Nuclear Safety Convention - 1st Review Meeting

(Vienna, 12 - 23 April 1999)

Answers (from HSK and RD-BFE) to

Questions on the Swiss National Report (in Countries Group 2)

from the following countries:

Austria, Brazil, France, Germany, Hungary, Ireland, Italy, Japan, Korea

1st column:
Country from which questions are originated

Question number
in the country of origin

Öst .....Austria
Bra .....Brazil
F .....France
D .....Germany
Hg .....Hungary
Eire ....Ireland
It .....Italy
Jap .....Japan
Kor .....Korea

2nd column: Article No. in NRC (also Chapter No. in the Swiss Report) referred to /relevant to the question as indicated by the question's author

3rd column: Chapter concerned in the Swiss report identified on the basis of question's content and meaning; [...] indicates additional reference parts where the subject is addressed and elements of answer could possibly be found

4th column: Page number containing the text referred to ; [...] indicates additional reference pages where the subject is addressed and elements of answer could possibly be found

5th column: Comment or question as formulated by the author of comment /question [some obvious corrections have been made to the original; other inconsistencies are noted (??? Sic) and, if available, correct interpretation is given]

6th column: Running number intern to HSK

7th column: HSK (and RD) Answer (if necessary for coherence and language, amended by SU+ZJ)

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 6	Art. 6	13-14	Were risks during shutdown situations studied in the frame of the periodic safety reviews ? If so, could Switzerland indicate which measures were identified as necessary to reduce these risks ?	1.	Note: HSK staff could not establish a connection between this question and article 6. The question seems to refer to the risk from periodic shutdown situations (such as refuelling shutdown). HSK requires plant-specific Probabilistic Safety Analyses (PSA) also for low power and shutdown operations. The corresponding licensee studies are currently being reviewed by HSK. Based on an insight from the low-power and shutdown PSA, the Gösgen plant has decided to backfit an additional spent-fuel pool cooling train.
Art. 6	Art. 6	13-14	YEAR 2000 Computer Issue: How does Switzerland ensure that each licensee has an adequate strategy and action plan in place to deal with the Year 2000 issue ?	2.	The operators of the power stations had already begun in 1996 and 1997 with their own investigations concerning the Y2K issue. Main projects have been started in 1998. The licensees are aware of the problem and are assessing the appropriate computer based systems for possible "Year 2000" problems. The documentation which has been required by the HSK showed that all plants have a project organisation to handle the Year 2000 issues. All plants have made an inventory of the computer based systems and devices which could have an impact on the safe and reliable operation of their plant. The inventories include a categorisation and classification of the systems, according to their importance. The documents contain indications on how each of the systems have to be handled. The number of systems which could have a direct impact to safety is small, as expected. There are, however, a relatively large number of systems which have an indirect importance for the safe operation of the plants. For important computer based systems, suppliers either have confirmed that the systems have no date related problem or they have indicated particular problems and solutions to remedy these shortcomings. HSK has recognised that, in addition to the answers given by the suppliers, all Swiss NPPs have performed their own tests on some systems to find out date related bugs or to ensure that they have no such problems. The tests at the NPP sites will continue in 1999. This will also be the case for those systems which have been remedied. HSK suggested that the NPPs also follow the US Guideline NEI/NUSMG 98-07 for Contingency Planning and required a specification of such planning measures. As one special measure, in the frame of contingency planning, HSK explicitly demanded an augmented staff personnel during the critical days before and after the change of the century. A confirmation of the Y2K readiness of the systems is expected from the licensees in the summer 1999. Further information (available in German): Internet Information der HSK: Das Jahr 2000 Problem in den schweizerischen Kernkraftwerken

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 6	Art. 6	13-14	Could you provide summary plant-specific data on the production and on-site storage of spent fuel ?	3.	Average number of annually discharged spent fuel assemblies: KKB I: 35; KKB II: 32; KKG: 43; KKL: 112; KKM: 42. All these spent fuel assemblies are stored on-site; they are eventually transported to reprocessing or intermediate storage facilities. Currently, the total amount of irradiated spent fuel assemblies stored on-site is as follow: KKB I: 168; KKB II: 250; KKG: 303; KKL: 1729; KKM: 271.
Art. 7	Art. 7 3rd item in RadProt.Act Licensing procedure	16, 19	Does the reference to the state-of-the-art in science and technology imply that this state has to be applied on a detailed level, e.g. to the technical characteristics of safety systems ? Who defines the state-of-the-art ?	4.	Part 1: yes, as appropriate to the age of the reactor. Part 2: to our knowledge, no generally agreed or approved definition of the expression 'state of the art' exists. Our interpretation of the expression „state of the art": the best available technical means at present for achieving the intended application goals.
Art. 7 Clauses 2 (ii) and 2 (iv)	Art. 7 Clauses 2 (ii) and 2 (iv)	18-21 and 22	Besides suspension and revocation of licenses are there other sanctions in cases of infringement of the conditions and technical specification stated in licences or in cases where the prerequisites of the licences should no longer be valid ? What happens if a dose limit or an authorised discharge limit is exceeded ? In short, how is enforcement carried out ?	5.	The Atomic Energy Act and the Radiological Protection Act also contain penal provisions. Depending on the offence the sanctions are fine or imprisonment. According to the Radiological Protection Act, the exceeding of a dose or emission limit can be penalised with imprisonment of up to three years or with a fine of up to 100'000 Swiss francs. Individuals only can be hold responsible under criminal law. For offences by a company persons in charge will be prosecuted. In general, an ordinary court is competent to judge offences against the Atomic Energy Act or the Radiological Protection Act. (answer also valid for question HSK-16 = Öst-7)

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 7, § 2	Introduction, Background (no mention in Art. 7)	9	As mentioned in the Report, public constraints imposed a moratorium for nuclear energy. For this reason, Swiss suppliers of electricity are investing financial for the construction on NPPs in France, with proportional access rights on their electricity production. How can the sustainable development principles, specially the "polluter payer principle" as provided in the national legislation (as mentioned in page 19/69 of the Report *[??? sic]*) be interpreted in this situation?	6.	The Nuclear Safety Convention is not the right frame to discuss the so-called "polluter payer principle" in the sense of the Rio Convention (climate change, chemical pollution of the atmosphere, etc.). Even if the "polluter payer principle" is not explicitly mentioned in the Swiss nuclear energy legislation (as wrongly stated in the question), it is tacitly applied in Switzerland: a funds for decommissioning exists (see 3rd question from Brasil below) and a funds for radioactive waste management is being prepared to confirm the efforts already made and paid by the utilities for final storage of radioactive waste.
..... Art. 7, § 2	..... Introduction and Art. 7, clause 2		..... How is the "access rights" in the French electricity production ensured ? In this sense, is the electricity production considered just as another commodity ? How can this be interpreted vis-à-vis the Nuclear Safety Convention, since the electricity produced in France comes mainly from nuclear energy, with an associated risk for French citizens ?		..... Several Swiss electricity suppliers have concluded long-term contracts to purchase electricity produced in French NPPs in proportion of investment for construction. The import of electricity from French NPPs is not in contradiction to international or Swiss law. To the contrary of nuclear safety, electricity imports from foreign NPPs are not subject of the CNS. The French and the Swiss NPPs have to comply with the same international and recognised safety standard.
				7.	(included in HSK-6)
Art. 8 Clause 1	Art. 8 Clause 1	25-26	Financial and Human Resources: The question of adequacy in human resources available to the Inspectorate (page 26) ought to be addressed.	8.	In Article 415 of the IAEA „Code on the Safety of Nuclear Power Plants: Governmental Organisations“ a full time regulatory staff of 80 to 100 professionals is suggested as the minimum number for a member state operating a few power reactors of the same type even when extensive use of consultants is made. Since Switzerland operates four different reactor types the actual staffing of the regulatory body as mentioned on page 25 is below this suggestion. However it is emphasised in Art. 415 that this figure may very widely. The adequacy of the human resources of the HSK was reviewed during an IRRT

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					mission in December 1998. During this review, some areas were identified where there are a lack of resources. These areas are the Reactor Design and Safety Analysis Division and the Section for Radioactive Waste Management. The IRRT recommended that: A review of the resources of the HSK Sections should be performed taking into account the duties and responsibilities of those sections. Full-time Section Heads should be nominated to all HSK Sections to strengthen the line management of the Divisions in question. Taking into account the number and type of Swiss NPPs, HSK should increase the human resources available to the Reactor Design and Safety Analysis Division, RST Section in particular, considering the extent, diversity and highly specialised activities. HSK should establish and provide appropriate resources for a formal group within its organisation with the responsibility to monitor decommissioning activities and provide project management for reviewing regulatory required decommissioning documents and inspection of decommissioning projects. HSK should address and fulfil its full range of competent authority responsibilities concerning the transport of radioactive material not related to NPPs. ....It is recognised that significant resources may be required with regard to this responsibility..... The review of the resources has been performed this spring and a formal request for reorganisation and additional five posts has been addressed to the Federal Department for Environment, Transport, Energy and Communication.
Art. 8 Clause 1			Is the Inspectorate also responsible for supervision of radioisotopes used in medicine, industry and research ?		No, the Inspectorate is not responsible for supervision of radioisotopes used in medicine, industry and research. The Federal Office of Public Health (BAG / OFSP) (within the Ministry of the Interior) is the competent authority responsible for the supervision of radiological protection **outside nuclear installations** while the Swiss National Insurance in case of Accidents (SUVA) deals with operational safety aspects (supervision for prevention and indemnification in case of accident).
			In the Organisational Chart in Figure 5 and in the subparagraph on the Supervisory Authority on page 25 a unit called SNS/TNT is mentioned, but its functions are nowhere stated.		The unit called SNS/TNS is the Section Nuclear Technology and Safeguards at the Federal office of energy (as indicated in the list of abbreviations to Figure 5, but not at the right place in the alphabetical order). As mentioned on page 23 of the Swiss Report, this Section for Nuclear Technology and Security (SNS/TNS) deals with all aspects of physical protection in nuclear installations and of safeguards and, in that

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					regard, is part of the regulatory body.
Art. 8 Clause 2	Art. 8 Clause 2	26-27	The question of effective separation between the functions of the regulatory body and other bodies concerned with promotion or utilisation of nuclear energy is not entirely clarified; indeed, the Swiss regulatory body appears at the moment to be funded under the Federal Department of Energy (BFE/OFEN) budget, the functions of which Department comprise aspects of energy economics, energy politics and supply security.	9.	This answer is also applicable to questions Hg-1 = HSK-10 and Eire-1 = HSK-11 The CNS doesn't require a formal separation between the functions of the regulatory body and those of any other body or organisation concerned with the promotion or utilisation of nuclear energy. In fact, on the technical level, the supervisory body acts independently from the Department of Environment, Transport, Energy and Communication and from the Federal Office of Energy. Therefore, those authorities are effectively separated as requested by the CNS. Modification of structure and organisation of the Inspectorate is considered since some time. The establishment of a National Safety Agency for technical safety (NASA) outside the governmental administration is being prepared. It will make the supervisory authority (Swiss Federal Nuclear Safety Inspectorate) formally independent, too. Earlier date could be the year 2000 or 2001. This aspect has been picked up by the IAEA IRRT mission in December 1998 (See also IRRT report on Internet under http://www.hsk.psi.ch/hsk-publ.html). Some parallel could be made with the situation in Belgium: a Federal Agency has been created by law (1994) but not yet implemented.
.....	.....	.....	.....		
Art. 8 Clause 2	Art. 8 Clause 2	26	How and when do you intend to review the issue of the independence of regulatory body and to perform the necessary reorganisation ?		
.....	.....	.....	.....		
Art. 8	Art. 8 Clause 2	4 and 26	Regulatory Body On page 4 and 27 it is said that the requirements of Art. 8.2 regarding separation of the regulatory function from certain other bodies is complied with while it is admitted that this separation is only at the technical level. Is it not the intention of Art. 8.2 to have all functions separated from all functions of those other bodies concerned with the promotion and utilisation of nuclear energy ?		
				10.	(included in HSK-9 = It-3)
				11.	(included in HSK-9 = It-3)

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 9	Art. 9 or better Art. 7	28 or better 15-17	The prime responsibility for the safe operation of Nuclear Power Plants rests with the license holder, even though this is not explicitly stated in the Atomic Energy Act (Report, page 4). Why has the responsibility of the license holder of a nuclear installation not been explicitly introduced in the Swiss legislation ? Will it be introduced in the revised Atomic Energy Act ?	12.	Because it is so obvious that organisations such as utilities (they are private firms - Company limited - even if the shares are mostly in public hands) are responsible and liable for their activities. Without being explicitly mentioned, the responsibility of the licence holder for the safety of the nuclear installation and its safe operation has been established through practice and jurisdiction. This responsibility will be explicitly fixed in the new Nuclear Energy Act, now in preparation, which will replace the initial Atomic Energy Act that came into force in the year 1959 and, for several other reasons also, needs to be revised.
Art. 9	Art. 9 or better Art. 7	28 or better 15-17	Is the liability of the license holder under Atomic Energy Act a strict one („no fault liability“) and is it unlimited ?	13.	According to the nuclear liability legislation, i.e. the Nuclear Liability Act (KHG/LRCN) and the Federal Ordinance on civil liability in nuclear energy area (KHV/ORCN), the licence holder has unlimited liability for nuclear damages which are caused by nuclear materials in his nuclear installation. He will be discharged from liability only if the victim caused the damage intentionally or trough gross negligence. This unlimited liability is covered by private insurance + licence holder's own means/fortune + insurance through the State (if not sufficient in case of severe accidents, necessary supplementary special means from State approved by Parliament on ad hoc basis).
Art. 9	Art. 9 or better Art. 7	28 or better 15-17	Has a Swiss licensee a right of recourse against his employees (in particular those in operational control), if they have caused a nuclear damage either by their negligent behaviour or with the intent to cause such damage ? If this is the case, is this right of recourse granted on the basis of the labour contracts entered into with them or otherwise ?		Against his employees, the licence holder has a right of recourse if it is fixed in the employment contract and the employee caused a nuclear damage intentionally. Switzerland has not ratified Paris and/or Vienna Conventions on civil liability because Swiss legal covering is higher than that agreed upon in these Conventions.
				14.	(included in HSK-13 = Öst-4 + Öst-5)

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 9	Art. 9 or better Art. 7	28 or better 15-17	In the case a licensee or its employees do not conform with relevant rules concerning the safety of nuclear power plants, are the Swiss authorities empowered to impose administrative sanctions against them ? If this is the case, what are the sanctions that can be imposed for what kind of administrative offences against the licensee or these employees ?	15.	
Art. 9	Art. 7 Atomic Energy Act	16	What is the content of the penal provisions referred to in the Swiss report under Article 7 ? Do they establish a criminal responsibility of the license holder or of physical persons in their capacity as organs of the licensee ? If this is the case, what are the sanctions that can be imposed for what kind of criminal offence against the licensee or these employees ?	16.	The Atomic Energy Act and the Radiological Protection Act also contain penal provisions. Depending on the offence, the sanctions are fine or imprisonment. According to the Radiological Protection Act, the exceeding of a dose or emission limit can be penalised with imprisonment of up to three years or with a fine of up to 100'000 Swiss francs. Individuals only can be hold responsible under criminal law. For offences by a company persons in charge will be prosecuted. In general, an ordinary court is competent to judge offences against the Atomic Energy Act or the Radiological Protection Act. (answer also valid for question HSK-5 = It-1)
Art. 9	Art. 7 Federal laws and ordinances	15-17	Does Switzerland intend to become a party to the Convention on the Protection of Environment through Criminal Law (European Treaty Series/172), opened for signature in Strasbourg on 4 November 1998, which deals, in particular, with intentional and negligent offences committed by means of nuclear substances or installations ?	17.	The question whether Switzerland will sign the Convention on the Protection of Environment through Criminal Law is still open. The Cantons, which would be responsible for the execution of the Convention, have to be consulted first.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 10	Art. 10	29 4th para	The report states that "Both NPPs concerned have initiated Programmes in order to make the staff aware of this problem (complacency) and to foster a better developed questioning attitude." Please explain about the programmes initiated at the NPPs.	18.	The programme SAFE involves specific training programmes, a series of posters and a set of safety indicators for the personnel visible on blackboards in various places. SAFE is an acronym in German for „self-criticism, clear understanding of job and associated duties, discovery and identification of mistakes and failures, learning from taking experience into account“. There are also programmes initiated to introduce the STAR concept (Stop, Think, Act, Review).
Art. 10	Art. 10	30 last para	The report states that "*Discussions between the Inspectorate and operators about this issue* [economic pressure] *and the related problems have been started. The operators of NPP emphasise that the priority given to safety is not influenced by this economic pressure. The development of organisational issues and the readiness of the operators to comply with the safety requirements are followed closely by the Inspectorates.*" What are the main points in the discussions ? What conclusions or solutions are expected from the discussions ?	19.	Such discussions between the Inspectorate (HSK) and operators have been performed at management level with all NPPs. Points of discussions: Economic pressure may result in reduced available resources. This may have an influence on safety. HSK expects a transparent information about decisions taken at the plants and their consequences. Expected results: Planned organisational modifications and reductions in NPP's staff have to be announced in advance to HSK (already required in Guidelines HSK-R-15 and HSK-R-17). Additionally the NPP has to show to HSK that the planned modifications do not affect safety. HSK requires feedback about the experience with the modifications. If the operators have the intention to modify maintenance intervals, conditions pertaining to technical specifications or refuelling outages, they have to submit to the Inspectorate appropriately documented proposals with an adequate justification.
Art. 11	Art. 11 Clause 2	31-32	What is the average turnover of nuclear power plant staff ? What measures are taken to ensure that a sufficient number of personnel is available in the mid- and long-term future ?	20.	Personnel in NPPs is very stable. Average turnover is below 2% per year for the two newer plants. In the older plants it is in the order of 3-4%, mainly due to natural fluctuations (the main reason for hiring new personnel is the retirement of the older generations). In one plant it was in the order of 5% during the past few years due to a special action (offer for early retirement). The values are well below the average for other industries in Switzerland. No recruitment problems are expected for the mid-term and long-term future. This is periodically confirmed within the frame of regulatory supervision.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 11, (also Art. 7)	Art. 11 and Art. 7	31 and 15 & ff	As mentioned in the Report, legal provisions established a fund for decommissioning. Please, provide more details about the fund. What are the sources for the fund (public, private or both) ? Is the utility participation in the fund ? Are the resources provided by tax, fees or others ?	21.	Only licence holders of private nuclear installations are paying contributions to the decommissioning fund. The annual contributions are calculated in relation to the presumed costs for decommissioning and dismantling after 40 years of operation. If the contributions are not sufficient, the Swiss Confederation can advance funds, which have to be paid back. The costs for decommissioning and dismantling of the Swiss NPPs are estimated to 2.5 billion francs. At the end of 1998 the fund contained about 778 million francs.
Art. 12	Art. 12	34-35	Modifications to the control rooms and implementation of computerised plant information systems have been carried out. What is the situation in case of loss of the main control room ?	22.	Control rooms in the Swiss NPPs are all of the classical type with hardwired control and instrumentation equipment. The computerised plant information systems are additional devices which were installed only after the TMI accident in order to obtain a better overview of the plant status. For the case where the main control room has to be abandoned, each NPP is provided with a protected supplementary control panel or emergency control room to enable the operating staff to shut down the reactor and to maintain the plant in a safe shut-down condition.
Art. 12	Art. 12	34-35	In addition to the operating procedures for all normal operating modes, each NPP uses dedicated procedures in case of emergency situations. The Inspectorate requires these procedures. The emergency procedures include the alerting of the stand-by safety engineer. Do these procedures cover severe accident management ?	23.	Selected severe accident management procedures are in place in all Swiss NPPs to mobilise means and operate systems available to respond to severe accidents. In addition, the HSK has required that Severe Accident Management Guidance (SAMG) be implemented on a systematic basis in all NPPs within the next years.
Art. 12	Art. 12	34-35	Shutdown situations have particular features concerning human factors : Are there specific measures (procedures) relating to shutdown situations ?	24.	Procedures exist for low-power and shutdown operation, but none were developed in response to specific human factors concerns.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 12	Art. 12	34 1st para	The report states that "*HSK/DSN has set up the section on Personnel, Organisation and Safety Culture*." and in page 8 of Inspectorate 's descriptive booklet, "*MOS considers question of human reliability and the safety culture of nuclear installation operators.* ". Please explain what was done by MOS to foster the safety culture among nuclear installation operators to date.	25.	In the framework of root cause analysis, the Inspectorate (Section on Personnel, Organisation and Safety Culture - MOS) has requested the analysis of near misses. Two plants have up to now implemented corresponding procedures and given the necessary means. In 1997, MOS has initiated a research program at the University of Berne to develop a method for the evaluation of safety awareness of NPP staff. The project is conducted in collaboration with two Swiss NPPs. Safety culture (safety management) is a topic addressed during management meetings between NPPs and HSK. MOS follows the activities in this area at Swiss NPPs.
Art. 12	Art. 12	34 5th para	A computerised alarm system and procedure is planned to be installed in NPPs in 1999. What are the regulatory criteria and technical basis for the evaluation of the procedure and system.	26.	A computerised alarm system and computerised procedures are foreseen only in the NPP Beznau. The basis of licence for plant operation are the paper-based EOP and the classified instrumentation and control, which stay in operation also when the new computerised systems will become in operation. The new computerised systems for alarm and procedure are (like the Safety Parameter Display System) classified as safety related systems. They will be used by the shift team (shift supervisor and two operators) to deal with all types of events (incidents and accidents), instead of the existing paper EOP and I&C. Therefore, they have large impact on shift performance. To meet the regulatory requirements (e.g. HSK-R-06, IEC 1226), that operators have to use high classified information dealing with emergency events, the computerised procedures (CP) are backed-up with a simplified paper version (SPV). In case of emergency events, the stand-by safety engineer will be called, dealing with the SPV and using the existing classified I&C to keep the transient under control also in case of undetected computer failure. In the latter case, the shift team has, by order of the stand-by safety engineer, to take a transition from CP to paper-based emergency operation procedures. To assure high quality for the new computerised systems, strong attention is given to the software development and implementation as well as to an independent verification and validation process for the plant specific properties of the new systems. Design basis of computerised procedures are the existing paper-based EOPs. Design basis of the alarm system are based on Cognitive Engineering principles, the model has been developed by Rasmussen and adapted by D.D. Woods and E. Roth as known experts in this field.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 13	Art. 13	36-37	Does the Regulatory Body envisage to establish a QA system ? If so, when is it expected to be effective ?	27.	Yes The preparation for establishing a QA system is under way. It is expected that this system will be implemented during the year 2001.
Art. 13	Art. 13	36-37	Would you give information on regulations and/or technical guides used as reference for the Q.A. system?	28.	HSK requires that Swiss NPPs have a formal QA system. There is at the present time no detailed specification nor a regulation for this issue. Basis for HSK approval is that the systems fulfil the recommendations expressed in the QA codes and safety guides published by the IAEA in its Safety Series No. 50 (50-C-QA and 50-SG-QA). The standards in the series ISO 9000 are used for reasons of comparison.
Art. 13	Art. 13	36 6th para	The report states that: "*Quality has a long tradition in Switzerland that is based on a good professional training and experience.*" How is this tradition applied in NPPs' QA plan and QA activity ? Also, how is this incorporated into the regulatory framework ?	29.	Vocational training in Switzerland underlies a strong governmental regulation. The training ends with a theoretical and practical examination which is a requirement for a person to bear the official title of electrician, mechanic, baker, etc. This fact is implicitly reflected in the QA system of Swiss NPPs. The requirements for a specific and defined position are based on this professional training. This implies that certain posts are attributed only to people who have the required profession. Ca. 70% of the staff in Swiss NPPs have either an academic education, are engineers, technicians or have a profession in the above mentioned sense. Concerning incorporation into the regulatory framework, there was no need for explicit requirements at the level of nuclear energy legislation. Supplementary specific training is required by the Inspectorate only for personnel to be licensed: these requirements are formulated in its Guideline HSK-R-27.
Art. 13	Art. 13	37	Quality Assurance: On page 37 mention is made of the establishment of a quality management programme within the Swiss Regulatory Authority. Does this, in your view, come under Article 13 which seems to refer to QM at nuclear installations or is it simply a highly desirable self imposed discipline which falls outside of any obligation of the	30.	The preparation for establishing a QA system is under way. It is expected that this system will be implemented during the year 2001.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
			Convention ?		
Art. 14	Art. 14 Back-ground	38	The report states : "*Important conditions and prerequisites for the granting of a licence are imposed as licence conditions. One condition is that the Safety Analysis Report has to be annually checked for conformity. A detailed revision has to be submitted to the Inspectorate periodically*". What is the periodicity ?	31.	There is no standard (fixed) periodicity for SAR revisions. But the annual checks of SARs lead usually to a revision every three to five years according to realised plant modifications or to up-dated safety assessments (e.g. PSA).
Art. 14	Art. 14 Items reviewed	38	Items reviewed in a Periodic Safety Review: The report mentions that : *"In addition to the different Items considered for new installations, the assessment covers operational experience backfitting, modification and ageing for plants already in operation (Beznau II and Mülheberg)"*. Does this mean that these items have not to be taken into account with the second generation plants Gösgen and Leibstad although these went in operation respectively in 1979 and in 1989 ? Are these items defined after an agreement between the Inspectorate and the licensee ?	32.	The answer is „no" for the first question. The difference made between NPPs already in operation but needing a periodical renewal of the operation licence (KKB II and KKM) and the three other NPPs (KKB I, KKG and KKL) with a timely unlimited operation licence is rather artificial. All five plants are submitted to periodical safety review (PSR) and all items are reviewed at each plant. In the text of the Swiss report on these aspects, a „new plant" is a plant that has neither been commissioned nor built at the time of writing the present report. The major items backfitted in the older Swiss plants were included in the design of the second generation plants. The answer is „yes" for the second question only if the meaning of the phrase „agreement between the Inspectorate and the licensee" is limited to „a clarifying discussion with the licensee and a converging conclusion". The backfits were firm regulatory requirements that were formulated after detailed discussion and finally in agreement with the utility concerned.
Art. 14	Art. 14 [Clause (i)]	38-40	In which range of probability are the DBAs located or at which level of the INES scale they correspond ?	33.	Design basis accidents (DBA) occur only on paper, i.e. in reality incidents/accidents will always deviate from the DBA assumptions. Thus, INES scaling will have to take place according to the respective guidelines.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					Should nevertheless a DBA occur as analysed, no INES level beyond 3 should apply, as the event is within the design basis.
Art. 14	Art. 14 [Clause (i)]	38-40	Which are the severe accidents taken into consideration and which is the respective assigned probability ?	34.	PSA considers the full spectrum of initiators that can lead to severe accidents. These include internal events, such as pipe ruptures, system failures or fires, and external events, such as earthquakes, floods, aircraft crashes etc. The frequencies of initiating events is estimated from statistics or by expert judgement. The frequency of consequences (core damage or release of radioactive substances) is computed with the PSA model by adding up the frequencies of all credible accident scenarios.
Art. 14	Art. 14 [Clause (i)]	38-40	What releases, in terms of I-131 equivalent, are associated to the considered DBAs and severe accidents ?	35.	Depending on the frequency of the initiating event, DBAs are grouped into three categories: • Maximum releases associated with DBAs of the first category (with frequencies larger than 1.E-2 per year) are in the order of 1.E+9 Bq I-131 equivalent. • Maximum releases associated with DBAs of the second category (with frequencies between 1.E-2 and 1.E-4 per year) are in the order of 1.E+11 Bq I-131 equivalent. • Maximum releases associated with DBAs of the third category (with frequencies less than 1.E-4 per year) are in the order of 1.E+13 Bq I-131 equivalent. In PSAs performed for Swiss plants, releases are calculated for individual severe accident sequences. Typically, hundreds of thousands of source terms are evaluated, with I-131 equivalent releases ranging from 1.E14 Bq to 1.E17 Bq. For emergency planning purposes, scenarios with maximum releases in the order of 1.E+16 Bq I-131 equivalent are postulated.
Art. 14	Art. 14	38-30 items reviewed	Please explain details about PSR, such as procedures, plants to be reviewed, objectives and motivations of PSR. Is PSR within the regulatory framework ?	36.	A decennial PSR (every ten years) is applicable to <u>all</u> Swiss NPPs, and corresponds to a formal requirement that is well rooted in the Swiss regulatory framework. A HSK guideline for PSR is currently being finalised.
Art. 14	Art. 14	40	Have plant modifications been envisaged,	37.	In Swiss NPPs, a number of backfits and procedural changes were made based on the

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
	PSA		analysed or performed as a consequence of the PSA results ?		results of plant-specific PSA. These are summarised in Ref. NEA/CSNI/R(97)6 „PSA based plant modifications and backfits“
Art. 15	Art. 15 Fig. 7	44-46	The report indicates the average dose recorded for the personnel of each nuclear power plant. Could Switzerland also provide the statistical distribution of the doses with an indication of the maximum value ?	38.	See answer in form of a table on last page. These data are available on Internet under http://www.hsk.psi.ch/hsk-publ.html
Art. 15	Art. 15	44 & ff	Dose limits: Deterministic dose limits for workers and public, i.e. for lens of the eyes, extremities and skin, are not specified, nor is the classification system of workers for radiation protection purposes indicated. Are so called „specially authorised exposures“ provided for in cases where operations cannot be carried out under established dose limits? If so, who is responsible for authorisation? Is this done under the permit system?	39.	Dose limits for „occupationally exposed persons“ are detailed in Art. 35 and 36 of the Swiss Radiological Protection Act of 22 June 1994. • Limit for effective dose: 20 mSv/a*) • Limit equivalent dose eyes: 150 mSv/a • Limit equivalent dose skin and extremities: 500 mSv/a *) With agreement of the regulatory agency prior to the planned job: 50 mSv/a but <100 mSv/5a. The Swiss ordinance knows only one category of „occupationally exposed persons“; defined as persons who might accumulate an effective dose of more than 1 mSv per year through controllable radiation on account of their professional activity or training. Art. 97 of the ordinance gives a list of the measures that a licence holder has to undertake in order to keep failure incidents under control. Art. 40 states that the dose limits set in Art. 35 and 36 can be exceeded for a particular duty. Art. 120 categorises the range of persons which can be called up for such duties (fire-fighters, police, medical personnel etc.). Art. 121 limits the exposure to 50 mSv to this group for technical tasks and to 250 mSv for tasks including the saving of human lives.
Art. 15	Art. 15	44 & ff	Dose limits: Would you give information about the organisation established for the physical and medical surveillance of exposed workers?	40.	Art. 13 of the Radiological Protection Act of 22 March 1991 states that every person which is occupationally exposed to ionising radiation shall be subject to preventive medical measures. Annual medical examinations are organised and registered by the Swiss National Accident Insurance Establishment (SUVA). The licence holder has to evaluate monthly individual doses of its radiologically

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					exposed employees using the services of a licensed dosimetry laboratory. At the present time, all Swiss nuclear power plants hold such a dosimetry licence for monitoring external exposition. Dosimetry service for internal exposition (e.g. whole body counters for measurement of incorporation), if needed, is provided by two national research establishments (PSI in Villigen and IRA in Lausanne).
Art. 15	Art. 15	44 2nd para	What is the basis of the guideline for annual collective dose of 4 Person-Sv per unit?	41.	A limit of 4 Person·Sv/a for each NPP unit is set in the guideline HSK-R-11. No weight is given to the reactor size (power). If there is a need to exceed this value for a planned work, the licence holder has to seek authorisation from the Inspectorate prior to the execution of the job. Fig. 6 on page 45 of the Swiss National report shows that a guideline value of 4 Person·Sv/unit and year was a real goal in 1980, when guideline HSK-R-11 was first issued. Today, again illustrated in Fig. 6, this value does not correspond anymore to the ALARA principle. Correspondingly, it shall be significantly reduced (probably to 2.5 Sv/unit) in a future revision of the guideline HSK-R-11.
Art. 16	Art. 16 [Art. 6 and 18]	49 [13-14 56-57]	Which measures exist or have been additionally implemented in Swiss NPPs for prevention and mitigation of severe accidents, e. g. measures to prevent high pressure core melt and to prevent early or late containment failure?	42.	A filtered venting system was backfitted to all Swiss NPPs as a means to prevent late containment failure. Besides the filtered venting system, a number of systems and procedures are in place to prevent or mitigate severe accidents. Examples are: hydrogen control, refilling of steam generators from mobile water sources, pressure control in the containment, etc. In Switzerland, the implementation of severe accident prevention and mitigation systems is required on a plant-specific basis, in consideration of the plant-specific (level-2) PSA results. (See also Ref. NEA/CSNI/R(97)6 „PSA based plant modifications and backfits“)
Art. 16	Art. 16	49 & ff	The distinction between the national plan, the on-site and off-site plans does not result completely clear. Would you provide additional information to better address the peculiarities of the above plans?	43.	The on-site plan (plant specific emergency preparedness documentation) regulates: • Responsibilities of the plant in the case of an accident • Criteria for the triggering of warnings and alerts (warning of the public authorities; alert of the population) • Procedures for the case that the criteria are fulfilled (notification to the Federal authorities) The off-site plan (national plan) regulates: • Responsibilities of the off-site emergency organisation • Action levels (emergency reference levels for intervention) • Procedures to disseminate alerts and alarms from the Federal authorities to the Cantons and Communities • Ordering of protective measures for the population

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					This strict separation of on-site and off-site responsibilities is bypassed for the emergency planning Zone 1, where a rapid notification to the communities is done directly by the plant itself.
Art. 16	Art. 16	49 & ff	In addition, we would know which are the reference accident scenarios for the emergency plans. Are beyond DBAs taken into consideration for the emergency planning? And, if this is the case, which is the associated characterisation ?	44.	Yes; emergency preparedness and emergency planning is concerned mainly (even only) with beyond DBAs. Three groups of representative scenarios have been defined for the planning of emergency protective measures, namely scenarios without core damage (including design base accidents), scenarios with core damage and correct functioning of the containment and the filtered venting system and scenarios with core damage and non-correct functioning of the containment or the filtered venting system. Typically the scenarios without core damage are characterised by a short or non-existent initial phase and a small release of radioactive materials. Radiological consequences in the cloud phase are limited to a downwind distance of about 5 km from the plant (i.e. within the emergency planning Zone 1). No significant consequences are expected in the ground phase. The scenarios with core damage and correct functioning of the containment and the filtered venting system are characterised by a rather long initial phase and a filtered release of radioactivity via the stack. Protective measures during the cloud phase could nevertheless become necessary for downwind distances of up to about 20 km from the plant (i.e. within the emergency planning Zone 2). Limited radiological consequences are expected in the ground-phase, but must be considered in the planning of countermeasures. Iodine and aerosols are largely retained in the filters. The scenarios with core damage and non-correct functioning of the containment or the filtered venting system are characterised by an intermediate to long initial phase and a non-filtered release of radioactivity from the containment. Protective measures during the cloud phase could become necessary for downwind distances of up to about 20 km from the plant (i.e. within the emergency planning Zone 2). Significant long-term radiological consequences are expected in the ground-phase.
Art. 16	Art. 16	49 & ff	Would you provide information about different intervention levels relevant to the organs, in particular to the thyroid,	45.	For sheltering and evacuation only effective dose intervention levels are defined. For the taking of iodine tablets thyroid dose levels are used. In practice sheltering is always combined with the taking of iodine tablets. A precautionary evacuation is only

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
			delegated to implement countermeasures, such as evacuation and sheltering not included in the report?		considered if it can be terminated before radioactive materials are released. Therefore iodine tablets need not to be taken in this case.
Art. 16	Art. 16	49 & ff	Throughout the text of the article the implication is made that conditions of radiation alert are expressed also in terms of activity releases: Are these conditions laid down in regulations or in the licences? If so, what are the relevant action levels in terms of effective doses and equivalent doses? Are such alert levels the same as the emergency reference levels in Table 3 on page 51? Which of the radioisotopes are chosen as reference for monitoring? From page 53 it seems that the dose rate is the quantity monitored.	46.	Radiation Alert is activated if a dangerously high release of radioactive materials is imminent or has already occurred. If the release of radioactivity is via the stack, it can measured by ionisation chambers in the stack. Depending on the plant, the relevant action level dose-rate in the stack (defined in the emergency preparedness documentation) is about 100 mSv/h. There is no connection with the emergency reference levels (table 3 on page 51). The automatic dose rate monitoring system (MADUK) is equipped with Geiger-Mueller counters as detectors: they measure therefore the total gamma radiation; there is no isotope identification.
Art. 16.1	Art. 16 [Clause 1]	49-52	16.1. On-site and off-site emergency plans It is indicated that a warning is issued when a high dose-rate is monitored inside the containment. Could Switzerland indicate if criteria other than fission product doses are used to enter into an emergency situation as soon as possible (for example core exit temperature) ?	47.	A high dose-rate in the containment is an important but not the only criterion for issuing a warning. Depending on the plant, violation of various safety criteria are also considered. They are derived from a few essential safety objectives for functions important to safety. Such criteria for immediately declaring an emergency situation are: • subcriticality not ensured (ATWS) • core exit temperature larger than a specified value (e.g. 650°°Celsius at the Beznau NPP) • loss of the heat sink • loss of the integrity of the reactor coolant system (primary circuit)

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					• containment pressure above a specified limit • etc.
Art. 16.1	Art. 16 [Clause 1]	49-52	16.1. On-site and off-site emergency plans Are there computerised support systems to understand the status of the installation, to predict the accident progression and doses around the plant ?	48.	For evaluating accident progression (prognostic), a computerised support system called „ADAM“ (acronym for Accident Diagnostics, Analysis and Management) is being installed. It uses about 30 plant parameters constantly up-dated delivered by the „ANPA“ system (*ANPA is a system for automatic transmission of about 30 plant parameters from each NPP to the Inspectorate emergency centre with updating every two minutes that can be used for computing plant behaviour simulations, using analytical models*). Data from the primary system, the containment and the stack are available on-line. The module has two modes: on-line Accident Diagnosis and Accident Prognosis. The dose assessment is derived from calculations using models of the atmospheric dispersion and data from the MADUK system (*MADUK is a monitoring network for the automatic dose rate measurement in the nuclear power plants' vicinity)*. A more complex real-time computer system, which correctly accounts for topography and 3D-windfields, is under development. It uses the American atmospheric dispersion code ADPIC developed at the Lawrence Livermore National Laboratory together with measured regional windfields. An interface with ADAM for using on-line calculated accident source terms is under development.
Art. 16.1	Art. 16 [Clause 1]	49-52	16.1. On-site and off-site emergency plans Are there criteria to issue prohibitions and restrictions regarding the commercialisation of food products ?	49.	Concerning radioactive contamination of food products, two reference levels are established by the legislation: a tolerance value and a larger limiting value. Prohibitions and restrictions on food products are enforced if the limiting value is exceeded. As an immediate action harvesting and grazing in the affected (and restricted) areas are prohibited.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 17	Art. 17 (also Art. 14 PSA)	54-55 (also 40)	Have state-of-the-art seismic analyses been performed for the Swiss nuclear power plant sites (e.g., probabilistic seismic hazard analyses, seismic margin analyses, seismic PSA) ? Did any upgrading result from these analyses ? If the analyses are planned, what is the schedule for their completion ? What are the basic principles and analytical procedures for evaluation of external hazards for Swiss nuclear power plant sites ?	50.	The PSAs made for the Swiss NPPs include the risk from earthquakes, as well as from any other external hazard which represents a (probabilistically) credible cause of severe accidents. As a result of a regulatory review, the Inspectorate has requested that a new probabilistic seismic hazard study be performed for all Swiss NPP sites within the next years. (for further information on seismic aspects, see also answer to French question F-15)
Art. 17.1	Art. 17 [Clause (i)]	54	17.1. External events taken into account._ Could Switzerland give the methodology used to define the level of external hazard taken into account in the initial design (design basis earthquake, nature of the airplane in the study of the airplane crash...) and in the safety reviews ?	51.	During the 60's, seismic evaluations were made deterministically by utilities' experts. The NPPs of the first generation were licensed on the basis of a horizontal peak acceleration for SSE of 0.12g. In 1977, regulatory experts established a probabilistic seismic risk map for Switzerland, and defined the design basis SSE as an earthquake with a frequency of 10^{-4}/year, corresponding to a horizontal peak acceleration of 0.15g. This became the licensing basis for the second generation NPPs. In the 80's a seismic re-evaluation for all NPPs in view of this new licensing basis was performed with the following general results with respect to seismic resistance: • Reactor buildings are sufficiently robust • Reactor coolant piping was sufficiently robust, but smaller piping had to be replaced and/or needed additional and/or stronger supports • Auxiliary buildings needed some additional shear walls

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					• The Borated Water Storage Tank had to be replaced (only partly for seismic reasons) • The ceilings of the control rooms had to be strengthened. The next important external event, especially for the first generation plants, is flooding caused by dam breaks. This event was analysed on a deterministic basis[GR], assuming worst case scenarios. These analyses were conservative; however, some backfitting was done to further protect and/or to automatically trigger some of the safety systems in the event of flooding (see page 58/59 of the Swiss report). For the second generation NPPs, the design basis included an airplane crash event defined as follows (Note: no such basis was defined for the first generation NPPs): Airplane ..... Boeing 707 Mass..... 90 tonnes Velocity ..... 370 km/h Impact force..... 90 MN Impact area ..... 37,2 m² Complementary information concerning today's situation (corresponding to Austrian question Öst-11): The PSAs made for the Swiss NPPs include the risk from earthquakes, as well as from any other external hazard which represents a (probabilistically) credible cause of severe accidents. As a result of a regulatory review, the Inspectorate has requested that a new probabilistic seismic hazard study be performed for all Swiss NPP sites within the next years.
Art. 18	Art. 18 [Clause (i)]	57	A filtered venting system is installed to mitigate severe accidents : Is it the only severe accident management feature ?	52.	Besides the filtered venting system, a number of systems and procedures are in place to prevent and/or mitigate severe accidents. Examples are: hydrogen control, refilling of steam generators from mobile water sources, pressure control in the containment, etc. In Switzerland, the implementation of severe accident prevention and mitigation systems is required on a plant-specific basis, in consideration of the plant-specific (level-2) PSA results.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 18	Art. 18 [Clause (ii)]	57 58	Classification, fabrication, maintenance and inspection of components are ensured, especially taking into account experience feedback. Are there new technologies, such as digital I&C, which are envisaged ?	53.	At this time, in Swiss NPPs only a few digital I&C systems important to safety are in operation. However in the next future, as replacements of older I&C technologies become necessary, more new digital I&C systems, including safety systems, will be implemented. For the qualification digital I&C technology it is necessary to consider other acceptance criteria in addition to testing and analysis. Furthermore, the use of experience in qualification is limited due to the rapid change of the I&C technology. The main additional aspects to be considered for the acceptance of I&C systems are: • Precise and unambiguous specification of the functions • Categorisation of the functions according to IEC 1226 • Failure mode and effect analyses to avoid or minimise design errors • The use diversity and defence-in-depth- principles in the functionality and in the I&C structure. • Well established methods and/or tools for specification, design and implementation • Verification and validation in accordance with the life cycle phases • Configuration management and control It is of great advantage if highly qualified and well tested I&C basic modules and I&C basic structures are already available. Experience feedback could be taken in consideration for these basic parts.
Art. 18	Art. 18 [Clause (iii)]	58	The control rooms have been improved. Are there also design features and improvements related to maintenance and repair ?	54.	Within the scope of backfittings or system renewals, improvements regarding testing features to fulfil surveillance, maintenance, and repair requirements are taken in consideration too. At the instrumentation level (e.g.: wide range nuclear monitoring system), more channels (higher redundancy) have been installed when these systems have been replaced. New I&C systems generally have self-checking features which did not exist before and which gives an additional improvement. Another kind of improvement is the installation of supplementary diagnostic devices for motor and solenoid operated valves.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 18	Art. 18 (also Art. 14, and Art. 19)	56-58 (also 39, 40-41 and 58, 61, 63)	Which were the corrective actions taken at those plants who had experienced ageing effects in their primary circuit components (e.g. Beznau nuclear power plant) ?	55.	KKM: recirculation loops; /KKM: reactor core shroud; / KKB: replacement of steam generators (done for KKB I; planned in 1999 for KKB II;
Art. 18	Art. 18 Clause (iii)	58-59	How is the accident management being rearranged in order to allow for an extended time period during which operator interference is not required ? How does this relate to the "10 hrs-period" in case of external events ?	56.	The time windows during which no operator action is required, namely 30 minutes (for internal events) and 10 hours (for external events), are design bases. They have no impact on accident management procedures.
Art. 18	Art. 18 (also Art. 14 and Art. 19)	--	How have the safety analyses been changed to reflect the ongoing process of design changes and facility upgrading measures ?	57.	Safety analysis is performed in conjunction with any change of design / plant upgrade, as appropriate. This means that the scope of the analysis and/or the input to the analysis models and/or the level of detail of analysis is adjusted according to the design change / upgrade implemented.
Art. 18	Art. 18 (also Art. 14 and Art. 19)	--	Have the codes used for these new analyses also been modified in order to represent the current configuration adequately ?	58.	The analysis models (codes) are periodically updated to reflect improved modelling techniques and faster / higher capacity computer hardware. Code changes due to design changes / plant upgrades are seldom necessary; usually the modification of input parameters & assumptions are sufficient to cover such changes.
Art. 18	Art. 18 (also Art. 14 and Art. 19)	--	By which procedures is it ensured that following a modification or design change all documents, operation procedures and drawings are updated accordingly ?	59.	According to the Swiss guidelines HSK-R-15, HSK-R-06, HSK-R-31, HSK-R-35, etc., a modification or design change of safety related items needs a formal approval of the Inspectorate. To get it, documents are necessary to show that all related guidelines are fulfilled and that the QA process for implementation is clearly defined. Additionally, for each modification of safety related items, the plant specific QM system requires also the updating of all affected plant documents in a controlled

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
					and recorded manner.
Art. 19	Art. 19 Clause (iv)	62	The report indicates : *"In addition to the operating procedures for all modes of normal operation, each NPP uses dedicated procedures in case of operational anomalies and emergency conditions, called emergency procedures. These procedures are required by the Inspectorate".* Does the Inspectorate assess these procedures ?	60.	Emergency operating procedures are not subject to formal approval by the Swiss regulator (HSK). Normally they are not assessed on a systematic, but rather on a case by case basis (such as after a relevant operational occurrence). Registered - and hence up-to-date - copies of all emergency operating procedures are available at the Inspectorate office.
Art. 19	Art. 19 Clause (VII)	63-64	The report mentions that : *"IRS events from abroad are systematically followed by the Inspectorate staff and evaluated in term of relevance for Swiss nuclear power plants*". IRS 1307 reports a design error (cross redundancies at the protection system) at Trillo NPP in Spain, made by the NSSS vendor. This design error was not discovered by neither start up nor surveillance tests during four years of operation. Did Goesgen NPP suffer the same deficiency, since these two NPPs have the same design and NSSS vendor ?	61.	IRS 1307 deals in our opinion more with a construction or commissioning deficiency than with a design error (change of redundancy by construction mistake). As Gösgen NPP hasn't installed the same safety feature in the protection system, it wasn't affected by the lesson learned. Swiss regulations do not require to take over all safety features of the country from where the plant supplier comes. In this case, Swiss regulation allows that the passive single failure criterion for emergency pipes (assuming an independent pipe failure in the containment sump cooling system outside containment in case of LOCA) hasn't to be applied if the systems are designed to assure high quality and all operational loads are coped with. This requirements has been met. Therefore, independent pipe failures in sump cooling systems in case of LOCA are coped with by accident management measures in Gösgen. Nevertheless, such types of failures as mentioned in the IRS report, called „latent failures", are taken very seriously in Swiss Operation Experience Feedback Process because of unexpected plant response, which may lead to a break-down of operational control in emergency situations.

Article in NSC	CHNR chap + para	CHNR page	COMMENT/QUESTION	Nr. HSK	ANSWER
Art. 19 (viii)	Art. 19 clause (viii)	65 4th para	What are the standards of the low activity level waste to which the radiation protection legislation has not applied?	62.	The condition for the clearance of waste which might be radioactive from regulatory control is that the radiation protection legislation shall not apply to that waste. The scope of application of the radiation protection legislation is precisely set in Annex 2 of the Radiological Protection Ordinance. According to this. Clearance of waste may occur if the following three conditions are met: specific or total activity of the waste below nuclide specific limits; dose rate increase at 10 cm from the waste surface below 0.1 microSv/hour; surface contamination of the waste below nuclide specific limits.

Answer to question F-11 (HSK Nr. 38)

Question:

The report indicates the average dose recorded for the personnel of each nuclear power plant.
Could Switzerland also provide the statistical distribution of the doses with an indication of the maximum value ?

Answer:

The following tables show the statistical distribution in dose intervals of the number of persons and of the collective doses, as well as the highest individual doses for each Swiss NPP site compiled for the calendar year 1998. Corresponding data for previous years are given in each of the annual reports published by HSK and available on Internet (under http://www.hsk.psi.ch/hsk-publ.html). In addition, these data are also available to all participating countries through the OECD/NEA ISOE data bank.

Dose distribution	KKB I+II			KKG			KKL			KKM			NNP		
[mSv]	P	C	P+C	P	C	P+C	P	C	P+C	P	C	P+C	P	C	P+C
> 0.0 - 1.0	271	484	755	218	392	610	228	674	902	164	519	683	881	1642	2523
> 1.0 - 2.0	57	37	94	22	46	68	54	74	128	36	138	174	169	273	442
> 2.0 - 5.0	38	41	79	29	39	68	67	85	152	52	106	158	186	260	446
> 5.0 - 10.0	6	2	8	23	29	52	15	18	33	20	25	45	64	85	149
> 10.0 - 15.0	1		1	3		3		3	3	5	3	8	9	8	17
> 15.0 - 20.0				1		1							1		1
> 20.0 - 50.0															
> 50.0															
Total persons	373	564	937	296	506	802	364	854	1218	277	791	1068	1310	2268	3578
Average[mSv]	0.8	0.4	0.6	1.3	0.9	1.0	1.2	0.8	0.9	1.6	1.1	1.2	1.2	0.9	1.0

Dose distribution	KKB I+II			KKG			KKL			KKM			NPP		
[mSv]	P	C	P+C	P	C	P+C	P	C	P+C	P	C	E+F	P	C	E+F
0.0 - 1.0	62.6	64.6	127.2	44.4	57.3	101.7	41.5	135.3	176.8	30.7	107.5	138.2	179.2	320.1	499.3
> 1.0 - 2.0	81.1	53.4	134.5	33.1	63.1	96.2	77.9	111.9	189.8	57.6	201.7	259.3	249.7	395.8	645.5
> 2.0 - 5.0	108.9	120	228.9	97.9	123.6	221.5	203.0	264.9	467.9	153.7	335.4	489.1	563.5	824.1	1387.6
> 5.0 - 10.0	32.9	11.7	44.6	149.3	197.6	346.9	97.1	128.8	225.9	144.2	164.0	308.1	423.4	571.4	994.8
> 10.0 - 15.0	10.6		10.6	38.6		38.6		35.0	35.0	55.9	34.9	90.8	105.1	92.9	198.0
> 15.0 - 20.0				16		16							16.0		16.0
> 20.0 - 50.0															
> 50.0															
Total [Pers.-mSv]	296.1	249.7	545.8	379.3	441.6	820.9	419.5	675.9	1095.4	442.0	843.5	1285.5	1536.9	2204.3	3741.2
Highest ind. dose [mSv]	10.6	6.6	10.6	16	9.2	16	7.5	12.7	12.7	14.6	13.0	14.6	16.0	13.0	16.0

P: Plant personnel
C: Contractor personnel