



Kingdom of Belgium

National Report Established for the Second Meeting of the Contracting Parties in The Framework of the Nuclear Safety Convention

Answer to the questions on the Report

Vienna, April 2002



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?			<p>Have been implemented all requirements specified by the regulatory body AVN as a result of unit review after 10 years of operation, and at which units specifically related to hydrogen recombiners, application of the probabilistic safety analyses results, safety parameters display (Post Accident Monitoring System) in compliance with NUREG 0737 and R.G.1.97?</p>	<p>Most safety improvements decided within the frame of the ten years safety review have been implemented. Some are still being implemented. The passive auto-catalytic recombiners, designed to cope with the hydrogen generated after a severe accident, were installed in all units between 1995 and 1998. The results of the PSA have allowed to identify desirable safety improvements, that were implemented. Further use of the PSA results are under development. Safety parameters displays were implemented in all units as a results of the post-TMI actions.</p> <p>To be noted that the post-TMI action plan was applied to all Belgian plants when it was issued in the USA (NUREG737 & addenda) and its implementation was completed during the first PSR.</p>
6	6	9	<p>Have the 3 bunkered emergency trains (Doel 3 and 4 and Tihange 2 and 3) the same capacity as the 3 independent redundant safety trains for internal events (non-bunkered)?</p>	<p>The bunkered emergency trains have been designed to cope with a single failure, like the other safety trains. Their capacity therefore is 3x50% or 2x100%. However, it must be realised that they are not designed to cope with the same events. Their capacity in terms of physical parameters (e.g. flow rate) may not be the same. The bunker is designed to automatically keep the plant in hot shutdown during 3 hours, and to manually bring the plant in cold shutdown, in case of an external event (e.g. gas cloud explosion) destroying all non bunkered structures (including the main control room). The design of the bunkered systems is such that an external accident cannot induce an accident of internal origin (For instance, a bunkered seal injection system avoids a small LOCA). The combination of an</p>



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				external event and an <u>independent</u> internal event (like large break LOCA) is not considered within the design basis.
6	6	9	<p>Article 6 (page 9), states that US rules and all the associated documentation (regulatory guides, standard review plans, ASME code, etc.) were applied to the design and safety analyses of Doel and Tihange.</p> <p>To what extent have performance indicators been used to assess the safety performance of the units? What indicators are used?</p>	<p>Article 18 gives more information on the rules applied during the design of the plants (USNRC rules) or on the rules applied for the PSR (Basic USNRC rules + rules selected according to their safety significance).</p> <p>At the time when the Belgian NPPs were designed (i.e. before 1985), the use of performance indicators was not required by the US rules. Presently, the feasibility and desirability of using performance indicators to help monitor operational safety of the plants are being assessed, but no specific indicators are used until now. The utilities use WANO performance indicators and these results are looked at during periodic inspections. Indicators related to the unavailability of safety related systems are looked at on a systematic basis.</p>
7	7	33	<p>The report indicates (p. 33) that the regulator "can rely, for exercising some of its missions, to the collaboration of recognised organisations" called authorised inspection organisations.</p> <p>The IAEA safety requirement GS-R-1 (Legal and governmental infrastructure for nuclear, radiation, radioactive waste and transport safety) states:</p> <ul style="list-style-type: none"> In paragraph 4.4: "The use of consultants shall not relieve the regulatory body of any of its 	<p>1) In Belgium, the control of nuclear power plants is achieved at three different levels: -Health Physics department of the operator, - authorised inspection organisation (AVN), - FANC. The regulatory system is organised in such a way that the authorised inspection organisations are integral parts in the legal framework. In this framework the FANC may delegate some of its missions to inspection organisations. It is also the FANC that certifies those organisations according to strict criteria. It must be a non-profit-making organisation, demonstrate qualification of the organisation's personnel, have the necessary means the organisation must have at its disposal to accomplish its missions, follow detailed internal rules related to the working</p>



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			<p>responsibilities. In particular, the regulatory body's responsibility for making decisions and recommendations shall not be delegated",</p> <ul style="list-style-type: none"> In paragraph 5.15: "If the regulatory body uses the services of consultants for the inspections, then it shall have the responsibility for taking any actions on the basis of these inspections". <p>How will the respective role of the Federal Agency for Nuclear Control (FANC), on one hand, and of the Association Vinçotte Nuclear (AVN), on the other hand, be consistent with these requirements?</p>	<p>methods of the organisation and to the execution of the entrusted missions. The link that exists between the FANC and the authorised inspection organisation is therefore legal and not contractual. Being legally mandated, those organisations assume the responsibilities of the missions they realise. However, beside the activities that are not subject to delegation, the FANC also performs redundant control on the installations as well as control of the inspection organisations and assume the responsibilities related to them. The FANC, supported by the inspection organisation, forms the regulatory body in charge of applying the Law for the protection of the population, the workers and the environment against the danger resulting from ionising radiation. The FANC assumes the responsibilities of this regulatory system. More detailed information can be found in article 8.1 of the National report.</p> <p>2) The inspection organisation realises controls within its mission and makes recommendations to the operator when appropriate. The FANC has access to the reports and may ask for additional control or clarification, it may also make the recommendation mandatory.</p>
7	7.6	23	<p>In the section 5.3 of the Royal Decree, it is described that the license of the class 1,2,3 facilities can be issued for unlimited or a limited time period.</p>	<p>Validity of licenses: - class 1 installations: unlimited, but a re-evaluation of the safety is required at fixed time intervals (10 years for nuclear power plants).</p>



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			How do you decide this time period for each facility?	- class 2 and 3 installations: unlimited in the past; since the entry into force of the new general regulations on the 1st of September 2001, a time period is fixed in the licenses (normally 15 years), in order to facilitate the follow-up, and the assurance of compliance with the regulations and the provisions, of the licenses.
7	7.8	33-34	<p>Under CNS Article 7 section 8, the Law of 15 April 1994 creating the Federal Agency for Nuclear Control (FANC), is presented. In Article 28 of this Law, it is stated that "under its own responsibility the Agency can rely, for exercising some of its missions, to the collaboration of organisations it specifically recognises..". Please explain the procedure for adopting such organisations. Which organisations have such recognition at present?</p> <p>Article 29 of the Law extends the validity of such a delegation to maximum five years with a possibility of extension for another period of maximum five years. Please clarify if this is the final extension. Please explain whether the provision on limited authorisation periods affects the long term planning of the</p>	<p>At the present time, the situation is still in a transition phase, defined by article 52 bis of the Law of April 15, 1994. The existing authorised inspection organisation (AVN) keeps its authorisation until articles 28 to 30 of the Law of April 15, 1994 will be implemented.</p> <p>These articles refer to an open procedure to recognize (qualify) an inspection organism, based on specifications edited by the FANC. The inspection organisms must also fulfil defined criteria: it must be a non-profit-making organisation, demonstrate qualification of the organisation's personnel, have the necessary means the organisation must have at its disposal to accomplish its missions, follow detailed rules related to the working methods of the organisation and to the execution of the entrusted missions.</p> <p>Although the procedure is open in order to respect equity and transparency principles, it is obvious that the large experience of AVN particularly in Belgian nuclear power plants and the existing efficient partnership between FANC and AVN will legitimately and largely justify the continuity of the actual control situation. It must be mentioned here that article 28 to 30 apply to class I (nuclear power plants), II and III installations. It was therefore necessary to make a</p>



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			"authorised inspection organisations", in particular with regard to development and maintenance of the necessary technical competence.	<p>general framework applicable to the three classes. It is justified, in case of smaller installations, to follow procedures to select and qualify candidates inspection organisms regarding capacities, working methods.... For Class I installations, as explained, this procedure is less necessary and priority must be given to experience and know-how.</p> <p>These elements are of a nature to guarantee the future of its activities to AVN.</p> <p>At the present time AVN is the only inspection organisation which is recognised/licensed for NPP .</p> <p>The recognition procedure of an inspection organisation for a maximum period of 5 years, described in Article 29, may be extended for periods of maximum 5 years at a time. There is no reference to a final extension mentioned in the Law.</p>
8	8	40-49	Are there any plans to introduce risk informed regulations?	Risk insights from the PSA allow to focus a number of regulatory activities on what is really important for safety. AVN is using now PSA to analyse operational events (real incidents) and is developing the use of PSA to risk inform the regulatory plants inspections. The use of PSA to review plant modifications, and in particular the use of the USNRC Regulatory Guide 1.174, are presently under discussion.
8	8	40-49	One of the most difficult challenges in assessing the safety performance at a	1. Strictly speaking, there are no resident inspectors at the nuclear power plants. However, as the distances between AVN's



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			<p>nuclear power plant is to recognize the early signs of declining safety performance, before conditions become so serious that regulatory sanctions must be imposed or, worse, a serious incident or accident occurs. In this connection, it is widely known that a good approach is to have senior resident inspectors who can observe the day-to-day operations of the plant.</p> <ol style="list-style-type: none"> 1. What is the role of resident inspectors in the regulatory framework? 2. What is the size(number) of resident inspectors per reactor or site? 3. What are the major activities of resident inspectors? 4. What are the requirements for the qualification of resident inspectors? 	<p>headquarters and the Belgian nuclear power plants is about 100 km, access is very easy and the inspectors are spending at least about two days a week inside the installations. The inspectors' duty is to assess the effectiveness of the safety management of the nuclear power plant (see also the report to the convention, second bullet on page 43) .</p> <ol style="list-style-type: none"> 2. As stated in the report on page 46, one inspector is assigned for each nuclear unit, considering Doel 1/2 as one unit. In addition to these dedicated inspectors, one inspector for each nuclear site is responsible for the inspections activities related to generic activities. 3. The inspectors are performing systematic inspections, mostly unannounced, during which they inspect on a systematic basis the control room and some of the premises and equipment inside the NPP. In case of identified abnormalities they ask the plant responsible persons for clarification and corrective action if necessary. In addition to these systematic inspections periodic inspections are performed in order to cover, within a given time frame all relevant safety related subjects. To summarise, the activities of the inspectors are shared between inspection activities inside the installations, discussion with responsible persons from the licensee and safety assessments of documents issued by the licensee (modifications, training program, incident analysis, ...) 4. A formal qualification requirement by the legislation is to be an agreed expert for Class 1 installations (university degree in Physical engineering or nuclear engineering, plus three year of experience) and to have experience. In addition to that requirement, AVN has voluntarily set up a comprehensive



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				training programme aimed to prepare the inspectors to their future work. This programme completes the minimal basic knowledge defined as Academic Engineer (from university: “Ingénieur Civil” in French). The full training program lasts between 1 and 2 years and includes basic knowledge of the nuclear power plant, study of the operation of systems, control and protection systems, procedures, ... and a 6-week training on a full scope simulator to cover normal, incidental and accidental operation. Finally he spends three months in a foreign operating nuclear plant to gain experience during operation and refuelling activities. After completion of this program, the candidate inspector undergoes several weeks of on-the-job training with an experienced inspector.
8	8.3.c	46	One AVN engineer is assigned to one nuclear power plant. How prevents AVN biases, loss of independence, etc., by a too long involvement with one plant?	<p>First there are changes in the inspectors assigned to the units due to turnover or other reasons, and this in spite of language difficulties due to the facts that the sites are located in both cultural regions of Belgium.</p> <p>Next the reports of the inspectors are discussed and reviewed by the hierarchy, who is able to detect deficiencies.</p> <p>Finally regular coordination meetings between inspectors are conducted weekly with inspections coordinators and the head of the inspection division. This allows some uniformity of the inspection practices and attitudes (peer discussions).</p> <p>In addition to this, a copy of the reports is circulated by the inspectors to allow them to make themselves acquainted with</p>



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				<p>the comments/remarks made on other installations.</p> <p>For certain domains (e.g. emergency planning, fire protection), specific inspections are organised with the support of expert(s) in the given domain.</p>
8	8	40	<p>What were the individual steps taken for the practical implementation of the recent organizational changes (i.e. transfer of the supervision responsibilities from the Ministries SPRI and SSTIN to the Federal Agency for Nuclear Control)?</p>	<p>The Law of April 15, 1994 defines the missions of the Federal Agency for Nuclear Control. It fully includes the missions which were under the responsibility of the SSTIN and the SPRI. The legal framework is therefore adequate to properly transfer the competences. This is done since the Royal Decree of July 20, 2001 has entered into force and that the FANC has become operational since September 1, 2001.</p> <p>At the present time, all the SSTIN and SPRI personnel members are functionally integrated in the FANC, and will be, in the future, officially transferred. The organizational changes have therefore no impact on the continuity of the control and surveillance activities.</p>
8	8	40-49	<p>In Belgium, most of the technical inspections of nuclear safety are delegated to a private approved organism safety. The inspection costs of that private organism are paid directly by the nuclear operator inspected to this private organism.</p> <p>In the national Report of the first Review Meeting three years ago, the Belgian authorities indicated that this</p>	<p>This will be done in the future. The target date is 2003.</p> <p>This is however not explicitly required by law.</p>



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			<p>direct payment will be replaced, so that in the future all financial transactions have to be done via the Federal Agency of the Nuclear Control.</p> <p>Actually, in this matter no progress has been achieved, which constitutes a problem in the light of Art 8 of the Convention (independence clause). At what time will this change take place?</p>	
10	10.A	52	<p>In the paragraph that describes the ELECTRABEL's aim to promote the safety culture at its plants is emphasized as an integral part of an efficient management. It is also reported "A Safety Evaluation Committee has been set up at each site".</p> <p>1. Do you have any tool to evaluate the permeation of safety culture among the relevant organizations?</p> <p>2. Can these evaluations be done voluntarily by the utility?</p> <p>3. How is the regulatory body involved in these activities?</p>	<p>1) The evaluation of the safety culture is performed by the safety team on site (part of the cluster CARE – see § 10.5), on the basis of independent safety audits, the results of which are assessed and translated into improvement actions by the plant and site operation committees. This assessment is completed by independent audits made by the department "Audit Qualité ZPNT". Besides, the Safety Evaluation Committee also promotes safety and is in charge to consolidate the organizational process of the safety management.</p> <p>2) These assessment are organised by the utility on a totally voluntary basis, in a constant approach to improve safety. However, once included in the Safety Analysis Reports of the nuclear units, these evaluations must take place because the SAR is part of the licence.</p> <p>3) The reports of the Safety Evaluation Committee are distributed to AVN. The comments on these reports are discussed with the general manager of the plants.</p>



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				The establishment general manager must provide the inspection body in charge with the permanent supervision of the establishment with all relevant information and documents.
10	10.B	54	<p>It is reported that the PEM of the AVN is developing the database (Diane & Ariane) of Belgium and foreign incidents.</p> <ol style="list-style-type: none"> Do you have any public documents on the databases? Can the domestic utilities access freely to these data-base? 	<ol style="list-style-type: none"> The last publication on the ARIANE and DIANE databases is the paper “Computer aided feedback from operating experience”, Seminar on the use of unusual event reports for improving NPP safety, Vienna, May 1990 (IAEA-SR-169/ 3). The domestic utilities have free access to these databases. They receive every 3-month the content of the ARIANE updates. The utilities have in principle, on demand, access to the information in DIANE but they do not use this right as they exchange information directly between themselves.
10	10.A	52-53	<p>To what extent is priority to safety an “overriding principle”? What is the current practise, especially with regard to the deregulation of the electricity market?</p>	<p>The utility considers safety in nuclear plants as priority 1 and believes this is a token of efficient operation which contributes to the economic profitability of the plants and which is an essential condition to face the deregulation of the electricity market.</p> <p>The site general manager must organise a health physics department, in charge of nuclear safety and radiological protection, with important responsibilities and reporting directly to the general manager himself.</p> <p>The current practice, especially with regard to the deregulation of the electricity market, is that no actions,</p>



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				<p>having an adverse effect on safety, are allowed.</p> <p>In the framework of the re-organisation of Electrabel (NUC21), AVN requested the definition of a safety policy by Electrabel's corporate management, which enforces a basic safety charter presently incorporated in the safety analysis report.</p> <p>The inspection activities by AVN supervising the decisions of the Health Physics Department monitor the implementation of the charter and in particular of the principle of priority to safety..</p>
10	10.B	53	With regard to operational feedback, AVN can ask for corrective measures. To what extent is the licensee obliged to give a follow-up to this request? Or is the licensee only committed to requests by the government (SPRI, SSTIN, FANC)?	The licensee is not strictly obliged to give follow up to AVN's requests. However, AVN's activities, and in particular the unanswered requests, are reported every three months by AVN to its surveillance committee chaired by a member of the FANC (formerly member of SSTIN). Besides the points may be risen during contact meetings between the licensees, the FANC and AVN. Finally, in case of urgency, AVN can always submit the problem directly to the FANC.
10	10	52-54	What methods for systematically investigating ageing are used in order to demonstrate the safety of installations during the next decades ?	As required by the Quality Assurance Programs (Art.13) and the Technical Specifications for Operation (Art.14) periodic verifications are performed continuously in order to verify that the equipments maintain their qualified lifetime. In the frame of the periodic review (10 year) a systematic reassessment of all the phenomena that can affect the ageing of the safety related components is performed taking into account the internal operating experience.



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10	10	52-54	What approach does Belgium take to the management of severe accidents ?	In the periodic safety review, specific severe accident topics were examined in detail leading to the identification of possible countermeasures taking into account the combination of conservative design and post-TMI measures already implemented to reduce the risk associated with beyond-design accidents. Based on the results of probabilistic safety assessment studies which identified the vulnerability to severe accidents as well as the potential causes of containment failures, preventive and mitigation measures have been introduced in the plants to cope with severe accident risk: hydrogen passive auto-catalytic recombiners and specific severe accident management guidelines SAMGs
10	10	52-54	How does the regulator assess safety culture ?	There are no specific procedures or formal indicators to assess the safety culture. The assessment of safety culture is based on findings included in the inspections reports, and on the safety assessment of documents produced by the utility (procedures, non conformity reports, event analysis, social climate, dose registration ...). This topic is discussed during periodic meetings with the general manager of the plants.
10	10.B	54	Article 10, Section B (page 54) indicates that probabilistic safety analyses are available for the stations. 1. How does the regulator use risk assessment data? 2. Is risk assessment data used, for example in planning inspections, developing inspection procedures, developing technical specifications, and evaluating	1. The first results of the PSA have allowed to identify desirable safety improvements, that were implemented. More refined use of the PSA results (e.g. importance measures) is under development in order to gain better risk insights. AVN expects that those risk insights will allow to focus a number of regulatory activities on what is really important for safety. 2. In particular, AVN is using now PSA to analyse operational events (real incidents) and is developing the use of PSA to risk inform the regulatory plants inspections. The use of PSA to review plant modifications (including modifications to the



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			<p>incidents?</p> <p>3. How does the facility operator use risk data?</p>	<p>technical specifications), and in particular the use of the USNRC Regulatory Guide 1.174, is presently under discussion.</p> <p>3. The PSA studies were used mainly to:</p> <ul style="list-style-type: none"> • Improve the design of the plants and correct identified weaknesses • Develop and adapt to the plant characteristics the generic SAM guidelines developed by Westinghouse in the WOG framework..
10	10	52-54	<p>Article 10 discusses activities to ensure that due priority is given to nuclear safety.</p> <p>Is there a process for addressing allegations of safety concerns that could be raised by a worker at a station or from the public?</p>	<p>Our nuclear legislative and regulatory framework does not foresee explicitly a process for addressing allegations of safety concerns that could be raised by a worker at a station or from the public. However, every allegation of safety concern – whether it is orally or communicated in a written manner to the FANC – is investigated by the FANC, which also answers parliamentary questions.</p> <p>On the other hand, AVN’s staff might be approached by individuals or groups (there are requests from FANC, ministries, politicians, press, trade unions, ...). Then AVN records the concern and performs the necessary investigations to verify it.</p>
11	11.4	57	<p>It is reported that ELECTRABEL, TEE, and AVN decided to put together all their information in order to anchor the knowledge. and to establish a common structure for the mutual utilization of the data. We are</p>	<p>A specific project is being developed in the periodic (10 year) review that just begun, in order to share the design basis documentation between the four organisations. This project is called « Design Basis Retrieval (DBR) » and proposed at the moment to develop a portal to the available design basis documents.</p>



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			<p>interested in these activities as the reference to the so-called knowledge-base development.</p> <p>What is current status of the development?</p>	<p>This system will be implemented as follows:</p> <ul style="list-style-type: none"> - Identification of the design bases documents recorded in the documents management systems of the various organisations. This is performed through selection criteria given by the project DBR ; - Filling in specific metadatas for each document (Unit – System – Equipment – Status [As built, as it is, etc] – Document type – Activity – Context [why a new revision, validity of a document, what for is it used, etc.]). This step must sum up the existing knowledge around a document ; - Share the documents between the four organisations through a portal to the multiple documents management systems, with specific access rights with a search tool using the metadatas -mentioned above. <p>Future users have been interviewed to identify the selection criteria for the documents to be shared, as well as the design bases related tasks and the needed metadatas to support these tasks.</p> <p>For the moment, the selection criteria and the metadatas have to be validated by a pilot project.</p>
11	11.5	57	<p>It is reported that ELECTRABEL has decided to re-engineering as a matrix structure more in conformity with the main professions and with the collaboration relationship existing among the different actors in the operation and management.</p>	<p>This new organization is actually completely implemented. There are of course still procedural and organizational adjustments. The safety effectiveness of the new organization is being evaluated by AVN.</p>



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			What is current status of the development?	
11	11.4	56	Qualified personnel is trained every two years on the full-scope simulator. Does this training include EOPs, FRGs and SAMGs? Is this training enough to keep the necessary skills for an adequate Accident Management, including the associated division of tasks?	The simulator training deals mainly with the use of EOPs and of FRGs. As for the SAMGs, the training is made in specially adapted classroom sessions. The retraining is systematically included in the retraining plans of the control room operators with a average frequency of one retraining every two year.
12	12	58-61	Section 12 concentrates on human factor aspects related to control room personnel and its environment. What is your human factor programme concerning personnel otherwise engaged in the operation of the plant (e.g. for maintenance, chemistry)?	Most emphasis was put to the control room personnel, but training programmes also exist for other categories of personnel (maintenance, chemistry, radiation protection,...) Presently, the utility's project "Human Factors" launched a multi-disciplinary working group. Its mandate is to analyse the operating feedback according the an event tree methodology in order to identify the organisational and communication mechanisms which caused the anomalies and to identify good practices in that domain. This process leads to technical, organisational or cognitive corrective actions and covers the activities relating to the plant operation (maintenance, operation,...)
12	12	58-61	Has an assessment of the plant operating instructions been made regarding Human Factor aspects?	No such assessment has systematically been performed up to now.. However, the operating procedure (control room, maintenance, surveillance, etc) are periodically reviewed to take account of the experience feedback.
12	12.4	60	It is reported that you have started the approach to evaluate the safety significant operational events by using	When we analyse human factors (HF)in safety significant operational events, we concentrate on interesting events and focus on the possible lessons learned or solutions. Accordingly,



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			<p>"a methodology for event analysis taking account human factors".</p> <p>What is the fraction of human related events to the population of total occurrences?</p>	<p>the statistical results drawn from our analyses are not very significant. It is clear also that the fraction of HF related event in the analysed events increased with the time as first technological problems are solved, second as HF are more and more taken into consideration. Therefore we do not think useful to spend energy to determine statistical data on HF.</p>
12	12.4	61	<p>In second paragraph of page 61, it describes that the regulatory body examines the influence of human factors during the post-incident analysis phase. What are the main features of the AVN's investigation/analysis technique for the examination?</p>	<p>AVN collects information on human and organisational performance deficiencies, which occurred during or are underlying causal factors for reported events. This information is collected during post-incident inspection observations and discussions with the licensees and on the basis of the event reports themselves received from the licensees. The development of an event investigation methodology, which fully integrates the assessment of human factors and is adapted to AVN's needs, is the object of a current R&D project.</p>
13	13	62-66	<ol style="list-style-type: none"> 1. Were there any external Quality Assurance audits conducted at the plants? 2. What is the general position on external audits and peer reviews for independent safety verification? 	<p>1 : There is no external formal quality assurance audit (certification type) conducted at the plant in the field of safety. There are however environmental (so-called EMAS) audits performed on a systematic way by certification organizations.</p> <p>2 : The external audits and peer reviews (WANO, EDF's VISUREX) on overall operation quality are considered by the utility as important improvement factors for the audited processes. The conclusions of these audits are translated in action plans for improvement of quality, safety and plant management. Besides the participation of plant staff to peer reviews in other plants promotes the exchange of knowledge at international level and increases the global safety level of the plants.</p>
13	13.3.4	65	<p>What regulatory method does AVN</p>	<p>There is no specific method used by AVN to assess the</p>



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			utilize to verify that the tiers' or sub-tiers' QA program conform to the requirements of 10CFR50 Appendix B and 50-C-QA in case of delegation or subcontract of activities for which those requirements are applicable?	conformity of QA programs of subcontractors. This is the licensee's responsibility. AVN verifies and discuss with the licensee the requirements imposed to subcontractors and discuss the results of QA audits performed accordingly.
13	13	66	<ol style="list-style-type: none"> Does AVN possess any monitoring method such as verification of inspection activities, audit, etc. for AIA that performs inspection for pressure vessels for which the ASME code is applicable? Is there any process or legal requirement for the revision of industry codes & standards such as ASME? 	<ol style="list-style-type: none"> The responsibilities and tasks of the Owner (utility), the Authorised Inspection Agency (AIA) and the Authorised Nuclear In-service Inspector (ANII) as laid down in the ASME III en XI codes are distributed amongst AVN and the boiler and pressure vessel inspection agencies (BPVI) in accordance with a document, the so-called "Transposition of the regulatory aspects of the ASME III and XI codes to Belgian level". The main principles on which this distribution is based are the following: <ul style="list-style-type: none"> AVN has to keep an overall view, and has the authority to participate at discussions between the utilities and the BPVI; the BPVI inspect the construction and installation of new systems, repair and replacements and the in service inspection and testing programme (except for the periodic testing of pumps and valves and for the periodic inspection of concrete components: see below). AVN inspects all issues related to operational safety and overviews all inspections carried out on safety related systems and components by the BPVI; the BPVI rely on the inspections carried out by AVN in



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				<p>the field of periodic testing of pumps and valves (there is one exception: the safety valves are inspected by the BPVI, but the acceptance criteria and testing procedures are submitted to AVN for approval) and periodic inspection of concrete components.</p> <p>In practice, the implementation of these principles and of the above mentioned document results in the following responsibilities for AVN in the framework of safety related pressure retaining systems and components:</p> <ul style="list-style-type: none"> – overall approval of the in service inspection and testing plan and of the related procedures and NDE-methods; – inspection of periodic testing of pumps and valves – inspection of periodic inspection of concrete components – examination of the "Summary Reports" – approval of non conformity records – in the framework of Repair and Replacement, examination of the "Evaluation Reports" <p>2. The re-evaluation of industry codes & standards such as ASME belongs to the scope of the 10-year periodic safety reviews.</p>
13	13	62-66	<p>1. Has the Regulatory Body established a Quality Management system?</p> <p>2. On which approach or model is</p>	<p>The Federal Agency for Nuclear Control has decided to implement a Quality Management system and ask for its certification after the ISO 9001-2000 standard. This model will be used inside the Agency as the primary referenced system for Quality management.</p>



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			<p>this system based?</p> <p>3. Are audits or external reviews regularly performed?</p>	<p>As per the standard recommendation, an internal auditing plan is to be implemented in order to evaluate the functioning of the Quality Management system. Implementation audits, scheduled and non scheduled audits will be performed according to the recommendations of the quality manual and according to the audit plan. The time duration of the auditing cycles will be yearly based.</p> <p>Regarding the technical content of the Quality Management system, the Agency is willing to combine the Quality Management system audits with technical reviews of the used procedures inside the different departments. These audits will be conducted by technically competent people from independent department.</p> <p>All results from audits will be combined at the General Management level in order to provide continuous improvements of the methods and procedures used in the Agency.</p> <p>As a result from its duty to protect population and environment, the Agency will integrate in its management methods the results of external indicators that will be collected under various forms, e.g., complaints, results of inquiries made at different stake holders levels, interest groups forums.</p> <p>The Authorised inspection organisation AVN used for a long time various sets of procedures or instructions. Since 1999, AVN has initiated a process of implementing a more formal Quality Management System.</p> <p>The methodology includes the description of the various</p>



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				<p>processes and the definition of possible improvements using a so-called “risk analysis”. An action plan has been defined and some improvements have already been implemented.</p> <p>The first objective is to improve and maintain the quality (effectiveness and efficiency) of the technical and administrative activities, focusing more on their impact on safety.</p> <p>The certification of this system will be considered at a second stage, on the basis of its expected added value.</p>
14	14	67-72	<p>1. What are the arrangements at the plants to ensure proper and timely feedback of plant modification and operating experience into the Probabilistic Safety Assessment?</p> <p>2. What are the related rules and procedures for this process?</p>	<p>The updating of the PSA studies is included in the periodic (10 years) safety reviews. It takes account of the impacts:</p> <ul style="list-style-type: none"> • The unavailability related to intervention times for maintenance or periodic tests • The modifications of systems or procedures • The improvement of the methods or tools for assessments. <p>It is moreover planned to assess their completeness with respect to plant modifications every 5 years.</p>
14	14.2	69	<p>The importance to implement "the ten-yearly overhaul / safety review" for the nuclear safety achievement is emphasized in the report.</p> <p>How much difference is the content of the ten-yearly overhaul from the content of a regular inspection?</p>	<p>Regular inspections do not focus on aspects related to the three main objectives of PSR, which are:</p> <ol style="list-style-type: none"> (1) Evaluate if the plant is as safe as originally designed (no subtle degradations, e.g. due to accumulation of modifications; were all scenarios intended to be covered by the design, really considered in all circumstances?); (2) Evaluate if the plant is still safe for the next 10 years (ageing, wear-out), (3) Compare the status of the plant with the most recent



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				<p>safety standards.</p> <p>The scope of PSR and regular inspections is essentially the same (i.e. all safety-related aspects dealt with in the FSAR).</p> <p>Furthermore, PSRs tend to tackle simultaneously the same content on more than one units at a time.</p>
14	14.2.b	70	<p>The report describes that the severe accident consequences were analyzed in order to infer prevention and mitigation measures.</p> <p>3. If you have plant specific severe accident management guidelines (SAMGs) for Doel 3 & 4 and Tihange 2 & 3 units, what kind of general SAMGs are referenced and what kind of strategies are adopted to cope with the severe accident?</p>	<p>Plant-specific severe accident management guidelines (SAMGs) exist for all the seven Belgian Nuclear Power Plant. The Tihange SAMG's are based on the generic SAMGs developed by the Westinghouse Owners Group (WOG) while the Doel SAMG's are in-house specific guidelines.</p> <p>In both approaches, a general document, so-called "the strategy document" identifying the possible actions to face a severe accident has been developed taking into account plant-specific characteristics that could impact the accident progression and management. Based on this document, a set of guidelines corresponding to the selected strategy/action have been set up; they contain the relevant information needed to implement the actions together with the pro and the contra of the implemented actions regarding the reduction of the risk.</p>
14	Ap.4		<p>In the appendix 4 an overview is given of the subjects examined during the 10-year periodic safety review. To what extent are organisational, personnel and administrative subjects part of this review?</p>	<p>Few organisational, personnel and administrative subjects were/are part of this reviews. Examples of related subjects are:</p> <p>1rst PSR Doel 1&2/Tihange 1): subjects on operation and quality organisations.</p> <p>1rst PSR Doel 3&4, Tihange 2&3: subjects on training and licensing of the personnel, implementation of QA programmes, quality and safety organisations.</p> <p>2rd PSRs Doel 3/Tihange 2: subjects on training of the personnel and knowledge management, event analysis methodologies</p>



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				(including human factors).
16 (2)	2.2	79	<p>In the text, two ways of informing the CGCCR are mentioned (via the Minister of Foreign affairs and via IAEA and EU quick information channels).</p> <p>Is there any ranking between these channels? Which channel alerts the CGCCR?</p>	There is no ranking in these information channels; they all report to the CGCCR acting as the national warning point.
16 (1)	2.1	79	<p>Could you please give a brief outline of the time schedule expected in case of an emergency, especially regarding the information of the Emergency Director, the implementation of the Governmental Crisis Centre and the implementation of countermeasures necessary, especially regarding the information of the public?</p>	<p>All emergencies (N1 to N4) have to be notified to the Governmental Centre for Co-ordination and Emergencies (CGCCR). This centre is permanently manned, alerts the cells involved in the crisis management at the federal level (Emergency and Co-ordinating Committee, evaluation cell, measurement cell, information cell) and houses these cells during the crisis situation as well.</p> <p>The staffing of the crisis management cells is supposed to be fully completed at the CGCCR at least within the two hours after the initial notification. The implementation of protective measures at the provincial level is expected to be performed within approximately three hours.</p> <p>For the specific case of N4 emergency (sudden emergency with immediate important consequences) a by-pass of this procedure allows to initiate protective measures directly at the province level.</p>
16 (1)	2.2	80	<p>Please give a more detailed explanation on the intervention guide</p>	<p>Actually, the intervention guide levels are 5 to 15 mSv (projected/averted) dose equivalent to the total body for sheltering (calculated over 24 hours potential exposure time), 50</p>



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			levels and the calculation parameters.	<p>to 150 mSv (projected/averted) dose equivalent for evacuation (calculated over 2 weeks exposure time) and 50 mSv (projected/averted) thyroid dose (calculated over the expected cloud travel) for intake of stable iodine. Lower levels can be considered for thyroid exposure for children and other sensitive groups</p> <p>For off-site radiological calculations, focussing on the urgent protective actions, the licensee has to implement a radiological evaluation model. For that purpose a dose/dispersion model developed by the Belgian Nuclear Research Centre (SCK•CEN) is used. The model is a segmented Gaussian plume model, based on the Belgian (also called Bultynck-Malet or SCK•CEN) turbulence typing scheme and the associated dispersion ('sigma') parameters [1]. These parameters were obtained using extended tracer experiments on each site during the years sixties/seventies. The calculation domain extends up to 50 km around the release point. For the Tihange site empirical correction factors were introduced to take the more complex topography into account. Calculations are done per time step of 10 minutes, extrapolations (projections) over time can be made as well. In addition to the dispersion model, a set of standard scenarios have been developed in order to perform quick assessments at early stages. In the latest version of the diffusion model [2], the parameters associated with the standard scenarios have been stored in a database allowing rapid projections for any of the pre-defined scenarios.</p> <p>The exposure pathways considered for urgent protective actions are cloudshine dose, inhalation dose and groundshine dose (instantaneous and integrated up to one day and two weeks). Ingestion pathway would be covered by implementing measures</p>



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				<p>on the food chain (food ban,...).</p> <p>Effective adult doses and thyroid doses to adults and children are calculated. Deposition of iodine (limited to I-131) and caesium (limited to Cs-137) are also calculated. Related to forecasts, the total projected doses as well as the avertable doses are calculated.</p> <p>[1] H. Bultynck and L.M. Malet, <i>Evaluation of atmospheric dilution factors for effluents diffused from an elevated continuous point source</i>, TELLUS Vol 24, N°5 (1972).</p> <p>[2] A. Sohier, <i>Expérience et évaluation des codes de calcul de doses actuels utilisés en temps de crise nucléaire</i>, Annales de l'Association belge de Radioprotection, Vol 24, N° 4 (1999).</p>
16 (1)	2.2	80	Please clarify which of the issues of the emergency plans mentioned in this paragraph are in operation and which are still (to be) developed.?	Emergency planning is a continuously evolving issue on which is worked on a permanent basis. On the one hand this effort incorporates lessons learned from emergency training exercises and aims at a steadily progress in the development of standardized working procedures and tools for diagnostic purposes, radiation monitoring strategy and decision making on the other hand.
16	16	78-82	<ol style="list-style-type: none"> 1. What is the status of decision-support systems? 2. Are up-to-date computerized decision-support systems being used? 	<p>1 et 2:</p> <p>The tools used by the utility for emergency management deal with the evaluation of releases in the environment due to the accident and the potential radiological consequences. These tools are based on atmospheric dispersion models developed by the Research Center in Mol.</p> <p>In its emergency room AVN uses simple users friendly</p>



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				prediction tools elaborated on the basis of standard scenarios and/or pre-calculated standard releases.
17	17.a	85	3. With regard to the external events of human origin, it is stated that at the Tihange site, the preferred option was to bore wells from where groundwater can be pumped. In case the groundwater is pumped for guaranteeing the emergency heat sink, the stability of foundations of major structures can be affected due to the stress change in the subsurface materials. Was the potential effect by pumping evaluated? Did the regulatory body issue any particular request on this subject?	The Tihange site is situated in the alluvial plain of the river Meuse. Under the gravelled alluvial deposits of about ten meter thickness, the substratum is formed of a shisty bedrock. The foundations of the safety related structures are directly in contact with the bedrock so that they are not affected by the pumping operations
17	17	84-86	What are the current siting criteria in force in Belgium with respect to external human-induced and natural hazards?	The characteristics taken into account in the section for the existing Doel and Tihange nuclear station sites are described on page 84 of the National Report. For the moment, there are no new nuclear sites planned in Belgium.
18	18.1	88	In 1975, the Belgian Nuclear Safety Commission decided that the next plants will be protected against aircraft crash (Article 7, chapter 2, page 16/95). Later, in Appendix 1, page	Indeed the reactor building but also the spent fuel pools buildings and the waste storage buildings resist the impact of a civil airplane crash.



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			<p>31/70 and page 47/70, you state "The containment is designed to withstand ... an aircraft crash". In Article 18, page 88/95, you write: "For the aircraft crash the bunkerized structures have been designed to resist the impact of a civil airplane of about 90 tons at a speed of 85 m/s."</p> <ul style="list-style-type: none">We understand that not only the bunker itself, but also the reactor building is protected. Is that correct?	
18	18.1	88	What is the wall thickness of the emergency buildings of Doel 1 and 2 and Tihange 1?	Classified Information
18	18.1	88	What is the wall thickness of the emergency buildings of the later plants?	Classified Information
18	18.2	88	<p>In Article 18, page 88/95, you write about the ten-yearly safety review. "... report (is) submitted jointly by the licensee and the regulatory body AVN to the Safety Authorities ...".</p> <p>Is there no conflict of interest if the licensee and the regulatory body write a common report?</p>	<p>The Royal Decrees of Authorisation require a common report by the licensee and by AVN for the PSR, probably in order to ensure that the safety Authorities receive a report resulting from in-depth discussions.</p> <p>The subjects analysed in the PSR are a combination of subjects put ahead by the licensee and by AVN. As for the methodologies used to assess the problems, they have to be approved by AVN before being used in practice. Hold points are defined by AVN to control the progress of these activities. Besides, AVN reviews the report and gives an approval of the results. Therefore the role</p>



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				of AVN is in practice more an on-line review and approval of the methodologies and of the results of the studies than a common work with the licensee. In any case, should a disagreement be left between the licensee and AVN at the moment of the issuance of the report, both opinions would be presented to the authorities in the report.
18	18.1	88	Concerning the development of the bunkerized structure, it is reported that it was verified that these structures resisted the impact of a military air craft of about 13 ton at a speed of 150 m/s. How has this verification made, by the analysis or by the experiments?	The verification was made by analysis.
19 (iv)	19 (4)	93	The report states that SAM procedures are being implemented and the training programme of control room operators is developed in parallel. What is the current status?	All the Belgian plants have SAM procedures or equivalent. The operators have been trained for their use. The training programme is described in question NL5.
19 (v)	19 (5)	94	Which tools are used to bundle the information in the organisations AVN, Electrabel, TEE and Laborelec, to preserve the knowledge on plant design?	See answer to the question N° J4.