

Kingdom of Belgium

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

Second Review Meeting (May 2006)

Answers to the Questions of Contracting Parties on the National Report submitted by Belgium

Seq. No	Article	Ref. in National Report
1	General	

Question/ Comment We commend you on the program you are in the process of implementing to site a facility for low and intermediate level waste, and the partnerships which have been developed with communities which have expressed interest in becoming hosts. Concerning the long-term management of high-level and long-lived waste, we note that ONDRAF/NIRAS has obtained Ministerial approval to start a broad consultation and dialogue process.

Would you provide further information about the nature of the broad consultation and dialogue process which you plan to implement or are currently implementing?

Answer ONDRAF/NIRAS will prepare an update of the National Waste Management Plan in the period 2006 - 2008. The consultation and dialogue process will focus in this period entirely on the preparation of this Plan, which will be mainly oriented towards long-term management of all the radioactive waste in Belgium (including the high-level and long-lived waste). ONDRAF/NIRAS is currently analysing the appropriate structure and organisation of this process, taking into account the recent legal requirements on the consultation of the public for plans and programmes (law of February 13, 2006, which transposes EC Directive 2001/42/EC). See also answer to question France 7.

Seq. No	Article	Ref. in National Report
2	General	Section K Page 122

Question/ Comment Could Belgium provide information on the preparation of the National Waste Management Plan (requirements, schedule and milestones, responsibility and organization)?

Answer The Belgian legislation gives mission to ONDRAF/NIRAS to establish and update a general program for the long-term management of radioactive waste giving a technical and economical description of the actions considered to manage the radioactive waste. Recent legislation (law of 13 February 2006), transposing the European directives 2001/42/EC and 2003/35/EC in Belgian federal law, adds complementary requirements for the establishment of this program such as consultation of the public, additional federal and regional bodies and potentially concerned member states of the EU, preliminary environmental impact assessments, the consideration of the reasonable substitution solutions. The construction of the future general program (also called National Waste Management Plan) will happen in two steps: the first step, starting now, will be the redaction of an activity report giving the situation as is of the radioactive waste management in Belgium. The scheduled date for its publication is end of 2007. Based on this first report, the actual National Waste Management Plan will present the envisaged management solutions for the future and is expected to be published end of 2008 or early 2009. Both documents will be submitted for discussion to all potential stakeholders, including the general public.

Seq. No	Article	Ref. in National Report
3	General	

Question/ Comment The report should provide more concrete examples and information about the implementation of the mentioned measures.

Answer This general remark will be addressed in the presentation at the second review meeting in order to define how this remark can be taken into account in the third national report.

Seq. No	Article	Ref. in National Report
4	General	Chapter 11

Question/ Comment The Belgian 2003 report promised to report in the 2006 report on progress on the issues mentioned in Chapter 11 of the 2003 report. However, no progress on the further feasibility investigations, i.e. practical implementation and remaining R&D aspects, regarding geological disposal of high-active waste in Boom Clay were reported.

Answer We can refer to the information provided in section 2.4.2 point 5. In addition to that, we can give following information. Main progress since the publication of the SAFIR 2 report can be summarised as follows.

- thorough review of the disposal concept for vitrified reprocessed waste and spent fuel, leading to a new reference design based on an engineered containment concept, permanent shielding and construction of the Engineered Barrier System at the surface. The resulting design is a “supercontainer” which comprises, starting from the vitrified waste or the spent fuels, a carbon-steel overpack, a massive concrete buffer and a stainless steel liner;
- extension of the underground laboratory: excavation of a connecting gallery (between 2 existing shafts) with industrial techniques (tunnel boring machine with road-header and wedge-block lining);
- preparation of a large scale in-situ heating experiment Praclay to a representative scale of a disposal cell in order to study the thermal (and hydraulic-mechanical and chemical) impact of the heat producing waste on the Boom Clay and on its excavation disturbed zone. This heater test requires a new, dedicated gallery to be excavated in 2007-2008 and will be running during the period 2009-2019.

Seq. No	Article	Ref. in National Report
5	Article 3	p. 17 and 30

Question/ Comment What are the criteria by which the assignment of NORM residues as radioactive waste is determined (i.e. the appropriate classification by the Federal Agency for Nuclear Control (FANC))?

Answer Currently, these materials are considered as radioactive waste only if they are used for their radioactive characteristics in a professional activity. In this case, these materials are regulated by the waste management rules, as described in the national report. The residues originating from industrial activities using natural radioactive materials (indicated with the acronyms NORM and TENORM) belongs to the competences of ONDRAF/NIRAS, once the FANC has classified them for reasons of harmfulness for public health as radioactive waste.

Although there is no precise criteria (expressed in concentration levels) in the Royal Decree GRR-2001 (the general clearance levels in annex Ib are not applicable), the FANC takes into account the recent work undertaken by the IAEA in the production of its report DS161 (RS-G-1.7) in which the exclusion levels for the uranium and thorium series and for K-40 have been agreed internationally. It gives the levels below which materials may not enter the scope of its recommendations depending on national policy. The FANC also uses figures from the European document RP122 (part 2)

It should be added that the Royal Decree GRR-2001 (Art. 1, Art. 4, Art. 9, Art. 20.3) applies to activities which imply the presence of natural sources of ionizing radiations and are likely to involve a notable increase in the exposure of the people so that they may not be neglected from the point of view of the protection against ionizing radiations. According to the Decree, these activities are :

1. Activities including a risk of exposure to the daughter products of radon, such as underground working rooms (e.g. culture of mushrooms), water treatment installations, educational establishments, health care, public buildings and, in general, any working facilities located in “risky areas” defined by FANC.
2. Activities which can lead to external or internal exposure to natural ionizing radiations :
 - production of phosphates
 - sands with zircon
 - tin foundry
 - rare earths extraction
 - manufacture of electrodes with thorium (welding)
 - any other occupation defined by the FANC and appearing on a list published in the “Belgian Monitor”
3. Plane travels

These activities must be declared to FANC if :

1. Regarding the activities during which the workers and/of the people of the public are exposed to radon and its daughter products : if the exposures are likely to involve effective doses higher than 3 millisievert per annum (3 mSv / y) or the annual exposure to radon exceeds the level of 800 kBq.m-3.h
2. Regarding the activities which can lead to external or internal exposure to natural ionizing radiations : if the effective dose is higher than 1 millisievert per annum (1 mSv / y)
3. Regarding flight crews : if the effective dose is higher than 1 millisievert per annum (1 mSv / y).

Remediation of the contamination constitutes a situation of intervention according to GRR-2001 (Art. 72bis : interventions in the event of durable exposure - this article applies to the interventions in the event of durable exposure resulting from a past or old practice or work activity, and durable exposure of any other causes, including the presence of gas radon in the dwellings).

Seq. No	Article	Ref. in National Report
6	Article 3	17

Question/ Comment The last paragraph makes mention of the fact that military radioactive wastes are managed according to the civilian radioactive waste laws and regulations. Please clarify in this Section, and in Section D (Inventories and Lists) if necessary, whether or not this means that the inventories of military-origin radioactive wastes are included in the total reported inventory.

Answer Radioactive waste of military origin and presented to ONDRAF/NIRAS are included in the total reported inventory. It concerns very limited quantities of essentially radium sources.

Like for civilian cases, once RW is taken over by ONDRAF/NIRAS, on request of the armed forces, it is taken up in the total inventory.

Seq. No	Article	Ref. in National Report
7	Article 4	

Question/ Comment It is stated that the mechanical features of the fuel cans, especially corrosion resistance, have been improved by using new alloys.

Can you be more specific about improvements?

Will the long-term storage of the spent fuel in wet conditions influence mechanical stability of the spent fuel? Especially during a transport from a wet storage to a disposal containers.

Answer The use of new alloys like M5 and Zirlo for claddings reduce corrosion and the production of corrosion products.

Seq. No	Article	Ref. in National Report
8	Article 4	G, 7.1.1.2, page 75

Question/ Comment What requirements are imposed on long-term fuel integrity?

Answer The containers must fulfill the requirements of 10 CFR 72, i.e. that they are retrievable and that they keep their mechanical integrity. This is achieved by the helium atmosphere and by keeping low temperature (400°C) of the rods. This temperature limit for normal conditions of storage eliminates the need to perform detailed calculation of cladding hoop stress and creep deformations.

Seq. No	Article	Ref. in National Report
9	Article 5	Section G, page 94

Question/ Comment Please, indicate us if your Regulatory Body allows the storage of damaged spent fuel in the Interim Spent Fuel Storage Facilities? If, yes, please shortly describe the storage conditions.

Answer Storage facilities in Belgium normally involve pool storage and dry storage of intact fuel elements.

The storage of damaged spent fuel is not allowed in the dry storage facility.

Damaged spent fuel elements may be placed in the pools if they are placed in a separate leaktight “box” as an additional measure to avoid contamination.

Seq. No	Article	Ref. in National Report
10	Article 5	Section G, page 94

Question/ Comment Please, specify us if the license of a NPP unit (Doel or Tihange) authorizes also the operation of the ISFSF situated at the site or there is a distinct license for the ISFSF.

Answer The fuel cooling ponds at the Doel and Tihange units (buildings “GNH” (Doel 1/2), “SPG” (Doel 3/4), “BAN” (Tihange 1) and “D” (Tihange 2/3)) were included in the initial operating license of the nuclear power plants.

Both the dry storage building at Doel as the wet storage building at Tihange were added on after the initial licensing of the nuclear power plant.

A separate license (royal decree) was given for these two buildings.

Seq. No	Article	Ref. in National Report
11	Article 5	Section G page 94

Question/ Comment If there is only a license for NPP unit and ISFSF, please indicate us how the ISFSF is integrated into FSAR of NPP unit (as a separate section?). Also, please, indicate us, if the NPP document “Operating Limits and Conditions” has a section that contains limits and conditions applicable to the intermediate spent fuel storage, or there are two distinct documents.

Answer A separate safety report has been made for the dry storage building at Doel. The operating limits and conditions for this building are included in this separate safety report.

The storage building at Tihange is integrated in the safety report of the reactor Tihange 3. In this case, the operating limits and conditions for the wet storage building are also integrated in the overall operating limits and conditions of the unit Tihange 3.

Seq. No	Article	Ref. in National Report
12	Article 9	p. 98

Question/ Comment The report states that the "Technical Liability Fund" has been set up to cover obligations resulting from decommissioning. How is the fund managed? What is the current status of it?

Answer At the Belgian level, we have to distinguish different funding arrangements: for commercial nuclear power plants and spent fuel, for “historic” nuclear liabilities under responsibility of the Belgian Federal State, and for other nuclear facilities. The Belgian State inherited “historic” nuclear liabilities, from past nuclear activities. It concerns the Belgoprocess (BP) sites, regarding all the activities conducted before 01/01/1989 (site BP1, formerly Eurochemic reprocessing facility, and site BP2, formerly SCK∙CEN Waste department facilities), and the SCK∙CEN site, regarding all the activities conducted until 31/12/1988. For the management of the funding of the historic nuclear liabilities see also section 5.2.1.5 page 35 of the national report. In addition to the information presented there, we can add that the current financing plan for BP1 and BP2 covers the period 2004-2008.

Seq. No	Article	Ref. in National Report
13	Article 11	p. 99 and 100

Question/ Comment The Belgian Agency for Radioactive Waste and Enriched Fissile Materials (ONDRAF/NIRAS) has developed and implemented a system of waste acceptance criteria based on the General Rules. Do these waste acceptance criteria contain only qualitative requirements or also quantitative requirements such as radionuclide-specific activities?

Who is responsible for the periodical re-assessment of the stored waste packages 3 years after acceptance and then every 10 years? What measurements are necessary if the waste packages will not be conform with the waste acceptance criteria and who has to pay for measurements?

Answer The waste acceptance criteria contain both quantitative and qualitative criteria. One of the quantitative type of criteria are radionuclide-specific activity limits for a list of critical radionuclides. On the bases of these limits ONDRAF/NIRAS determines if the presented waste can be disposed of in a surface disposal facility or not. ONDRAF/NIRAS is responsible for the periodical re-assessment of the accepted waste. The inspections are performed by the operator of the storage facility. If a waste package is not conform with the acceptance criteria, the measures and measurements depend on the type/degree of the non conformity. The applied measurements will be defined on a case-by-case basis. ONDRAF/NIRAS has to proof whether the non-conformity is due to hidden defects or

due to for example wrong manipulations during storage. If the proof is made that it is a hidden defect the waste producer pays as part of his liability for hidden defects for a period of 50 years. In the other case the measurements and measures will be paid from the Long Term Fund and thus be distributed over all waste producers (The Long Term Fund is the instrument developed by ONDRAF/NIRAS, by virtue of the legal obligations of 1981, to finance its long term assignments, more specifically the technical activities within the scope of the disposal of conditioned waste. The radioactive waste producers put money into the fund at the moment ONDRAF/NIRAS accepts their conditioned waste (transfer of property), after checking its compliance with the applicable acceptance criteria).

Seq. No 14	Article Article 12	Ref. in National Report p. 101
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Question/ Comment Are there past practices in Belgium which would need to be reported under Article 12.ii?

Answer The past activities of radium extraction at the Olen site of Umicore have been reported in section 4.3.3. A site remediation plan for part of the contaminated area has been prepared and the actual remediation activities of the brook "Bankloop" are planned to start early 2007 and end mid 2007. The resulting contaminated materials will be put in interim storage on the premises of Umicore.

Seq. No 15	Article Article 12	Ref. in National Report p. 102
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Question/ Comment Section 8.2.1 states that for some waste processing and conditioning installations and some storage buildings, operating licences is granted for a limited period. What are the criteria to decide whether a facility is to obtain a limited or an unlimited license? Does the requirement of ten-yearly safety reviews also apply to radioactive waste management facilities?

Answer At the moment the licensing periods depend on the class of the facilities:
 - class I facilities: unlimited period + periodic safety review
 - class II or III facilities: 15 years (since 2001)
 At this moment all the major waste processing and conditioning installations (which are class I facilities) have an operating license for an unlimited period.
 The requirement of a periodic safety review has been recently extended to include all class I facilities, including the radioactive waste management facilities.

Seq. No 16	Article Article 12	Ref. in National Report Tables section 8.2.3
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Question/ Comment Tables in section 8.2.3. of the report show the acceptance criteria/conditions with regard to radioactivity for conditioned waste on site 1 of BELGOPROCESS. One of the criteria/conditions for some buildings is that Ra-226 and Th-232 in the primary package are only allowed in mass-activity concentrations which do not exceed the natural radioactivity of these isotopes. Which is the level considered for that natural concentration?

Answer 1000 Bq/kg for both Ra-226 and Th-232.

Seq. No 17	Article Article 13	Ref. in National Report Section H Page 113
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Question/ Comment Could Belgium provide detailed information about the necessity of public inquiry for spent fuel facilities, corresponding regulations and implementation?

Answer According to GRR-2001, spent fuel facilities are “class 1” installations (art. 3) and have to follow the standard licensing procedure for this class, as defined in article 6 of the GRR-2001.

The normal licensing procedure for class I facilities includes a public inquiry (see section 5.3.1.1 of the report) which must be held during 30 days in all the communities in a radius of 5 km of the facility. The license application, including an environmental impact assessment can be consulted by the public during this time. If requested, a public information hearing can also be held.

Translation of GRR-2001 art. 3 :

Article 3. - Classification of the establishments where practices are exerted.

3.1. The establishments where practices related to the first subparagraph of the first article 1 are exerted, are in one of the following classes:

a) class I :

1. nuclear reactors ;
2. facilities where quantities of fissile substances (...) higher than half of the minimal critical mass are in use or stored ;
3. facilities for reprocessing of irradiated nuclear fuels (enriched or not) ;
4. facilities where radioactive wastes are collected, treated, conditioned, stored or, in a general way, handled when they constitute the principal activity of the company; 5. final repositories of radioactive waste ;

(...)

Seq. No	Article	Ref. in National Report
18	Article 13	H, 8.3.2, page 113

Question/ Comment Is there a comparative analysis to assess the suitability of different sites for radwaste disposal facilities, and is there a requirement to analyse at least three sites with the purpose of identifying the most suitable site for further detailed investigations and approval?

Answer For the low-level short-lived radioactive waste management programme for each of the selected sites, an integrated safety assessment has been conducted, taking into account all the components of the disposal system (site + design) in order to evaluate the acceptability from a safety point of view. No comparison of the various selected sites has been and will be made.

For the high-level long-lived radioactive waste management programme the approach to and process of site selection still has to be defined.

Seq. No	Article	Ref. in National Report
19	Article 13	99

Question/ Comment SAFIR-2 (Safety Assessment and Feasibility Interim Report, 2002) is an important milestone in the demonstration of repository disposal for Belgium’s high-level radioactive waste, and was peer-reviewed by the NEA in April 2003. The National Report does not discuss the findings of the International Review Team, and the effect of SAFIR-2 on ONDRAF/NIRAS’s plans, as promised in Section K of the 2003 National Report. Our understanding is that the results confirmed the Boom clay formation for

disposal. Please summarize the results of the review and how the SAFIR-2 report and NEA review affect Belgium's strategy for repository disposal.

Answer First, we can refer to the information provided in the National Report (section 2.4.2 p. 14).

The results of SAFIR 2 and the conclusions of the International Peer Review both confirm that geological disposal of high-level and long-lived waste in Boom Clay remains a viable option. Furthermore, the NEA Peer Review concludes that the Belgian disposal programme is mature enough to go for siting, providing that specific policy decisions being taken and dedicated regulations being put into force.

Additionally, the NEA Peer Review highlighted several scientific and technical uncertainties, the reduction of which requiring additional R&D. These recommendations have been taken over in the current R&D programme from ONDRAF/NIRAS.

Based on the SAFIR 2 report and the International Peer Review a double decision has been taken by the Board of Directors of ONDRAF/NIRAS and confirmed by the supervising Minister in his letter of November 19, 2004:

(1) to prepare and initiate a dialogue at all levels on the long-term management of the high-level and long-lived waste; and

(2) to define and implement the methodological technical programme for deep disposal of this waste.

The supervising minister asked ONDRAF/NIRAS in his letter dated November 19 2004 to make a proposal of programme and of societal dialogue structure in order to be able to organise this dialogue on the long-term management of this waste. ONDRAF/NIRAS is currently preparing this proposal to the supervising Minister. See also answers to questions Canada 1 and France 7.

Seq. No	Article	Ref. in National Report
20	Article 15	30

Question/ Comment In Section K, "Planned Activities to Improve Safety," of the 1st Belgian National Report, it is indicated that applicable procedures then in place for the licensing of Class I installations did not sufficiently cover all aspects of the licensing process, in particular those aspects related to the decision making process and stakeholder consultation. There does not appear to be any new discussion of these issues in the second National Report. For example, in Section 5.2.1.2 of the 2nd National Report, the discussion of the General Radiation Regulation, (which is said to comprise all the licensing procedures for practices and activities involving ionizing radiation or radioactive substances), is silent with regard to decision making and stakeholder consultation. Please provide further information on any improvements that may have been made in these areas during the period since the 1st National Report was issued as well as any plans that may exist for additional improvements.

Answer In section K of the first National Report, reference was made to a (further) development of the licensing procedure for waste disposal facilities, with special emphasis on stakeholder involvement.

In developing the legal framework for waste disposal or spent fuel disposal facilities, specific attention is paid to:

- The good experience obtained from the local partnerships (cooperation, communication, stakeholder involvement), which finally resulted in a preliminary acceptance of a disposal concept (and site) for low level radioactive waste,
- As far as the license application file is concerned, cooperation with the Flemish region resulted in a common table of contents for the environmental safety assessment report, covering both nuclear and non-nuclear aspects,
- Contacts with the different regions were initiated with the aim of setting up a

cooperation agreement between the federal authorities (nuclear) and the regional authorities (non-nuclear aspects). The main purpose is mutual information exchange and obtaining advice at discrete points in the licensing process

Today, the licensing procedure for class I type activities or facilities already foresees a public inquiry on local community level. On specific request of the local communities a public hearing may be organized. Also the advice of the province where the facility is located is asked.

Disposal facilities belong to the class I facilities. A specific licensing procedure for such facilities is under development and will be discussed with the authorities concerned. Specific attention will be drawn on evaluation hold points during the disposal process. It is foreseen that the Scientific Council of the Agency will be informed on a regular base as well.

Seq. No	Article	Ref. in National Report
21	Article 19	
Question/	It is stated that the transport and transboundary movement of radioactive waste and irradiated fissile materials is performed according to the European and international regulations concerning the international carriage of dangerous goods by road, rail, ship, and airplane.	
Comment	Does Belgian regulation allow temporary import of radioactive waste for the purposes of treatment and conditioning after which conditioned radioactive waste will be returned to the origin country?	
Answer	According to the applicable regulations for nuclear safety, that type of activity is in principle possible.	
	The law regulating the activities of ONDRAF/NIRAS foresees explicitly that ONDRAF/NIRAS decision to accept foreign wastes for treatment in Belgium must be endorsed by the minister of energy. It is the tradition that the minister of energy refers to the whole government before taking a decision.	
	It is a common international practice that the end product is returned to the country where the waste comes from.	

Seq. No	Article	Ref. in National Report
22	Article 19	Section E Page 28
Question/	Could Belgium provide examples of applied procedures for clearance (type of waste, level of activity, applied procedures and follow-up actions)?	
Comment		
Answer	Clearance procedures have been in use in Belgium for different kind of waste :	
	<ul style="list-style-type: none"> - Decommissioning waste, e.g. for former EUROCHEMIC plant and for the BR3 research reactor (SCK-CEN): metals, concrete, - Operational waste from nuclear power plants in service - Medical waste from hospitals, (short half-life radioactive elements): storage during at least 10 half-life's 	
	The clearance procedures are written by the Health Physics department and have to be approved by the AIO, such as AVN and AVC. The acceptable levels of activity are given in annex Ib of Royal Decree GRR-2001. A yearly inventory of the cleared products has to be sent to FANC.	

Seq. No	Article	Ref. in National Report
23	Article 19	p. 36 to 42

Question/ Comment Are there any specific regulations in the Belgian legislative and regulatory framework addressing specifically the management of radioactive wastes (e. g. safety requirements for interim storage or waste disposal facilities) or specifying in detail the licensing procedure for a radioactive waste repository?

Answer According to GRR-2001, these installations are “class 1” (art. 3). The Royal Decree specifies the licensing procedures to be followed ; they are the same as for nuclear reactors.

This legislation is to be completed; related documents are not yet published.

Where needed, specific regulations for radioactive waste facilities or repositories are in preparation, as for example it is recognized that long-term safety (post-closure monitoring, etc) is not adequately addressed by GRR-2001.

Seq. No	Article	Ref. in National Report
24	Article 19	Section 5.3.1.2

Question/ Comment It is stated that nuclear operators have to record gaseous and liquid discharges, as well as stored solid wastes and the amounts of cleared materials. Are (uncleared) stored liquid wastes exempted from this recording requirement?

Answer Stored liquid wastes must also be recorded (see GRR-2001 art. 37.4 - A continuous inventory of radioactive waste contained in storages and of eliminations is kept as precisely as possible. This inventory is at the disposal of the controllers of FANC).

Seq. No	Article	Ref. in National Report
25	Article 19	Section E, page 33

Question/ Comment ONDRAF/NIRAS is responsible not only for interim storage but also for treatment and conditioning. Taking in consideration that ONDRAF/NIRAS assesses the capabilities of other waste management facilities and issue qualifications for this, it means that in Belgium all the activities regarding the waste management are done in a centralized manner. If ONDRAF/NIRAS licensee the operators, which are the FANC attributes in the field?

Answer With regard to the management of radioactive waste, the FANC and ONDRAF/NIRAS have been entrusted by the legislator with a common global legal objective, namely the protection of the public and the environment against the hazards of ionizing radiation, in particularly resulting from the presence of radioactive waste. However, the instruments used by those agencies in order to achieve this objective, are different. ONDRAF/NIRAS as a waste management agency has to ensure a safe and coherent waste management system and makes proposals for technically safe and socially acceptable waste management facilities, while FANC as a regulatory body plays a central role in the granting of authorisations for nuclear facilities

Seq. No	Article	Ref. in National Report
26	Article 20	Pag.28 y 29

Question/ Comment What is the main authority and maximum responsible in the decision making process in the radioactive waste management, the Federal Agency for nuclear control (FANC) or the Radioactive waste management Agency (ONDRAF/NIRAS)?

Answer ONDRAF/NIRAS as a waste management agency has to ensure a safe and coherent waste management system and makes proposals for technically safe and socially acceptable waste management facilities, while FANC as a regulatory body plays a central role in the granting of authorisations for nuclear facilities. Basic policy decisions are taken at governmental level.

Seq. No	Article	Ref. in National Report
27	Article 22	Section 6.2.2.2.2

Question/ Comment According to Section 6.2.2.2.2 the only formal external motive for the controlling Follow-up Committee to decide for an increase of the financial provisions is the required positive ONDRAF/NIRAS advice. Since Electrabel/SPE remain fully liable for costs regarding the future dismantling of the NPPs but are no longer responsible for the management of nuclear provisions, how can they ascertain that their future liabilities are indeed sufficiently covered by the nuclear provisions fund set-up by Synatom?

Answer Midyear in 2003, a new law was published concerning the settlement and management of provisions for ultimate decommissioning of the NPPs including the management of the spent fuel from these power plants. The provisions will both be centralized at SYNATOM, which is a 100% subsidiary of ELECTRABEL. The Belgian State owns a golden share in SYNATOM, which is one share that has the power to veto decisions of the major shareholders.

The funds for decommissioning and spent fuel management are charged to the consumer in the selling price of electricity. The funds are collected from the consumers by ELECTRABEL and transferred to SYNATOM.

A Surveillance Committee has been created as a legal entity entrusted with control of the settlement and the management of the funds entrusted to SYNATOM. The Committee activities include the methodology of the settlement of the funds, the investment policy, and the refunding of the invested funds.

Every three years, the Surveillance Committee audits the methods used for building up provisions for decommissioning and spent fuel management, in close consultation with Synatom and Electrabel. This audit is performed on the basis of a report made by Synatom and Electrabel. On this occasion, Synatom and Electrabel may suggest modifications to these methods and the Surveillance Committee may request Synatom and Electrabel to suggest such modifications.

The advice formulated by the Surveillance Committee is binding for SYNATOM. With regard to its advice on the existence and sufficiency of the funds for decommissioning and management of the spent fuel, the Surveillance Committee has to follow the unanimous opinion that ONDRAF/NIRAS has formulated on this matter.

Every 3 months, SYNATOM estimates the real yield of the funds and, in case of insufficiency in comparison with the yield taken into account in the assessment of the liabilities, SYNATOM invoices this difference to ELECTRABEL.

Seq. No	Article	Ref. in National Report
28	Article 23	Section 6.3.3

Question/ Comment Apparently the intended completion of the ONDRAF/NIRAS Quality Management System by an Environment Management System complying to ISO 14001, stipulated in the Belgian 2003 report, has been abandoned.

Answer ONDRAF/NIRAS is now qualified 9001:2000. It is currently considering how and to which extent the standard 14001 could be applied to the waste management system, considering that ONDRAF/NIRAS is not an operator of nuclear facilities and taking into

account that waste management as a whole can have an indirect impact on the environment.

Seq. No	Article	Ref. in National Report
29	Article 23	Section F, page 61

Question/ Comment Please detail the QA requirements for operating and maintaining the spent fuel and radioactive waste databases.

Answer QA requirements for spent fuel management software are the same as defined in our general information systems governance. They are developed, managed and operated consistently with legal, regulatory and contractual requirements.

Seq. No	Article	Ref. in National Report
30	Article 23	Pag. 59

Question/ Comment How can be made consistent the application of ISO 9001 (conventional industry and focused on the clients) with fulfilling of OIEA and others international nuclear quality assurance standards (focused on the safety and more strict), applicable to activities concerning the safety of spent fuel and radioactive waste management?

Answer ISO 9000:2000 norm “Fundamentals and vocabulary” § 3.2.8.: Quality management: coordinated activities to direct and control an organisation with regard to quality
ISO 9000:2000 norm “Fundamentals and vocabulary” § 3.2.11.: Quality assurance: part of quality management focused on providing confidence that quality requirements will be fulfilled.
ONDRAF/NIRAS Quality management system refers in its procedures to the laws, norms, and other applicable standards. According to the ISO 9001:2000 norm (7.2.1. c)), the organization has to determine statutory and regulatory requirements related to the product (“product” is equivalent to “service”). An ISO 9001:2000 certificate confirms that the organization demonstrates its ability to consistently provide product (=service) that meets customer and applicable regulatory requirements.

Seq. No	Article	Ref. in National Report
31	Article 23	Pag. 60/61

Question/ Comment What is the regulatory framework for inspecting external companies?

Answer The regulatory framework is in GRR-2001 (art. 37) :

Section VI - Operational protection of the workers from outside companies exposed at the risk of ionizing radiations during their intervention in a controlled zone.

Art. 37ter. - General provisions. The radiological monitoring system of the workers from outside companies ensures a protection equivalent to that available to the workers employed on a permanent basis by the owner.

Art. 37quater. - Obligations of the outside firm. The outside firm takes care, either directly, or through contractual agreements with the owner, with the radiological protection of its workers, the provisions envisaged in chapter III, and in particular:

a) ensures the respect of the general principles as regards protection against radiation and the limitations of dose;

b) provides in the field of protection against radiation the information and the formation related to article 25.

Art. 37quinquies. - Obligations of the owner. The owner of a controlled zone in which workers from an outside company intervene is responsible, either directly, or through contractual agreements, for the operational aspects of their radiological protection which are directly in relation to the nature of the controlled zone and of the intervention. In particular, for each worker from an outside company who intervenes in controlled zone, the owner must:

- a) make sure that in addition to the basic training in protection against radiation related to chapter III section II, he receives a specific training in relation to the characteristics as well of the controlled zone as of the intervention;
- b) make sure that this worker has the necessary equipment for individual protection;
- c) respect the general principles of protection against radiation and the limitations of doses.

Seq. No	Article	Ref. in National Report
32	Article 23	Pag. 60/61

Question/ Comment How does your Regulatory Body maintain confidence in the way licensees control the work done by the external companies?

Answer The quality assurance programme remains fully applicable in case of subcontracting. Depending on the type of work to be carried out, subcontractors have to prove that they have a sufficient QA programme for themselves that includes aspects for safety as well (e.g. VCA). It is the responsibility of the licensee to control the quality of the work to be performed, and this not only during and after execution of the work, but also during the appliance phase (before any order is placed). The authorised control organisation AVN, monitors the effectiveness of the overall QA-programme and hence is a second line of control for the quality of work performed by subcontractors. See also answer to question 6 from Spain

Seq. No	Article	Ref. in National Report
33	Article 23	Pag. 60/61

Question/ Comment What type of inspections does your Regulatory Body carry out to verify the effort spent by the licensee doing external companies supervision?

Answer An important issue of the Thematic Inspections of the Maintenance departments, which are carried out by AVN typically once a year, is related to the organization of these departments, in particular the organization with regard to the use of contractors. Discussed items are for instance the qualification, work preparation and supervision process. Besides the above mentioned proactive approach, specific inspections are carried out following events showing deficiencies in these processes.

Seq. No	Article	Ref. in National Report
34	Article 23	Pag. 60/61

Question/ Comment Do you visit external companies or manufacturers sites? If not, why not?

Answer The Authority (FANC), as well as AVN, do not visit systematically external companies or manufacturers, since it is the final responsibility of the licensee to control the quality of work of the subcontractor. In some cases however, FANC or AVN can ask to visit an external company or manufacturer. An audit of the QA programme of a supplier of

software based technology is a typical example of such a visit.

Manufacturers of pressure retaining components and contractors carrying out inspections or repairs and replacements of these components need, according to the ASME code, a formal qualification. These qualifications, which are issued by the Boiler and Pressure Vessel Inspectorate, require usually one or more visits.

Seq. No	Article	Ref. in National Report
35	Article 23	Pag. 60/61

Question/ Comment Does the Regulatory Body have regulatory authority over the external companies of licensees and their subcontractors?

Answer The Regulatory Body authority over the subcontractors is focused on radioprotection of the workers on site. However, when the subcontractor is a licensed operator (for other applications involving ionising radiation), this subcontractor falls under regulatory authority for its activities, but not specifically related to their work as subcontractor for other licensees. See also answer to question 6 from Spain

Seq. No	Article	Ref. in National Report
36	Article 23	Pag. 60/61

Question/ Comment For external companies located away from the nuclear power plant, in what capacity do you visit the external companies' sites?

Answer Please see answer to question 9 from Spain

Seq. No	Article	Ref. in National Report
37	Article 23	F, 6.3.2, page 55

Question/ Comment Does the ONDRAF/NIRAS conduct inspections of the manufacturing process and selective non-destructive examinations of radwaste packages?

Answer Inspections of the manufacturing process: this is part of the qualification process of the ONDRAF/NIRAS Waste Acceptance System.
Qualification is declared at the end of three stages:

- the approval, by ONDRAF/NIRAS, of a technical qualification file written by the operator, which describes the functioning of the process and the facility and their ability to deliver end products that meet the applicable acceptance criteria;
- the satisfactory verification of the correspondence between the information documented in the technical qualification file and their effective implementation in the facility to be approved. This verification is performed at the facilities concerned;
- the satisfactory examination of the documentation compiled by the producer to demonstrate the conformity of the waste produced and verified in the facilities to be approved.

Selective non-destructive examinations: this is part of the acceptance procedure of waste. Physical controls are also foreseen as part of the acceptance to confirm certain documented values (dose rates, weight, ...) declared by the waste producer.

Seq. No	Article	Ref. in National Report
38	Article 24	Section F Page 63

Question/ Comment Could Belgium provide information on the observed personal doses in the concerned facilities?

Answer o Belgoprocess (Waste treatment and conditioning facilities, interim storage buildings for conditioned waste and spent fuel, decommissioning activities (e.g. Eurochemic)):

- total activities of the company:
 - o collective year dose: ~ 140 man.mSv/year (about 43% due to waste & spent fuel management and 57% due to decommissioning activities)
 - o mean individual dose: less than 1 mSv/year
- waste and spent fuel management (excluding decommissioning projects):
 - o max. individual dose: ~ 5 mSv/year (about 3% of the staff had a dose higher than 3 mSv/year).
 - o mean individual dose for a typical waste treatment and conditioning installation: ~ 2 mSv/year
- o NPP Doel:
 - mean individual dose for the company: less than 1 mSv/year
 - Waste treatment and conditioning facilities:
 - „X collective year dose: ~ 40 man.mSv/year
 - „X mean individual dose: less than 1 mSv/year
 - Dry Spent Fuel storage:
 - „X collective year dose: ~ 3 man.mSv/year
 - „X mean individual dose: less than 1 mSv/year
- o NPP Tihange:
 - Waste treatment and conditioning facilities:
 - „X collective year dose: ~ 32 man.mSv/year
 - „X mean individual dose: less than 2 mSv/year
 - „X max. individual dose: ~ 4 mSv/year
 - Wet Spent Fuel storage:
 - „X collective year dose: ~ 5 man.mSv/year
 - „X mean individual dose: < 1 mSv/year
 - „X max. individual dose: ~ 1 mSv/year

Seq. No	Article	Ref. in National Report
39	Article 24	Section F

Question/ Comment Could Belgium provide more detailed information on the observed doses, especially the doses that exceed or are close to the limits (the average collective dose is insufficient information regarding the obligation of the Convention)?

Answer The observed doses for the workers were far below the dose limits (20 mSv/year). See the results of the max. individual doses.

Seq. No	Article	Ref. in National Report
40	Article 24	Section 6.4.4.3

Question/ Comment The revision of discharge limits, already announced in the Belgian 2003 report, is still going on. When will it be concluded?

Answer The majority of the concerned operators have finished their studies related to the revision of the discharge limits. Some of the studies had to be adapted after discussions with the FANC and the authorized inspection organization (AVN). After finishing these studies (foreseen mid 2006) all the results will be put together and global analysis will be performed by the FANC to harmonise the practices.

Seq. No	Article	Ref. in National Report
41	Article 24	

Question/ Comment There are several spent fuel and radioactive waste facilities in the country, but no data on average individual or collective dose, neither for a particular facility nor on the total collective dose for workers in all these facilities (due to SF&RW management) could be found in the report.

Could you please provide this information?

Answer Please see answer to question 4 from Netherlands

Seq. No	Article	Ref. in National Report
42	Article 24	Page 63

Question/ Comment It is not clearly understood if the voluntary dose constraint for individual dose (a half of the limit), taken in all nuclear installations, is related to SF&RW management waste only.

What is a typical dose constraint for the public exposure due to discharges from nuclear facilities and what is the range of estimated doses for members of the public?

Answer This voluntary dose constraint for the individual dose is taken in all nuclear installations (NPP's, Nuclear Fuel Cycle Facilities, Nuclear Research Centres, Isotope Production Facilities, etc...). For this approach there is no distinction between the different activities (including decommissioning of installations).

For the moment, there is no official point of view for the dose constraint for the public exposure due to discharges from nuclear facilities. It depends on a case by case evaluation (based on conservative approaches), taking into account the exposure to other sources of radiation for the concerned installation (e.g.. direct radiation of a storage building, atmospheric and liquid discharges, other nuclear sites, etc...). However the combination of several exposures has to be always below 1 mSv/year, but values from 10 µSv/year (e.g. for one chimney) and 300 µSv/year (combination of several exposure pathways or discharge points) have been used. In the framework for the revision of discharge limits this item will be more clear after harmonizing the practices.

Seq. No	Article	Ref. in National Report
43	Article 24	Page 64

Question/ Comment Are there really 183 measuring stations of ambient radioactivity concentration in the air and water?

Answer The automatic radioactivity measurement network consists today in 212 radioactivity measuring devices located on 189 different monitoring stations. Each station provides a permanent monitoring of the gamma dose rate in air; six of them, located on the banks of rivers also provide a continuous monitoring of radioactivity in water.

Seq. No	Article	Ref. in National Report
44	Article 24	

Question/ Comment F, 6.4.2 – 6.4.4, pages 63-64

F, 6.4.4.2, page 64

F, 6.4.4.3, page 64

Why obligations in compliance with Article 24 are considered only with regard to the designed structures and facilities for radwaste storage but there is no information on radwaste processing and conditioning facilities?

What regulatory requirements exist with regard to non-exceeding of surface contamination levels for all radwaste management facilities (and not only for spent fuel dry storage facilities)?

Is there obligatory integrity monitoring of containers in spent fuel dry storage?

Answer

- 1) In general, there are no differences for the facilities for radwaste processing and conditioning compared to the storage facilities. The limits, the principles and the approaches are the same. Most of the examples in this text for the article 24 can also be applied to the radwaste processing and conditioning facilities.

- 2) The degree of the surface contamination for the waste packages of conditioned waste in an interim storage building has also to be below 4 (beta) and 0.4 Bq/cm² (alpha). As an example for a storage building for conditioned low level radioactive waste at the site of Belgoprocess even a lower operational limit was applied of 0.4 and 0.04 Bq/cm² for respectively beta and alpha-emitters.

- 3) Yes. As an example for the dry storage of spent fuel from the BR3 reactor (Castor Casks), it is explicitly mentioned in the operating license that the preservation of the tightness has to be controlled permanently (primary and secondary lids). During the whole period of storage, means and installations need to be in standby so that appropriate interventions can be performed in the case were a leak at the primary lid is detected.

2)

Seq. No	Article	Ref. in National Report
45	Article 25	

Question/ Comment The Royal Decree of 17 October 2003 sets the emergency planning zones relative to the direct measures to protect the population (evacuation, sheltering, iodine prophylaxis). These evacuation and sheltering zones vary from 4 to 10 km radius depending on the nuclear plant concerned; the stable iodine tablets pre-distribution zones extend to 20 km around the nuclear plants.

What are the values for the intervention levels for evacuation, sheltering and iodine prophylaxis?

Answer The emergency reference guidelines have been revised by the FANC on 17/10/2003 and published in the Belgian official journal of 24/11/2003.
The values are given here below; the lower value is generally considered as justified.
Sheltering : 5* - 15 mSv (effective dose integrated over 24 hours)
Iodine prophylaxis for children (< 18y) and pregnant or breastfeeding women : 10* - 50 mSv (thyroid equivalent dose)
Iodine prophylaxis for adults : 50* - 100 mSv (thyroid equivalent dose)
Evacuation : 50* - 150 mSv (effective dose integrated over 7 days)

Seq. No	Article	Ref. in National Report
46	Article 25	6.5.1

Question/ Comment Only one emergency plan dealing with nuclear and radiological accidents exists in the country.

Are there established differences in national emergency plan between the response to the nuclear accidents and to any other radiological emergencies?

Answer The national emergency plan foresees that these two types of emergencies are dealt with at the federal and local level on the same basic response pattern. Most intervening actors are the same in both situations; however, the local response will be adapted to the particular circumstances.

Seq. No	Article	Ref. in National Report
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47	Article 25	6.5.2.2
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Question/ Comment From the reading of the report, we can't establish how many people are involved both in the CGCCR (Governmental Centre for Co-ordination an Emergencies) and in the local level of emergency response.

Are there experts on call living near the NPP and participating in the Emergency Response organization as a support of the CGCCR ?

Answer The CGCCR organizes a permanency of 24h a day and 7d a week with 13 agents in each shift. In case of emergencies, more than 30 experts, from competent organisms, in particular FANC, are mobilized in the buildings of the CGCCR to constitute the different cells (measurement, evaluation, decision, information) as described under 2.L.2.b. A crisis committee is also organised at the local level (Province) grouping at the provincial crisis centre the relevant experts (about 15 persons) able to deal with the operational aspect of the crisis management. This local crisis committee also relies on the competencies of local authorities (police, fire brigades, emergency medical services ...). Last but not least, it must be reminded that the NPP has its own emergency management team which remains in permanent contact with the CGCCR.

Seq. No 48	Article Article 26	Ref. in National Report Section F Page 71
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Question/ Comment Could Belgium provide information on the required technical content of the decommissioning plans ? Is ONDRAF in charge of assessing the safety of the proposed solutions or just in charge of compiling the data?

Answer A decommissioning plan (initial and final) must include the following main topics:
 „X A brief functional description of the facilities, along with their physical and radiological inventories (infrastructures, equipment, waste in stock),
 „X A discussion of the possible decommissioning strategies envisaged, leading to the selection of one (or a few) strategy(ies) to be analysed in greater depth,
 „X A description of the decontamination and dismantling techniques to be used,
 „X A balance of resulting decommissioning materials and waste, based on applied release / recycling criteria,
 „X An execution planning forecast,
 „X A decommissioning cost evaluation and a description of the funding mechanisms.
 The owner/operator of the nuclear facility must issue a final decommissioning plan with the decommissioning license documents of his facility. The initial and final decommissioning plan has to be approved by ONDRAF/NIRAS.
 ONDRAF/NIRAS is not only in charge of compiling the data, it also has to approve the global decommissioning plans. However, ONDRAF/NIRAS isn't in charge of assessing the safety of the proposed solutions; this item is in the field of competence of the Federal Agency for Nuclear Control.

Seq. No 49	Article Article 26	Ref. in National Report 6.6.2.1(p.71)
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Question/ Comment The report states that an initial decommissioning plan is set up by the licensees for new facilities.What should be included in such a plan?

Answer See answer to the question 5 of France.

Seq. No 50	Article Article 26	Ref. in National Report 6.6.2.2(p.71)
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Question/ Comment The report states that the operator or the owner of a nuclear facility can call upon ONDRAF/NIRAS for the execution of his decommissioning programme. In this case, the report further states that ONDRAF/NIRAS has to conclude a convention with the

operator or owner covering the technical and financial aspects of the decommissioning. What was the result of convention to cover the human resources that would be needed for carrying out actual decommissioning works?

Answer With the exception of the “historic” nuclear liabilities, ONDRAF/NIRAS has at this date no convention signed with an owner/operator for the execution of his decommissioning programme.
Principally, the human resources to perform dismantling are part of the total cost of the project and have to be covered by the owner.

Seq. No	Article	Ref. in National Report
51	Article 26	6.6.2.2(p.71)

Question/ Comment What data should be kept during the construction and operation of the facility for future use in the decommissioning stage?

Answer Data such as the exact location of several equipments that can be used by the future decommissioning activities like cranes, roller bridges,..., and the use of some materials that can be easily recycled.

Seq. No	Article	Ref. in National Report
52	Article 26	p. 87

Question/ Comment The report states that the report titled "Reevaluation de la surete des installations du SCK.CEN - Etude des agressions d'origine externe" by Belgatom in January 1988 discussed the effect of an aeroplane impact, explosions, etc. What were the major features and processes to deal with the external events? Were they applied to the existing facilities in practice? .What will be their preventive measures, if any?

Answer The conclusion of the report is that the probability of an accidental airplane impact is sufficiently low. Radiological consequences are within the accidents considered by the emergency plans. As a consequence no special provisions were taken. The two most important issues of external accidental aggressions (airplane impact and external explosions) were evaluated again in 2006, as a subject for the periodical safety review of the installations. The calculated probability for airplane impact with radiological consequences is, according to the recent evaluation, 2E-7 per year. For external explosion this is 1,7E-6 per year, due to a new gas expansion station in the neighbourhood. Again, potential radiological consequences remain within the defined accidents for emergency plans and no special provisions were taken.

Seq. No	Article	Ref. in National Report
53	Article 26	70

Question/ Comment Although the report does mention keeping decommissioning plans to date, it does not explain whether record keeping is provided and maintained for information specifically important to decommissioning. Please explain.

Answer The record keeping of the decommissioning plans is based on the update of the physical and radiological inventory of the nuclear facilities every 5 years. This data is kept by ONDRAF/NIRAS in its data base system, which is specially developed for this issue.

Seq. No	Article	Ref. in National Report
54	Article 27	Section 9.1

Question/ Comment How is the request of article 27.2 (no license for shipments of spent fuel or radioactive waste to destinations south of 60 degrees South latitude) incorporated in Belgian law?

Answer This provision is introduced in article 44ter.1 of the GRR-2001. Also corresponds to the

transposition of directive 92/3 article 11.1a.

Seq. No 55	Article Article 28	Ref. in National Report Section J, page 120
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Question/ Comment Which are the provisions to find and identify orphan sources in Belgium? Is this in the ONDRAF/NIRAS responsibility?

Answer First, pursuant to the national regulations the authorized holder of sealed sources must maintain an updated inventory of its sources and inform the regulatory body of any incident or lost of control other sources.
Further, the FANC applies defined procedure, with the help of a AIO, to recover orphan sources to be sent to ONDRAF/NIRAS. Close relations with industry like metal scrap or foundries are also developed in order to increase the detection and reaction capabilities. Specific information sessions are regularly organised.

Seq. No 56	Article Article 28	Ref. in National Report
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Question/ Comment How many orphan sources are recovered annually in Belgium?

Answer Over the past 5 years only a few orphan sources were recovered in Belgium

Seq. No 57	Article Article 28	Ref. in National Report Page 120
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Question/ Comment Is the establishment of the fund, financed by guarantees, a legal requirement and who has to contribute to the fund?

Answer The establishment of a financial fund to cover the interventions costs related to the orphan sources recovery is pursuant directive Euratom 2003/122 which must be transposed in the national regulatory framework. The on-going project on this financing issue foresees that the insolvency fund of ONDRAF/NIRAS will be used to cover those costs. As explained in § 2.4.2., This fund is fed through a levy of 5% on the sums that waste producers deposit for the management of their waste production.

Seq. No 58	Article Article 28	Ref. in National Report 120
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Question/ Comment The report states that the competent authorities must establish appropriate provisions to recover orphan sources and to deal with radiological emergencies resulting from any misuse of these sources. To what extent will the orphan sources recovery program comport with the categorization and controls described in IAEA Code of Conduct and TECDOC-1344?

Answer The provisions related to the recovery of orphan sources, pursuant the national legislation, including the transposition of the Euratom directive 2003/122, are largely equivalent to the code of conduct guidelines and the TECDOC-1344, some of them go beyond. For instance, it is foreseen to recover ALL orphan sources despite their activity level. Also the scope of the Euratom directive includes sources emitting 1 mSv/h at 1 meter (this is equivalent in average to D/10, lower dose rate than category 3).

Seq. No 59	Article Article 32	Ref. in National Report Section D Page 18
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Question/ Comment Could Belgium provide information on the envisaged management strategies for the

Comment spent fuel originated from BR1 and VENUS research reactors?

Answer At this moment, no envisaged management strategy has been defined yet as the reactors are still working with their initial fuel load and as they are expected to continue doing so for many years to come.

Seq. No	Article	Ref. in National Report
60	Article 32	p.15

Question/ Comment Section 2.4.2 of the report describes in a very comprehensive way the planned long-term management for the different waste categories. For category A (short-lived waste) it says that the options “surface disposal” and deep disposal” are studied. Can you give a date when a disposal facility for category A will go into operation and when the phase of decision-making for category B (long-lived waste) and C (high-level waste) will probably be finished?

Answer If the Belgian federal government would decide for disposal at the surface of the category A waste, the disposal facility could be operational within a period of ten years from that moment on. This period of ten years is deemed reasonable for obtaining the necessary licenses and for constructing the facility.

For the high-level (category C) and long-lived (category B) waste ONDRAF/NIRAS would like to obtain in first instance from the Belgian Government the decision-in-principle that confirms the reference option for the long-term management of these waste types (i.e. geological disposal under the Belgian territory, with the Boom Clay as the preferred host formation). This decision might also contain elements defining the next phases of the decision-making process. As long as this decision-in-principle is not taken it is impossible to give information on the planning of construction and operation of a deep repository for B&C waste types. A hypothetical working planning for ONDRAF/NIRAS is as follows:

„X 2030: start of construction of the underground facilities

„X 2040: start of disposing of historical B waste

„X 2050: start of disposing of dismantling B waste

„X 2080: start of disposing of heat-emitting C waste (after 60 years of cooling in interim storage)

Seq. No	Article	Ref. in National Report
61	Article 32	p. 23 to 25

Question/ Comment Is the Umicore site in Olen the only NORM-contaminated site in Belgium, or have other past practices occurred from which radioactive waste remains?

Answer The contamination of the Umicore site in Olen is the result of a past practice (and not a work activity) and should not be considered as a NORM-contaminated site.

A typical « NORM-contaminated » site is located in the Winterbeek and Laak valley where wastes from the plant of “Tessenderlo Chemie” (work activity : production of phosphates) have contaminated the area.

In both cases, remediation of the contamination constitutes a situation of intervention according to GRR-2001 (Art. 72bis : interventions in the event of durable exposure - this article applies to the interventions in the event of durable exposure resulting from a past or old practice or work activity, and durable exposure of any other causes, including the presence of gas radon in the dwellings).

Seq. No	Article	Ref. in National Report
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62	Article 32	p. 23 to 25
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Question/ Comment What is the inventory in terms of mass at the Umicore site, and what is – in relation to that mass – the average mass specific activity of Ra 226?

Answer

- Related to the BRAEM-file, the averaged specific activity is about 10 Bq/g in a total volume of around 200 000 m³.
- About the same averaged specific activity and a 10 times smaller volume apply to the SIM file.
- The mass of Ra-226 in the UMTRAP installation is estimated as:
 - o encapsulated Ra-needles (about 200 g Ra-226)
 - o presence of tailings (2000 ton, containing about 700 g Ra-226) with Ra-226 activities up to 30 000 Bq/g.
 - o presence of Ra-contaminated remnants (14 000 ton, containing in total 110 g Ra-226) with Ra-activities up to 7500 Bq/g.
 - o presence of 60 000 ton contaminated soil rubble with an average Ra specific activity of about 15 Bq/g.

Seq. No 63	Article Article 32	Ref. in National Report Section B, page 11
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Question/ Comment Until present there are only interim storage facilities for radioactive wastes, final disposal being an option under investigation. Is it taken in consideration the lifetime extension of the interim storage facilities? What is the strategy for long term management of radioactive wastes?

Answer The operator of the centralised waste storage facilities (Belgprocess) makes periodic revisions of the lifetime of the storage facilities (including activities of maintenance of equipment). These revisions can in some cases indeed lead the extension of the lifetime. This is however, mostly for control and operation systems (incl. software) and less for hardware (such as waste emplacement equipment).

Seq. No 64	Article Article 32	Ref. in National Report Section D, page 18
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Question/ Comment Are the ion exchange resins included in the category of bituminised waste?

Answer The bituminised waste stored in building 127 does not include ion exchange resins. These resins are immobilized in either a cement or a polymeric matrix.

Seq. No 65	Article Article 32	Ref. in National Report Section D, page 20
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Question/ Comment What is the technical option for the treatment of Ra-226 contaminated radioactive wastes?

Answer The reference technical option for treatment and conditioning of radium waste can be described as follows:

- the packages containing the unconditioned waste are compacted;
- this compacted waste is put in an internal drum and embedded with sand;
- this internal drum is welded in order to avoid any radon emanation;
- the internal drum is embedded in a cement matrix in the final storage drum.

Seq. No 66	Article Article 32	Ref. in National Report Section D, page 22
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Question/ What is the technical option for the treatment and conditioning of the spent resins and

Comment filters resulted from the Tihange and Doel nuclear power plants?

Answer Spent Ion Exchange Resins of Doel and filters of both sites are conditioned with cement (and chemical additive in the case of IER). Spent Ion Exchange Resins of Tihange are conditioned using a polymer-binding agent.
For more details: see appendix 2 § 2.2.3 and 2.3.3.

Seq. No	Article	Ref. in National Report
67	Article 32	Section D, page 25

Question/ Comment What is the technical option for conditioning of the sealed sources from ionizing smoke detectors?

Answer Two ways of conditioning are applied:

- The smoke detectors are collected in a drum followed by supercompaction of the drum and immobilization in concrete in a 400 liter drum of the compacted drums.

- The source is manually removed from the smoke detector and the sources are collected in a drum. The drum will be filled with pure sand and the drum will be closed with a lid and immobilized with concrete in a 400 liter drum.

Seq. No	Article	Ref. in National Report
68	Article 32	D, 4.3.3, page 24

Question/ Comment Do waste acceptance criteria for near-surface disposal, besides specific activity limits (40Bq/g), take into account radionuclide half-lives?

Answer The indicative value of 40 Bq/g, subordinate to the results of a formal safety assessment for the disposal system, takes into account the long-lived nature, mainly Ra-226, of the contaminated materials on the Olen site (Umicore)

Seq. No	Article	Ref. in National Report
69	Article 32	D, 4.3.4, page 25

Question/ Comment What regulatory limits are specified with regard to the storage period of non-conditioned radwaste, including spent sealed radiation sources, on the waste producer site? What measures are taken or planned to minimise the amount of radwaste accumulated at the producer sites?

Answer The storage period of non-conditioned waste are to be as short as reasonably possible, taking into account the availability of treatment facilities or financial resources.

In recent authorizations for class II facilities (hospitals), it is stipulated that wastes have to be notified to ONDRAF-NIRAS within 6 months or one year, so that any accumulation of wastes can be detected.

Seq. No	Article	Ref. in National Report
70	Article 32	14

Question/ Comment Belgium expected a final report from a third municipal partnership in the second half of 2005. Please provide information on the municipality's decision at the Review Meeting. Please elaborate during your presentation on the strategies and results of the "partnership" process, issues addressed, their resolution, and lessons learned.

Answer We can already announce that for the third partnership, in which two municipalities (Fleurus and Farciennes) are represented, a negative vote in the council of one municipality was taken. Subsequently the council in the second municipality abstained from voting. This partnership and its integrated pre-project are now finished and the

project will not be taken forward.

Information will also be provided in the presentation at the Review meeting.

Seq. No	Article	Ref. in National Report
71	Article 32	25

Question/ Comment Section 4.3.4 reports 40,000 sealed sources in ionizing smoke detectors. Are these of the common household variety, of which there are vast quantities in use world wide, or are they specialized detectors?

Answer The smoke detectors are of the common household variety.

Seq. No	Article	Ref. in National Report
72	Article 32	13

Question/ Comment Belgium's reference geologic disposal medium is the "poorly indurated" Boom Clay. Please provide a brief description of the host formation and its attributes making it a desirable disposal medium.

Answer Boom Clay is a poorly indurated argillaceous formation of Rupelian age (~35Ma) characterized by alternating silty and clayey layers, by high water, immature organic matter and pyrite content. This clay formation is present under the whole NE Belgium and displays a high level of lateral continuity. It has never been buried deeper than currently (i.e. few hundreds meters).
As a barrier to radionuclides and other contaminant transport the Boom Clay displays the following performances:

1. Contaminant transport is mainly diffusion-controlled, as a result of the very slow water movement (low permeability and hydraulic gradient);
2. Most contaminants are strongly retained by the clay (sorption processes, formation of poorly soluble precipitates); organic matter does not enhance transport;
3. The physico-chemical transport characteristics (hydraulic permeability, diffusion coefficients) are very homogeneous.
4. The geochemical and mineralogical characteristics of the clay are not expected to change very much over the geological time due to the very slow (or even absent) diagenesis processes operating in the clay and its high geochemical buffering capacity;
5. The plastic character of the clay is responsible for its pronounced self-sealing properties; this is of prime importance for the rapid and efficient sealing of excavation-induced fissures;
6. The structural/tectonic stability of the clay over a time frame of one million years is well supported by a series of geological evidences.

Seq. No	Article	Ref. in National Report
73	Article 32	13

Question/ Comment Please describe any international cooperative efforts with other countries exploring clay formations as a deep geologic disposal media.

Answer Besides its involvement in general international cooperation (at EC, NEA and IAEA levels, ONDRAF/NIRAS is actively participating in NEA dedicated activities on deep disposal in clay formations (the "Clay Club"). ONDRAF/NIRAS ensures the chairmanship of the "Clay Club".
ONDRAF/NIRAS has also, and continues to, be involved in numerous EC projects that are dedicated to argillaceous host formations (e.g. SELFRAC and TIMODAZ on self-sealing capacities) or that include specific working packages devoted to clays (e.g. FUNMIG on radionuclide migration).
Bilateral agreements of cooperation have been signed with Andra and NAGRA. Since 2000 an intensive collaboration with Andra on a range of priority themes is being

organised, including bilateral reviews of parts of the disposal programme (e.g. design, safety assessments). Another priority theme is in situ testing in URLs.