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

Questions and Comments in 2009 on the National Report posed to Germany

No	Article / Reference	Comment or Question	Answer
1	17	Is there a difference between “monitoring” and “routine measurement of the environmental media air, water soil” after the closure of a disposal facility?	There is no difference between these two terms. The mentioned routine measurement describes the way monitoring will take place. The use of different terms lines out that no special control and surveillance programme is required and only the routine measurements usual in Germany take place.
2	22	Who is responsible for monitoring arrangements – if there are any – after closure of a disposal facility?	Post closure measures only comprise routine measurements which are carried out by the *Laender* (federal states). This does not mean that monitoring is considered to be necessary.
3	32	When is the backfilling of the Asse mine expected to be completed? Which material(s) are used for backfilling, for backfill support and for barrier structures? What kind of analyses and checks are provided to assure long-term safety?	On 05.11.2008, the Federal Government decided that the Asse mine has to be operated by the Federal Office for Radiation Protection (BfS) and be prepared for closure in accordance with the Atomic Energy Act (atomic law). The transition of responsibility from the Helmholtz Zentrum Muenchen (HMGU) to BfS took place on 01.01.2009. What closure concept will be chosen has not yet been decided. The overall goal is to examine and, if necessary, carry out further measures to improve the safety situation in the Asse mine. At present, complementary and alternative closure concepts are being evaluated. Latest rock mechanical computations predict stability until the year 2020 under certain terms and conditions. The concept of the former operator to close the Asse mine stipulates that the pit is flooded with a saturated saline solution. The suggested magnesium chloride saturated solution is in chemical equilibrium with the in-situ minerals and has a higher specific gravity than the influx solution. This so-called “protective fluid“ is projected to protect the rock salt from disintegration and corrosion. Due to the hydrostatic pressure of the protective fluid, also a mechanical stabilisation effect of the pit building is projected. In addition, the following backfill measures are suggested: filling remaining cavities with sorel concrete; installation of Mg-storage depots in the chambers to limit the radionuclide mobilisation, construction of sorel concrete flow barriers (drift seals) for limiting and guiding movements of the solution in the post-operation phase; the closure of shafts. To assure long-term safety, a total system performance assessment for the aforementioned closure concept has been carried out. This safety assessment includes, among others, geo-mechanical modelling, scenario analysis and nuclide transport modelling.

No	Article / Reference	Comment or Question	Answer
4	General	In different paragraphs (i.e. pages 73, 77, 84,88 and 90) the BfS is, at the same time the licensing authority for nuclear fuel storage , the applicant and the subsequent operator for a repository site. On one hand the BfS is advising the BMU regarding nuclear licensing procedures (except repository licensing), on the other hand the BfS is the licensee for a repository. On p. 94 it is stated that 'any possible conflicts of interest is precluded by… "self-surveillance"….: How is this 'self-surveillance' organised/managed in order to avoid in reality possible conflicts of interest from occurring.	The responsible body for the supervision of repositories – the *Endlagerueberwachung* (formerly *Eigenueberwachung* - self surveillance) – can work independently. This functional independence is defined in the internal rules of procedure of the Federal Office for Radiation Protection (BfS). The *Endlagerueberwachung* has an own budget and the possibility to contract own experts. The *Endlagerueberwachung* is authorised to issue instructions to the operator. For example, in the licence for the Konrad repository it is specified that the *Endlagerueberwachung* is authorised to issue instructions to the person accountable according to the atomic law. The statutory supervision as well as the legal and technical oversight are the responsibility of the president of the BfS who, in turn, is supervised by the BMU. The supervision of the president of the BfS – if required – only is carried out as the last instance to decide whether the position of the *Endlagerueberwachung* is to be followed by the operator.
5	27	Would you care to describe what is the procedure for action in case of detection of illicit trafficking of nuclear or radioactive material across the border or in case of detection of such in scrap metal?	As the solution to the illicit trafficking problem depends at least on the kind and the origin of the found radioactive material, the nuclide distribution, the activity and the measured dose rate, it is not possible to provide a single answer covering all possible cases. Instead, the procedure can best be illustrated using an example. It is assumed that e.g. an orphan Co-60 source inside a transport of scrap metal from abroad is detected at the German border (e.g. Co-60 activity 4 MBq, 10 µSv/h dose rate in contact with the outer container surface). This transporter will be stopped by custom officers and kept safe. A barrier around the transporter will be set up (e.g. at the 1 µSv/h or 5 µSv/h line). After that, a control measurement will be performed immediately by local authorities to exclude a false alarm. If the presence of a source is confirmed, the find must be reported to the nuclear supervisory authority or to the authority responsible for the public safety and order without delay according to § 71 of the Radiation Protection Ordinance (StrlSchV), because it exceeds the exemption limits of Appendix III, Table 1, Columns 2 and 3. Further measures will be discussed between the responsible local and federal authorities and the custom officers or the police. These measures can include safekeeping, return to sender or further transport licence. In any case, relevant prescriptions of the transport regulations and other parts of the regulatory framework are respected. It should be mentioned that orphan sources are not frequently found in Germany. If such an event occurs it is recorded as an incident or accident in the "Unusual events subject to reporting" database, which is annually issued by the Federal Office for Radiation Protection.

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6	27	Where is it stored the encountered nuclear or radioactive material and in what manner is it processed and under what financial arrangements?	The procedure after detection of nuclear or radioactive material depends on the individual case. Any orphan source that has been discovered e.g. in a scrap load will be kept safe, followed by the necessary leakage tests according to § 27 StrlSchV and packaging and transfer to the local State collecting facility (*Landessammelstelle*) operated by the respective *Land*. The State collecting facility takes title of the orphan Co-60 source, after which it is treated as appropriate, conditioned and kept in storage. It will be considered as radioactive waste. Financial arrangements are to be met with the consignor of the scrap metal transport prior to any action. If the radioactivity is caused by contamination on the material, e.g. by NORM contamination on metal scrap from the oil or gas industry, the procedure depends on the contamination level. If mass related exemption values are not exceeded, transport of the material to the consignee may be continued. It would then be left to the discretion of the consignee to decide whether to accept or reject the material. If the material exceeds exemption values, the procedure would be similar to the one for orphan sources.
7	Planned Activities p. 187, 133	The National Waste Management Plan in preparation at the BMU and scheduled for presentation to the Bundestag in the first half of 2009 may not include a definitive statement concerning Gorleben or alternative sites. However, more may be known at the time of the May 2009 Meeting on the Joint Convention. Will the Plan include site selection process options for the consideration of the government?	The progress of the waste management plan has reached a stage in which a consensual decision about the disposal concept for heat-generating waste is necessary for its completion. The waste management plan may be completed and presented to the German *Bundestag*, when a consensus on a disposal concept for this type of waste has been reached within the Federal Government.

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8	Planned Activities p. 4 & 244	The impact of former uranium mining on the territory of the former GDR has been undergoing remediation by Wismut GmbH since 1991 on waste heaps, sludges, open underground drifts and large areas of land. The volume of heaped waste and sludges concerned is reported as approximately 311 M m^3 and 160 M m^3 respectively. Considerable progress has been achieved at a large scale from 1991 to the end of 2007 and the current view reported expects substantial completion of remediation by 2015. The report advises that approximately 6.2 billion euros were earmarked to achieve this by the Federal Government and that approximately 5 billion has been spent to the end of 2007. a) Are current cost estimates to substantial completion still within this allocation? b) Also, following this remediation, what are the likely on-going costs of the post-remedial long-term tasks over the first decade or so?	a) In 1990, the German Federal Government issued a declaration of exemption to the amount of DM 13 billion (about € 6.65 billion), earmarked for the remediation and recultivation by Wismut GmbH of the legacies left behind by uranium mining conducted by the Soviet-German Wismut joint stock company (*Sowjetisch-Deutsche Aktiengesellschaft – SDAG Wismut*). The 2007 re-evaluation update on the remediation programme put the funding requirements (including long-term tasks) at some € 6.4 billion. These requirements are still within the framework of the 1990 total funding allocation. b) Defining the remediation programme in greater detail in 2007, Wismut GmbH assumed a period of 30 years for the completion of long-term tasks regarding mine dumps, open pit, tailings ponds, and water treatment. Commencing after the post-remedial phase (5 years), this period is not part of the long-term tasks. Funding requirements for the completion of long-term tasks over a period of up to 30 years are currently put at a total of € 490 million. From today's perspective, the financial requirements over the first decade are likely to range from about € 150 million to € 200 million.

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9	General p. 3, 244	Restoration and re-use of Wismut sites is mentioned in the report. It is noted that 1.5 million visitors attended in April through October 2007 at the German Federal Garden Show (BUGA 2007) at the former mining site at Ronneburg. Naturally this is very positive news. a) Please elaborate on any public attitude shift or any change in image or stigma that may already be observable and attributed to the progress of remediation activities. b) Please comment on the potential sustainability and benefit to local businesses and communities.	a) Intense public relations by the Federal Government and by Wismut GmbH as well as the early involvement of concerned communities, associations and citizens into remediation preparatory and planning phases were conducive to improving Wismut's public image and acceptance. Annual high-profile events at Wismut GmbH sites (open day, Miner's day) were largely responsible for this improvement. The growing public response is reflected in attendance figures (about 6,000 in 2007). b) The benefit of remedial measures is, first and foremost, the restoration of intact living and environmental conditions in former mining regions. Areas are permanently rehabilitated according to environmental standards allowing future agricultural and forestry uses and laying the basis for the establishment of industrial enterprises and job creation. To date, Wismut GmbH has sold reclaimed areas in an order of magnitude of a total of approx. 652 hectares. Of this total: about 230 ha are used for agricultural and forestry purposes; about 86 ha are used for industrial purposes; about 64 ha are used for the golf course at Bad Schlema; about 201 ha are used for general public purposes (e.g. BUGA horticultural exhibition sites, roads, etc.); about 13 ha are used for residential areas; about 47 ha are used for miscellaneous purposes; about 8 ha are used for hybrid purposes; about 3 ha comprise the former Marienschacht site. By placing order to the tune of some 100 million euros annually to local industries, Wismut GmbH has become a significant economic factor of regional importance.
10	10 G.7.1. p. 146	In comparison with past practice, please elaborate upon the technical, social and cost advantages and disadvantages of Germany's current strategy of "direct disposal" for spent fuel assemblies held at near-site interim storage until federal disposal facilities are available	The renouncement of reprocessing in favour of direct disposal was rather a political decision than a decision based on economical evaluation. Until 1994, reprocessing and recycling (mixed oxide – MOX fuel) was mandatory according to the German Atomic Energy Act and a precondition for the operation licence of German nuclear power plants. In 1994, the German Atomic Energy Act provided a choice between reprocessing and direct disposal. Since July 1st, 2005 reprocessing is no longer a legally viable solution for spent fuel from commercial nuclear power reactors. Cost advantages are not yet quantifiable because of the unknown costs for disposal of spent fuel. Regarding the phase-out of the commercial use of nuclear power, the ban of reprocessing was necessary to avoid the production of excess plutonium which cannot be used as MOX fuel in the existing nuclear power plants.

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11	12 p. 153 – 154	Past practices are reported to have been investigated in Germany. a) Radium use and thorium use legacy sites have been largely catalogued and categorized, as reported. Current cleanups at some sites are reported to be underway. i) Please advise on the approximate quantities of waste that have been recovered or remain and describe the facilities or methods of final disposition. b) Also noted is the BfS project on "Radiological Survey, Investigation and Assessment of Mining Residues (Altlastenkataster)" which considers non-Wismut sites and legacy sites from historical mining activities. Among such sites we are interested in those which may be in occupied urban or urbanizing areas. i) Please advise on the approximate quantities of waste that have been recovered or remain and describe the facilities or methods of final disposition.	a) By 2000, the Saxon State Ministry of the Environment and Agriculture (SMUL) entered about 1,430 objects into the database of technical information system on environmental radioactivity caused by mining (*Fachinformationssystem bergbaubedingter Umweltradioaktivitaet - FbU*) which are registered as so-called *Altstandorte*, i.e. formerly abandoned sites of uranium mining of the Soviet stock company (SAG)/Soviet-German joint stock company (SDAG) Wismut. About 780 of them were taken into further consideration. For remediation of these abandoned Wismut sites in Saxony, the Federation and the Free State of Saxony signed an administration agreement for joint funding of the work. By 2012, both sides provided € 39 million each. Until now, more than 150 projects have been licensed or already been realised. For the selection of the remediation variants, special attention is paid to the location of the object as well as to the radiological and geotechnical situation. In case of heaps, relocation or on-site storage with cover layer thicknesses of 0.3 m to 1.5 m, depending on the object, may be chosen. As an example for the relocation of a heap on an abandoned site, "Halde 39" in Johanngeorgenstadt shall be mentioned. This heap was relocated to another the so-called central shaft heap for joint on-site depositing. The completely remediated site is ready for unrestricted use. On-site depositing was performed at the abandoned site "Drei Koenige" in Annaberg-Buchholz. The necessary stability and compliance with the requirements of radiation protection as well as of soil and water protection was reached by extensive remediation measures. The site is now freely accessible as park and leisure facility. The two conical waste rock piles remained as a landmark and mining monument. In some *Laender*, there was also a registration of residual waste (to a considerably smaller extent than at the Wismut sites) and decontamination measures taken. b) From 1991 to 1998, the project "Radiological Survey, Investigation and Assessment of Mining Residues" was carried out by the BfS. Mining objects and areas that belong to the Wismut GmbH were not investigated within the scope of this project. Within this project, 820 sites have been identified, where an exposition bigger than 1 mSv/a cannot be excluded and further investigations are necessary. These sites cover 2,120 ha and a volume of 184 million m³. Contaminated soil normally is not classified as radioactive waste. There are several disposal options: • special cases (small volumes): underground disposal, • mostly near or above surface disposal, • in general engineered barriers required (in particular covers ranging from simple earth covers to sophisticated multi-layer cover systems), • additional measures ma y be required (e. g. reduce acid generation; improve geotechnical stability).

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12	13 A.2. p. 16, H.3.3. p. 156	Regarding the further consideration of the Gorleben site for a repository for heat-generating radioactive waste, the report advises that in spite of the favourable findings of BfS presented at the end of 2005, following the earlier decision of the Bundesrat 14 May 2004 to continue investigations, the Federal Government has not made a decision on the further site selection procedure. a) Has there been any indication when a government decision on process might be made? b) If the process decision, when it is made, is to consider alternative sites as well as Gorleben, then what may be a reasonable estimate of time to weigh options and prepare a final site selection recommendation? c) Also, how might selection of a different site other than Gorleben, impact the national strategy?	a) To date a consensus on this conceptual plan could not be reached within the Federal Government. Progress may be expected during the coming legislative period, when lifting the moratorium on Gorleben by the end of 2010 will require a decision about the restart of exploration activities or the implementation of a site selection procedure in which Gorleben would be integrated. b) The answer to question b) depends on the decision of the Federal Government and the chosen way it will have been carried out. As stated in the justification of the amendment of the Atomic Energy Act in 2002, the aim is to construct a repository in deep geological formations for the disposal of heat-generating waste around the year 2030. c) The answer to question c) can be given when the Federal Government has decided.
13	13 p. 156	At the 2nd JC review meeting Germany stated that the necessity to establish a site selection procedure for HLW disposal was currently under review. Has there been any progress on this subject in the past 3 years?	The coalition partners in the Federal Government specified in their Coalition Agreement of November 11th, 2005 that a solution to the repository question should be addressed in a speedy and results-oriented manner so that a solution is reached in this legislative period. At the present time, there are still different views among the Federal Government on how to proceed further in the realisation of a repository for heat-generating radioactive waste. In essence, it is about the question whether the exploration of the Gorleben site – in whose principal suitability so far there are no doubts – shall be continued or whether previously a selection procedure shall be conducted in order to search for possible better alternatives before a site is finally selected and further explored.
14	23 p. 101	IAEA Documents GS-R-3, GS-G-3.1 are not mentioned. To our knowledge KTA1401 was issued far before GS-R-3. To which extent are the IAEA documents considered in Germany?	The German regulatory framework (including KTA 1401) has been checked for consistency with the IAEA Safety Standards system. Regarding quality assurance, it has been found that German regulations are consistent with the corresponding safety standards of the IAEA. The results of the corresponding checks are comprehensively documented. Regarding integrated management systems, the German regulatory framework is currently being revised taking into account the results of the WENRA-WGWD-process (WGWD - Working Group on Waste and Decommissioning).

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15	32 p. 21	Since the reprocessing of spent fuel has been prohibited in Germany, what is the short and long term management of the damaged fuel elements in Germany?	At the reactor sites, damaged fuel rods (e.g. leaking fuel rods, fuel rod remnants and fuel rod fragments) are collected in quivers. Quivers are of the same dimensions as regular fuel assemblies and meet the same safety requirements as intact fuel assemblies. The damaged fuel rods are stored in the spent fuel pool until the quiver is filled. For long term management the quivers will be stored in dry storage containers. The containers will be evacuated, dried and sealed leak-tight. The handling during transportation and storage is identical to the handling of containers with regular fuel assemblies. The containers are placed in dry interim storage facilities at the reactor sites and remain there until duly conditioned and disposed of in a repository in a deep geological formation.
16	32 p. 33	What is the reason for the plan to transfer the fuel assemblies currently stored in the wet fuel storage facility of Obrigheim into a dry storage facility still to be constructed at this site?	At the Obrigheim nuclear power plant, in total 342 fuel assemblies are stored at the wet interim storage facility at the site. Within the decommissioning of the Obrigheim nuclear power plant, the applicant (EnBW Kernkraft GmbH) plans complete dismantling of the facility. The wet interim storage facility constrains the dismantling of the facility. Further, it is more economical to operate a separate dry storage facility than the continued operation of the existing wet storage facility. Therefore the applicant has applied for on-site dry storage of the spent fuel assemblies in a total of 15 storage casks in a new separate building.
17	32 p. 53	Why are the spherical fuel assemblies unloaded from the THTR explicitly listed in Table D.8 as interim products? It is planned to condition these assemblies for direct disposal?	The spent fuel from the THTR is listed as an interim product as it is not clear if it will need further conditioning. This decision cannot be taken without having a repository for spent fuel and heat generating waste.
18	General p. 17	What is the radiation guideline to remedy the contaminated site caused by Uranium mining? How to dispose the residues?	In line with § 118 of the Radiation Protection Ordinance [StrlSchV], administrative regulations of the former GDR (Ordinance on the Guarantee of Nuclear Safety and Radiation Protection [VOAS], VOAS implementing regulation and the Directive on Guarantee of Radiation Protection for Waste Rock Piles and Tailings Ponds and the Usage of Materials Deposited Therein [HaldAO]) continue to apply to the decommissioning and rehabilitation of uranium ore mining sites as well as to the remediation of legacies left behind by early operations. Excepted are the radiological protection of occupationally exposed persons as well as emission and immission monitoring to which the respective rules of the Radiation Protection Ordinance have to be applied. On principle, evaluations and approvals of remediation measures have to take the principles of justification, dose limitation, and optimisation (according to the ALARA principle) into account. The guidance level for the maximum permissible effective individual effective dose to the general public after remediation is completed is 1 mSv/a in the long-term annual average. Any approach to decommissioning affected sites had and continues to have to consider to what extent the proposed remedial measure will be conducive to yielding a net benefit in terms of radiation exposure and other risks. Evaluation criteria considered are in particular the maximum individual and collective doses. In addition, the Guideline Relating to Emission and Immission Monitoring in Mining Activities (*Richtlinie zur Emissions- und Immissionsueberwachung bei bergbaulichen Taetigkeiten – REIBergbau*) applies to the new *Laender* (federal states) of the reunited Germany. Wastes generated during remedial actions at contaminated sites include demolition materials (scrap, building rubble, timber, etc.), excavated soil, waste rock material, and water treatment residues. When these materials are contaminated (which normally is the case) they are safely deposited. These materials are deposited in existing tailings management facilities, a worked-out open pit uranium mine, or in selected mine dumps using defined and approved technologies. Following deposition, disposal sites and the enclosed wastes are safely sealed.

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19	17 H.7. p. 174	After closure of the disposal facility, how long will the acitve and passitive control period last respectively?	No special control and surveillance programme is required and only the routine measurements usual in Germany take place. As such there is no time specified for active or passive measures.
20	17 Table L-18, p. 216	What kinds of activity are included in "remove"?	The research and prototype facilities which are listed in Table L-18 as “removed” are totally deconstructed. All the components have been decontaminated, if necessary, and all internals were treated in an adequate way, either as radioactive waste or as re-usable materials. Dependent on their contamination, components were treated, e.g. incinerated or compacted, then conditioned in drums or containers, and subsequently stored as radioactive waste at interim storage facilities. Materials that complied with the clearance levels were released and utilised as non-radioactive materials. After having finished the dismantling, the locations were released from regulatory control.
21	32 B.1.1. p.22	What is the construction plan of the disposal facility for spent fuel?	At the moment, Germany has not yet decided on a site for a disposal facility for spent fuel. As the construction plan for a repository only can be site-specific, no construction plan exists so far. For host rock type “salt”, there are technical developments for the emplacement of waste in bore holes as well as in large containers (POLLUX).
22	32 B.1.4, p.23	What types of waste can be treated by mobile installlation in the NPP in Germany now?	Typical mobile facilities that are used in German nuclear power plants are FAKIR hypercompactor for mixed waste, PETRA for drying of mixed waste, FAVORIT for drying of evaporator concentrates, UWS and ZVA for underwater shearing, KETRA for drying of core parts, FAFNIR for drying of spherical resins (PWR), NEWA for post-drainage of resins, PUSA for suction-transfer of powder resins (BWR) as well as several facilities for thermal and mechanical scrap cutting processes. For more detailed technical information visit www.gns.de.
23	32 B.1.4. p.24	How do the authority supervise the waste package quality?	The BfS as the operator of the repository ensures the fulfilment of the waste acceptance requirements by quality control measures according to Section F.3.2. and F.3.3. of the German report. The operation of the repository including the quality control measures is subject to supervision by the department *Endlagerueberwachung* (formerly *Eigenueberwachung* - self surveillance) within the BfS (see E.2.3. and E.2.5. of the German report).

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24	16	What indicators and criteria does the Regulatory Body use for making judgments about the licensee's safety culture?	To assess the safety culture of nuclear facilities under supervision, the *Laender* supervisory authorities make use of the safety indicators applied by the licensees. These include, in particular, indicators regarding the smooth or careful operation of the plant, such as various criteria for the recording of system and component conditions and especially incident-induced and ageing-related deviations and events, and for the recording of events, such as reportable events and significant disturbances. Furthermore, they also include indicators relating to operation at low risk. Here, indicators are important that can provide information about the number and trend of safety system challenges as well as those that concern the ability to control events, such as for the recording of safety system performance, personnel skills and emergency preparedness, and finally those concerning risk. The third major group of indicators is to cover the necessary positive safety attitude of the operators. It is about questions of attitude towards safety and the striving for improvement. The results of the assessment of safety culture also have an influence on the supervision programme. Any deficiencies and potential improvements identified receive special attention in this programme.
25	16	Can you describe your standard approach to characterization of solid radioactive waste (e.g. geometrically complicated)?	The decision whether a residue is to be considered as radioactive is made on the basis of measurements independent of the geometrical complexity. According to the Radiation Protection Ordinance (StrlSchV Annex X, §§ 72 to 79), the residues are classified in dependence of their physical and chemical characteristics. Treatment, processing and packaging of the residues will lead to products which may be either re-usable material or radioactive waste. Conditioning includes the treatment and/or packaging of radioactive wastes for storage and disposal. Processes and equipments being used for this step are proven for many years. For solid and (if necessary) pre-treated raw waste and intermediate products, several processes like shredding, packaging, drying, incineration, pyrolysis, melting, compaction and cementation are available. As there are defined standardised disposal containers, specific limitations for the final packaging have to be considered with regard to mass and dose rates.
26	24	Does the StrlSchV contain the concept of dose constraints with respect to the spent fuel and radioactive wastes management activities?	The StrlSchV explicitly contains dose limits in § 5 (effective dose 1 mSv/a for the public, 20 mSv/a for occupationally exposed persons) as well as in §§ 46, 47, 55, 56, and 58 for organs and for special situations. In general, the concept of dose constraints is implemented only implicitly in § 6 para 2: "Anyone who plans or performs a practice pursuant to § 2, para. (1), subpara. 1 shall minimise any unnecessary radiation exposure or contamination of man and environment, even if below the respective limit, by taking into consideration the state of the art and by taking into account all circumstances of individual cases."
27	24	Are there any values for public dose constraint included into national legal documents related to the operation of storage and disposal facilities?	National legal documents do not contain dose constraints for members of the public related to the operation of storage and disposal facilities The StrlSchV explicitly contains dose limits in § 5 (effective dose 1 mSv/a for the public) as well as §§ 46, 47, 55, 56, and 58 for organs and for special situations.

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28	25	Which body is responsible for ensuring the function of the National Warning Point? How is this body incorporated into the organization scheme of the emergency preparedness (fig. F-5)?	The National Warning Point in terms of the IAEA is instituted at the Federal Ministry of the Interior (BMI Lagezentrum), which is 24h/7d a week achievable. An alerting from abroad or IAEA and EU will be given to this authority. Subsequently, the alert will be forwarded to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. All relevant institutions, which are then involved in a case of emergency, are comprised in Figure F-5 of the German report. In case of an emergency situation in a German facility, the plant operator alerts the civil protection service of the competent *Land* authority. He recommends to the civil protection service which level of alarm should be raised, either an early warning or an emergency alert. Then the head of the civil protection service gives the suitable alarm. The Federal Government monitors and assesses the radiological situation in Germany both during routine operation and under incident and accident conditions. The Integrated Measurement and Information System (IMIS) ensures comprehensive monitoring. In case of need, the measuring frequency of the IMIS will be increased.
29	32	Can you describe your approach to management of very low level radioactive waste? What criteria do you use for disposal of VLLW on landfills? What properties must have such landfill?	The German concept of management of materials from nuclear installations or licensed practices does not contain the category “VLLW”. There are only the categories of heat generating waste and of waste with negligible heat generation, which can be roughly set equal to the categories HLW and LILW as outlined in Figure B-1 of the German report. The term “VLLW” could be best ascribed to material that has been cleared from nuclear installations according to § 29 of the German StrlSchV. § 29 para. 2 No. 2 letter a) contains the option of clearance of solid materials for disposal on landfills (or for incineration in a waste incinerating facility). The clearance levels are laid down in Appendix III Table 1 Col. 9, and further requirements can be found in Appendix IV Parts A and C. Apart from complying with the clearance levels of Col. 9, the waste must comply with the criteria for (conventional) waste disposal, and it must belong to the categories of waste the particular landfill site can accept. The properties that a landfill has to fulfil have been studied in recent years when sets of new clearance levels have been proposed as replacement of the current values in Appendix III Table 1 Col. 9 StrlSchV. These properties refer to the landfill category (Category I or higher) and the overall annual capacity of at least 10,000 Mg per calendar year.

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30	16 Closure of Asse Mine p. 173	In the latest closure plan, rock salt with addition of magnesium chloride solution is envisaged to be used as filling material. Thus, the post-closure disposal environment will change from dry, as previously planned, to wet. Is there a safety assessment considering this closure plan and what are the safety implications of the closure plan modification?	Until now, it has not yet been decided which concept for closure of the Asse mine radioactive waste repository finally will be chosen. The overall goal is to examine and, if necessary, carry out further measures to improve the safety situation in the Asse mine. At present, complementary and alternative closure concepts are being evaluated. The Asse II mine is an old commercial salt mine and has a high degree of mined space. The load bearing system of the southern flank is in post failure state of dilatancy and strain softening with an impact on the adjacent overburden. Due to the low salt barrier dimension and geo-mechanical related degradation in the upper southern flank, an integrity loss occurred. The loss of integrity has led to a ground water influx from the overburden which cannot be detained. The degradation processes in the rock salt barrier and the effects of deformation on the overburden progress further because of the elected soft backfilling material of the caverns (salt grit). The concept of the former operator to close the Asse mine stipulates that the pit is flooded with a saturated saline solution. The suggested R-solution (magnesium chloride saturated) is in chemical equilibrium with the in-situ minerals and has a higher specific gravity than the influx solution. This so-called “protective fluid“ is projected to protect the rock salt from disintegration and corrosion. Due to the hydrostatic pressure of the protective fluid, also a mechanical stabilisation effect of the pit building is projected. In addition, the following backfill measures are suggested: filling remaining cavities with sorel concrete; installation of Mg-storage depots in the chambers to limit radionuclide mobilisation, construction of sorel concrete flow barriers (drift seals) for limiting and guiding movements of the solution in the post-operation phase; the closure of shafts. To assure long-term safety, a total system performance assessment (TSPA) for the aforementioned closure concept has been carried out. This safety case includes, among others, geo-mechanical modelling, scenario analysis and nuclide transport modelling. Once the evaluation of closure options has been completed, there will be an update of the safety assessment taking into account all present and future consolidated findings.
31	20 Safety requirements for the final disposal	BMU is preparing a new guideline for the disposal of radioactive waste, replacing the document given as reference 3-13 in the JC report. What is the status of the development of the guideline?	A first draft of safety requirements governing the disposal of heat-generating waste have been proposed in August 2008. This draft is available at the website of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and is still under discussion.
32	32 B.1.3. p. 22: “Disposal itself is the	Does this statement mean that the Federal Government has full financial liability for disposal of radioactive waste, or is there a mechanism to charge the disposal costs from the waste generators, e.g. NPP utilities?	As stated in E.2.7, the polluter-pays principle also applies to the financing of spent fuel and radioactive waste management activities. Though the Federal Government initially bears the necessary expenses for the planning and construction of radioactive waste disposal facilities, it refinances these costs by means of advance payments on contributions or partial payments on advance payments. The use of radioactive waste repositories and state collecting facilities (*Landessammelstellen*), operated by the respective *Land*, is financed or refinanced by charges and fees that are payable by the waste producers.
33	General A.1. p 10	Residuals materials arising from former uranium ore mining are not counted among the radioactive wastes. Could Germany precise depleted uranium status and storage?	During the enrichment process, depleted uranium (tails) in the form of hexafluoride is generated which stays with the operator of the enrichment plant according to the contractual regulations. The actual strategy is to store the depleted uranium for a longer period at the Urenco site in Gronau. Most of these tails has been sent to Russia for re-enrichment. This option will be in use until the end of 2009. Another option to deal with the uranium tails is the conversion into uranium oxide in France. Licensed storage capacities for uranium oxide are available at the Gronau site.

No	Article / Reference	Comment or Question	Answer
34	General Additional report	Could Germany precise main differences between ex-RDA regulation the German regulation in force? Do these differences lead to different radiological impact on workers, population or environment, during and after remedial operations?	For occupational radiation protection in connection with the Wismut remediation programme and also during remediation of other legacy sites in the new and the old *Laender*, § 118 of the Radiation Protection Ordinance (StrlSchV) applies with specific reference to the individual relevant parts. The continued radiation protection regulations of the former GDR do not apply for this purpose, but they apply to the protection of the public during and after remediation measures. The reason is that the current StrlSchV - like its predecessor - provides no radiation protection requirements for the licensing and supervision of remediation measures. As a consequence, the radiation protection authorities had no powers regarding performance and supervision of remediation measures. This was not acceptable and therefore a practical solution was needed. Since the mentioned issue was regulated differently in the radiation protection legislation of the former GDR – actually, there is a corresponding need and corresponding requirements for licensing and supervision of remediation actions - it was decided to continue the applicability of this legislation (see Unification Treaty). The relevant regulations are the Directive on Guarantee of Radiation Protection for Waste Rock Piles and Tailings Ponds and the Usage of Materials Deposited Therein (HaldAO) and the Ordinance on the Guarantee of Nuclear Safety and Radiation Protection (VOAS). Accordingly, the reference value for protection of the public is 1 mSv/a, as it is in the StrlSchV, and thus, there is no difference in the level of protection.
35	5 G.2.1. p. 132	Regular safety reviews are required. Could Germany explain how are these reviews planned and their frequency?	The requirements for regular safety reviews are specified in the “Safety Guidelines for Dry Interim Storage of Irradiated Fuel Assemblies in Storage Casks”. These guidelines were recommended in 2001 by the Reactor Safety Commission (RSK). The main features can be summarised as follows: 1. Relevant systems have to be subjected to in-service inspections. These in-service inspections have to be specified in an inspection manual in the sense of KTA 1202. Safety-relevant findings from the in-service inspections have to be documented. 2. To control long-term and ageing effects during the operational period of the interim storage facility, the licensee has to present a monitoring concept. Here, a general distinction is made between parts and components that are designed for the entire period of use of the facility, and those that may need to be replaced. The monitoring concept has to ensure that the overall condition of the storage facility is monitored and has to fulfil at least the below-mentioned requirements: • At intervals of 10 years, the facility operator regularly has to prepare a report about the condition of the storage building and of the components necessary for interim storage. • The condition of the storage building and of the components necessary for interim storage is controlled by means of walkdowns and suitable measurements. • Recurrent subsidence measurements are performed for the storage building. • The external condition of the spent fuel storage casks is surveyed. • The findings from in-service inspections are evaluated. The operators of the centralised interim storage facilities at Ahaus (TBL-A) and Gorleben (TBL-G) are required to submit their first ten-yearly reports in 2011, those of the on-site interim storage facilities 10 years after approval (i.e. 2012 or later). The necessary contents and scope of such evaluation reports are currently being determined by the regulatory authority.

No	Article / Reference	Comment or Question	Answer
36	12 H.2.2. p. 153	Past practices : contaminated sites have been or are currently being remediated. Could Germany precise when will end these planned remediation operations?	Areas which uranium mining operations had claimed for decades were for the most part permanently rehabilitated according to environmental standards. Nevertheless, some measures – like groundwater treatment – will need to go on for decades. E.g. the Wismut GmbH assumed a period of 30 years for the completion of long-term tasks regarding mine dumps, open pit, tailings ponds, and water treatment. Commencing after the post-remedial phase (5 years), this period is not part of the long-term tasks.
37	15 H.5.1. p. 160	Environmental impact assessment is mandatory for nuclear waste storage facilities to be operated for more than ten years. Could Germany precise if environmental impact assessment is also for storage facilities to be operated for less than ten years?	According to § 3b para. 1 (1) in conjunction with Annex 1 No. 11.3. of the Environmental Impact Assessment Act (*Gesetz ueber die Umweltvertraeglichkeitspruefung - UVPG*), the erection and operation of an installation or establishment for the sole purpose of planned storage for more than ten years of irradiated nuclear fuels or radioactive waste at a location other than the location where such substances arose (interim storage facility) is subject to an environmental impact assessment (EIA). Further, the erection and operation of a facility for the disposal of radioactive waste (repository) is subject to an EIA pursuant to § 9b para. 2 of the Atomic Energy Act (AtG). There is no other obligation in Germany to perform an EIA for facilities designed for the storage of nuclear waste.
38	20 E.3.1. p. 91	Could Germany precise how many inspections are carried out anenually in average for each type of facilities?	The number of inspections performed annually depends on the type of activities in the respective facility. The inspections are carried out by the ministry of the *Land* responsible for the facility itself, by the technical support organisations (TSOs) or by other subordinate authorities of the *Land*. For waste management facilities including treatment and storage of waste, approximately eight inspections per year are performed. For the storage facilities for spent fuel from nuclear power plants up to 50 inspections are performed. During loading and emplacement of transport and storage casks in the on-site storage facilities, representatives of the TSOs are permanently on site and representatives of the authorities are frequently on site.
39	20 E.3.2. p. 94	Independence of BfS operator and regulatory functions for federal storage facilities and repositories is obtained by organisational separation between units in charge of planning and self-surveillance. Furthermore, BfS employs a third party (DBE mbH) to fulfil the task of repository operator. Could Germany precise if a third party is also employed for federal storage facilities? How the independence of functions is achieved for Laender waste storage facilities?	(1) The BfS is no operator of storage facilities and as such there are no complications regarding independency. The separation of units in charge of planning and self surveillance is only necessary for repositories, where the BfS is the licensee. No storage facility is operated by the Federation – therefore the Federation does not need a third party for such a case. (2) § 9a para. 3 of the Atomic Energy Act stipulates that the *Laender* shall establish state collecting facilities for the interim storage of the waste originating in their territories. To fulfil their obligations, they may avail themselves of the services of third parties. The independence of functions for state collecting facilities is achieved in different ways. The *Laender* are free to organise these storage facilities by themselves. Operator and supervision are always separated. The Free State of Bavaria, for example, assigned this task to the Bavarian collecting organisation for radioactive substances (*Sammelstelle Bayern fuer radioaktive Stoffe GmbH – GRB*). Since the mid-eighties, the GRB is in charge of the collection, the transport, the interim storage and the future transport to a federal repository of the low- and medium-level radioactive waste originating in Bavaria. The Bavarian Agency for Environment Protection (LfU) is in charge of the nuclear supervision on the GRB.

No	Article / Reference	Comment or Question	Answer
40	22 F.6.2. p. 124	Cost evaluation updates take into account technical progress and prices index. Could Germany precise if project risks, uncertainties and unexpected events are also taken into account?	For this case, in Germany there is no mechanism of ensuring a secure legal position in form of a legal provision. According to German law, the operator organisations are obliged to build up financial reserves for the later decommissioning of the nuclear installations and the treatment and disposal of radioactive waste including spent fuel elements. Basis for this build-up of financial reserves according to the commercial law is the disposal obligation under public law derived from the Atomic Energy Act. This obligation shall serve to ensure that the payment obligation under public law can be fulfilled (normal case: after final cessation of electricity generation). According to German law, the operator has to ensure that the financial resources set aside are available at the time they are needed. According to commercial law, financial reserves have to be entered in full in the balance sheet as from the beginning of operation. Regarding the financing of decommissioning before reaching the estimated operating life of an installation it is pointed out that in Germany financing of decommissioning is not only to be ensured by the individual operator of a nuclear power plant but also by the parent or affiliate company in case of corresponding contracts. Thus, there are legal provisions for protecting against project risks, uncertainties and unforeseeable events in connection with the financing of the decommissioning of nuclear installations.
41	25 F. p. 115	Could Germany detail how transboundary harmonization between the different Laender is achieved?	The guideline “Framework Recommendations for Disaster Control in the Vicinity of Nuclear Facilities” (reference [3-15] in the German report) lays the basis for emergency response control which is in the responsibility of the *Laender*. There are also requirements on the ways of communication, information and coordination between the *Laender* in case of an emergency. This ensures a harmonised approach.
42	25 F. p. 118	Could Germany give examples of updating and reviewing of off-site nuclear emergency preparedness plans?	The preparation and the up-date of off-site nuclear emergency preparedness plans is in the responsibility of the *Laender*. The results, e.g. from civil protection exercises, which help to optimise the plans, are not reported to a federal authority.
43	26 F.6.1. p. 123	It is stated that the German regulations deal equally with the two decommissioning options of direct or deferred dismantling after safe enclosure. The operator keep also these two options equally opened. Could Germany precise when one of these two options is picked by an operator, on what criteria the approval of authorities is given? How is justified the choice of one option or another?	According to the German Atomic Energy Act, both decommissioning options (direct dismantling and deferred dismantling after safe enclosure) are likewise acceptable and there is currently no preference to one or the other option. Accordingly, the operator is free to select and to apply for the one or the other option. Direct dismantling is the preferred decommissioning option in Germany so far. Criteria which might be used by the operator are solely internal to the operator. Those criteria might be the radiological situation, knowledge of plant operation, availability of experienced operational staff, availability of infrastructure, storage capacities for radioactive waste or a repository, existence of other operating reactors at the site, waste characterisation, and others. Up to now, there are no regulations requiring specific criteria to be assessed by the operator when making his decision on the decommissioning option or which shall be reflected by the regulatory body during the licensing process. Nevertheless, whatever the selected option is, the operator has to demonstrate during the licensing process that the general prerequisites of § 7 para. 2 of the Atomic Energy Act are met. As a special aspect for decommissioning he has to provide confidence that those decommissioning and dismantling activities applied for do not prevent later decommissioning and dismantling activities to achieve the proposed final state of decommissioning; this is especially of importance in those cases where the total decommissioning and dismantling project is performed as a multiphase decommissioning project with separate licensing procedures.

No	Article / Reference	Comment or Question	Answer
44	28 J. p. 182	Source manufacturer has to take back disused high-radioactive radioactive sources. Could Germany precise: 1. if this requirement concerns the source manufacturer or the source supplier? 2. requirements to take back disused radioactive sources ? (transport, packaging and financial requirements) 3. when and how are defined requirements related to the source take back, in particular financial provisions? When the source is sold? 4. how are taken back sources if the responsible manufacturer / supplier is not able to take back the source? 5. if sources can financially guaranteed ? If yes, by who? Source take back only concerns high-radioactive sources. How is organised other sources take back ?	1. According to § 3 para. 2 number 36 of the Radiation Protection Ordinance (StrlSchV), both the source manufacturer and the source supplier are responsible for take back of disused high-activity sealed radioactive sources. It is also possible for them to ensure the take back by a special licensed third party (see § 69a StrlSchV). Disused high-activity sealed radioactive sources shall be delivered to the manufacturer, importer or another holder of a licence after end of use or shall be delivered as radioactive waste or stored in an interim storage facility. 2. Special requirements for take back are outlined in the Radiation Protection Ordinance in detail (see § 20, 69 and 69a as well as 70 and 70a). Furthermore, appropriate packaging and transport regulations such as IAEA TS-R-1, ADR and Dangerous Goods Transportation Act (GGBefG) are valid. The transport of high-activity sealed radioactive sources may require an additional licence according to § 16 StrlSchV if the conditions outlined in § 17 StrlSchV are not fulfilled. Additional regulations should be taken into account regarding transboundary shipment. 3. Financial precautions for orderly source take back should be ensured before buying or handling of high-activity sealed radioactive sources. The handling of high-activity sealed radioactive sources requires a licence according to § 7 StrlSchV. The necessary financial precautions are prerequisite for the licence for the use of sealed sources. Furthermore, the handling of high-activity sealed radioactive sources requires the duty to provide financial security according to Annex 2 of Nuclear Financial Security Ordinance (AtDeckV), i.e. 50,000 € per source. 4. Disused high-activity sealed radioactive sources can be delivered to another licensed manufacturer or another holder of a licence if they are interested in, or delivered as radioactive waste or stored in an interim storage facility. 5. If the licence holder is bankrupt and if moreover the manufacturer and the supplier are not able to take back the source, the take back will financially be guaranteed by the government (public authorities). 6. The reported general take back measurements according to Article 28 concern other disused sources as well if they exceed the exemption values of Appendix III, Table 1, Columns 2 and 3 StrlSchV. The necessary financial precautions are prerequisite for the licence for the use of sealed sources. Disused sealed sources have to be returned to the manufacturer, supplier or to be disposed of as radioactive waste (see § 69 para. 5 StrlSchV).

No	Article / Reference	Comment or Question	Answer
45	28 J. p. 183	Loss of a high-radioactive sources requires immediate reporting to the register for high-radioactive sources at the BfS with an electronic form. Could Germany detail the organization of the reporting process? Does the electronic forms record implicate a direct update of the radioactive sources central register? What are security provisions related to this register?	Germany has been holding a national register pursuant to the European Directive 2003/122 since 2005. The database is established as a web-based communication system (HASS register) via SSL conducted by the Federal Office for Radiation Protection (BfS) in Germany. Source data can be generated by users/licensees using a web browser and a personalised user account. The licensee notifies receipt, transfer and loss of a source by using specific online forms, whereas the electronic version of the notification is an xml-file. If a source is found, the local authority notifies the BfS immediately according to § 71 of the German Radiation Protection Ordinance by using this web-based system. The notification will arrive within minutes at the BfS. Every notification is not included directly into the database - the data will be tested on plausibility before. The update of the database is performed within days. The access rights are separated into several types of user groups. Licensees are not allowed to access the database directly. They are using a different web application via an SSL-communication with a user ID and a password. The notification generated by a licensee is sent to the administrator account. Local authorities have restricted access using the main web application with an SSL-communication secured by a personal certificate. Local authorities will control the notification by the licensee and can have a list of all sources currently registered. Only the BfS has full administrator privileges. All persons using the HASS web application have to be registered at the BfS before. Persons at the BfS with administrator privileges have to agree to confidentiality.
46	General A.2. p. 15	In the third paragraph from the end of page 15, the report refers to the design of the Gorleben plant for the conditioning of spent fuel assemblies for direct disposal. (1) Could Germany please give a description of the processes involved in this conditioning of spent fuel assemblies? (2) Could Germany please explain what these processes are designed to achieve?	The Gorleben Pilot Conditioning Plant (PKA) has been designed as a multi-purpose facility for treatment of spent fuel and waste of various kind with the aim to produce disposal packages that meet waste acceptance requirements. Spent LWR fuel will be conditioned by removing the end pieces of the fuel assemblies, pulling the fuel rods out of the skeleton and inserting the rods into canisters. Skeletons are hyper-compacted. Two options are followed. The reference concept is arranged for inserting five canisters containing the rods of ten PWR fuel assemblies (or an adequate number of BWR fuel) into a shielded cask of the POLLUX-type for disposal into drifts of the repository. Alternatively, the BSK3 canister is being investigated. Here, the rods of three PWR fuel assemblies are filled into an unshielded canister for disposal into boreholes. The outer diameter of the BSK3 canister corresponds to that of vitrified HLW and hyper-compacted residues from reprocessing. These techniques have been developed for disposal into a salt dome repository. However, so far no decision has been taken by the German government regarding the host rock as well as the repository site. As a consequence, no acceptance criteria for waste containers are available. Therefore, the PKA albeit fully operable is on standby and its operation licence is limited to the repair of defective casks if needed. For more information visit www.gns.de.

No	Article / Reference	Comment or Question	Answer
47	General A.3. p. 18	In the second bullet point, the report refers to the nuclear fuels returned from reprocessing. (1) Will all the uranium separated during reprocessing be returned to Germany? (2) Is it planned to reuse the separated uranium which is returned by re-enriching it and converting the re-enriched uranium into new fuel for use in German reactors? (3) What are the plans to deal with the 'tails' which remain from the enrichment process? (4) Might some of these tails eventually be declared as radioactive waste which has to be disposed of?	(1) The German Atomic Energy Act (AtG) stipulates that the operators of the nuclear power plants have to demonstrate the safe disposition of uranium from reprocessing (§ 9a, para. (1d) AtG). The quantity that will be returned to Germany is a matter of contracts between the reprocessors and the utilities. All the uranium separated during reprocessing remains in the property of the reprocessing customer and has to be returned. Parts of the reprocessed uranium have already been converted into new fuel for use in German power plants. (2) A large part of the uranium from reprocessing has been and will be re-enriched and reused in nuclear power reactors. The re-enrichment can be performed either by feeding the uranium into an enrichment plant or by blending it with surplus highly enriched uranium from military stocks. During the last years, fuel elements containing enriched reprocessed uranium (ERU) have been introduced in the nuclear power plants at Brokdorf, Unterweser, Neckarwestheim and Gundremmingen. (3) During the enrichment process, depleted uranium (tails) in the form of hexafluoride (UF_6) is generated which stays with the operator of the enrichment plant according to the contractual regulations. The actual strategy is to store the depleted uranium for a longer period at the Urenco site in Gronau. Most of these tails have been sent to Russia for re-enrichment. This option will be in use until the end of 2009. Another option to deal with the uranium tails is the conversion into uranium oxide in France. Licensed storage capacities for uranium oxide are available at the Gronau site. (4) As aforesaid, it is possible that a part of the tails will be declared as radioactive waste which has to be disposed of.
48	4 G.1.7. p. 131	The first paragraph says "Interim storage is limited to a maximum of 40 years." (1) What is the definition of "interim storage"? (2) Has all the fuel from the earlier reactors which were shut down in the 1970s been reprocessed? (3) If not, how likely is it that a repository for used fuel will be available before the fuel removed from these early reactors reaches 40 years old?	(1) The amendment to the Atomic Energy Act in 2002 banned the nuclear power plants as from July 1st, 2005 to ship any spent nuclear fuel to reprocessing plants abroad (§ 9a, para. (1) AtG). Since then only the direct disposal of spent fuel assemblies existing and arising in future in Germany is possible. As stated in the justification of the amendment of the AtG in 2002, the aim is to construct a repository in deep geological formations for the heat-generating waste (spent fuel assemblies and high-level waste from the reprocessing of the spent fuel assemblies) around the year 2030. The Federal Government's concept envisages that spent fuel assemblies and the high-level waste to be taken back from reprocessing abroad should be placed in interim storage at the reactor sites where they are generated, and should remain there until duly conditioned and disposed of in a repository. Interim storage at the reactor sites means that the number of fuel assembly transportations will be reduced. The operators of the nuclear power plants have to take care that on-site interim storage facilities are built and operated. In the meantime, on-site dry interim storage facilities for spent fuel assemblies have been commissioned at the sites of all operating nuclear power plants. The aspects of operational lifetime are taken into account by the general limitation of the operating licences for the interim storage facilities and the storage time of a single cask to 40 years as well as by the consideration of this time period in the licensing procedure. (2) Nearly all the spent fuel from earlier reactors ("prototype reactors") has been shipped for reprocessing to the UK, France and Belgium or the reprocessing facility Karlsruhe. A small part was shipped to SKB in Sweden and CEA in France and will remain there. THTR and AVR pebbles are stored in interim storages. Table D-4 in the German report gives a detailed overview on the disposition of the spent fuel from the earlier reactors. (3) Spent fuel from early reactors does not exist anymore (in Germany).

No	Article / Reference	Comment or Question	Answer
49	9 G.6.1. G.6.2. p. 143	Two of the paragraphs on this page refer to an 'operating manual'. This is one of the few places in this report where the documents of the licensee are referred to (see also Sections E.2.3. on the safety analysis report and H.6.1. on the operating manual). (1) Could Germany please provide more details of the document hierarchy that it expects the licensees to have? (2) Could it explain which of the documents the licensee might be required to submit to the regulatory authorities for approval? (3) Could it explain whether a breach by the licensee of one or more of the licensee's documented procedures would be regarded as a breach of a legislative requirement?	(1 + 2) According to the Nuclear Licensing Procedure Ordinance (§ 3 AtVfV), the following documents are to be submitted: Safety Report, planning documents and description of the facility, information on provisions to protect the facility against malevolent acts by third parties, information on the reliability and technical knowledge of the management personnel, verification of the existence of the necessary knowledge of the staff, safety specifications for the control of accidents and damages, framework plan for checks. More detailed information on this can be found in Section E.2.3 of the German national report including a description of the safety requirements related to the precautions against damage caused by the erection and operation of the facility in accordance with the state of the art in science and technology. The operating manual is part of the quality management system and contains all operational and safety-related instructions being necessary both during normal operation and in the case of incidents. Besides that, it contains the work rules which apply to the whole staff. During the licensing procedure, safety requirements are to be specified which are laid down in the inspection manual. All the proofs mentioned above are prerequisites for a licence and must be checked by the authority. Before the commissioning of a facility, a commissioning programme is conducted. The results of the tests are submitted as part of the licensing documentation and assure that the safety requirements are kept. (3) As with the licensing process, supervision shall ensure the protection of the public and the staff against the risks associated with the operation of the facility. According to the Atomic Energy Act (AtG), the supervising authority has at any time access to the facility and has the right to conduct necessary investigations and to request relevant information. If provisions and conditions of the licence are not fulfilled, this can be considered as a breach of the legal requirement of taking adequate precautions in line with the state of the art in science and technology (§ 7 AtG) and can lead to civil penalty or sanctions up to the cancellation of the licence.
50	19 E.2.2. p. 72	Figure E-1 is the same as that shown in the German report for the 2008 Convention on Nuclear Safety. Unfortunately, this Figure still does not make clear to us which part of the regulatory body, i.e. Federal (BMU or BfS) or within the Laender, has the power to enforce each of the various tiers within the regulatory pyramid. (1) Could Germany please explain which of the component parts of its regulatory body/bodies enforces each of the tiers of this Regulatory pyramid? (2) In particular, could Germany please explain how the regulatory powers exist to enforce the "sub-statutory regulatory requirements" (see page 73, fourth paragraph).	(1) As described in Section E.2.1 of the German report, the Atomic Energy Act is implemented by the *Laender* on behalf of the Federal Government. This means that the licensing authority of the *Land* where a nuclear facility is located has the primary responsibility for the enforcement of each of the tiers of the regulatory pyramid shown in Figure E-1. The federal authority (BMU) only takes action if lawfulness and appropriateness of the *Laender's* actions are not fulfilled. For clarification, it should be added that the regulatory bodies/organisations listed at the left side of Figure E-1 do not indicate the responsibility for enforcement of the regulations but the responsibility for their development. (2) As indicated in Figure E-1, the sub-statutory regulatory framework (i.e. the non-mandatory guidance instruments) is binding by specification in the licence or by supervisory measures in the individual case. According to the German statutory system, the competent *Laender* authorities have the powers and are obliged to enforce these sub-statutory regulatory requirements within their supervisory responsibilities.

No	Article / Reference	Comment or Question	Answer
51	19 E.2.2. p. 74	The paragraph underneath the bullet says "The safety provisions and general regulations of the Atomic Energy Act and associated ordinances are further concretised by general administrative provisions, guidelines, safety standards of the Nuclear Safety Standards Commission (KTA), recommendations by the Reactor Safety Commission (RSK) and the Commission on Radiological Protection (SSK), and conventional technical standards." (1) Could Germany please explain what legislation makes a breach by the licensee of each of these 'general administrative provisions, guidelines, KTA safety standards, RSK and SSK recommendations and general safety standards' a breach of the law and hence a punishable offence? Note that on page 75, the paragraph under the sub-heading 'KTA Safety Standards' says "In themselves, KTA safety standards are not legally binding"", and the final paragraph on page 93 refers to "non-legally binding guidance instruments".	As indicated in Figure E-1, the sub-statutory regulations become binding by specification in the licence or by supervisory measures in the individual case. According to § 46 of the Atomic Energy Act, “an administrative offence is committed by any person who wilfully or negligently contravenes ... an enforceable obligation imposed pursuant to § 17, para. (1), sentence 2 or 3, or an enforceable order pursuant to § 19, para. (3)“. In this case, offenders shall be liable to an administrative fine of up to EUR 50,000. A breach of a sub-statutory regulation being specified in the licence is considered as a punishable offence and falls under the above-mentioned legal provision. (cf. also Section E.2.6 of the German National Report dealing with criminal and administrative offences) Beyond that, the competent regulatory authority itself disposes of statutory instruments (§ 19 para. 3 AtG) to correct a status representing a breach of the law.

No	Article / Reference	Comment or Question	Answer
52	19 E.3.1. p. 93	The last paragraph under the sub-heading 'Financial Resources of the Regulatory Body' says "An expert opinion prepared at the end of 2006 on behalf of the BMU shows the narrow limits of levying fees regarding the tasks of the BMU at issue here, and only few and very limited discretionary powers regarding further review. It is unclear what this sentence means, and whether these "narrow limits "and "few and very limited discretionary powers "should be regarded as a good thing or a bad thing. Could Germany please clarify what is meant by this sentence?	The Federal Office for Radiation Protection (BfS) is authorised to charge fees regarding its responsibilities in the field of the treatment of spent fuel assemblies and radioactive waste (see Section E.3.1., p. 90). Apart from that, the given constitutional basis only allows the competent authorities of the *Laender* to charge fees regarding their responsibilities (see Section E.3.1., p. 90). Regarding the scope of tasks of the BMU, the “narrow limits” of levying fees and “few and very limited discretionary powers” (better: “a very limited scope”) regarding further review are therefore facts deriving from the constitutional basis of a regulatory body consisting of – apart from BfS - authorities of the Federal Government and the *Laender*. The Federal Government does not intend to change this constitutional basis.
53	21 F.2.1. p. 97	Article 22 states that each Contracting Party shall take the appropriate steps to ensure that: (i) qualified staff are available as needed..... The text of the report under this Article describes in detail the facilities available for the training of staff, but says nothing about how the adequacy of the numbers employed by the licensee for safety-related posts is regulated. Can Germany please explain how it regulates the adequacy of the numbers of staff available to fill the safety-related posts within each licensee's organisation? (See also the requirement for "adequate numbers" in Sections H.6.3. and H.6.4.)	As stated in the German report, p. 96: “The holder of a licence issued according to § 31, para. 1 StrlSchV is responsible for the entire field of radiation protection. In addition, § 31, para. 2 StrlSchV stipulates that radiation protection commissioners must be appointed for technical activities and monitoring of operation. Together with the radiation protection supervisor, these ensure due compliance with all protection and supervisory provisions of the Radiation Protection Ordinance.” Therefore, the radiation protection commissioners together with the radiation protection supervisor are responsible for the appropriate number of staff and for providing the necessary competence to comply with all tasks for the safe operation of the installation and requirements stipulated in the German regulations. According to § 32, para. 5 StrlSchV, the radiation protection commissioners must not be hindered in the performance of their duties or suffer any disadvantages by virtue of their activities. Regulations regarding the number of staff needed for a specific facility do not exist in Germany. It is the duty of the competent supervision to check the level of compliance with all protection and supervisory provisions, which is strongly related to the adequacy of the number and qualification of the staff.

No	Article / Reference	Comment or Question	Answer
54	32 B.1.4. p. 23	The first paragraph says that liquid and gaseous waste is excluded from acceptance for disposal in deep geological formations. Gases such as tritium and radon will inevitably be given off in the repository by many types of waste. (1) Are such wastes excluded, or are they controlled by other means? (2) Article 16, Section H.6.5., page 169 of the report, refers to liquid and gaseous wastes. Will all such liquids need to be treated to immobilise them before they can be disposed of in a deep repository?	(1) Only solid radioactive waste is accepted for disposal in a deep geological repository. The release of gaseous radionuclides like tritium or radon is permitted up to the limits defined by the waste acceptance requirements. (2) All liquid wastes need to be processed prior to disposal by means of e.g. drying, cementing or vitrification (cf. Section D.3.1. – p. 43).
55	32 D.2.1. p. 42	The report says that "four SUR cores....have been incinerated...." (1) Could Germany describe this process and say which parts of the core were treated in this way? (2) What were the materials that were incinerated?	SUR cores consist of 8 to 13 fuel elements (plates), each element of a homogeneous mixture of approx. 71% polyethylene as the moderator and 29% uranium oxide (20% U-235-enrichment). Polyethylene is an ideal material for the safe sealing of radioactive substances. However, UV and ionizing radiation can damage polyethylene. Under prolonged irradiation its solid properties will be changed. Because of a radiological decomposition and microbiological processes, a chemical conversion under a release of hydrogen or methane can occur. For this reason, storage of the untreated SUR cores in a repository is problematic. Polyethylene is also flammable, which would require special fire prevention measures in the repository. In the Radiochemistry Department of the Technical University in Munich a process has been established to incinerate the polyethylene selectively without a chemical modification of the uranium oxide. The so obtained uranium oxide is mixed with depleted uranium oxide up to around 4.9% enrichment of U-235 and can be used again as nuclear fuel in LWR reactors.
56	15 H.6.3.	According to the safety requirements for the longer term storage (RSK recommendations) , waste containers should be designed in order to ensure their integrity during and after the interim storage. Is the corrosion resistance requirement fixed in time? Could some detail on the qualification procedure for this requirement be provided?	The RSK recommendations on the long term storage of low and intermediate level radioactive waste consider a storage time of up to 40 years. In this time, the integrity and the shielding of the activity has to be guaranteed. This has to be achieved by the construction of the containers (material, geometry, protection against corrosion, solid construction, e.g. no unprotected gaps). If this cannot be guaranteed (due to the waste properties or to the atmospheric conditions in the storage facility), periodic inspections have to take place. This would mean non-destructive methods like visual inspections. By design check and quality control it has to be shown that the requirements are met. The competent *Laender* authorities define the specific requirements on the approval of containers for storage depending on storage conditions at the particular facility. These requirements were considered in the RSK guidelines, e.g. about visual inspections in the storage facility.

No	Article / Reference	Comment or Question	Answer
57	16 H.6.9. p. 172	It is affirmed that since September 2008 the BfS has taken the responsibility for the Asse mine as operator. Could Germany describe what is planned concerning the licensing procedure? There will be an updating of the Safety Case, in particular in view of the presence of water?	On 05.11.2008, the German Federal Government decided that the Asse has to be operated by the Federal Office for Radiation Protection (BfS) and be prepared for closure in accordance with the Atomic Energy Act (AtG). The transition of responsibility from the HMGU to BfS took place on 01.01.2009. What closure concept comes to fruition has not yet been decided. The overall goal is to examine and, if necessary, carry out further measures to improve the safety situation in the Asse mine. At present, complementary and alternative closure concepts are being evaluated. On 12.02.2009, the BfS submitted an application to the Lower Saxony Ministry for the Environment and Climate Protection for the initiation of a plan-approval procedure according to the Atomic Energy Act for the decommissioning of the Asse repository for radioactive waste. Once the evaluation of alternative closure options has been completed, there will be an update of the safety case taking into account all present and future consolidated findings.
58	20 E.3.1.	Could Germany describe more in detail the provisions of the Ordinance concerning Prepayments for the Erection of Federal Facilities for the long term Engineered storage and Disposal of Radioactive Waste (Endlagervorausleistungsverordnung – EndlagerVlV)? How is determined the contribution? Is the disposal of spent fuel included?	The Repository Prepayment Ordinance (*Endlagervorausleistungsordnung – EndlagerVlV*) serves to enforce the polluter-pays principle in connection with radioactive waste management by erection of federal facilities for the long-term engineered storage and disposal of radioactive waste since, according to it, the polluter has to bear the full cost of disposal. In order to cover the necessary capital expenditure, the German Atomic Energy Act provides the imposition of contributions and advance payments. With the EndlagerVlV, the first step of a two-step overall concept ("advance payments against contributions" and "contributions") is pursued. In this first step, advance payments are imposed to the amount of the annual expenditure for disposal. The amount of the advance prepayments is specified according to an allocation key that differentiates between advance payments for repositories for all types of radioactive waste (e.g. also spent fuel elements) and repositories for waste with negligible heat generation. The extent of the advance payments to be paid by the party obliged to deliver the waste primarily depends on the waste to be expected from the utilisation of the licence. Accordingly, advance payments are currently to be paid according to the following key (as of March 2009): For a repository for radioactive waste with negligible heat generation - 64.4% mainly by the nuclear power plant operators - 6% by the Karlsruhe experimental reprocessing plant (WAK) - 29.6% by other waste generators For a repository for all types of radioactive waste - 96.5% mainly by the nuclear power plant operators - 0.7% by the Karlsruhe experimental reprocessing plant (WAK) - 2.8% by other waste generators This distribution key is reviewed at regular intervals and updated, if required. The advance payments serve to finance siting, investigation and finally the construction of repositories. In a later second step, the EndlagerVlV shall be replaced by another ordinance which regulates the imposition of contributions for the utilisation of the repository/repositories with all necessary details. Regarding the later imposition of contributions on the individual waste deliverers, the advance payments imposed according to the EndlagerVlV will be credited against the utilisation contributions to be paid for the respective repository.

No	Article / Reference	Comment or Question	Answer
59	32 D.4.	We would have interest on details about the quality control procedures carried out on the waste packages from the reprocessing of the spent fuel.	The product control procedure for waste packages from the reprocessing of spent fuel is analogous to that of product control for radioactive wastes with negligible heat generation (see Section F.3.3). The processes for the vitrification of high level waste concentrates from reprocessing of spent fuel in France (AREVA-NC) and the United Kingdom (BNFL) are qualified by BfS and are subject to regular inspections by experts on behalf of the BfS.
60	32 D.4.	In section D.4 is mentioned that Germany has to receive from UK waste packages from the cementation of the liquid waste resulting from the reprocessing at Dounreay of research reactor spent fuel. Could a description of the waste acceptance criteria of this cemented waste be provided?	Dounreay and the repatriation of the waste are based on specifications. The compliance with the specifications is the condition precedent to the repatriation of the cemented waste products to Germany. Currently, neither a concept for the further treatment (packaging) of the cemented waste products nor a concept for the storage or disposal exist. For this reason, there are no acceptance criteria for such waste. In the future concept, the waste packages will need to meet the respective requirements of the storage facility and the repository.
61	32 D.5.5.	What are the release criteria that will be used for the clearance of the WAK facility? Could Germany also describe the procedure that will be carried out for the verification of the clearance levels?	It is assumed that this question points to the clearance levels that are / will be used for clearance of WAK buildings and subsequently for clearance of the WAK site. Clearance of buildings has been regulated by a licence issued in April 2004 that contains the following items on clearance: • Building rubble arising prior to demolition of buildings will be cleared using the clearance levels of Appendix III Table 1 Column 6 of the Radiation Protection Ordinance (StrlSchV). • Buildings are cleared for demolition using clearance levels of App. III Tab. 1 Col. 10 StrlSchV. No application for clearance of sites has been filed yet, so that the procedure for clearance measurements cannot be described in short. There is, however, an up-to-date summary of the procedure for clearance of buildings that is applied in the *Land* Baden-Wuerttemberg (where WAK is located). It can be downloaded at: http://www.um.baden-wuerttemberg.de/servlet/is/20272/ under link “English version: Messstrategien fuer die In-situ-Gammaspektrometrie (PDF)“ This document describes an approach that has been used before for the clearance of the LABSAN building of WAK.
62	32 D.4.	Could Germany give some information on the radioactive waste management at the JRC Karlsruhe (ITU)? Which is the inventory and what kind of waste is stored? What are the safety features of the interim storage? Are they conditioned according to the waste acceptance criteria for Konrad?	The ITU has various kinds of radioactive waste resulting from a variety of research projects including research with fuel. The waste is stored at the storage facility of the HDB in Karlsruhe – so the same safety features apply. The HDB department manages radioactive wastes originating from the FZK, ITU and various other sites in Germany. The inventory includes waste with negligible heat generation and some heat generating waste. The focus of the Karlsruhe waste management is on management of historical waste and the dismantling of obsolete nuclear equipment, such as glove boxes. The ITU has about 1,300 m³ of conditioned non heat generating waste and about 9 m³ of conditioned heat generating waste. Euratom’s policy is to dispose of the resulting waste packages in a national repository in the host country. Therefore, the waste with negligible heat generation will be conditioned according to the waste acceptance criteria for Konrad. The heat generating waste is to be disposed of in a respective repository.

No	Article / Reference	Comment or Question	Answer
63	16 H.6.9. p. 171	Does your regulation require the application for the closure of existing openings including shafts when the mine is determined to be used as a repository? If so, why does it require it in spite that such closure realizes several decades later? We would like to know the reason and/or the basic concept.	The closure of the mine is regulated in the so-called safety criteria. The reason is that we have a one-step licensing procedure which includes operation as well as closure.
64	22 F.2.1. p. 99	You indicated that 2005 and 2006, a total of nine vacant or new professorships were offered by the universities, partly with substantial financial support of the industry, in the fields of reactor safety, reactor technology, radiochemistry, repository sdcystems and radiobiology. We think these are good initiatives taken by the industry. What kinds of support are taken other than money? How about the result? Do these new professorships attract many students?	In Germany, many retiring university professors were repositioned. This is the case for Munich, Dresden, Stuttgart (all in the field of reactor technology) and Clausthal-Zellerfeld (in the field of repository research). As for the national research centres, the two Helmholtz Centres Karlsruhe and Juelich merged with the neighbouring universities Karlsruhe and Aachen, forming the Karlsruhe Institute of Technology (KIT) and the Juelich Aachen Research Alliance (JARA). In this context, retiring heads of institute or heads who quitted their job were repositioned: altogether, these were two positions in reactor safety and two positions in waste disposal. In addition, at JARA, two new positions (nuclear fuel cycle, nuclear simulations) plus staff were created with the direct support of industry (RWE/Thyssen-Krupp). At KIT, three new professorships were created with direct industry support, being reactor dynamics and safety, nuclear professional school, radiochemistry. The supporting institutions are EnBW, AREVA and SEF. In addition, at KIT, the *Land* of Baden-Wuerttemberg created a new professorship for innovative reactor systems. KIT itself created a professorship for radiation research and another one for decommissioning. The support by industry is the budget for the professorship and a considerable staff (often PhD positions) and equipment for a period of either five or ten years. Industry gives research grants to the respective institute and has close contacts with the students and PhD students in order to hire them after their degree. All of the German professors in nuclear technology have between 20 and even 100 students in their lectures. Several of the German universities offer the degree of Master in nuclear engineering.

No	Article / Reference	Comment or Question	Answer
65	24 B.1.5. p. 24	Could you indicate some examples to re-use or recycle “reusable or recyclable material or material comply with the clearance levels”, which had been generated by dismantling nuclear power reactors?	Examples for reuse of items from NPPs are: • direct reuse of tools or equipment in other NPPs of similar design, often with prior clearance to facilitate shipment • direct reuse of tools, lathes, tool cabinets etc., but also shielding blocks, steel beams etc. for conventional construction Examples for recycling cannot only be given in generic form, as this is a regular practice for all decommissioning projects: • recycling of metals by melting in a licensed facility (existing e.g. in Germany and Sweden) for manufacturing of containers for radioactive waste, • recycling of metals by melting for re-integration of the material in the conventional material cycle (steel, aluminium, copper) – this is the most important option for metals, • recycling of building rubble mainly for use in road construction or as fill material for closure of landfills etc., (in principle, it is also possible and allowed to recycle cleared rubble as aggregate for new concrete), • recycling of other types of material, like electronic scrap, cables etc. in their respective material cycles. As mentioned, recycling and reuse is a common practice for all decommissioning projects, so that no more specific examples can be provided.
66	32 B.1.5. p. 24	Have you estimated the cost of the concept that all types of radioactive waste are to be disposed of in deep geological formations? We would like to have your explanation on how you have considered system optimization including cost evaluation when you have adopted the concept.	Optimisation of the disposal concept (including cost evaluation) is carried out for the specific projects. Gorleben was identified as a site for a repository for all types of radioactive waste in 1977. During the following above-ground exploration activities and underground exploration of the salt dome, also the costs of this concept have been considered with a date of 1998. Because of the moratorium, no optimisation has been carried out. The costs for the Konrad repository have been estimated in detail. Optimisation takes part during the planning and construction phase.
67	32 D.3.3. p. 49	You indicated that the waste will represent 90 % of the total waste to be disposed of in a repository but a mere 0.1 % of the total expected activity. Could you clarify whether the total waste means sum of the whole already accumulated waste with negligible heat generation and the waste to be generated in the future? How about the remaining 10 % of the total waste? Do you find another repository?	The radioactive waste that has to be disposed of in the Konrad repository represents 90% of the volume of all waste that already accumulated today and will be generated in future. These are all radioactive waste with negligible heat generation The remaining waste (10% of the volume) will be heat generating waste (spent fuel, high active waste from reprocessing) which has to be disposed of in another repository.

No	Article / Reference	Comment or Question	Answer
68	4 G.1.7. p. 131	In Section G.1.7 of the report, it states that the dose constraint of 0.3 mSv/y for nuclear power plant is also applied to the post-operational phase of repository. Do the "post-operational" safety criteria mean the dose constraints for the "post-closure" phase of the repository?	Yes, the "post-operational" safety criteria mean the dose limits for the "post-closure" phase of the repository.

No	Article / Reference	Comment or Question	Answer
69	15 H.5.1. p.160	With regard to the regulatory inspections preformed during the construction and operation of the radioactive waste repository, please provide more detailed information on the followings: - types and periods of regulatory inspections, - applicable requirements and guides for regulatory inspections, and - practices of regulatory inspections, etc.	Legal basis and possibilities of regulatory inspections The responsible body for the supervision of repositories – the *Endlagerueberwachung* (formerly: *Eigenueberwachung* - self surveillance) of the Federation – has extensive competencies by an analog use of the atomic law (Para. 19): • The right to control and inspect the installation at any time. This also includes contracted experts. • The right to demand information from any responsible person and any worker. • The right to demand the correction of conditions which are not in line with the licence or the according laws and ordinances. The right to demand protective action including the temporary suspension of operation in case of danger for life, health or goods. These competencies enable the Endlagerueberwachung to control all actions of the operator regarding to the protective provisions according to the atomic law, the radiation protection ordinance and the licence. Details of supervision The supervision is ensured by regular inspections and visits. By the attendance of operational release procedures and in-service inspections, the operational readiness of installations, systems and components are ensured and the operational safety and plant safety are evaluated. E.g. according to the licence for the Morsleben repository, an assessment of all installations has to take place every five years. This assessment of the operator is supervised by the *Endlagerueberwachung*. The licence describes in detail how and when the assessment of the operator and events during operation are to be reported. The reports are audited by the *Endlagerueberwachung*. On the basis of the reports it is decided whether from a safety point of view operation can continue or if further measures are necessary. The following reports have to be presented regularly: • Monthly reports on radiation protection and operation • Quarterly reports about supervision of emission and immission • Yearly reports on radiation protection and operation, safety and security Criteria In addition to the atomic law, the Radiation Protection Ordinance (StrlSchV) and the further body of rules and regulations, also international standards and rules are criteria for the safety. The state of the art in science and technology is also taken as a criterion for safety topics.

No	Article / Reference	Comment or Question	Answer
70	19 E.2.3. p. 78	Table E-1 summarizes specifically the responsible organizations related to licensing and supervision of radioactive waste and spent fuel management facilities. However, it seems that the responsible organizations for clearance are not directly addressed in the national report. Please provide clearly which organizations are responsible for licensing and supervision of clearance of materials, buildings and land areas pursurant to § 29 of the Radiation Protection Ordinance.	Table E-1 contains the licensing and supervisory authorities responsible for nuclear fuel, radioactive waste containing fissile material and other radioactive waste. After clearance, however, the material is no longer radioactive in a legal sense and therefore does not belong to any of these categories. This is the reason why clearance has not been included in Table E-1. Prior to clearance, the authorities responsible for clearance and material to be cleared are the same as those for dealing with radioactive waste, i.e. the *Laender* authorities. After clearance, the material belongs to the conventional material cycle, so that the regulations of the Closed Substance Cycle and Waste Management Act (*Kreislaufwirtschafts- und Abfallgesetz*) apply.
71	26 F.6.5. p. 127	According to Section F.6.5 of the report, it seems that records of information from the decommissioning phase are limited only to radiological data. Are the other technical records and data such as decommissioning technologies (e.g. equipments used fro dismantling and decontamination, etc.) not reserved?	With respect to the purpose of the Radiation Protection Ordinance, keeping and preservation of radiological data are the most important objectives for decommissioning. Therefore, there is no stipulation on how to proceed with technical data or information related to costs, experience, lessons learnt etc. However, in reality, such data and information are usually preserved by the operator or the company to which it belongs. This is often carried out in order to preserve lessons learnt, benchmark figures etc. for planning of future decommissioning projects. Many decommissioning projects also describe their experience in reports. In any case, the licence may contain any additional binding requirements on record keeping (contents of data, preservation of records etc.).
72	26 Annex L p. 213	Table L-15 shows that research reactors such as FR-2 and FRN are under "Safe Containment" Status. 1. Are the research reactors FR-2 and FRN regulated as "reactors under decommissioning" or as other nuclear facilities? 2. Have any parts of the above facilities and their sites ever been released from regulatory control? Otherwise, will the whole facilities and sites be released at the same time in the future? 3. Is visitor's access to the above facilities allowed or prohibited?	1. The licence for these reactors is a decommissioning licence currently allowing only the operation of a safe enclosure or safe containment status. This means that currently no steps may be taken to dismantle the facility. Dismantling would be regulated by a further licence. 2. Prior to reaching its safe enclosure status, FR-2 has undergone significant dismantling in the reactor hall and the auxiliary systems so that currently only the biological shield enclosing the reactor tank and its structures is under safe enclosure. FRN has been prepared for safe enclosure or safe containment in a similar way. The activity has been confined inside the biological shield. 3. FR-2 is accessible to the general public on arrangement. A small exhibition on the history of nuclear energy in Germany has been set up in the reactor hall around the remaining structures. The hall in which FRN is located is not accessible in a similar way. The remaining structures of the reactor are surveyed routinely by the radiation protection department of the Helmholtz Zentrum Muenchen German Research Center for Environmental Health (formerly *GSF Forschungszentrum fuer Umwelt und Gesundheit*).

No	Article / Reference	Comment or Question	Answer
73	32 B.1.1. p. 22	Section B.1.1 and other sections of the report state that the spent fuel from research reactors will be immediately stored until its final transportation to the repository, if it is impossible to return it to the country of origin. 1. Which methods are considered for safe storage of the spent fuel from research reactors? 2. Which technical areas are specifically considered in the R&D programs on the high level waste repository, for final disposal of the spent fuel from research reactors?	1. All spent fuel assemblies of MTR facilities in Berlin, Geesthacht and Juelich are shipped to the manufacturer in the US. Currently, there is no need to store spent fuel from these research reactors. As for the FRM II research reactor, the current legal situation obstructs the path to the US. Its fuel assemblies will therefore be put in interim storage at Ahaus with the aim of their direct disposal. (see p. 41 of the German report) The fuel elements were generally stored dry in special casks (CASTOR MTR II). 2. Most of the spent fuel from research reactors will be returned to the producer. Only for small amounts of spent fuel, direct disposal is intended. The concept for the disposal of SF from research rectors generally may be similar to the concept for spent fuel of power reactors. As currently no concept for a repository for heat generating waste exists, no specific requirements for the waste can be given. Nevertheless, some specific research is carried out concerning the corrosion of spent fuel in different solutions and about the mobilisation of nuclides from this spent fuel.
74	32 D.4.2. p. 55	Section D.4.2 states that the wastes from nuclear power plants are mixed waste, filters, metallic waste, etc. In case of packaging the mixed waste in drum, are the mixed waste streams further sorted and segregated based upon their compositions or just packaged as mixed.	In order to avoid further segregation, waste from nuclear power plants is usually collected taking into account the intended treatment processes. Solid waste is subdivided into scrap for recycling and mixed waste for hyper-compaction. Moreover, waste is categorised into burnable or not burnable waste, depending, among others, on the dose rate of the material. To the extent possible, waste is conditioned and packaged in a way to comply with the respective waste acceptance criteria. Typical categories are mixed waste for compaction, mixed waste for drying, evaporator concentrates, core parts, resins or scrap.

No	Article / Reference	Comment or Question	Answer
75	16 H.	During the past 12 months, discussions on the status of the Asse mine have continued to attract public interest in Luxembourg. For this reason we would like to ask the following questions to Germany: 1. Could you highlight the major events that led to the designation of a new operator? 2. What steps have been decided by the new operator BFS since overtaking the responsibility? 3. Can you report about any new findings concerning the geological stability of the mine? 4. What are the foreseen next steps related to the safety of the radioactive wastes?	1) Until 31.12.2008, the Helmholtz Zentrum Muenchen (HMGU) was owner and operator of the Asse research mine on behalf of the Ministry of Education and Research (BMBF). As the mine was considered to be a research mine, the closure was planned according to the mining law. On 23 April 2007, a lawsuit was filed for preparing the closure under the atomic law. In June 2008, it was discovered that contaminated brines have been handled in the mine without an adequate licence. Hereupon, the Federal Ministry for the Environment (BMU) asked the Lower Saxony Ministry for the Environment and Climate Protection (NMU) to prepare a report which presents the inventory and the contamination in the mine as well as the handling of the contaminations and the licensing situation. This report (*Statusbericht*) of the NMU was presented on 02.09 2008.It states that the radiation protection so far did not meet the usual standards of a nuclear installation and that this had to be changed in the future. There was, for example, no clear separation between the control area and the monitored area as it is demanded in the Radiation Protection Ordinance (StrlSchV). On 4 September 2008, the BMU, BMBF and NMU agreed to procedurally treat the Asse mine as a repository in future. As, according to § 23 of the Atomic Energy Act (AtG), the BfS is responsible for operating repositories this means a change of the responsible authority for the Asse. The cabinet decision for replacing the HMGU by the BfS on 1 January 2009 as the responsible authority dates from 5 November 2008. 2) Since the BfS became the operator of the Asse (and partly before), the following steps have been taken: • Reorganisation of the radiation protection. • Collection and disposal of the incoming brines according to the Radiation Protection Ordinance. • Planning and implementation of measures of protection for chamber 4//50 which is at risk to collapse. • Development of a risk analysis which includes the scenario of a not manageable influx of brine. • Preparation of measures for stabilising the mine. 3) At a meeting of experts for rock mechanics on 29 January 2009, it was stated that the stability of the mine can be prognosticated till 2020. This will only be valid if the incoming brine does not imbrue the remaining load bearing elements. As the movement of the rock will continue, there still is the danger of a not manageable influx of brine. 4) The Comparison of Options Working Group (AGO) - which has been established by the BMU, the BMBF and the local administrative district – published a preliminary report on 12 February 2009. This report describes the possible options for the closure of the mine: • Backfilling of the remaining volumes of the mine with concrete (allowing incoming water to fill the remaining pore volume), no moving or retrieving of waste. • Retrieval of the waste • Relocation of the waste inside the Asse mine. On these issues, the BfS carries out several analyses. The objective is to come to a decision for a concept in the year 2009.

No	Article / Reference	Comment or Question	Answer
76	B 1.5. p. 24	There is a statement "In Germany, the intention is that all types of radioactive waste should be stored in deep geological formations." Question – What are requirements for the conditioning of waste from the use of radioisotopes (e.g. for spent sealed sources)? Do you intend to use the same packaging (e.g. external dimensions) requirements? Could you elaborate more about Konrad repository, which may accept waste from the industry, WAC?	In Germany, the intention is that all types of radioactive waste should be disposed of in deep geological formations. With regard to the repository relevant aspects, radioactive waste is subdivided into heat-generating waste and waste with negligible heat generation. The Konrad repository is expected to be available in 2013 for the disposal of waste with negligible heat generation. The emplacement of radioactive waste from the application of radioisotopes in the Konrad repository is possible if the waste acceptance requirements are fulfilled. This waste may be packaged together with other radioactive waste. According to the Konrad waste acceptance requirements standardised containers may be used. The standardised containers for the Konrad repository are two types of cylindrical concrete containers, three types of cylindrical cast iron containers and six types of rectangular containers made of sheet steel, concrete or cast iron.
77	19 E. p. 81- 82	What is the typical time for the decision of licensing, taking into account public participation? What are criteria for the "citizens who might be affected"? Could you provide an example from the court case or licensing authority decision on this issue?	1) The duration of a licensing procedure including public participation depends on the type and complexity of the facility. The licensing of a facility according to § 6 or § 7 of the Atomic Energy Act (AtG) or of a radioactive waste repository takes more time than the licensing of a small waste storage facility according to § 7 of the Radiation Protection Ordinance (StrlSchV). Typical examples for recent projects are the on-site interim storage facilities in Germany. The licensing procedures for these facilities took between three and four years. (2) In the licensing procedures for nuclear facilities according to the Atomic Energy Act (e.g. spent fuel storage facilities) there are no restrictions concerning public participation. Any person has the right to submit objections. Of course, this applies in particular to those being affected by the planned facility, e.g. if legitimate legal, economic or intangible concerns could be compromised by the project. In order to file a claim against an administrative act, however, the plaintiff must demonstrate that he is affected in subjective rights, as stipulated in § 42 II of the Rules of the Administrative Courts (*Verwaltungsgerichtsordnung – VwGO*). (3) As an example, a court decision on this issue can be cited. The higher administrative court of Rhineland-Palatinate held in Case 7 C 11657/94 with respect to the nuclear power plant Muelheim-Kaerlich that objections in a lawsuit must demonstrate that a violation of a subjective right is possible (Federal Administrative Court (BVerwGE 60), 297). Failure to do so results in the dismissal of the court action.
78	24 also 25 F.4.6. p. 111 also F.5.1. p. 115	What are the safety requirements behind the chosen limits 10^7 times for open radioactive materials and 10^{10} times for enclosed radioactive materials, to introduce on-site measures?	The exemption limits mentioned in section F.4.6. are laid down in § 53 StrlSchV. This paragraph implemented the EU directive 89/618/Euratom. These activity limits are based on the concept that serious incidents or accidents that require on-site emergency preparedness measures can be excluded if the inventory of a facility falls below a certain limit.

No	Article / Reference	Comment or Question	Answer
79	Planned Activities K.1.	Instead of planned activities concerning a repository concept for heat-generating radioactive waste here only the lack of progress in this respect is reiterated.	The governing coalition stated in its coalition contract of November 11, 2005 that it intends to find a solution for the disposal of radioactive waste disposal within this legislative period. As a consequence, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) developed and published a conceptual paper pursuing the implementation of a selection procedure for a site for heat generating waste. However, to date a consensus on this conceptual plan could not have been reached within the Federal Government. Progress may be expected during the coming legislative period, when lifting the moratorium on Gorleben by the end of 2010 will require a decision about implementation of a site selection procedure in which Gorleben would be integrated.
80	Planned Activities K.2.	The waste management plan being prepared by BMU to be presented in 2009 will not include a definitive statement concerning final disposal of heat-generating radioactive waste. Will this BMU prepared waste management plan then contain a "provisional" statement concerning final disposal of heat-generating radioactive waste, or will this issue not be addressed at all?	The progress of the waste management plan has reached a stage in which a consensual decision about the final disposal concept for heat-generating waste is necessary for its completion. Aspects such as implementation of a site-selection procedure, choice of host-rock, implementation of new safety requirements and others are still subject to scrutiny. Therefore, the waste management plan will be completed when a consensus on a disposal concept for this type of waste has been reached within the Federal Government.
81	General List of abbreviations	"AkEnd" is no longer referred to. "HMGU" is missing in the list. "Mg HM" in stead of "Mg SM"	The "AkEnd" (*Arbeitskreis Auswahlverfahren Endlagerstandorte* – Committee on a Selection Procedure for Repository Sites) process ended in 2002. Therefore, "AKEnd" does not need to be referenced in the list of abbreviations any longer. However, the recommendations of the AkEnd process were taken into account in the concept for a site selection procedure which was presented by the Federal Ministry for the Environment in 2006. "HMGU" is the Helmholtz Zentrum Muenchen - Deutsches Forschungszentrum fuer Gesundheit und Umwelt, i.e. the German Research Centre for Environmental Health. HMGU is the former operator of the Asse mine. "Mg SM" must be replaced by "Mg HM".
82	General A.3.	The German Federal Government intends to decide on the issue of safe disposal of heat-generating radioactive waste in 2009. This is in line with the max 10 year moratorium period for exploration of the Gorleben salt dome, expiring in October 2010	A political consensus on how to proceed regarding a final repository for heat-generating waste has not been reached within the Federal Government. Since the moratorium for the Gorleben site will be lifted by the end of 2010, a decision about implementation of a site selection procedure including Gorleben will have to be made by then. In the current legislative period lasting till September this year, no decision in this matter is expected.

No	Article / Reference	Comment or Question	Answer
83	9 G.6.1.	Why does the availability of a repository for spent fuel depend on the limited license of the pilot conditioning plant in Gorleben (PKA)?	The availability of a repository for spent fuel does not depend on the limited licence of the Gorleben pilot conditioning plant (PKA). The licensing procedure for the PKA was concluded in December 2000 with the granting of the 3rd partial construction licence. According to a collateral clause in the licensing decision, its operation is limited at present to the repair of defective transport and storage casks for spent fuel assemblies and HAW glass canisters. Only after a repository site for heat generating waste will be named, the PKA may be operated for the conditioning of fuel assemblies at an annual throughput of up to 35 Mg HM. This is a part of the agreement between the Federal Government and the electricity utilities on 11 June 2001.
84	13 H.3.3.	The German report for the 2nd review meeting dedicated 2 full pages to the recommendations of the AkEnd with respect to siting of a disposal facility [AkEnd 02] Are the recommendations of the AkEnd with respect to siting of a disposal facility no longer valid?	In autumn 2006, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety presented a concept for the implementation of a site selection procedure for a final repository for heat-generating waste. This concept takes into account the recommendations of the final AkEnd (*Arbeitskreis Auswahlverfahren Endlagerstandorte* – Committee on a Selection Procedure for Repository Sites) report.
85	15 H.5.1.	Are radioactive waste management facilities in Germany really “identical in construction”?	No, the waste management facilities are not identical in construction. There has been an inaccuracy in the translation. The correct text should be “The structural works are to be built according to the respective codes of the *Laender*”. We apologise for this mistake and thank you for your remark.
86	16 H.6.9. Asse mine	How does BfS as the new operator of the Asse mine intend to deal with the potential conflict between its legal obligations concerning the closure of the Asse mine according to nuclear law at the one hand, and the physical limitations imposed by the – with respect to disposal conditions – suboptimal state of the mine at the other?	The BfS will close the Asse mine according to the atomic law. This is laid down in the amendment of the Atomic Energy Act (AtG) irrespective of the fact that the Asse may be considered as a legacy site. The chosen option for closing the mine will be geared to the strict demands of the atomic law concerning damage precaution according to the state of the art in science and technology. The best option according to the aspects of safety will be chosen. If and to what extent the existing problems of the repository system Asse may be compensated can only be judged after the necessary safety analysis.
87	20 E.3.1.	The German report gives an extensive overview of the number and qualities of the personnel covering the supervision of SF and radwaste management, both for the regulatory bodies as for its assisting institutes. This is interesting information.	Thank you for this comment.

No	Article / Reference	Comment or Question	Answer
88	20 E.4.	This section provides additional information concerning the intended revision of the safety requirements for final disposal facilities [3-13], probably based on recommendations of AkEnd (see the German report for the 2nd review meeting (H, art. 13))	The safety requirements for disposal will partially be based on recommendations of the AKEnd (Arbeitskreis Auswahlverfahren Endlagerstandorte – Committee on a Selection Procedure for Repository Sites). The AkEnd recommended criteria to be used for searching and finding a suitable site. Some aspects of AkEnd recommendations, such as the concept of an isolating rock zone, were integrated into the safety requirements.
89	22 F.6.2.	In section F.6.2 (page 124) is stated that the financial resources for facilities belonging to the privately owned power utilities, in particular nuclear power plants, are provided in the form of reserves built up during the operational phase, based on the obligation under public law. Are there are also provisions in force for the (unforeseen) case that a nuclear power plant has to be shut down and dismantled (much) earlier than the expected lifetime?	For this case, in Germany there is no mechanism of ensuring a secure legal position in form of a legal provision. According to German law, the operator organisations are obliged to build up financial reserves for the later decommissioning of the nuclear installations and the treatment and disposal of radioactive waste including spent fuel elements. Basis for this build-up of financial reserves according to the commercial law is the disposal obligation under public law derived from the Atomic Energy Act. This obligation shall serve to ensure that the payment obligation under public law can be fulfilled (normal case: after final cessation of electricity generation). According to German law, the operator has to ensure that the financial resources set aside are available at the time they are needed. According to commercial law, financial reserves have to be entered in full in the balance sheet as from the beginning of operation. Regarding the financing of decommissioning before reaching the estimated operating life of an installation it is pointed out that in Germany financing of decommissioning is not only to be ensured by the individual operator of a nuclear power plant but also by the parent or affiliate company in case of corresponding contracts. Thus, there are legal provisions for protecting against project risks, uncertainties and unforeseeable events in connection with the financing of the decommissioning of nuclear installations.
90	23 F.6.5.	Record keeping is regulated in the StrlSchV, requiring among others that, after removal or clearance of the facility or site, records and documentation must be deposited with the competent authority. Where exactly are these records deposited? For how many years these records are intended to remain available with the competent authority, and in what form the records are kept? And does the licenseholder pay for the management by the competent authority?	According to §. 70 para. 6 StrlSchV, records need to be kept for 30 years after the time of release / clearance of the material. If the licensee will cease to exist, the authority is required to take over all or part of the documents. The place and method where and how these documents are to be stored is not prescribed. Usually, the folders are put into the archive of the authority. While currently at least the main records are kept as paper, in the future, electronic record keeping shall be enhanced. The exact form or format is not prescribed. Transfer of the documents to the authority and subsequent keeping until the end of the prescribed period may require fees to be paid by the licensee. Further details are regulated in the scale of charges and fees of the federal authorities.

No	Article / Reference	Comment or Question	Answer
91	24 F.4.2.	It remains unclear that Category A personnel is equivalent to the group "individuals exposed to radiation by virtue of their occupation"	§§ 54 and 55 StrlSchV characterise two categories of individuals exposed to radiation by virtue of their occupation. For Category A personnel, the effective dose may exceed 6 mSv per calendar year and is limited to 20 mSv per calendar year. For Category B personnel, the effective dose may exceed 1 mSv per calendar year but is limited to 6 mSv per calendar year. Also different organ doses are specified for category A and B personnel. The dose limits for category A are described in table F-1 (p. 108). The StrlSchV distinguishes between these two categories because of controlling and different demands on occupational health prevention.
92	24 F.4.3. Table F-1	The dose limits listed behind § 59 StrlSchV most probably refer to "effective dose" In German report for the 2nd review meeting life saving actions by pregnant women was excluded. Was § 59 StrlSchV revised in this sense?	Your comment is right. The dose limits listed in table F1 behind § 59 StrlSchV refer to an effective dose per calendar year and an effective dose once a life time. The exclusion of pregnant women is explicitly mentioned in § 58 StrlSchV as cited in the current German report and not in § 59. Table F-1 of the 2nd German report has been corrected. § 59 has not been revised in the last years.
93	24 F.4.5.	Compared to the German report for the 2nd review meeting a paragraph concerning annual checks on the yearly collective dose for the population covered by all clearances to be limited to 1 manSv, based on BSS [1F-18], has disappeared. Why has this notion of limiting the yearly collective dose for the population been abandoned?	Compliance of the German practice of clearance with the collective dose criterion of the EURATOM Basic Safety Standards has been established by a study that has projected the current development of clearance into the future (based on the database of 2003). For the first decade, where a good prediction of the cleared quantities is possible, the study showed that even by application of a conservative model, the resulting collective dose would be only a fraction of the criterion of 1 man·Sv/a. There is therefore no need for re-assessment until major changes in the clearance practice will occur.
94	24 F.4.6. Asse mine	For several years now, the inflowing salt saturated groundwater is collected and recycled by Kali & Salz AG (see H.6.9). Although direct contact between this solution and the wastes is prevented, it will collect tritium – due to its nature – that is much broader dispersed in the mine. Since it forms a transport medium for tritium, its load should appear in Table F-2.	The limit for tritium in brines to be delivered to the mine "Maria Glueck" of "Kali und Salz" is 140,000 Bq/l. Currently, only brines with less than 40 Bq/l are delivered to this mine. This is due to a self restriction for reasons of public acceptance. Brines that could be released and that are not to be delivered will be reused internally (as additive for back-fill material).

No	Article / Reference	Comment or Question	Answer
95	24 F.4.6. Table F-2	Compared to the tritium inventory of the Asse mine (Table D-13) the tritium discharge in exhaust air is rather high. Compared to the tritium discharge in exhaust air for the Morsleben repository, the discharge is relatively 10 times higher. Why is the tritium discharge in exhaust air – compared to the total tritium inventory – for the Asse mine so much higher than for the Morsleben repository?	The German national report for the 3rd review meeting concerning tritium discharge is based on the emission with exhaust air from the Asse mine in 2006 and the Morsleben repository in 2005. The emission of tritium given for the Asse mine in Table F-2 (4.9E10 Bq) was not precise. The actual value for 2006 is 4.1E10 Bq. The emission of tritium given for the Morsleben repository in Table F-3 (1.4 E10 Bq) was not precise. The actual value for 2005 is 1.7E10 Bq. The statement that the emission of the Asse mine compared to the inventory is relatively higher that at the Morsleben repository is correct. The reason for this is currently being examined. During the last years, several measures like backfilling and closure of chambers have been carried out in the Morsleben repository. It can be assumed that this led to a significant reduction of the tritium emissions. There have been no comparable measures at the Asse mine – so there the release may be higher. It also cannot be excluded that the inventory in the Asse mine is higher than assumed.
96	24 F.4.6. Table F-3	Since the German report for the 2nd review meeting the radionuclide discharge in exhaust air and waste water of the Morsleben repository has changed significantly. Why did for ERAM the radionuclide discharge in exhaust air decrease by 25 - 35%? Why did the radionuclide discharge in waste water increase by factors 2.5 (H-3) resp. 25 (others)?	The decrease in the discharge of nuclides with exhaust air results from several measures like backfilling and closure of chambers that took place during the last years. Contaminated water from the Morsleben repository is only discharged in small amounts every year. It is water for washing and sewage water arising from cleaning installations in the control area. The concentration of nuclides varies between the values mentioned in the question. The values are far below the legal limits.
97	24 F.7.2.	This section provides additional information regarding clearance of materials not mentioned in previous sections of this chapter.	Section F.7.2 refers to developments since the last report of Germany for the 2nd review meeting. The major development with respect to clearance has been the development of four sets of clearance levels. These clearance levels pertain to clearance for disposal on a landfill or for incineration in a waste incinerator and apply to masses up to 100 Mg/a or up to 1,000 Mg/a. However, these sets of clearance levels have not yet been implemented into legislation, which is why this issue has not been referred to elsewhere in the report.
98	32 D.2. Table D-1	The number of storage positions in fuel pools is inconsistent with the numbers listed in Table L-1. The same holds for the quantity of Mg HM emplaced in wet storage (Table D-3).	The number of storage positions in fuel pools as indicated in Table D-1 is not inconsistent with the numbers listed in Table L-1. As mentioned in the heading, the 19,523 positions in Table D-1 refer to the fuel pools in reactor buildings. Table L-1 includes in addition 1,210 positions at the Obrigheim NPP which are in a storage pool outside the reactor building. The same reason holds for your second remark. In Table D-, the quantity amounts to 3,441 Mg HM, in Table D-3 to 3,541 Mg HM. The difference of 100 Mg HM is the quantity of spent fuel stored at the Obrigheim NPP outside the reactor building (cf. Table L-1, line “Obrigheim”).

No	Article / Reference	Comment or Question	Answer
99	32 D.2.1. Table D-4	Whereas the AVR ceased operation in 1988 already, since the German report for the 2nd review meeting both the number of AVR fuel pebbles as the number of casks needed to store them at FZJ increased by 20%. What caused this increase in AVR fuel pebbles? Why did the quantity of HM contained in the AVR fuel pebbles increase from 1.1 to 1.8 Mg (i.e. by 60%)? [N.B. p.53 mentions 1.5 Mg HM]	As correctly mentioned, the AVR ceased operation in 1988. Of course, no further spent fuel pebbles were generated after that date. The increase of the numbers of fuel pebbles and filled casks from 2005 to 2008 can be explained by the fact that in this time period additional casks have been filled with spent fuel pebbles which were stored in a hot cell by then. For the same reason, the figure for the mass of heavy metal has increased, too. Maybe the figure given in 2005 was indicated too low so that the relative increase by 2008 seems very high. The correct figure for the actual amount of heavy metal in the spent fuel pebbles is 1.8 Mg HM (not 1.5 Mg HM). This figure has been confirmed by the competent regulatory authority.
100	32 D.4.2. Table D-9	Since the German report for the 2nd review meeting the inventory of ERAM for some key radionuclides decreased significantly more than expected. What caused the decrease in the nuclide inventory of ERAM for C-14, Co 60, Ni-63 and Cs-137?	In comparison with the report for the 2nd review meeting, the inventory of ERAM in Table D-9 does not include the intermediately stored sealed cobalt and caesium radiation sources. Taking into account this waste, the total activity for Co-60 amounts to $1.8 \cdot 10^{14}$ Bq and for Cs-137 $1.3 \cdot 10^{14}$ Bq. The activities for C-14 and Ni-63 result from corrective actions of the radionuclide inventory of single waste generators.
101	32 D.5.1. Table D-14	The number of research reactors < 1 MW thermal power that are fully removed from regulatory control should read 25 (see D.5.3)	There are 27 research reactors with a thermal output of less than 1 MW explicitly listed in Table L-16. 25 of these reactors, including a number of zero-output reactors for educational purposes, are fully removed or released from regulatory control. For one reactor, the SUR Berlin, decommissioning is currently planned. Another reactor, the AKR-1 in Dresden, was rebuilt and rededicated to AKR-2 but it was not accounted for as a new facility (AKR-2 is at the very same location as AKR-1). Therefore, in Table D-14, the sum for removed or released reactors is 26 because AKR-1 does not exist any longer and there is no additional research reactor. The AKR-1 training reactor was operating from July 1978 until March 2004. To comply with legal requirements, the Technical University Dresden had to upgrade the reactor in accordance with the state of the art in science and technology. After comprehensive upgrade measures, the new AKR-2 (former AKR-1) training reactor was commissioned on 1 July 2005. It reached first criticality in March 2005. The maximum thermal output amounts to 2 W.
102	32 D.5.2.	Grundremmingen A and Lingen are missing in the list of power reactors that are being decommissioned	Gundremmingen A and Lingen are included in the list. They belong to the seven prototype or demonstration facilities mentioned in the first paragraph of Section D.5.2. After removal of the activated components and the major part of the contamination, the project KRB-A (Gundremmingen A) is currently undergoing conversion into a decontamination and dismantling service centre for the other two NPP blocks on the site. KWL (Lingen) has just filed the licence application for dismantling.

No	Article / Reference	Comment or Question	Answer
103	32 D.5.2.	The NPP Niederaichbach and the Heissdampfreactor Kahl have been fully dismantled, and the sites have been cleared for non-nuclear use. Could you please provide more information about the total decommissioning costs for these two reactors?	The total costs for decommissioning of KKN (NPP Niederaichbach), which was finalised in 1996, amounted to 267.2 million DEM (about 137 million €). This figure includes costs for disposal of radioactive waste in the Morsleben repository (ERAM) of 1.7 million €. Further costs for disposal will be incurred in the future. The costs for decommissioning of the superheated steam reactor HDR (*Heissdampfreaktor Kahl*), which was finalised in 1999, have been in the order of 40.3 million €. This figure does not include disposal of the radioactive waste. Additional effort of the research centre Forschungszentrum Karlsruhe and the Central Decontamination Department (*Hauptabteilung Dekontaminationsbetriebe - HDB*) of the Forschungszentrum Karlsruhe amounted to 9.3 million €, so that the total costs for decommissioning of HDR (excluding disposal) are 49.3 million €.
104	32 D.5.5.	A description of the decommissioning status of Muelheim-Kaerlich is missing	As for a number of other nuclear installations undergoing decommissioning (several fuel cycle facilities, major research reactors), a description of the decommissioning status of KMK has not been included in the current report of Germany, because these decommissioning projects do not contain information beyond the included projects. An overview of decommissioning of KMK can be found at http://www.rwe.com/web/cms/de/17200/standorte/kernkraftwerke/kkw-muelheim-kaerlich/ as well as at http://www.rwe.com/web/cms/contentblob/77430/data/3982/blob.pdf
105	32 D.5.3.	Eight research reactors with a termal output of 1 MW or more are in various stages of decommissioning. One reactor has been fully dismantled and removed. Could you please provide more information about the total decommissioning costs for this reactor?	The one major research reactor having been fully removed is the FMRB at the PTB Braunschweig (cf. Table L-15 of the German report). The costs for decommissioning of the FMRB amount to 16.3 million €. This figure does not include the effort of personnel of the PTB for carrying out this project. The FRJ-1 with 10 MW has been completely removed in September 2008. The total costs for decommissioning of the FRJ-1 amounted to 30 million €.
106	20	The Bundesamt fuer Strahlenschutz acts both as an entity being responsibility for planning and operation of repositories and as a supervisory organ (regulatory body). This seems to contradict the principle of independence for the regulatory function. Why is this role as planning and operating entity not completely transferred to another branch of the government as in many other countries?	The supervision of the operation of a repository is specified in the atomic law only in case the state assigns a third party for the operation. This third party then is supervised by the Federal Office for Radiation Protection (*Bundesamt fuer Strahlenschutz – BfS*). If the state itself is the operator, the responsibility of the BfS is only defined with regard to construction and operation. Nothing is specified about supervision. Practice and jurisdiction interpret it the way that construction and operation do not need the supervision by another authority and can be supervised by the BfS itself. The supervision by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) complements this self surveillance. It is widely accepted that organs of sovereign power - and so the state as such – are by themselves responsible for the application of all laws and regulations. As such, it is left to the BfS under the supervision of the BMU how to guarantee the safe operation of a repository. This does not exclude supervision by other organs of sovereign power regarding different fields than the atomic law. E.g. concerning the mining law and water law, the operation of repositories also is under supervision of the responsible authority of the *Land* as these points are not specified in the atomic law.

No	Article / Reference	Comment or Question	Answer
107	25 p. 116 Table F-4	In this table intervention reference levels for iodine prophylaxis were (to organ – i.e. thyroid in 7 days) : -50 mSv for children and adolescents up to 18 yrs including pregnant women -250 mSv for population from 18-45 yrs. Can you please explain the deviation from the IAEA recommendation of 100 mGy in 7 days regardless to age distribution?	The reference levels for iodine prophylaxis given in Table F-4 are a recommendation of the Commission on Radiological Protection (*Strahlenschutzkommission - SSK*). They take into account the shortage of natural iodine in Germany. Furthermore, possible side effects of iodine prophylaxis were considered. E. g. for persons older than 45 years in Germany the risk of developing a disease caused by side effects of the iodine prophylaxis exceeds the risk of getting thyroid cancer.
108	25 p. 116	During the emergency the decisions are taken by the competent licensing and supervisory authorities for nuclear facilities in the Land concerned. Please explain how these decisions are coordinated with the neighbouring Laender?	The guideline [3-15] “framework recommendations for disaster control in the vicinity of nuclear facilities” lays the basis for disaster control which is in the responsibility of the *Laender*. There are also requirements on the ways of communication, information and coordination between the *Laender* in case of an emergency. This ensures a harmonised approach.
109	4 p. 187	May be this chapter could be extended by planned activities on specific facilities with concrete planned activities for a give period.	Section K should describe the planned activities to improve safety in accordance with the guidelines regarding the form and structure of the national reports. Section K in the German report does not report on planned activities for specific facilities because general technical improvements for groups of facilities are not planned in the near future and are not necessary at the moment from the German point of view. Therefore, main emphasis in this part of the report was given to the updating of Germany’s regulatory framework in accordance with the activities of the European Union and the Western European Nuclear Regulators Association (WENRA).
110	16 p. 171	What are the technical criteria for licensing a repository? For example i there a radiation standard for a 10 000 year period?	The general safety requirements are described in Chapter H.1. Chapter G.1.7 points out a dose limit of 0.3 mSv per calendar year for the post closure phase. There is no endpoint in time defined. The timeframe for the calculations depends on the scenarios for the development of the repository system and the waste. The relevant peaks are to be covered by the calculations. E.g. the calculations for the Konrad repository cover about 300,000 years. For the Morsleben repository, calculations are carried out for 1 million years.
111	20 p. 93	It is mentioned that an expert opinion on the financing of BMU activities was prepared in 2006. Does it means that activities are started towards "fee based" regulatory budget? What is the philosophy in this regards?	The Federal Office for Radiation Protection (BfS) is authorised to charge fees regarding its responsibilities in the field of the treatment of spent fuel assemblies and radioactive waste (see Section E.3.1., p. 90). Apart from that, the given constitutional basis only allows the competent authorities of the *Laender* to charge fees regarding their responsibilities (see Section E.3.1., p. 90). Regarding the scope of tasks of the BMU, the “narrow limits” of levying fees and “few and very limited discretionary powers” (better: “a very limited scope”) regarding further review are therefore facts deriving from the constitutional basis of a regulatory body consisting of – apart from BfS - authorities of the Federal Government and the *Laender*. The Federal Government does not intend to change this constitutional basis.

No	Article / Reference	Comment or Question	Answer
112	22 p. 97	What is your financial mechanism in order to collect appropriate and adequate financial resources for decommissioning of radwaste management facilities (other than NPP)? Please specify in more details.	The Repository Prepayment Ordinance (*Endlagervorausleistungsordnung – EndlagerVlV*) serves to enforce the polluter-pays principle in connection with radioactive waste management by erection of federal facilities for the long-term engineered storage and disposal of radioactive waste since, according to it, the polluter has to bear the full cost of disposal. In order to cover the necessary capital expenditure, the German Atomic Energy Act provides the imposition of contributions and advance payments. With the EndlagerVlV, the first step of a two-step overall concept ("advance payments against contributions" and "contributions") is pursued. In this first step, advance payments are imposed to the amount of the annual expenditure for disposal. The amount of the advance prepayments is specified according to an allocation key that differentiates between advance payments for repositories for all types of radioactive waste (e.g. also spent fuel elements) and repositories for waste with negligible heat generation. The extent of the advance payments to be paid by the party obliged to deliver the waste primarily depends on the waste to be expected from the utilisation of the licence. Accordingly, advance payments are currently to be paid according to the following key (as of March 2009): For a repository for radioactive waste with negligible heat generation - 64.4% mainly by the nuclear power plant operators - 6% by the Karlsruhe experimental reprocessing plant (WAK) - 29.6% by other waste generators For a repository for all types of radioactive waste - 96.5% mainly by the nuclear power plant operators - 0.7% by the Karlsruhe experimental reprocessing plant (WAK) - 2.8% by other waste generators This distribution key is reviewed at regular intervals and updated, if required. The advance payments serve to finance siting, investigation and finally the construction of repositories. In a later second step, the EndlagerVlV shall be replaced by another ordinance which regulates the imposition of contributions for the utilisation of the repository/repositories with all necessary details. Regarding the later imposition of contributions on the individual waste deliverers, the advance payments imposed according to the EndlagerVlV will be credited against the utilisation contributions to be paid for the respective repository.

No	Article / Reference	Comment or Question	Answer
113	22 p. 100	It is mentioned that "In February 2007, the ...". This is a commendable initiative to knowledge management. In this regard what are the experiences with the Alliance for Competence in Nuclear Technology established in 2000?	Interim results of the work of the Alliance for Competence in Nuclear Technology (*Kompetenzverbund Kerntechnik*) achieved so far may be summarised as follows: • To counteract the decreasing number of students studying nuclear technology and as a consequence a lack of expert personnel, the institutions that have joined the Alliance for Competence in Nuclear Technology are intensifying cooperation with neighbouring universities so as to provide adequate training and dissertation possibilities in the nuclear area. Successes have already been achieved by the new establishment of chairs in nuclear technology and reappointments of their holders. • By coordination and bundling of R&D programmes, efficiency of the use of public funds to promote nuclear safety and waste disposal research has been increased sustainably. • Special colloquia and information meetings for students are regularly organised with a view to attract young scientists and engineers to the nuclear field. Furthermore, the centres and universities offer attractive pre-doctoral student employments to qualified university graduates. • In line with the research policy requirements, participation of German R&D institutions in international projects is possible via third-party funds. Thus, it can be concluded that the Alliance for Competence in Nuclear Technology has made a valuable contribution to the maintenance of expert knowledge but work must continue to cope with future challenges.
114	26 p. 121	What are measures to ensure the availability of adequate financial resources for decommissioning in the case of premature/unplanned shutdown of nuclear facility?	For this case, in Germany there is no mechanism of ensuring a secure legal position in form of a legal provision. According to German law, the operator organisations are obliged to build up financial reserves for the later decommissioning of the nuclear installations and the treatment and disposal of radioactive waste including spent fuel elements. Basis for this build-up of financial reserves according to the commercial law is the disposal obligation under public law derived from the Atomic Energy Act. This obligation shall serve to ensure that the payment obligation under public law can be fulfilled (normal case: after final cessation of electricity generation). According to German law, the operator has to ensure that the financial resources set aside are available at the time they are needed. According to commercial law, financial reserves have to be entered in full in the balance sheet as from the beginning of operation. Regarding the financing of decommissioning before reaching the estimated operating life of an installation it is pointed out that in Germany financing of decommissioning is not only to be ensured by the individual operator of a nuclear power plant but also by the parent or affiliate company in case of corresponding contracts. Thus, there are legal provisions for protecting against project risks, uncertainties and unforeseeable events in connection with the financing of the decommissioning of nuclear installations.

No	Article / Reference	Comment or Question	Answer
115	3 C. p. 28	The German National Report distinguishes "practices" from "work activities" mainly by whether the material is used for its radioactive properties (practice) or is incidentally radioactive (work activities). This seems inconsistent when applied to residues to uranium mining waste, which are a byproduct or the extraction of uranium because of its radioactive properties. The application of NORM to uranium mining residues to remove it from the reporting requirements is inconsistent within the German regulatory infrastructures and inconsistent with the consensus of the closing plenary of the first Review Meeting of the Contracting Parties in November 2003. In this affirmation, the reporting of uranium mining residues is within the scope of the Joint Convention.	Considering Chapter 1, Article 3 (2) of the "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management" of September 1997, the Joint Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of the Joint Convention by the Contracting Party. Since the German Contracting Party has not declared the residues from remedial activities pertaining to former uranium ore mining as radioactive waste for the purposes of the Joint Convention, the Joint Convention does not apply to those materials. As a consequence, such materials are included in a separate report. There seems to be no evidence of contradiction.
116	11 H.1.1. p. 148	The German National Report indicates that results of site-specific safety analysis at the KONRAD repository were used for setting waste acceptance requirements and that this ensured that criticality was avoided and that residual heat was accounted for at KONRAD. If only radioactive waste with neglible heat generating capacity was disposed at KONRAD, why were these studies deemed necessary?	Waste with negligible heat generation does not necessarily mean low level waste. Part of the waste that will be disposed of at Konrad arises during the production of fuel assemblies (UO2, MOX). For this type of waste criticality has to be avoided. The studies that were undertaken deemed to be necessary to prove that criticality and residual heat was accounted for.

No	Article / Reference	Comment or Question	Answer
117	19 E.2.2. p. 72	The German National Report states that a scientific advancement will displace the application of a standard which has been rendered obsolete by this advancement. It goes on to say that there is no need to suspend this standard. Furthermore, the improvements in safety requirements required by law is not bound by the formal development of the standards. This appears to imply that the regulatory framework is not much of a legal framework; there is little to indicate that the designation of a standard, as obsolete, is not only a purely technological determination, but that there is no need to repeal or revise the obsolete standard at all. Please explain.	The Atomic Energy Act (AtG) stipulates as a licensing requirement for various activities that "the necessary precautions have been taken in the light of the state of the art in science and technology to prevent damage ". This unspecifically phrased statutory requirement ensures that precautions are taken which, according to the most recent scientific findings, are deemed necessary. Non-mandatory guidance instruments specify which technical measures are principally required to ensure the necessary precaution against damage in line with the state of the art in science and technology. As these non-mandatory guidance instruments themselves are not legally binding (see regulatory pyramid), they generally require no formal suspension. It is therefore possible and indeed necessary that backed-up scientific developments are considered in the necessary precaution against damage in line with the state of the art in science and technology without necessitating a suspension of these non-mandatory guidance instruments. As an example for such non-mandatory guidance instruments, the safety standards of the Nuclear Safety Standards Commission (KTA) may be given. By regular reviews and amendment, where necessary, of adopted safety standards at intervals of no more than five years it can be assured that the standards are adapted in line with the state of the art in science and technology. To have detailed specifications of the safety-related requirements in the law itself would be very difficult owing to the numerous details. Furthermore, there would be the risk that the legislator might not implement technical and scientific developments promptly. Specifying guidance instruments at non-mandatory level contribute to a more dynamic implementation of the protection of life, health and material goods against the risks involved in nuclear energy and the harmful effects of ionising radiation.

No	Article / Reference	Comment or Question	Answer
118	21 F.1.1. p. 96	The German National Report indicates that to provide an independent check on the safety systems at operating nuclear facilities, including spent fuel conditioning plant, there are Nuclear Safety Officers and/or Radiation Protection Commissions, which do not answer to “corporate interests of cost effective operation.” However, the report also indicates that the Nuclear Safety Officer reports to the plant manager. Usually, the plant manager reports to those same corporate interests of cost effective operation. Please explain how this maintains independence from the company hierarchy.	In the Nuclear Safety Officer and Reporting Ordinance (AtSMV), the appointment of the nuclear safety officer (§ 2 duties of the safety officer (§ 4) and position of the safety officer (§ 5) are clearly described. Among other duties, the nuclear safety officer has to notify the licensee forthwith of safety deficiencies and of proposals to correct these deficiencies or to improve the safety standard. In § 5 it is stated that the nuclear safety officer shall not be hindered in the performance of his duties and shall not be discriminated against on account of his work. Furthermore, the licensee shall ensure, by means of organisational measures within the plant, that the nuclear safety officer is able to submit any proposals and doubts directly to the management if he is unable to agree with the plant manager and considers a decision by management to be necessary due to the particular importance of the matter in question. He has the right to report directly to the plant manager but does not report in the role of a subordinate, and he has no responsibility for a cost effective operation of the facility. On the contrary, if the nuclear safety officer assigns greater value to economical aspects than to the safety of the plant, then he renders himself liable to prosecution. The radiation protection commissioner represents the counterpart to the nuclear safety officer in the field of radiation protection. Appointment, position and duties are described in the Radiation Protection Ordinance (StrlSchV). In § 31, para. 2 StrlSchV it is stipulated that a radiation protection commissioner must be appointed for the control and surveillance of the practice. The radiation protection commissioner is responsible for the management and supervision of measures designed to ensure compliance with the radiation protection principles and protective measures as laid down in the Radiation Protection Ordinance. The licence holder and the radiation protection commissioner shall assure that in the event of danger to man and the environment adequate measures are taken immediately in order to avert this danger (§ 33, para. 3 StrlSchV). According to § 32, para. 5 StrlSchV, the radiation protection commissioner shall not be hindered in any way in performing his duties or suffer any disadvantage due to performing these duties. In order to fulfil his duties, the radiation protection commissioner shall not organisationally be assigned to departments responsible for operating profit (e.g. production, maintenance). In summary, it can be stated that both the nuclear safety officer and the radiation protection commissioner have a very strong and independent position within the company hierarchy. Ultimately, of course, it is a matter of personal integrity and social sense of responsibility how they perform their responsible roles. The legal framework can only lay the foundations.
119	26 F.6.2. p. 124	The German National Report indicates that commercial/private facilities set aside reserves during the operational phase for funding decommissioning. How are these reserves maintained and protected to ensure that they will be available at that time? If a serious event early in the operational phase results in the need for decommissioning, will funding reserves be sufficient for decommissioning? If not, how will this be handled?	For this case, in Germany there is no mechanism of ensuring a secure legal position in form of a legal provision. According to German law, the operator organisations are obliged to build up financial reserves for the later decommissioning of the nuclear installations and the treatment and disposal of radioactive waste including spent fuel elements. Basis for this build-up of financial reserves according to the commercial law is the disposal obligation under public law derived from the Atomic Energy Act. This obligation shall serve to ensure that the payment obligation under public law can be fulfilled (normal case: after final cessation of electricity generation). According to German law, the operator has to ensure that the financial resources set aside are available at the time they are needed. According to commercial law, financial reserves have to be entered in full in the balance sheet as from the beginning of operation. Regarding the financing of decommissioning before reaching the estimated operating life of an installation it is pointed out that in Germany financing of decommissioning is not only to be ensured by the individual operator of a nuclear power plant but also by the parent or affiliate company in case of corresponding contracts. Thus, there are legal provisions for protecting against project risks, uncertainties and unforeseeable events in connection with the financing of the decommissioning of nuclear installations.

No	Article / Reference	Comment or Question	Answer
120	32 B.1.4. p. 23	The German National Report states only stable/fixed radioactive waste will be accepted in deep geologic formations. The exclusion of liquid/gaseous waste seems to imply some necessary treatment and conditioning. But in section B.1.5, "Criteria Used to Define and Categorize Radioactive Waste" it is stated that heat generating waste, including feed sludge would be disposed in a deep geologic repository. Section D.3.1 indicates that liquid wastes "may" be pre-treated. Will "sludges" be conditioned to be stable/fixed waste forms, prior to such disposal? Please clarify this apparent discrepancy.	Only solid radioactive waste is accepted for disposal in a deep geological repository. Liquid wastes like “sludges” need to be processed by means of e.g. drying, cementing or vitrification (cf. Section D.3.1. - p. 43) prior to disposal.