (para 3.2, [2.4]) and GS-G-1.3 (para 4.1, [2.5]):

"The regulatory body should provide internal guidance on the procedures to be followed in the review and assessment process and guidance on the safety objectives to be met."

"To ensure that all nuclear facilities in a State are inspected to a common standard and their level of safety is consistent, the regulatory body should provide its inspectors with written guidelines in sufficient detail."

Good practice:

The manual for government oversight is a very precise and comprehensive document that reflects the licensing and oversight activities performed by UM.

The procedures of the UM oversight manual are subjected to a continuous improvement process. However, the UM does not yet have a formal system to audit, review and monitor all aspects of its activities. Therefore, the ILK members made a suggestion:

Basis: IAEA GS-G-1.2 (para 4.2, [2.4]) and GS-G-1.3 (para 6.1, [2.5]):

"The regulatory body should have a system to audit, review and monitor all aspects of its review and assessment process so as to ensure that it is being carried out in a suitable and efficient manner and that any changes to the process necessitated by advances in knowledge or improvements in methods or for similar reasons are implemented."

"The regulatory body should have a system to audit, review and monitor all aspects of its inspection and enforcement activities so as to ensure that it is being carried out in a suitable and effective manner."

Suggestion:

A formal audit of the review and assessment process and of inspection and enforcement activities should be performed at appropriate intervals to draw lessons learned from the implementation of the oversight manual. This would also serve to better harmonize the practical work within and between UM and TSOs.

Department 3 has a structure which is described in the organization manual [1.5] and which contains a clear assignment of responsibilities, goals, means, methods and the important processes of the oversight task. This gives a good guidance to the staff members on how to perform their duties. A number of regular meetings at the department and the section levels serve to exchange information, the critique of and the learning from past actions as well as to prepare and plan future actions. These meetings and regular personnel talks between managers and their staff members for agreeing on individual goals are means to ensure that the members of the department work in a coordinated manner towards achieving departmental goals and according to the expectations of the UM management. These are important elements of an efficient management system and serve a relatively small organization unit with a good communication culture well. The department management is thinking of formalizing some as yet informal elements of this system to add to the clarity of processes and to increase the efficiency of the work. This approach is supported and the following suggestion is made:

Basis: IAEA R-1 (para 4.5, [2.1]) and GS-G-1.1 (para 3.9, [2.3]):

"The regulatory body shall establish and implement appropriate arrangements for a systematic approach to quality management which extend throughout the range of responsibilities and functions undertaken."

"For a regulatory body to fulfill its statutory obligations, it should develop a regulatory management system with the necessary arrangements for achieving and maintaining a high quality of performance in regulating the safety of nuclear facilities under its authority."

Suggestion:

The UM should proceed in its efforts towards a more formal management system, e.g. by setting measurable performance objectives for its activities, self-assessment and improving its quality management. The decision-making process concerning the processing of its findings should be described.

3.4 Safety culture of the regulatory body

During the assessment of safety culture by the ILK experts both the appraisal of the licensee's safety culture and relevant actions and the development of safety culture within the regulatory organization were considered. The discussions of the working group with the UM demonstrated an excellent understanding of the concept as well as the UM's existing commitment. Since the IAEA Safety Requirements and Guides specify safety culture requirements in many documents, the ILK members decided to use the ILK statement ILK-19 (recommendation 3.7 [3.6]) as a reference, which is based on the IAEA documents.

Basis: ILK statement ILK-19 (recommendation 3.7 [3.6]):

"The regulatory authorities and their technical support organizations should perform their own self-assessment regarding their supervisory activities and should develop appropriate action plans."

"The advantages for the authorities of performing a self-assessment are multiple. …Third, it allows the establishment of continuous training programs in safety culture common to both the authorities and the technical support organizations."

Recommendation:

In order to harmonize the safety culture concept and application within the UM, it is recommended to develop a formal and systematic training course and have all UM staff attend it.

UM should check that safety culture is addressed in the same way in the training of their TSO's experts.

UM should start preparing its intended self-assessment after the training of the whole staff has been performed. The in-house expertise should be used for both the training course and the preparation for the self-assessment.

3.5 Advisory bodies and technical support organizations (TSO) to the regulatory body

In 1999 Baden-Württemberg, along with Bavaria and Hesse, set up the International Committee on Nuclear Technology (ILK, *"Internationale Länderkommission Kerntechnik"*) as an independent scientific advisory committee to their regulatory bodies. In addition, the Reactor Safety Commission (RSK, *"Reaktorsicherheitskommission"*), the advisory body of the BMU, takes up topics of general interest to all regulatory bodies in Germany.

The AtG [3.1] provides for the possibility of consulting external experts or technical support organizations (TSO). Germany chose right from the start of nuclear oversight not to set up the specialized technical expertise within the regulatory body, but instead make use of the expertise of the TSOs. Therefore, the organization of the authorities' oversight in Germany is strongly based on TSOs. This allows to keep the organization of UM quite lean and to decrease the workload of the UM due to the number of license conditions. At the same time TSOs contracted by UM carry out a massive amount of routine tasks, checks and inspections. ILK is convinced that while an excellent oversight is achieved with this setup, valuable resources are wasted in the process. Major parts of the work made by TSOs can be considered as a duplication of operator's quality assurance activities. In order to strengthen the safety culture of the operator the tasks performed by TSOs can be reduced:

Basis: IAEA R-1 (para 5.13 [2.1]):

"The main purposes of regulatory inspection and enforcement are to ensure that:

(1) facilities, equipment and work performance meet all necessary requirements;

(2) relevant documents and instructions are valid and are being complied with;

(3) persons employed by the operator (including contractors) possess the necessary competence for the effective performance of their functions;

(4) deficiencies and deviations are identified and are corrected or justified without undue delay;

(5) any lessons learned are identified and propagated to other operators and suppliers and to the regulatory body as appropriate; and

(6) the operator is managing safety in a proper manner.

Regulatory inspections shall not diminish the operator's prime responsibility for safety or substitute for the control, supervision and verification activities that the operator must carry out."

Recommendation:

The UM should strengthen the responsibility of the operator by

- Increasing the amount of activities which the operator is allowed to do on his own.
- Rely to a larger extent on the operator's quality assurance instead of having it assured by the TSOs, thereby reducing the number of expert reviews and inspections requested from the TSOs.

4 Authorization process

4.1 Authorization for nuclear facilities

In Germany, each nuclear power plant is granted a license for operation. These licenses typically include a very large number of often very specific and detailed conditions which are designed to support the oversight process. A main focus of the oversight process is to verify whether these license conditions are complied with. Up until 2006, the UM was not primarily responsible for granting a license, however, they provided the main safety assessment and suggestions for license conditions.

4.2 Modification of equipment and operation

The operating license requires all modifications to a plant and its operation to be reported to the UM and checked for their safety relevance. This covers the technical equipment as well as organizational and procedural aspects such as organizational structure, limiting conditions for operation, operating and emergency procedures, etc. The UM set up a so-called state-wide standardized modification procedure which distinguishes four categories (A - D) of modifications according to the possible effect on the plant safety. Category A requires a modification of the license, for category B the approval of the UM is needed, category C modifications are assessed by the contracted TSO and the UM is informed about the result, and finally for category D the UM (or the TSO) is not involved. This approach ensures a detailed oversight of all

safety relevant changes to the plant and its operation. The categorization is based on detailed deterministic criteria. In rare cases, the licensee makes use of probabilistic analyses which then complement the deterministic methods. With regard to modifications of category C with low safety significance the ILK refers to the recommendation made in chapter 3.5 on strengthening the responsibility of the operator.

4.3 Authorization of selected licensee personnel

BMU guidelines specify the qualifications required for different groups of personnel in the NPP and the requirements on initial and continuing training. Some of these, particularly responsible shift personnel, are individually authorized by the UM. UM oversees the qualification activities of the licensee. In the case of shift personnel UM staff participates in the oral examination for authorization.

In 2003, the UM added a license condition stating that every 6 months the licensee has to report the staffing levels of the individual departments and staff groups. Additionally, every year a personnel development plan has to be provided by the licensee. These reports allow the UM to verify that the licensee ensures adequate staffing.

5 Review and assessment

5.1 Establishment and use of review and assessment criteria

Review and assessment has to be considered the main activity of the UM oversight process. Topics and areas which are subject to review and assessment are, for example, changes of the plant organization, technical modifications to the plant, including modifications of hardware, operational limits or procedures, notifiable events, outages and periodic safety reviews. In addition to the requirements of nuclear regulations and guidelines, the main review and assessment criteria are defined for the specific plant in the license. They include personnel-related and plant-related conditions and provisions, which are in most cases deterministic. Thus far, probabilistic criteria are rarely used in the oversight process; however, a probabilistic safety analysis is a major part of the periodic safety review (see chapter 5.4).

5.2 Management of review and assessment

In its oversight concept [1.1], the UM distinguishes between the basic oversight, activities caused by notifiable events or specific findings (see chapter 5.3), focal oversight topics which are defined on a case-by-case basis and vary in terms of frequency and regularity (see chapter 5.4), and the periodic safety review (see chapter

Report

5.4). The basic oversight deals with a total of 14 areas and procedures. Most of them cover broad areas. The following text gives a short characterization and does not aim for completeness.

One important aspect of the review and assessment process is the analysis of regular reports and information provided by the licensee. These include, for example, daily reports on the operational parameters and events, monthly reports covering e.g. operational data as well as the status of work regarding modifications in the plants, inventory of radioactive material or emission data and a number of reports to be submitted in larger intervals, amongst others on the evaluation of operating experience, in-service inspections and tests, personnel qualification and staffing. Beyond the consideration of individual safety relevant aspects, these reports also contribute to a comprehensive assessment of the safety performance by allowing to set up indicators (see chapter 5.4). In addition to the regular reports, there are also reports related to special events such as notifiable events, modifications, outages, etc.

To maintain a high quality of his activities, the licensee has a formal quality management system. Its organization and procedures are described in manuals. Regular audits are part of the system. The UM oversees the system and assesses changes to it intended by the licensee. UM checks the reports on the audits and has contracted a TSO to perform its own audits and to check the implementation of the quality measures by the licensee.

The proper technical state of the plant is controlled and maintained by the licensee by in-service inspections and tests and maintenance. This is done according to a manual for inspection and test and one for maintenance, which describe the organization of the activities, contain a list of inspections, tests and maintenance works and the individual inspection, testing and maintenance instructions. The first two parts, i.e., the general organization and the list of activities, are approved by the UM and modifications to them are done according to category B of the modification procedure. The individual instructions are checked by a TSO and the UM is informed on the result. The TSO attends part of the in-service inspections, tests and maintenance works, the UM inspects a smaller number in the framework of its inspection program. The UM is informed about deficiencies found during inspections, tests or maintenance, which may prompt an UM inspection. Regarding its own in-service inspections and tests, the licensee submits a report about twice a year to the UM; an assessment of this report is prepared by the TSO and submitted to the UM (see also recommendation in chapter 3.5).

A safety management system (SMS) was recently installed by the licensees. The UM reviewed the concept, the basic structures and the selected processes and

subsequently imposed a license condition regarding the application and improvement of this system. There are yearly meetings to discuss the results and the development of the SMS, which is regarded as good practice by the ILK, see chapter 2.3. Based on the experiences with the system, the UM intends to consider the possibilities of a more process-oriented oversight.

The licensee is in the process of developing an aging management system. Important elements of such a system, such as in-service inspections and tests, maintenance or stress monitoring, have always been in place and have also been part of the UM oversight. However, these elements were not incorporated into a comprehensive management system by the licensee. The UM follows the organizational measures of the licensee and checks their effectiveness on a sampling basis. Since this area is under development, the UM selected aging management as one of the areas with a dedicated coordinator.

The control of compliance with the provisions of the Radiation Protection Ordinance is of utmost importance in UM oversight and it is done on a regular basis. This is supported by a large number of specific check lists and process charts which provide a comprehensive and structured approach in order to cover all relevant aspects. In the view of the ILK experts, in some cases, the way this oversight function is performed seems quite formal, but is well in accordance with existing rules. It is ILK's opinion that the international contacts should be strengthened. In particular, the UM should seek the connection to the European ALARA-Network or use the ISOE database for operational exposures and participate more frequently in international meetings. (See chapter 3.2 for a recommendation concerning improvements of international information exchange.)

The annual outage of each nuclear power plant, including refueling, in-service inspections and tests and maintenance as well as modifications, requires special regulatory approaches. Due to the large number of activities and labor force (e.g. up to 1000 external workers present on-site) the UM requests the licensee to present detailed information on activities during outages, e.g. an outage program listing all activities, particularities of taking redundancies out of service, and a fuel loading schedule, which are reviewed by the UM and a TSO. In line with the extensive revision activities, the on-site oversight is also intensified. Prior to the restart, it is checked that all necessary safety requirements are met. These include the completion of testing and maintenance activities, updating of the operational procedures, full operability of all safety systems and core calculations demonstrating the safety of the core for the new cycle. Only when these requirements are fulfilled will the UM give the approval for restart as stipulated in the license conditions.

Report

With regard to all review and assessment activities, the recommendation in chapter 3.5 to increase the responsibility of the licensee is referred to.

5.3 Review and assessment of operational experience feedback

According to certain criteria the licensee is required to report events to the UM. UM has to verify whether these events are properly analyzed by the licensee and the appropriate actions are taken by the plant. In addition, the licensee analyses events in other (German and international) plants. The UM requires him to submit regular reports on his conclusions gained and actions taken. Following the events at the Philippsburg plant in 2001 the UM called upon the licensee to improve the feedback of experience and, as a result, the licensee introduced a system of holistic event analysis (GEA, *"ganzheitliche Ereignisanalyse"*). The UM verified the underlying concept and supervises the implementation of the results of the analyses. This is done by evaluating the annual licensee report, which is also a topic of an annual meeting with the licensee.

However, the UM also has to take its own actions regarding the safety significance and the possible implications of an event and to make sure that points which need further clarification are identified as carefully as the available information allows. For this purpose, UM has organized a clearing group with members of different divisions and with different qualifications and experience. This clearing group convenes to prepare a first assessment of the event. The composition of the group is adapted to the type of the event. It works according to a well-defined guideline. This approach allows the UM to efficiently use its available competence and to perform a quick and reliable assessment of the event. Apart from using it as a basis for its further actions, the UM publishes a description of the event along with its assessment on its internet site. This not only gives the public access to facts about the event but, at the same time, provides an assessment by the responsible supervising authority.

Basis: IAEA GS-G-1.2 (para 3.47, [2.4]):

"Reports on safety significant events should be thoroughly reviewed by the regulatory body."

Good Practice:

The set up of a clearing group within UM in charge of the fast assessment of the safety significance of reportable events.

Basis: IAEA GS-G-1.1 (para 3.39, [2.3]):

"The regulatory body should be organized to provide public information concerning its activities, both on a regular basis and in relation to abnormal events.

Information provided to the public should be factual and as objective as possible, reflecting the regulatory body's independence. The regulatory body should be as open as possible while complying with national legislation on confidentiality."

Good Practice:

Publishing reportable events along with the UM's assessment of their safety significance on the UM website.

5.4 Performance of major review and assessment tasks

In addition to the basic oversight process, described in chapter 5.2, and the event-induced oversight described in chapter 5.3, focal oversight activities are defined by the UM on a case-by-case basis in order to perform comprehensive, targeted and in-depth assessments and inspections of particular plant areas, component groups or parts of the operating regime. Focal oversight activities can be based on findings, e.g. from other plants, or be planned for issues which require a coherent and in-depth assessment (proactive oversight). These oversight activities take time and effort and in particular require substantial contributions from the licensee. They are agreed upon with the licensee and performed as a project with a cross-division project group within the UM. Previous oversight activities covered aspects such as fire protection, austenitic coolant pipes and activities in the plant by third parties. As a result, numerous improvements were initiated.

While all assessments mentioned thus far look at specific aspects, there are also attempts to assess the plants' safety performance in a comprehensive manner. Starting in 2004, the UM began to collect a set of approx. 70 safety performance indicators, which are partly provided by the licensee. These indicators contain both direct information on the safety performance, e.g. non-availability of safety system components, and higher level indicators such as time taken to correct the operating manual. The results are discussed in the annual safety management meeting; however, long-term trend assessments are not yet available. The nuclear reactor remote monitoring system also provides data such as operating parameters or emissions, which in sum give a comprehensive picture of the current plant status.

The AtG requires a periodic safety review (PSR) to be undertaken every 10 years for each plant. Main parts of this review are the deterministic safety status analysis (SSA) and the probabilistic safety analysis (PSA). In the SSA, the actual status of safety-related systems is reviewed in order to determine whether the protection goals underlying the safety criteria for nuclear power plants are met in accordance with the state-of-the-art. Operation management and operating experience are evaluated as well. The PSA is used to review the plant safety level and to assess the balanced nature of the plant's safety concept.

6 Inspection and enforcement

6.1 Objectives of inspection and enforcement

Inspection and enforcement activities are undertaken by the UM in order to ensure that the licensee complies with e.g. the safety provisions of the radiation protection ordinance [3.2] and especially the conditions and provisions set forth in the licenses. They also serve to enable the UM staff to be aware of the status and progress of maintenance activities and modifications. In addition, the communication of UM staff with the staff of the licensee is important to gain a deeper understanding of current topics and possible problems.

6.2 Management of inspection

The UM does not sharply distinguish between assessment and inspection activities. Both areas are dealt within an organizational unit (plant division) by the same persons. As a result, the insight gained from inspections is available for assessments and vice versa. The UM does not enlist "resident inspectors". Neither do external experts have a permanent on-site presence. The on-site inspections are planned on the basis of an annual inspection program (see chapter 6.3). They are normally announced (with regard to schedule and subject areas), but individual facts are checked without announcement. Reactive inspections are performed especially after the occurrence of incidents as a supplement to these planned inspections. On-site inspections by external experts are very often carried out in relation to in-service inspections and tests or maintenance activities, but also cover control of operations management. The on-site UM inspections are documented in the AGAVE database, covering for example subject, findings and measures taken. Thus, this database provides a complete overview of inspections for each plant.

6.3 Inspection program for nuclear facilities

The inspection of the plants by UM staff is done on the basis of an inspection program which is set up annually for each plant. The framework for this program is given in the oversight manual. It specifies a total of 16 different inspection areas including operation management, in-service inspections and tests, emergency preparedness, handling of fuel elements and documentation. The manual describes the inspection goals for the different areas and the inspection activities to be performed. It also

gives guidance on the time required for the different areas, but this is modified plant-specifically and in particular is adapted to the findings of previous inspections. In total, an average of 48 man-days/year is envisaged per unit for inspection. Each inspection is documented by noting the topics inspected, the assessment and – where applicable – the actions taken or requested from the licensee. The reports are evaluated annually and represent one part of the assessment of the licensee's overall performance.

The inspections by TSO personnel in the areas of in-service inspections and tests and preventive maintenance, as contracted by the UM, are stipulated in the inspection and testing manual and the maintenance manual of the operator, both of which are subject to review and approval by the UM. The stipulations of the inspection and testing manual are usually based either on nuclear guidelines, e.g. KTA standards, license conditions of the individual plant or safety specifications which are submitted with the application for a license. Other fields of inspections by external experts, e.g. plant surveys or controls of operation management are defined by the UM according to inspection priorities, but often are not stipulated by nuclear guidelines or the license for the operation of each plant.

6.4 Performance of regulatory inspection

For each of the 16 fields of the inspection program, the necessary activities of the UM staff during the on-site visit are described in a detailed checklist which is part of the UM oversight manual. A structured approach is therefore provided. This allows for a comparison of the inspection results for a certain topic at different times, for instance by referring to the AGAVE database.

During plant inspections, observations are made and impressions gathered that relate to aspects of the plant staff's safety culture and go beyond the actual subject under inspection. Therefore in 2004 the UM developed the KOMFORT oversight tool (Catalogue for recording organizational and human factors during on-site inspections - *Katalog zur Erfassung organisationaler und menschlicher Faktoren bei Inspektionen vor Ort*) which supports the recording, documentation and analysis of certain organizational and personnel aspects. The KOMFORT tool uses a total of 8 indicators, including adherence to procedures, work load and interaction with the authorities. The indicators are evaluated during each on-site visit by UM staff according to their own expertise and supervision experience. The individual findings are not reported to the licensee; however, an annual feedback is given to the licensee using the annual discussion on safety management. The approach of the UM is considered as a good practice. In addition, a recommendation is given:

Basis: IAEA GS-G-1.3 (para 2.3 [2.5]):

"Regulatory inspection is performed to make an independent check on the operator and the state of the facility, and to provide a high level of confidence that operators are in compliance with the safety objectives prescribed or approved by the regulatory body. This should be achieved by confirming that:

(b) The operator has a strong and effective management, good safety culture and self-assessment systems for ensuring the safety of the facility and the protection of workers, the public and the environment."

Good Practice:

The newly established "KOMFORT" inspection instrument, based on the experience of UM gathered in several workshops for setting it up, is good practice for assessing licensee's safety culture in routine plant activities.

Basis: IAEA GS-G-1.3 (para 2.3 [2.5]):

"Regulatory inspection is performed to make an independent check on the operator and the state of the facility, and to provide a high level of confidence that operators are in compliance with the safety objectives prescribed or approved by the regulatory body. This should be achieved by confirming that:

(b) The operator has a strong and effective management, good safety culture and self-assessment systems for ensuring the safety of the facility and the protection of workers, the public and the environment."

Recommendation:

UM should formalize courses for UM inspectors in aiming at using KOMFORT indicators in a consistent way. In addition, it is recommended to include bottom-up communication in the tasks which are inspected in the indicator "seizing of leadership functions" and thereby extend it.

6.5 Regulatory enforcement

Enforcement actions may be necessary in case of deviations from acceptable situations. These may range from small findings, e.g. during inspections, to violations of laws or the license or might even pose threats to the public.

The routine action of the authority is to ask the licensee to take appropriate actions to eliminate the deviation. This may be done verbally or in writing and normally the

licensee complies without any formal regulatory steps being taken by the authority. The authority may also issue supplementary licensing conditions, which was done in a limited number of cases, e.g. to oblige the licensee to seek approval before significantly changing staffing levels. The licensee has the right to appeal such conditions at court.

For cases representing threats to public health and safety or violation of legal provisions, the authority can order the necessary actions.

The UM has also the possibility to impose fines, which so far happened twice.

7 Emergency preparedness

Disaster control measures serve the purpose of immediate danger defense. They are regionally limited and the respective state ministries of the interior hold responsibility for them for emergencies of all origins. The Ministry of the Interior is the highest disaster control authority in Baden-Württemberg. The specific regional board responsible for the respective nuclear power plant location is responsible for planning, coordination and, where applicable, for the directives of protective measures. The UM will assist the regional board in case of a nuclear emergency by determining the radiological situation and by providing recommendations with respect to radiation protection measures. The cooperation of the emergency organization within the UM with the responsible disaster control authorities (regional boards) is exercised regularly by means of disaster exercises.

Emergency preparedness measures can only be performed effectively if the participating personnel and organizations are properly qualified and prepared for these tasks. Therefore, corresponding training exercises are of particular importance and the experts made the recommendation:

Basis: IAEA GS-R-2 (para 5.31 to 5.36, [2.2]):

"The operator and the response organizations shall identify the knowledge, skills and abilities necessary to be able to perform the necessary functions [specified in GS-R-2]." "Exercise programs shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces … are tested at suitable intervals." "The staff responsible for critical response functions … shall participate in a training exercise or drill at least once every year." "The officials off the site responsible for making decisions on protective actions for the population … shall be trained in the strategy for protective action and shall regularly participate in exercises."

Report

Recommendation:

As already realized by the UM on their list of priority issues, emergency planning/preparedness should be further improved by increasing the frequency of exercises between UM and each plant under its supervision and including from time to time a larger exercise involving one NPP, the UM and the regional board.

8 Conclusions

The review of the nuclear oversight process in Baden-Württemberg showed that the UM applies appropriate processes to cover the different areas of oversight over the NPPs and these processes are consistent with the requirements of the IAEA standards. No areas were identified where the UM lacks information needed to properly assess the licensee safety performance. The UM has the staff, the competence and the financial means to perform its duties. This results in an effective oversight over the nuclear power plants in Baden-Württemberg.

During the different stages of the assessment the UM staff displayed very good cooperation, openness in the discussion of their work and a great interest in its further improvement.

Several good practices were identified and recommendations were given on how the work of the UM can be further improved.

Appendix 1: Reference material

[1] Reference material provided by UM:

[1.1] UM (Umweltministerium): *"Concept for government oversight of nuclear power plants in Baden-Württemberg (Oversight Concept)"*, Baden-Württemberg Ministry of the Environment, Stuttgart, March 2006 [Translation of German version, see also: *"http://www.um.baden-wuerttemberg.de/servlet/is/3694/ Aufsichtskonzeption.pdf?command=downloadContent&filename=Aufsichts-konzeption.pdf"* for the German version]

[1.2] UM (Umweltministerium): *"Manual for government oversight of nuclear power plants in Baden-Württemberg (Oversight Manual)"*, Baden-Württemberg Ministry of the Environment, Stuttgart, March 2006 [Translation of excerpts of German version; internal use only]

[1.3] UM (Umweltministerium): *"Mission statement for the department Nuclear Oversight, Environment Radioactivity"*, Baden-Württemberg Ministry of the Environment, Stuttgart, March 2001 [Translation of German version; see also: *"http://www.um.baden-wuerttemberg.de/servlet/is/15968/Leitbild.pdf?command=downloadContent&filename=Leitbild.pdf"* for the German version]

[1.4] UM (Umweltministerium): *"Answers to questions by ILK members"*, Baden-Württemberg Ministry of the Environment, Stuttgart, June 2006 [Translation of German version; internal use only]

[1.5] UM (Umweltministerium): *"Handbuch für die Organisation der Abteilung Kernenergieaufsicht, Umweltradioaktivität"* (Organizational manual for the department Nuclear Oversight, Environment Radioactivity), Baden-Württemberg Ministry of the Environment, Stuttgart, June 2004 [German version only; internal use only]

[2] IAEA reference material:

[2.1] IAEA (International Atomic Energy Agency): *"Legal and governmental infrastructure for nuclear, radiation, radioactive waste and transport safety"*, IAEA Safety Standard Series GS-R-1, Vienna, 2000

[2.2] IAEA (International Atomic Energy Agency): *"Preparedness and response for a nuclear or radiological emergency"*, IAEA Safety Standard Series GS-R-2, Vienna, 2000

[2.3] IAEA (International Atomic Energy Agency): *"Organization and staffing of the regulatory body for nuclear facilities"*, IAEA Safety Standard Series GS-G-1.1, Vienna, 2002

Report

[2.4] IAEA (International Atomic Energy Agency): *"Review and Assessment of Nuclear Facilities by the Regulatory Body"*, IAEA Safety Standard Series GS-G-1.2, Vienna, 2002

[2.5] IAEA (International Atomic Energy Agency): *"Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body"*, IAEA Safety Standard Series GS-G-1.3, Vienna, 2002

[2.6] IAEA (International Atomic Energy Agency): *"Documentation for Use in Regulating Nuclear Facilities"*, IAEA Safety Standard Series GS-G-1.4, Vienna, 2002

[3] Additional reference material

[3.1] BMU (Bundesumweltministerium): *"Atomic Energy Act (AtG): Act on the Peaceful Utilization of Atomic Energy and the Protection against its Hazards"* of December 23, 1959 (Federal Law Gazette, Part I, page 814), as Amended and Promulgated on July 15, 1985 (Federal Law Gazette, Part I, page 1565), Last Amendment by Art. 1 G of August 12, 2005 (Federal Law Gazette, Part I, page 2365)

[3.2] BMU (Bundesumweltministerium): "Verordnung über den Schutz vor Schäden durch ionisierende Strahlen (Strahlenschutzverordnung- StrlSchV) [*"Ordinance on the Protection against Damage and Injuries Caused by Ionizing Radiation (Radiation Protection Ordinance)*"] of July 20, 2001, last amendment of August 12, 2005 [German version only]

[3.3] BMU (Bundesumweltministerium): *"Ordinance on the Nuclear Safety Officer and the Reporting of Accidents and other Events (Nuclear Safety Officer and Reporting Ordinance - AtSMV)"* of October 14, 1992, last Amendment of June 18, 2002

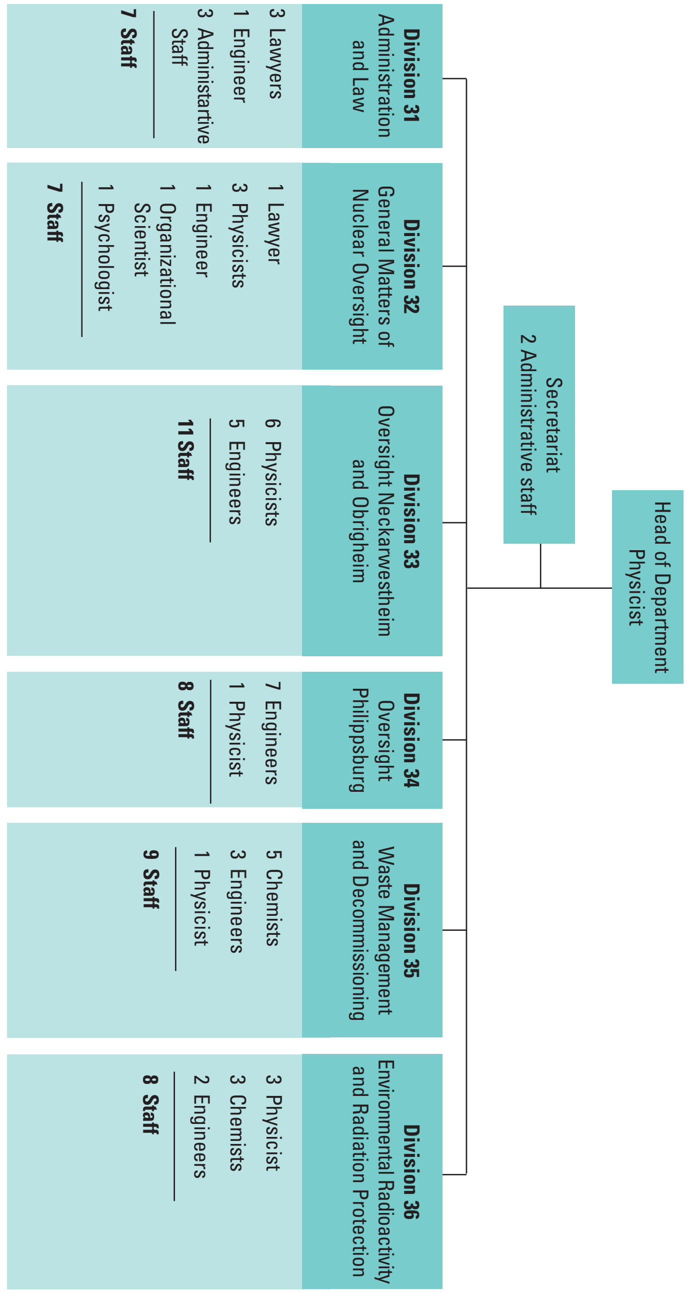
[3.4] BMU (Bundesumweltministerium): "Kostenverordnung zum Atomgesetz (AtKostV)" [*"Ordinance on Costs under the Atomic Energy Act"*] of December 17, 1981, last Amendment of December 15, 2004 [German version only]

[3.5] ILK (International Committee on Nuclear Technology): *"ILK Recommendation on the Promotion of International Technical and Scientific Contacts of the Nuclear Safety Authorities of the German States"*, ILK-5, Augsburg, October 2001

[3.6] ILK (International Committee on Nuclear Technology): *"ILK Statement on the Regulator's Management of the Licensee Self-Assessments of Safety Culture"*, ILK-19, Augsburg, January 2005

Appendix 2: Organizational chart of UM department 3

Organization of the Department Nuclear Oversight, Environmental Radioactivity



Date 1.11.2005

Report

Appendix 3: List of abbreviations

ALARA	As low as reasonably achievable
AtG	*Atomgesetz* – (German) Atomic Energy Act
BMU	*Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit* Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
GG	*Grundgesetz* (German) Basic Constitutional Law
GKN I / GKN II	NPP Neckarwestheim I, resp. NPP Neckarwestheim II
GRS	Gesellschaft für Anlagen- und Reaktorsicherheit mbH
IAEA	International Atomic Energy Agency
ILK	*Internationale Länderkommission Kerntechnik Baden-Württemberg, Bayern und Hessen – ILK –* International Committee on Nuclear Technology, Baden-Württemberg, Bavaria and Hesse – ILK –
IRRT	International Regulatory Review Team (by IAEA)
ISOE	Information System on Occupational Exposure (by OECD-NEA)
KOMFORT	*Katalog zur Erfassung organisationaler und menschlicher Faktoren bei Inspektionen vor Ort* Catalogue for recording organizational and human factors during on-site inspections
KKP 1 / KKP 2	NPP Philippsburg 1, resp. NPP Philippsburg 2
KTA	*Kerntechnischer Ausschuss* Nuclear Safety Standards Commission
NPP	Nuclear power plant
PSA	Probabilistic safety analysis
RSK	*Reaktor-Sicherheitskommission* German Reactor Safety Commission
SMS	Safety management system
SSA	Safety status analysis

TSO	Technical support organization
UM	*Umweltministerium Baden-Württemberg* Ministry for the Environment Baden-Württemberg
WENRA	Western European Nuclear Regulators' Association

1. **Prof. Dr. George Apostolakis, USA**
   Professor of Nuclear Engineering and of Engineering Systems at the Massachusetts Institute of Technology (MIT) in Cambridge, USA
2. **Prof. Dr. phil., Dr.-Ing. E.h. Adolf Birkhofer, Germany**
   Managing Director of the ISaR Institute for Safety and Reliability GmbH
   Chair for Reactor Dynamics and Reactor Safety at the Technical University of Munich
3. **Annick Carnino, France**
   Former Director of the Division of Nuclear Installations Safety at the IAEA
4. **Jean-Claude Chevallon, France**
   Former Vice President "Nuclear Power Generation" at EDF, France
5. **Prof. Dr.-Ing. habil. Hans Dieter Fischer, Germany**
   Holder of the Chair for Communication Theory at the Ruhr-University Bochum
6. **Bo Gustafsson, Sweden**
   Chairman Board of Directors, SKB International Consultants AB, Sweden
7. **Prof. Dr. rer. nat. habil. Winfried Hacker, Germany**
   Former Professor for General Psychology at the Technical University of Dresden
8. **Prof. Dr.-Ing. habil. Wolfgang Kröger, Switzerland**
   Chair for Safety Technology and Director of Laboratory for Safety Analysis at the ETH Zurich
9. **Dr.-Ing. Erwin Lindauer, Germany** (Chairman)
   Former Chief Executive Officer of the GfS Gesellschaft für Simulatorschulung mbH
   Former Chief Executive Officer of the KSG Kraftwerks-Simulator-Gesellschaft mbH
10. **Dr. Serge Prêtre, Switzerland** (Vice Chairman)
    Former Director of the Swiss Nuclear Safety Inspectorate (HSK)
    Chairman of the ILK From December 2000 to January 2006
11. **Antero Tamminen, Finland**
    Former long-time Technical Manager at Loviisa NPP, Finland

(Members are listed in alphabetical order)

ILK-01 ILK Statement on the Transportation of Spent Fuel Elements and Vitrified High Level Waste (July 2000)

ILK-02 ILK Statement on the Final Storage of Radioactive Waste (July 2000)

ILK-03 ILK Statement on the Safety of Nuclear Energy Utilisation in Germany (July 2000)

ILK-04 ILK Recommendations on the Use of Probabilistic Safety Assessments in Nuclear Licensing and Supervision Processes (May 2001)

ILK-05 ILK Recommendation on the Promotion of International Technical and Scientific Contacts of the Nuclear Safety Authorities of the German States (October 2001)

ILK-06 ILK Statement on the Draft Amendment dating from July 5, 2001 to the Atomic Energy Act (October 2001)

ILK-07 ILK Statement on Reprocessing of Spent Fuel Elements (November 2001)

ILK-08 ILK Statement on the Potential Suitability of the Gorleben Site as a Deep Repository for Radioactive Waste (January 2002)

ILK-09 ILK Statement on the General Conclusions Drawn from the KKP 2 Incidents associated with the Refueling Outage of 2001 (May 2002)

ILK-10 ILK Statement on the Handling of the GRS Catalog of Questions on the "Practice of Safety Management in German Nuclear Power Plants" (July 2002)

ILK-11 ILK Recommendation on Performing International Reviews in the Field of Nuclear Safety in Germany (September 2002)

ILK-12 Internal ILK-Report on the Intentional Crash of Commercial Airliners on Nuclear Power Plants (March 2003)

ILK-13 ILK Statement on the Proposals for EU Council Directives on Nuclear Safety and on Radioactive Waste Management (May 2003)

ILK-14 ILK Statement on the Recommendations of the Committee on a Selection Procedure for Repository Sites (AkEnd) (September 2003)

ILK-15 ILK Recommendation on the Avoidance of Dependent Failures of Digital I&C Protection Systems (September 2003)

ILK-16 ILK Statement on Sustainability Evaluation of Nuclear Energy and other Electricity Supply Technologies (January 2004)

ILK-17 ILK Statement on Maintaining Competence in the Field of Nuclear Engineering in Germany (March 2004)

ILK Publications

ILK-18 ILK Summary Report of the 2nd International ILK Symposium „Harmonisation of Nuclear Safety Approaches – A Chance for Achieving more Transparency and Effectiveness?" (May 2004)

ILK-19 ILK Statement on the Regulator's Management of the Licensee Self-Assessments of Safety Culture (January 2005)

ILK-20 ILK Statement on Requirements on Anticipated Transients without Scram (ATWS) (March 2005)

ILK-21 ILK-Report: Summary of the International ILK Workshop „Sustainability" (May 2005)

ILK-22 ILK Recommendations on Requirements on Updated General Nuclear Regulatory Guidelines in Germany (July 2005)

ILK-23 ILK Statement on determining Operating Periods for Nuclear Power Plants in Germany (September 2005)

ILK-24 ILK Statement on the Utilization of Nuclear Energy in Germany (November 2005)

ILK-25 ILK Recommendation on the Revitalisation of the Repository Projects Gorleben and Konrad (November 2005)

ILK-26 ILK Statement on the Impacts of the Chernobyl Accident – An Inventory after 20 years (January 2006)

ILK-27 ILK Recommendations on the Further Development of Periodic Safety Reviews in Germany (November 2006)

ILK-28 ILK Report on the Assessment of Nuclear Oversight Activities of the Ministry of Environment, Baden-Württemberg (December 2006)

- CD with presentations held at the ILK Symposium "Opportunities and Risks of Nuclear Power" in April 2001
- Proceedings of presentations held at the 2nd ILK Symposium "Harmonisation of Nuclear Safety Approaches – A Chance for Achieving more Transparency and Effectiveness?" in October 2003

Please visit our website http://www.ilk-online.org to view our most recent publications and to download or order the listed recommendations and statements free of charge.

We would like to point you to the page „News" on our website for more details on the topics currently being treated by the ILK.