Convention on Nuclear Safety
Questions Posted To United Kingdom in 2008

Q.No	Country	Article	Ref. in National Report
1	Canada	General	Entire report
Question/ Comment	The safety case is mentioned many times throughout the report (e.g., page 66, paragraph 11.46). Please describe the contents/main topics of the Siting and Operations safety cases, or provide a reference document that gives guidance on the contents of such safety cases.		
Answer	HSE-NII's expectations for the content and scope of nuclear safety cases is given in Technical Assessment Guide T/AST/051, available from: www.hse.gov.uk/foi/internalops/nsd/tech_asst_guides/tast051.pdf. This explains the different types of safety cases with typical contents and their relationship to the overall life-cycle of a facility.		
Q.No	Country	Article	Ref. in National Report
2	Canada	General	Articles 9,10,11,19
Question/ Comment	Under paragraphs 9.8, 10.5, 10.11, 11.30, 11.42. 19.25, what regulatory requirements apply and what kind of regulatory oversight is performed of the licensee's ability to maintain the 'intelligent customer' capability for various outsourced technical services?		
Answer	The Intelligent Customer (IC) principle is defined in a document entitled "The Licensing of Nuclear Installations" and further information on regulatory expectations is provided in NII guidance (T/AST/049). Regulatory oversight can comprise a range of activities, including: review of a licensee's definition of its IC skills requirements; examination of the procedures that define how a licensee meets the IC principle; and inspection of how the IC function is carried out on specific tasks.		
Q.No	Country	Article	Ref. in National Report
3	Canada	General	Annex 10, A10.8 to 10.11 & A10.13
Question/ Comment	Please provide a description of the prioritization scheme that was used to determine the order in which the "Recommendations and Suggestions" were addressed. Has there been any risk-ranking of the incomplete actions to determine their significance or a need to re-prioritize their delivery? To what extent, if any, has progress been made in identifying resource needs on the basis of resource requirements?		
Answer	The prioritisation scheme we adopted was based on urgency. We allocated the recommendations and suggestions to the following categories: Category 1: needs to be addressed as part of HSE's work associated with the review of energy policy Category 2: needs to be addressed urgently if HSE is requested to undertake further work associated with new build of nuclear power stations Category 3: needs to be addressed as part of NSD's ongoing continuous improvement programme Within category 3 we exercised our judgement to attach priority to those areas which we believed would lead to the most significant improvements in regulatory effectiveness given the limited resource available. This has proved to be a satisfactory approach given the small number of recommendations and suggestions to be managed.		
Q.No	Country	Article	Ref. in National Report

4	Canada	General	Annex 11, A11.3 and A11.4
Question/ Comment	Please explain why SEPA withdrew from the GDA process. Please explain what level of involvement was required of the 'credible' nuclear plant operator, in such areas as responsibility or funding.		
Answer	(i) In May 2007, following elections to the Scottish Parliament, there was a change in the ruling administration. The new administration was elected on the basis of a policy position that there is no need for new nuclear power stations in Scotland. Subsequently, SEPA reviewed its participation in the GDA process and withdrew on the basis that was no longer appropriate to commit resources and time to the GDA process. (ii) The Government's Energy White Paper (2007) [www.berr.gov.uk/energy/whitepaper/consultations/nuclearpower2007/page39554.html] defines a credible nuclear power plant operator as one which: 1. Currently operates a nuclear power station anywhere in the world; and 2. Has made a commitment to become or continue to be an operator of an electricity generating station (with a capacity in excess of 50MW) by 2016- 2022 in a market subject to UK health and safety and environmental regulation.		
Q.No	Country	Article	Ref. in National Report
5	Hungary	General	3.15, p.14
Question/ Comment	According to paragraph 2.28. the UK's Report was closed in August 2007. In paragraphs 3.12.÷3.15. the safety issue related to the AGR boiler closure units ageing is discussed. Since the UK's Report has been submitted for the Parties of the Safety Convention new information appeared a couple of times in the media about the detection of damage on some pre-stressing wires of these boiler closure units. Please give additional information on the new findings, their safety evaluation and handling.		
Answer	The Boiler Closure Units (BCUs) are part of the pressure boundary of the Prestressed Concrete Pressure Vessel. The BCUs are prestressed concrete cylindrical 'plugs', 3.4m diameter, 1.7m high. Each BCU is secured in place against pressure load by 48 studs. The BCU concrete cylinder is prestressed (compressed) by 9 separate wire winding layers around the cylindrical periphery (wire circa 2.6mm diameter). Each wire winding layer bears on the layer below. In October 2007 the periodic outage (every 3 years) of Hartlepool Reactor 1 included planned inspections of Boiler Closure Units (BCUs). Radiographic inspection indicated a discontinuity in a pre-stressing wire. Remote visual inspection showed corrosion damage to the wire and a wire break within the corroded zone. The existing safety case was established on the basis of no broken wires in any of the 9 separate wire windings around each BCU. The discovery of the failed wire was thus outside the safety case for the 4 reactors at Hartlepool and Heysham 1. As a result, in October 2007 the Licensee shutdown all the operating Hartlepool and Heysham 1 reactors. The performance of the BCUs has not indicated any obvious loss of compressive prestress in the concrete of the BCUs. At the present time (end January 2008) the 2 reactors at Heysham 1 and the 2 reactors at Hartlepool remain shutdown and work continues across all BCUs to:		

(i) inspect all BCUs (8 on each reactor, total 32) to establish the extent of degradation in wire windings;

(ii) review potential options for engineering modifications to provide the basis for a new safety case;

(iii) carry out engineering modifications to reduce risk As Low As Reasonably Practicable (ALARP) and establish the new safety case.

NII have a regulatory hold on the restart of each of the 4 reactors.

The Licensee has indicated they plan to return the 4 reactors to service in a phased process which will be extend out to the latter part of 2008.

Note Heysham 1 and Heysham 2 are separate stations, each with 2 reactors. The BCU issue affects only the Heysham 1 and Hartlepool reactors.

Q.No	Country	Article	Ref. in National Report
6	Hungary	General	3.16, p.14

Question/ Comment	Please clarify and complete the information given in paragraph 3.16. Why does require sustainable operation at lower load (power?) an additional Engineering Change document? The original design does not cover this case? What is the reduced power level at 84% feed flow? Is it around 84%, or is it different?
Answer	The Heysham 1 reactors can operate at feedflow / power levels below 100% and remain within their design envelope. The primary objective of the change in operation was to reduce the Hot Box Dome temperatures by reducing the fuel channel gas outlet temperatures. The purpose of the Engineering Change was to achieve a specific change in Hot Box Dome temperature by altering plant operational parameters. That adjustment has been achieved within the design envelope, though it was not envisaged at the design stage. Note, the Licensee's Engineering Change process encompasses: (i) changes to a safety case (claims, arguments or evidence) for instance in light of new information, without a physical modification to the plant; (ii) modifications to rules for operation of the plant (Technical Specifications); (iii) physical modifications to the plant. In this case, the Engineering Change was required as part of the Licensee's arrangements in order to: (1) Justify that the change in operational profile would achieve the desired result, in this case a reduction in the Hot Box Dome temperature; (2) Establish the basis for changes to station documentation for reduced power of operation to achieve the desired reduction in Hot Box Dome temperatures. So any further (e.g. unrelated modifications) will take account of the current changed state of operation; (3) Provide a defined initial position for any subsequent Engineering Change to increase power.

84% feed flow implies electrical output reduced by a similar amount.

Q.No	Country	Article	Ref. in National Report
7	Hungary	General	3.23, 3.24 p.15
Question/ Comment	Please clarify measurement “5te per reactor” in paragraphs 3.23. and 3.24. related to trial defuelling campaign at the Dungeness A and Sizewell A sites.		
Answer	The “5Te” refers to 5 metric tons (or tonnes), ie 1000 kilograms, and should have read “5T”.		

Q.No	Country	Article	Ref. in National Report
8	Ireland	General	
Question/ Comment	Ireland commends the UK on the comprehensive nature of its report. In particular Ireland appreciates the inclusion of Sections 2-5 covering, respectively, General Overview and Summary of Significant Developments since last Report, Nuclear Safety Issues at UK Nuclear Installations Safety Issues of Interest Identified at the Third Review Meeting, Rapporteur Feedback at the Third Review Meeting which are helpful in identifying recent progress and issues raised at the Third Review Meeting which have been addressed.		
Answer	Noted with thanks.		

Q.No	Country	Article	Ref. in National Report
9	Ireland	General	Sections 2.17 - 2.28 (and Annex 11.16)
Question/ Comment	The Generic Design Assessment (GDA) process will consider generic reactor designs in advance of any application to build a nuclear power station at a specific location is noted. However, it is also noted that the GDA is not mandatory and potential licences are not precluded from applying for a nuclear licence without going through the GDA. Can the UK comment on the implications (in terms of regulator resources) of another (fifth) vendor now applying directly for a nuclear licence? Can the UK explain the criteria it will use to reduce the GDA applications from four to three? Can the UK outline steps taken to maintain an appropriate level of knowledge and experience among the staff of its regulatory authority staff given international demand for personnel in the nuclear industry and, in particular, competition from the UK utility (ies) for such staff. While not explicitly stated in the report it is understood that it is the intention of the UK to build new reactors at existing sites? What steps have been taken to ensure that safety and security will not be compromised as a result of the construction process taking place alongside defueling and decommissioning activities?		
Answer	Can the UK comment on the implications (in terms of regulator resources) of another (fifth) vendor now applying directly for a nuclear licence? An application to the regulators, during the current GDA process, for a site licence by an operator wishing to construct a power station design which is not already being assessed under GDA, would be considered carefully by the regulators who would seek the advice of the Government on the priority that it considers should be allocated to such an application.		

Can the UK explain the criteria it will use to reduce the GDA applications from four to three?

The Government announced in its January 2008 White Paper on Nuclear Power (http://nuclearpower2007.direct.gov.uk/docs/WhitePaper.pdf) the process it proposes to apply if, after the completion of the regulators' initial GDA assessments it judges there is a need to reduce the number of designs proceeding to the next steps of GDA [the Government's criteria are detailed in paragraphs 3.34 – 3.45 of the White Paper].

Can the UK outline steps taken to maintain an appropriate level of knowledge and experience among the staff of its regulatory authority staff given international demand for personnel in the nuclear industry and, in particular, competition from the UK utility (ies) for such staff.

In November 2007, the Government agreed that HSE could make a substantial increase in the salaries of its nuclear specialists. HSE subsequently ran a recruitment campaign which led to very encouraging number of applications for nuclear inspector posts. It is hoped that this and further planned recruitment campaigns will enable HSE to fully resource its nuclear inspectorate with staff of the necessary high level of skills and experience.

Securing such resources is also a key part of the Environment Agency's "Strategy for Radioactive Substance Regulation 2006 - 2011" and our experience so far, is that we have been able secure the resources we need for our work. We have achieved this by being flexible in our staffing approach and through strategic workforce planning. However we are not complacent and we, with industry and NDA, are responding to this challenge. For example, we are supporting NDA's 'nuclear graduates' scheme - to encourage environmental graduates into the industry. This is a structured scheme of graduate secondment, providing graduates with experience within all aspects of the industry - within NDA, at sites, within organisations such as the Environment Agency, and also overseas.

While not explicitly stated in the report it is understood that it is the intention of the UK to build new reactors at existing sites? What steps have been taken to ensure that safety and security will not be compromised as a result of the construction process taking place alongside de-fueling and decommissioning activities?

There is considerable experience in the UK of nuclear facility construction adjacent to existing, operating nuclear installations (for example, Sizewell B was safely constructed adjacent to the Sizewell A site. At Sellafield, nuclear plants have been successfully constructed very closely to operational facilities. We are confident therefore that new nuclear power stations can be safely built alongside existing nuclear installations.

Q.No	Country	Article	Ref. in National Report
10	Ireland	General	Sections 2.17 - 2.28, 2.34
Question/ Comment	The main recommendations of the CoRWM are noted. New build is planned without a decision having been taken in relation to the siting of a long term disposal site or interim storage.		

	Can the UK provide a status report and more information in relation to its intentions this area?
Answer	The Nuclear White Paper sets out the Government's conclusions in relation to the management of radioactive waste produced by new nuclear power stations as follows: "Having reviewed the arguments and evidence put forward, the Government believes that it is technically possible to dispose of new higher-activity radioactive waste in a geological disposal facility and that this would be a viable solution and the right approach for managing waste from any new nuclear power stations. The Government considers that it would be technically possible and desirable to dispose of both new and legacy waste in the same geological disposal facilities and that this should be explored through the Managing Radioactive Waste Safely programme. The Government considers that waste can and should be stored in safe and secure interim storage facilities until a geological facility becomes available. Our policy is that before development consents for new nuclear power stations are granted, the Government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce The Government also believes that the balance of ethical considerations does not rule out the option of new nuclear power stations." In parallel with the publication of the Nuclear White Paper, a Summary and Analysis of responses to the Managing Radioactive Waste Safely (MRWS) consultation has been published. The Government believes that nothing emerged from the MRWS consultation that casts serious doubt on either the principle of geological disposal or an approach based on voluntarism and partnership as a means of securing a site. In light of this, Government continues to see geological disposal as the way forward, with interim storage providing an extendable, safe and secure means of containing waste for as long as it takes to site and construct a geological disposal facility.

Q.No	Country	Article	Ref. in National Report
11	Ireland	General	Section 2.56

Question/ Comment	The integration of the Office for Civil Nuclear Security (OCNS), the Government's security regulator for the civil nuclear industry, with the HSE in 2007 is noted. Can the UK outline improvements or problems which have resulted from this integration?
Answer	In April 2007, the Office for Civil Nuclear Security (OCNS) and the United Kingdom Safeguards Office (UKSO) transferred from the Department of Trade and Industry (now the Department for Business, Enterprise and Regulatory Reform) to the Health and Safety Executive (HSE). OCNS and the UKSO merged with the Nuclear Safety Directorate to form the Nuclear Directorate (ND) of the HSE. The merger was prompted by the wish to provide more effective, consistent and coherent regulation in keeping with the Hampton Review, to conform with the growing international consensus to establish a single regulatory authority for safety and security, and to ensure that regulatory provision could respond to the changes in the civil nuclear industry prompted by the Nuclear Decommissioning Authority and HMG's proposals with regard to the UK's future energy supply. It is too early to make a definitive judgement on the success of the merger but there are encouraging signs. The Nuclear Directorate is actively promoting joint working and the further development of this is a priority. OCNS will shortly be establishing a 'Northern Office' at Bootle which will enable early and closer integration of safety and security in regulatory decisions. Savings have been made in back office support and OCNS is looking towards the Health and Safety Laboratory at Buxton for support.

Not surprisingly, there have been some administrative difficulties associated with the merger, but none has proved insurmountable.

Q.No	Country	Article	Ref. in National Report
12	Netherlands	General	

Question/ Comment: The Energy White Paper consultation document sets out criteria and invited applications from vendors interested in having their designs assessed

Has there been any involvement of private sector companies in defining these criteria and selecting potential vendors?

Answer: Although the Government listened to the views of a number of private sector companies during its preparation of the 2007 Energy White Paper, the Government's decision on the criteria for the eligibility of potential vendors was made without reference to those companies.

Q.No	Country	Article	Ref. in National Report
13	Russian Federation	General	Section 3

Question/ Comment: What is the reason for graphite cracking in British AGRs?

Answer: Two basic ageing mechanisms affect the graphite cores:

• Graphite weight loss. Caused by radiolytic oxidation of the graphite in a carbon dioxide atmosphere in the presence of gamma radiation. This causes a loss of strength in the graphite bricks, an increased friability, a reduction in thermal conductivity, and a gradual loss of neutron moderation and thermal inertia in the reactor. The gradual increase in graphite weight loss in the core will result in a lower mass of moderator.

• Graphite shrinkage and material property changes caused by fast neutron irradiation. Graphite shrinkage will cause geometric changes to the fuel moderator bricks throughout reactor life, which may influence the core geometry by distorting the brick columns. More importantly, the combined effects of changes in shrinkage behaviour and material properties (in particular, irradiation creep and coefficient of thermal expansion) are predicted to cause fuel moderator bricks to crack from a keyway root later in reactor life, due to a combination of internally generated shrinkage and thermal stresses.

A distinction is made between cracks starting from a keyway (geometric feature which locates bricks in position) and bore cracking. Keyways are on the outside surface of the graphite bricks, the bore surface refers to the inner cylindrical surface of the brick which forms the fuel channel.

Primary cracking is a single through-thickness crack from a keyway root. Should a primary crack appear, some of the bricks affected might develop a second keyway root crack such that the brick may be in halves. This may be by either of the mechanisms of 'prompt' or 'delayed' secondary cracking:

• Prompt secondary cracking: The development of a second crack in a fuel moderator brick, almost coincident in time with the occurrence of a primary crack. The second crack is caused by the sudden release of strain energy as the primary crack surfaces separate, or the redistribution of stresses owing to the change in shape of the brick with growth of the primary crack.

• Delayed secondary cracking: The development, from a keyway root, of a second crack in a fuel moderator brick, some years after primary cracking. The second crack is caused by the regeneration of stresses in the primary cracked brick due to further graphite shrinkage and mechanical interaction with neighbouring bricks.

An important change during core life is 'stress reversal'. Stress reversal denotes the point in time at which the stress field in a brick reverses so that it becomes compressive at the brick bore and tensile at the keyway root. On this basis it is expected bore cracks would occur earlier in core life and keyway-related cracks later in life (after stress reversal).

No keyway cracking has been observed on any reactor to date. There have been reactor observations of bore cracking of fuel moderator bricks across the AGR fleet. Bore cracking is caused by the influence of the tensile stress field at the brick bore while the reactor is at power in the period up to stress reversal. The highest stresses arise from a combination of irradiation shrinkage stresses and thermal stresses enhanced by changes in fuel stringer eccentricity (when the fuel does not sit concentrically within the fuel channel). It is expected that during the period up to stress reversal, some proportion of the fuel moderator bricks will develop bore cracks of circumferential, axial or lasso morphology.

Q.No	Country	Article	Ref. in National Report
14	Russian Federation	General	Section 3

Question/ Comment: All four AGRs at Heysham-1 and Hartlepool show a trend towards increasing reactor pressure vessel top head temperature. Reactor power reduction (derating) was required to cope with this temperature increase.
What is the reason for this trend towards temperature increase?

Answer: In the Heysham 1 and Hartlepool reactors, the Hot Box Dome is a reactor internal structure which separates the hot and cold gas flows through the reactor core. The Hot Box Dome is a steel shell ‘cap’ over the reactor core. The Hot Box Dome is not part of the Prestressed Concrete Pressure Vessel (PCPV) pressure boundary. The pressure differential across the Hot Box Dome is a small fraction of the internal pressure of the PCPV; the pressure differential arises from primary circuit gas flow.

The top of the Hot Box Dome is the hot side, with cold gas on the under side of the Dome. The top surface of the Dome is covered in thermal insulation to keep the temperature of the Dome similar to the cold gas temperature. The Dome has a number of small holes to allow a ‘bleed’ flow of cold gas to pass over the top face of the dome. Installed thermocouples provide temperature readings for the Hot Box Dome.

The thermal insulation consists of layers of stainless steel foil under protective plates. Inspections during outages have shown no disturbance to the location of the insulation plates.

There is no detailed explanation of the gradual, observed increase in the temperature of the Hot Box Dome. Broadly, changes in the performance of the thermal insulation or partial blockage of some gas bleed holes in the Dome may contribute to the observed increase in temperature.

The PCPV is lined on its inner surface by a steel membrane covered with an insulation

system similar to the Hot Box Dome top surface. The PCPV steel membrane is cooled by an array of coolant water pipes embedded in the concrete. There is an extensive array of thermocouples monitoring the temperatures of the PCPV liner membrane. No temperature anomalies have been observed in the PCPV.

Q.No	Country	Article	Ref. in National Report
15	Russian Federation	General	Section 3

Question/ Comment	Four Magnox reactors were shut down long ago. However, they have not yet been defueled. 1) What reactor safety criteria are used to estimate their condition? 2) What means are used to maintain the necessary extent of reactor core subcriticality in these reactors?
Answer	(i) All reactors have a safety case that covers the shutdown condition. A post operation and defuelling safety case was produced for each site and this included an enhanced safety justification for the situation following the end of life shutdown. The enhanced case concentrated on core reactivity and cooling issues. It was shown that fuel clad and reactor internals integrity could be maintained provided that the coolant (air) moisture was maintained within strict limits. New air purge equipment and additional moisture instrumentation was installed so as to ensure very low moisture levels in the reactors. (ii) The reactors were shutdown using primary shutdown systems and the secondary system and means of removing absorber were either disabled or put under strict administrative control. The reactors were depressurised and placed in air (nitrogen is a good absorber) and all means of pressurising or adding other gases removed. Consequently there is a significant shutdown margin that cannot be challenged even with the reactors fuelled.

Q.No	Country	Article	Ref. in National Report
16	Russian Federation	General	Section 3

Question/ Comment	Reactor pressure vessel (RPV) head at Sizewell B’s PWR was replaced after 12 years of operation. What was the reason for this replacement?
Answer	The RPV head for Sizewell B was manufactured using Control Rod Drive Mechanism (CRDM) adapter tubes made of Alloy 600. The RPV was manufactured in 1991, some years before the station went into commercial operation. When Sizewell B went into commercial operation in 1995 it was known there was a potential issue of stress corrosion cracking in Alloy 600 CRDM adapter tubes (and other Alloy 600 components and associated weld metals, see Table 7 of ref 1). The Licensee established a programme of in-service inspection to monitor for the appearance of cracking in the CRDM adapter tubes (mainly eddy current inspections during refuelling outages). The Licensee also established a CRDM adapter tube degradation management programme. The Licensee concentrated on in-service inspections to detect cracking while cracks were still only part-penetrating and so before any leakage of primary coolant occurred. One objective of the management programme was that, should cracking be detected by in-service inspections, the RPV head would be replaced before any through-wall cracking occurred in a CRDM adapter tube. The new RPV head would use Alloy 690 CRDM adapter tubes. Inspections in the outages prior to RPV head replacement indicated the appearance of cracks in some CRDM adapter tubes. The Sizewell B original RPV head adapter tubes were classified as being in the ‘low susceptibility’ category among PWRs for this Alloy

600 CRDM adapter tube degradation mechanism. Thus, growth of cracks once they appear would be expected to be relatively slow. The Licensee put in hand a project to replace the RPV head before adapter tube cracking could progress to a through-wall defect and so a leak. That project was successful. The RPV head was replaced with a new head using Alloy 690 CRDM adapter tubes, before any crack in the original RPV head developed to a through-wall crack.

Ref 1: Geraghty J E., Structural Integrity of Sizewell B - the way forward. Nuclear Energy pp 97-103 Vol 35 No 2 (April 1996).

Q.No	Country	Article	Ref. in National Report
17	Spain	General	Environmental Monitoring
Question/ Comment	In assessing sites, one of the main aspects covered are the location, characteristics of the population around the site and the physical factors affecting the dispersion of released radioactivity. Are these parameters updated during the NPP operation, in special the land and water usage by the population?. The main objective of RIMNET network is to monitor the consequences for the UK of nuclear incidents abroad. Are any of these stations located in the vicinity of NPP?		
Answer	The Food Standards Agency (FSA), in association with the Environment Agency and HSE's Nuclear Directorate, carry out routine surveys of the habits and consumption rates around the major sites for discharging radioactive wastes into the environment. These surveys cover occupancy time (in door and outside), consumption rates of terrestrial and aquatic foods, land use and exposure to direct radiation from the sites. These surveys are carried out prior to operation of the site and at regular intervals, depending on the potential dose to the local population but generally every five years. DEFRA keep the environmental monitoring programmes at nuclear sites, including nuclear power plants, under review throughout their full life-cycle - i.e. commissioning, operation and decommissioning. We also conduct regular "habit surveys" of the local area and people to identify whether there has been changes on population, land use, food types and quantities consumed, etc, that might effect human exposure arising from the discharges made. There are no RIMNET monitor sites adjacent to UK Nuclear Power Plants. The industry has its own monitoring systems and subscribes to informing others of incidents.		

Q.No	Country	Article	Ref. in National Report
18	Ukraine	General	Section 4. Para 4.3, page 18
Question/ Comment	Does it mean that harmonization to WENRA reference levels has already done? How was planning work for harmonization? What are the main benefits?		
Answer	In common with other WENRA countries, the UK plans to be able to show harmonisation to the WENRA references levels has been achieved by 2010 both in terms of regulatory requirements and implementation at civil nuclear power stations. For regulatory requirements, this will be done by taking account of the WENRA reference levels in a range of published documents including the SAPs and the Technical Assessment guides (TAGs) that support the SAPs at a more detailed level. The ongoing programme of TAG revision is central to the UK action plan for harmonization and it has been designed to take explicit account of the WENRA references levels. The main benefit of Harmonization to the WENRA references levels is to demonstrate that the UK takes full account of international standards and best practices in its own internal regulatory practices.		

Q.No	Country	Article	Ref. in National Report
19	China	Article 6	Article 6 ipage30-33 j
Question/ Comment	There is no new nuclear NPPs build in UK currently, whether UK has a modification plan to extend their operating life before the replacement capacity gets available? If has, how about the considerations for safety case? Should the periodic safety review (PSR) for old units are more frequent than for new modern units?		
Answer	British Energy, the licensee which operates the Advanced Gas-cooled Reactors (AGR), has plans to extend the operating lives of these reactors and has already announced the extensions to the lives of the AGRs at Dungeness, Hinkley Point and Hunterston. The continued operation of these reactors beyond their previously declared life expectancy is still subject to there being an adequate safety case in place and to normal monitoring and regulation. Obviously, as nuclear power plants get older, more attention has to be paid to ageing and obsolescence and this should be done as part of their safety management. Nevertheless, this does not mean that a PSR, which is a major stand-back review, should be carried out more frequently than 10 years. However, there are always some items where uncertainty over ageing mechanisms may mean that a full case for the next ten years cannot be made. In these cases, PSR acceptance is caveated to recognise this.		
Q.No	Country	Article	Ref. in National Report
20	France	Article 6	p.32, § 6.18 – second bullet
Question/ Comment	The report states that an objective of the PSRs is to “implement any reasonably practicable improvements to enhance plant safety”.Could United Kingdom give some examples of improvements implemented further to a PSR ?		
Answer	UK reactors have all been subject to at least one completed periodic safety review. Most have had two reviews; a few have completed their third review. The earliest reviews led to the largest number of physical modifications to plant, reflecting shortfalls in comparing plant and safety cases against modern standards for reactors designed and built in the 1960s and early 1970s. Plant improvements from the first tranche of periodic safety reviews included those identified from consideration of the safety cases against internal and external hazards. Additional cooling provisions were provided, to allow for low frequency sequences in which existing systems may be lost. Electrical systems were also improved, in many cases, the PSR led to the identification of benefits from providing additional diesels or other generators to supplement the initial provisions. There was also considerable investment in additional fire protection, including additional fire barriers, fire detection systems, extinguishing systems, etc. At the older stations, there was also investment in alternative indication systems to allow for accident mitigation in the case of severe accidents. The PSR acted as a vehicle to identify degradation issues affecting civil structure and improve the maintenance of civil structures. There were also a considerable number of “soft improvements”, such as improvements to operating instructions, maintenance instructions, operator training, etc. In some cases, the first PSR “recaptured” the design intent for older plant, and this has the benefit of formalising safety requirements, maintenance requirements, etc., and has led to improvements in the management of plant. There has been an expectation that revisiting a periodic safety review after only ten years may lead to significantly fewer improvements being identified, and that many would not be reasonably practicable given the improvements carried out previously and		

the reduction in future operational period. Nevertheless, the licensee has found worthwhile safety improvements, including to their gas storage, vaporisation and distribution systems, and also for some water distribution systems. The regulator has continued to press for further insights, for example in the areas of obsolescence of I&C systems, and the safety threats and opportunities this affords. It is likely that this will be an area that leads to additional improvements in the future.

Q.No	Country	Article	Ref. in National Report
21	France	Article 6	P 32, § 6.21

Question/ Comment	Could United Kingdom give some examples of outcomes of the ageing analysis?
Answer	Some examples are: • Graphite weight loss within gas/graphite systems; the effects of this on reactor performance, fault studies, mechanical stability of the core, ability to ensure safe reactivity control and shutdown, ability to refuel safely. • Reactor steel internals corrosion. The ability to steel structures or components to perform duties including in accident conditions, their integrity case, and the ability of the licensee to forward predict its condition into the future with confidence. Also reactor component ageing due to neutron flux damage. • Degradation of civil structures, need for maintenance and/or repair. • Ageing/degradation of plant exposed to environmental conditions. This includes a wide range of issues, including pipe / vessel thickness checks, degradation of air coolers exposed to salt laden air next to the sea, etc. The expectation is that the majority of ageing issues should be identified, and managed, as part of the normal plant management of the NPS. The licensee's review within the PSR is expected to concentrate on the effectiveness of these processes and the adequacy of the look-ahead for future operations. The PSR may however include other aspects, such as plant walkdowns which can act to check whether existing processes are functioning adequately.

Q.No	Country	Article	Ref. in National Report
22	Hungary	Article 6	6.4, p.29

Question/ Comment	Please give clarification what is to be understood under primary containment for the gas-cooled reactors, for understanding that there is no need for secondary containments.
Answer	The primary containment on an AGR consists of a pre-stressed concrete pressure vessel (PCPV). This vessel provides, in conjunction with the steel plate liners, the pressure enclosure for the CO2 gas circuit which transports heat from the reactor core to the main boilers. The PCPV is in the form of a vertical cylinder which contains the boilers, the reactor core, the core support diagrid and the restraint tank. The concrete walls and slabs are 5.5m thick and are pre-stressed by a system of helical tendons anchored in stressing galleries at the top and bottom of the vessel. As an example, the Heysham 2 and Torness reactors have 3744 tendons each consisting of seven 18 mm diameter strands formed in layers, with double pairs of layers following paths alternatively clockwise and anti-clockwise around the PCPV in what are essentially concentric cylinders. The characteristic strength of the concrete pressure vessel is 40 N/mm-2 generally and 55 N/mm-2 in the anchorage zones. The PCPV has a design pressure of 1.1 x the working pressure of the reactor which is 41.5 barg. The proof pressure to which the vessels were tested is 1.15 x the design pressure and the ultimate pressure is in excess of 2.5 x the design pressure.

Q.No	Country	Article	Ref. in National Report
23	Korea, Republic of	Article 6	Paragraph 6.18

Question/ Comment	(Article 6, Paragraph 6.18) Paragraph 6.18 describes the objectives of PSRs. One of the objectives of PSRs, as described in the section, is to compare against current standards for new plant, which is discussed in more detail in Section 6.20. The purpose of the comparison against the current standards, as described in the above referenced sections, is to evaluate any deficiencies and identify any significant shortcomings and any improvements which are reasonably practicable. It is considered that any deficiencies or shortcomings from the total current safety case for the station, which have been identified via the PSRs, will have to be reflected into the plant. However, unless the significant shortcomings or reasonably practicable improvements result from the change of important regulation which requires backfit into the existing plants, it would be impractical to incorporate them. Please provide the basis or criteria for identifying those items that need improvements.
Answer	The concept of “reasonable practicability” is enshrined in UK health and safety law. The basic tenet is that all risks from any work activity be reduced so far as is reasonably practicable; in UK nuclear safety parlance this is expressed as “As Low As Reasonably Practicable” (ALARP). This means that the licensee for a nuclear power plant has to justify not fitting a modification by showing that the cost of fitting it would be disproportionate to the quantum of risk reduction achieved. So, at one stage in the life of a nuclear power plant it may be perfectly reasonable to show that fitting a particular modification would not be ALARP but that at a later stage, following advances in technology, materials, etc, the cost to risk quantum ratio may change to such an extent that the modification should be fitted.

Q.No	Country	Article	Ref. in National Report
24	Netherlands	Article 6	6.6

Question/ Comment	The unique designs of the gas cooled reactors have required a nuclear infrastructure in the UK which covers almost the complete fuel cycle. Ensuring continued safe operation and upgrading of these reactors is therefore essential to make full use this infrastructure. It is realistic to assume that most of them will be closed down earlier than 2030. This means that in the next 20 years there will be less and less need for this specific nuclear infrastructure. Are there any plans to maintain this infrastructure for new built NPP by selecting those designs that could also make use of these facilities, i.e. make partially use of the existing infrastructure?
Answer	We understand this question to mean whether the Government is looking to have new reactors which will need the fuel cycle facilities that we already have in the UK (i.e. in particular the reprocessing facilities). Our recent Nuclear White Paper outlines our position on reprocessing – that Government does not expect that reprocessing will be a feature of new NPPs, however should such proposals come forward in the future, they would need to be considered on their merits at the time and the Government would be expected to consult on them. On that basis therefore, it will not be the case that designs for new NPP being "selected" to make continuing use of current reprocessing facilities available in the UK. In addition, the Nuclear White Paper makes it clear that selection of designs for new NPP is a matter for the market (with the Government only getting involved insofar as

the prioritisation process - which makes no reference to the wider UK nuclear infrastructure).

Q.No	Country	Article	Ref. in National Report
25	Netherlands	Article 6	6.9, 6.12

Question/ Comment	The 10-years periodic safety review requires an in-depth assessment by the licensee and intensive review by the Regulator. How extensive are the assessments and review work during the biannual stop in comparison to the efforts required for the PSRs?
Answer	The assessments carried out during the statutory outages are normally those associated with those inspections and modifications which can only be completed at shutdown. It is difficult to quantify these for the purposes of comparison as they are much more intensive and not the same “stand-back” reviews that are conducted during a PSR. Nevertheless, they are an important part of the process for assessing the safety of the reactors before Consenting to a further 2 or 3 years (see 6.9 of the national report) operation and represent a substantial use of the licensee’s and regulator’s resource.

Q.No	Country	Article	Ref. in National Report
26	Pakistan	Article 6	Article 6, Section 3.2.7, Page 16

Question/ Comment	It is stated that a Review of the Safety Case (defective welds) has resulted in changes in Operation and requirement to inspect, modify and replace certain components. Would UK like to give some examples of the components which were replaced?
Answer	Replacement of components refers to part of the ‘plug units’ used at the top of fuel assemblies. The plug units are the top-most part of a fuel assembly. When a fuel assembly is in position in a reactor core, the plug unit is within the standpipe in the top of the Prestressed Concrete Pressure Vessel. Plug units are re-usable items that are transferred from used fuel assemblies to newly assembled fuel assemblies. One function of the plug unit is to provide radiation shielding to limit radiation levels on the pile cap. Another function of the plug unit is to provide thermal insulation so that temperatures in the upper part of the standpipe are low, compared with the hot gas temperatures at the lower end of the standpipe. The component to be replaced is the ‘biothermal shield’ in some plug units. This component provides both radiation shielding and thermal insulation. The biothermal shield is part of the load path when a fuel assembly is lifted into or lowered from the refuelling machine. Only some early manufacture plug units are likely to require this modification. The replacement will be needed on plug units where an earlier modification to secure load path integrity renders the items un-reusable.

Q.No	Country	Article	Ref. in National Report
27	Pakistan	Article 6	Section 3.36, Page 17

Question/ Comment	It is stated that in line with worldwide practice, the Reactor Pressure Vessel Head was replaced during the refueling outage in mid 2006 but the licensee chose to re-use the existing CRDMs and that increased the dose burden for this project. HSE is requested to elaborate how they were convinced that existing CRDM may be reused? In addition please describe how the dose burden was managed?
Answer	The replacement Reactor Pressure Vessel (RPV) head was manufactured using new Alloy 690 Adapter Tubes. The original RPV head was manufactured using Alloy 600 Adapter Tubes. The Adapter Tubes fit through holes in the RPV head.

The original Control Rod Drive Mechanism (CRDM) tubes were used when installing the Control Rod Drive Mechanisms onto the new vessel head. The CRDM tubes attach to the RPV head Adapter Tubes.

Worldwide, there has been no significant adverse operational experience with CRDM tubes. Adverse operational experience has been related to Alloy 600 Adapter Tubes. The CRDM tubes were designed for the design life of the plant.

The Sizewell B RPV original head after about 10 years operation was a relatively low dose rate item. This is in part due to original design and use of materials.

Dose to personnel was minimised by careful planning of disassembly of the CRDMs from the original head and assembly onto the new head. The CRDM tubes were removed from the original head inside containment and the CRDM tubes stored inside containment. The original head was removed from containment and the new head brought into containment. New weld preparations were machined at the end of each CRDM tube using a machining station inside containment. The CRDM tubes were then welded to the Adapter Tubes on the new RPV head. These operations were designed to minimise the need for personnel to be in the vicinity of the CRDM tubes.

The Licensee claims the following aspects in dose minimisation:

1. Health physics integrated into the project team at the start of the project;

2. Use of an experienced vessel head exchange team that had carried a number of head replacements;

3. The use of operational experience from other plants;

4. Optimised tooling and methods to reduce time, dose and increase shielding;

5. Careful control of high dose rate areas and the use of low dose rate waiting areas;

6. Separate high dose machining area away from workers;

7. Supervision of the job by health physics professionals.

NII took an interest throughout the project including the management of doses and ensured the Licensee's supervision of the job kept the dose burden as low as reasonably practicable.

Q.No	Country	Article	Ref. in National Report
28	Pakistan	Article 6	Article 6, Section 6.8, Page 29

Question/ Comment	It is mentioned that the main PSRs are carried out every 10 years. However intermediate reviews are carried out at more frequent intervals and any identified necessary upgrading measures are implemented. Can UK give some examples of such intermediate reviews and the need for them ?
Answer	In the UK each nuclear power reactor is required to shutdown every two or three years (depending on the nuclear power plant design) for maintenance, inspection and test. For

	the reactor to restart a Consent must be given by NII. In considering whether restart can be granted NII will review: the results from the maintenance, inspection and test activities; operational performance during the previous period of operation; and the safety case. In carrying out this work NII takes the opportunity to review aspects of safety significance for continued operation. This activity is considered to be an intermediate review of nuclear safety at each plant. When NII has been provided with satisfactory responses to issues raised from its review Consent for reactor restart will be granted. NII also attends a meeting, usually annually, to review safety performance on the site and this provides an opportunity for licensees to assess safety performance over the previous year and present their programme of safety related work proposed for the coming year. In addition, licensees may also carry out system safety reviews every three years, and these bring together details of any plant modifications, safety improvements or remedial changes on a system basis so that a complete and current record of plant condition and safety performance is maintained. These records are also used to inform the full PSR as and when necessary.		
Q.No 29	Country Romania	Article Article 6	Ref. in National Report
Question/ Comment	Please provide more information on the criteria used by the licensees for the classification of PSR findings and for the prioritization of improvement measures and corrective actions.		
Answer	UK Site Licensees have had a number of classification systems over time. A current example is that one of the licensees identifies safety significant PSR-Identified Corrective Actions as follows: • Type A: a nuclear safety shortfall which requires further work. • Type B: a minor nuclear safety shortfall/potential safety enhancement which requires further work. • Low: a shortfall identified from the PSR which has little or no nuclear significance. The licensee's arrangements for periodic safety review allow for priority to be given to Type A over Type B corrective actions and for both over the corrective actions categorised as "Low". The reality is more complex. Not all corrective actions compete for the same resource, and some will take considerably less time and effort than others. It is therefore possible for some corrective actions with lower safety significance to finish earlier than others of greater significance. The UK legal position is that risks should be reduced "as far as is reasonably practicable" and this implies that corrective actions are addressed in a timely manner. The UK regulator asks the licensee to justify the programme timescales for the more significant corrective actions.		
Q.No 30	Country Romania	Article Article 6	Ref. in National Report
Question/ Comment	What is the procedure for approving life extensions? Are these managed through the PSR process or are there additional requirements/guidance, already in place or planned, to deal with such applications?		
Answer	The NII does not "approve" life extensions as such. The licensee of a nuclear power plant may choose to announce an extension to the previously declared life. The major UK NPP licensee, British Energy, has declared life extensions for some of its reactors; this is separate to the PSR process but still subject to satisfactory PSR outcomes. The continued operation of these reactors beyond their previously declared life expectancy is still subject to there being an adequate safety case in place and to normal monitoring		

and regulation.

Q.No	Country	Article	Ref. in National Report
31	Canada	Article 7.1	Page 20, Paragraph 4.10

Question/ Comment	What has the UK established as a formal approach for long-term operation and life extension of NPPs?
Answer	The term “life extension”, as used in the UK, refers to the licensee of a NPP declaring that it wishes to operate the plant beyond its previously declared life, usually following an economic appraisal. The UK’s approach to long-term operation of NPPs is that at all times there must be an adequate safety case in place and the plant must be subject to normal monitoring and regulation; this applies no matter what the age of the NPP. As long as the licensee can demonstrate that there is an adequate safety case in place, by carrying out the appropriate reviews and there are continuing satisfactory results being demonstrated from the regular test and inspection programme that underpins the normal regulatory control of the station, there should be no impediment to continued operation. Obviously, as nuclear power plants get older, more attention has to be paid to ageing and obsolescence and this should be done as part of their safety management.

Q.No	Country	Article	Ref. in National Report
32	Canada	Article 7.1	Page 36, Paragraphs. 7.11 and 7.13

Question/ Comment	What dose limits (or targets) are used to evaluate the adequacy of a design? Are sheltering and evacuation considered to be mitigating measures in response to design basis accidents, or is the design basis set such that neither sheltering nor evacuation should be needed as a result of a design basis accident? What are the design requirements for new builds, such as to avoid the need for sheltering, evacuation or re-settlement following an accident, be it design-basis or beyond?
Answer	The requirement of the Ionising Radiations Regulations 1999 (IRR99) is for the dose to be below the dose limit and as low as reasonably practicable (ALARP). Dose constraints are concepts expected to be used for new sources of ionising radiation at the planning /design stage, regulation 8(3) IRR99 and paragraphs 119-125 and 134-135 of 'work with ionising radiation approved code of practice and guidance', HSE 2000, ISBN 0 7176 1746 7. The dose constraint recommended by the Health Protection Agency (HPA) [formerly the National Radiological Protection Board (NRPB)] is 0.3mSv per year for new sources. For all sources of ionising radiation the regulatory requirement is that the dose has been reduced below the dose limit and is ALARP. HSE use the Safety Assessment Principles (2006 edition) (SAPs) as the basis for their assessment of both existing and new nuclear facilities. The SAPs set out a number of targets and the legal limits referred to above (Targets 1 to 9). They are based on the Tolerability of Risk framework (HSE 1992 ISBN 0 11 886368 1) and are expressed in the SAPs in the form of dose levels or frequencies or risks. These are used by inspectors when they examine a safety case to judge the extent to which the targets and legal limits are met. In the case of modern plants, improvements in design standards and safety assessment methods have resulted in successive reductions in the size or consequences of the reference accident. For these plants the reference accident may not require any actions beyond the site boundary. The need for a detailed emergency planning zone in such cases arises from the desirability of having a foundation for responding to larger accidents. For the larger modern plants a minimum zone of 1km radius has been specified within which detailed planning for the protection of individuals takes place, but this could be extended where necessary to avoid splitting communities. These plans provide the necessary base from which an emergency response can be made and could

be extended should an accident greater than the reference accident ever occur.

Q.No	Country	Article	Ref. in National Report
33	France	Article 7.1	p. 41, § 7.42
Question/ Comment	The report states that the 2005 arrangements for the clean up of Britain's publicly owned nuclear legacy "are financed by the taxpayer and subsume all previous financial provisions for decommissioning made by the publicly owned civil nuclear utilities". Could the UK clarify the concrete meaning of "subsume" in this sentence?		
Answer	NDA took over the responsibility for clean up, and this responsibility incorporated any provisions for decommissioning by publicly owned civil nuclear utilities that were in place prior to the NDA's formation. So, this replaced the BNFL Nuclear Liabilities Investment fund – See Article 11 (11.8 – 11.19) for details of that fund.		

Q.No	Country	Article	Ref. in National Report
34	Japan	Article 7.1	Para.7.19
Question/ Comment	About the regulation of radioactive waste and others, EA is a regulatory body in England and Wales, SEPA is a regulatory body in Scotland. I recognize that these are based on RSA93. On the other hands, I was not able to find out a regulatory body in Northern Ireland equivalent to the organization, EA and SEPA. In Northern Ireland, I assume that LPAs is a regulatory body. Is the position of LPAs different from EA and SEPA? Also, why is it different from EA and SEPA?		
Answer	The Environment Agency is responsible in England and Wales for the enforcement of environmental protection legislation. It authorises and regulates radioactive and non-radioactive discharges and disposals to air, water (both surface water and groundwater) and land, under the Radioactive Substances Act 1993. The equivalent body in Scotland is the Scottish Environment Protection Agency. In Northern Ireland, this function is carried out by the Environment and Heritage Service, which is an executive agency of the Department of Environment for Northern Ireland.		

Q.No	Country	Article	Ref. in National Report
35	Latvia	Article 7.1	Part 7.42, P.41
Question/ Comment	Could you explain how the third party liability is managed in different activities of the NDA related to the decommissioning (especially for its own contracts)?		
Answer	Under UK law, liability to third parties can be considered as follows. 1. Nuclear liability This is imposed by the UK's Nuclear Installations Act 1965 (NIA65). The effect of this law is to channel nuclear liability to the site operator (also known as the "Site Licence Company"): this is the company which holds the licence to operate the site. Any liability arising under the Act (which includes death, bodily injury and damage to third party property caused by specified nuclear materials or the escape of radiation) devolves on the site operator: this applies even though somebody else, for example a contractor at the site, may have caused the incident. NDA has 19 sites. These are operated by 5 Site Licence Companies. NDA pays the premium due under the insurance policy which has been arranged to cover the Site Licence Companies' potential nuclear liability. The UK government is currently reviewing its nuclear liability regime in the light of the 2004 Paris Convention revisions. 2. Non-nuclear liability Liability may devolve upon the NDA, the Site Licence Companies or the site works contractors under UK common law ("tort") or contract. A site works contractor is a sub-		

contractor to a Site Licence Company. This could arise, for example, from a non-nuclear accident or incident on or off site. Generally speaking, such liabilities attach to the organisation which causes the accident/ incident.
The NDA buys non-nuclear public liability insurance which covers the NDA itself and the Site Licence Companies. Site works contractors are obliged to buy their own insurance cover for their activities.
Copies of NDA's site specific Management and Operations contracts and insurance policies are on the NDA website at:
www.nda.gov.uk/documents/
These provide more information on third party liabilities and insurance.

Q.No	Country	Article	Ref. in National Report
36	China	Article 7.2.1	Article 7 ipage35 C37 j

Question/ Comment	The report mentioned that The Health and Safety (Fees) (Amendment) Regulations 2007 which came to force on 2 July, 2007 defines the charging of fees for work by HSE in relation to the assessment of a proposal for any new nuclear installation, we ask, are there principal differences between it and the previous The Health and Safety (Fees) Regulations 2007? How about the newly added elements?
Answer	The Health & Safety (Fees) Regulations are issued annually. The regulations provide for HSE to charge various duty holders across a wide range of industries (mines, quarries, oil and gas installations etc) for work undertaken by HSE in relation to the Health & Safety at Work Act 1974. Before 2007, these regulations made no provision for HSE to recover costs in relation to the regulation of the nuclear industry. This was because most of HSE's costs in relation to licensed nuclear sites can be recovered through the Nuclear Installations Act. With the commencement of Generic Design Assessment (GDA) in 2007, HSE needed a mechanism to recover its costs as the Nuclear Installations Act cannot be used for this purpose. An amendment was therefore made to the existing Health & Safety (Fees) Regulations 2007 in order to allow HSE to recover costs for work related to GDA (that work began in July 2007).

Q.No	Country	Article	Ref. in National Report
37	Canada	Article 7.2.2	Page 42, Paragraph 7.50

Question/ Comment	It is a good practice to update the safety case to the satisfaction of HSE before any changes significant to safety are made. What are the bases for an HSE satisfactory review of a safety case? Who within HSE gives the formal/final approval?
Answer	HSE sets out its expectations for a licensee's safety case in its Safety Assessment Principles, both for the safety case production process (SAPs SC.1 to SC.6) and for the particular aspect covered by the case (the remaining principles). HSE will assess a licensee's safety case using these principles and its Technical Assessment Guides to form a view on the adequacy of the safety case. HSE does not "approve" safety cases themselves but permissions an activity associated with a safety case according to the Licence Conditions attached to a nuclear site licence. The level of permissioning approval depends upon the significance of the safety case, and this is detailed in our Business Management System (BMS), see www.hse.gov.uk/foi/internalops/nsd/bmm/bmm001.pdf and www.hse.gov.uk/foi/internalops/nsd/bmm/bmmannex2.pdf .

Q.No	Country	Article	Ref. in National Report
38	Japan	Article 7.2.2	Para.7.9 p35

Question/ Comment	Could you explain more concretely about the procedure of the transfer of existing authorization?

What kind of points is reviewed? And what kind of application by whom and to whom is necessary?

Answer

A company that operates a nuclear site must hold an authorisation to dispose of radioactive waste from that site. These authorisations are issued by the relevant Environment Agency within the UK. Where it is proposed that the site operator changes, for example because the site is sold to another company, before that change can take place the new operator must hold an authorisation to dispose of radioactive waste from the site.

Section 16A of RSA93 sets out a number of requirements which the environment agencies have to adhere to when determining whether to allow the transfer of an existing RSA93 authorisation. These requirements are similar to those set out for the determination of an application for a new authorisation in respect of the need to consult, provision of information to the public and consideration of aspects such at national security and trade secrets. Additionally, section 16A (7) sets down criteria that must be met to the satisfaction of the agnecies before the transfer can be granted. These criteria are listed below.

(a) The transferee will have operational control over the disposal to which the transfer relates;

(b) The transferee is willing and able to ensure compliance with the limitations and conditions;

(c) No other grounds exist on which it would be reasonable to refuse to grant the application.

UK law has been changed to make it possible to transfer authorisations from one company to another - previously, in such circumstances, the new operator had to apply for a new authorisation. To transfer the authorisation an application must be made jointly by the "old" and the "new" operating companies to the relevant Environment Agency.

Before agreeing to transfer the authorisation, the Environment Agencies carefully consider the arrangements that the new company intends to put in place to control disposals of radioactive wastes from the site and would have to be satisfied that these were acceptable. The agencies will also consider, where the old operating company would continue to operate a nuclear site elsewhere, whether the old company will continue to have sufficient resources to operate that site, were the transfer to take place.

Q.No	Country	Article	Ref. in National Report
39	Netherlands	Article 7.2.3	7.17 and 7.31

Question/ Comment

Health and Safety (fees) (amendment) Regulations 2007 provides for charging fees for work on new installations. Section 24A of the NIA65 (see par 7.31) enables charging of expenses made by the Regulator to the Licensee for the regulation of his installation.

In so far are these fees for work by HSE for new nuclear installations different from fees to be paid for analyses by HSE that are required for any licensee to continue operation or after a bi-annual stop?

Answer

The type of assessment work that HSE undertakes in connection with new build (generic design assessment) is similar to the assessment work that HSE undertakes in connection with existing nuclear installations (for example HSE’s assessment of a nuclear plant safety case for re-start after a periodic shut down). The basis on which HSE calculates its costs for work relating to generic design assessment (recovered by the Health & Safety (Fees) (Amendment) Regulations) is the same as the basis for calculating the costs in relation to the assessment of existing nuclear installations

(recovered through the Nuclear Installations Act).

Q.No	Country	Article	Ref. in National Report
40	Switzerland	Article 7.2.4	page 41, 7.43
Question/ Comment	Do you have many actual criminal proceedings or prosecutions? Is it possible that you describe some interesting cases?		
Answer	Two licensees have been prosecuted in the last two years 2006 -2007. The report of one incident that led to prosecution is available at http://www.hse.gov.uk/nuclear/thorpreport.pdf		

Q.No	Country	Article	Ref. in National Report
41	Australia	Article 8.1	
Question/ Comment	We note the UK government's announcement regarding a new generation of nuclear power stations. Does the NII have sufficient human and other resources to give expeditious consideration to design certification issues which will arise in the near future? Has the NII or the UK Government given consideration to relying – to a greater or lesser extent – on design certifications given by other regulatory bodies?		
Answer	(i) HSE's NII is currently running recruitment campaigns to increase the number of nuclear safety inspectors to around 230 full time equivalent in order to deal with the expanding work to deal with assessing three designs of new reactors, Government plans for decommissioning, other new work as well as existing work. (ii) In HSE's "Nuclear Power Station Generic Design Assessment - Guidance to Requesting Parties" (see www.hse.gov.uk/newreactors/guidance.htm) - paragraphs 62 to 66 sets out how HSE/NII will take account of overseas regulators assessment:- 62. Where a reactor design has been subject to assessment by overseas nuclear regulators, HSE sees great value in being able to share information with them. This is in fact an extension of the normal information exchanges that take place between international nuclear regulators through organisations such as IAEA, INRA and OECD-NEA CNRA. In addition, HSE is participating in the work of the newly formed Multinational Design Evaluation Program (MDEP). 63. Throughout the Design Acceptance assessment process HSE will thus seek to take advantage of assessments of the proposed design undertaken previously by overseas nuclear safety regulators. For example, where detailed independent analyses of nuclear safety issues, or validation of computer codes are available, HSE will seek to make use of them. HSE assesses on a sampling basis and therefore the availability of additional information will help target resources to best effect. HSE's attention could then, for example, be concentrated on UK specific areas. 64. However it should be noted that it is the responsibility of the requesting party to demonstrate the safety of its proposed reactor designs, including highlighting and directing HSE to previous outputs and assessments made by overseas regulators, not for HSE to assemble information on regulatory issues resolved overseas and in effect make the case on the requesting party's behalf. 65. IAEA guidance states that even if a similar design has been authorised in another State, the regulatory body should still perform its own independent review and assessment (Ref 11 - IAEA document GS-G-1.2 paragraph 3.37). HSE will therefore be undertaking its own assessment and coming to its own judgements. HSE will not necessarily accept that a regulatory issue of concern to it has been resolved simply because an overseas regulator has considered the same issue and agreed its resolution. HSE may, as it considers necessary, test the robustness of such claims. 66. The extent to which overseas assessments can be taken into account will depend on a number of factors including:		

• the date of the assessment and its continuing validity
• the level of detail and the purpose of the assessment
• the local conditions of use relating to the assessment
• the depth of information provided by the requesting party including the evidence of issue resolution
• whether overseas assumptions (e.g. on plant operating regime) will remain valid if the technology is adopted in the UK
• whether a demonstration can be made satisfying the legal requirement that the risks have been reduced to a level that is ALARP
• the scope of HSE's formal information exchange agreements with the overseas regulator
• the overseas regulatory system and HSE's knowledge of it
• the willingness of the overseas regulator to engage with HSE on issues of primary interest to the UK, including providing access to detailed information.

Q.No	Country	Article	Ref. in National Report
42	Canada	Article 8.1	Pages 47-48, Paragraph 8.25

Question/ Comment	What is the technical basis for "as far as is reasonably practicable" (e.g., benefit-cost ratios, absolute values of benefit-cost, relative placement on a risk-tolerability scale, etc.)?
Answer	So Far As Is Reasonably Practicable is a legal term rather than a technical term and comes from the HSW Act 1974. It is defined a 1949 legal judgement which in simple terms means that the if sacrifice involved in implementing measures to reduce the risk further is "grossly disproportionate" to the risk averted, then those measures are not reasonably practicable. There is no precise legal factor or HSE algorithm for gross disproportion. Our Technical Assessment guide T/AST/005 (published on the HSE website) suggests that the evidence given by John Locke, then Director General of HSE, at the Sizewell B Public Inquiry provides a starting point. Although this evidence was produced some time ago, no subsequent legal proceedings or public inquiries have countered these views or provided alternatives. In his evidence, Locke suggested a disproportion factor of up to 3 for workers. For risks to the public the factor would depend on the level of risk, and where the risks were low (consequence and likelihood) a factor of about 2 is suggested, whereas for higher risks the factor would be about 10 times.

Q.No	Country	Article	Ref. in National Report
43	China	Article 8.1	Article 8 ipage 46 j

Question/ Comment	Now some old units were closed for preparation of decommissioning, we ask, how to satisfy the requirements for decommissioning activities? HSE plans the recruit a further 35 inspectors this year, which field will these recruitments be assigned?
Answer	The initial recruitment is broad based across all fields relevant to the Nuclear Directorate. Dependent upon the outcome, subsequent recruitment will be targeted at specific areas.

Q.No	Country	Article	Ref. in National Report
44	Finland	Article 8.1	

Question/ Comment	Do you have currently in your regulatory staff, or in a technical support organization (TSO) working for the regulatory body, an adequate number of technical experts (e.g., in the areas of reac-tor physics, thermo-hydraulics, and materials engineering) who can conduct an in-depth safety assessment of nuclear power plant, as would be needed for evaluation of operating events, large power upgrade, lifetime extension, or new build?

	Do these experts have tools and ability to conduct independent safety analysis, including both deterministic analysis and PRA? What is the number of such experts in various technical areas within the regulatory body and within the TSO? What is the outlook concerning the number of experts in a few years ahead?
Answer	ND manages its level of resource by applying a sampling approach which prioritises where effort is placed, it also has access to external technical support to conduct appropriate in-depth safety assessment of the current fleet of UK nuclear power plant. Our own expertise and that of our external technical support does have access to up-to-date tools including codes and experimental data to undertake independent safety analysis. In the current year ND is funding external technical support to the level of £2.9m. ND is also progressing to plan the Generic Design Assessment (GDA) of new power reactor designs. Step 2 of the GDA is close to completion and currently ND is taking steps to increase numbers of regulatory staff and provide additional technical support to deliver Steps 3 and 4 over the next 3 years. To help support this work ND is working closely with the regulators in USA, France, Canada and Finland in order to have technical exchange on the designs being assessed. For the future, ND's workforce model is reviewed annually to ensure that specific resource needs are matched to programme requirements. ND plans to have the pre-tendered frameworks for accessing external technical support in place in early 2009 and this will coordinate with the assessment activities of the second part of Step 3 and all Step 4 in the GDA work.

Q.No	Country	Article	Ref. in National Report
45	Finland	Article 8.1	

Question/ Comment	What kind of systematic training and development programmes you have for your new regulatory staff members? How do you ensure that they are ready to conduct their duties as regulatory staff members in the tasks assigned to them?
Answer	The Nuclear Directorate developed a competence framework for Nuclear Safety Inspector in 2002 that set down expectations for the three different functional groups of NII Inspector staff. This has recently been reviewed and revised, and considerably expanded. NII Inspectors join into the assessment function. Recruits are expected to have appropriate academic and professional qualifications but may have experience from a range of industries. The revised competence framework therefore sets out specific competence expectations for nuclear inspection so that a common basis is first established in nuclear applications. A separate framework has been development for the functional activity of permissioning inspection (assessment) and progress against this would be monitored in parallel with that for nuclear inspection. Inspectors may move into the compliance inspection (site inspection) function in due course and a further competence framework sets out expectations for this function. In each case, the frameworks have been developed by analysing the tasks required in each function, the associated competencies needed for these tasks, and the training and development provisions that are intended to help underpin that competence. For each competence framework, a competence record has been developed that allows Inspectors and Line Managers to demonstrate and monitor progress against business expectations. The training and development provisions currently identified include formal courses, tutorials, on-job training packages and directed reading. Work is presently in hand to extend this range where appropriate.

The responsibility for ensuring that staff are ready to conduct their duties lies primarily with line managers. They will carry out an initial assessment of the capabilities of new recruits against the relevant competence framework, identify training and development needs, and supervise progress against the associated development action plan. They will also arrange coaching and mentoring, and exercise any additional oversight that is necessary whilst capabilities are being fully developed. The line managers' oversight is complemented by a system of Nuclear Topic Groups whose Leaders, usually very experienced NII managers, ensure that professional discipline development needs are also identified and progressed. A central Directorate oversight function for all training and development monitors and evaluates the effectiveness of the implementation of the competence frameworks by Line Managers.

Q.No	Country	Article	Ref. in National Report
46	France	Article 8.1	p. 45- 46, §8.13

Question/ Comment: The report states that "recent analysis showed projected recruitment needs were insensitive to a detailed understanding of the workload scenario beyond five years, as any change in the workload could either be matched by retirements, or there would be time to adjust recruitment requirements": is that statement still valid in the context of nuclear "renaissance"? Will HSE be able to assess in time the 4 designs of possible new reactors in the UK?

Answer:) Projections beyond 5 years are still considered insensitive to detailed understanding of the workload scenario as they could be matched by retirements or adjustments to recruitment requirements.

(ii) The timescales and programme for our assessment of new reactor designs under our Generic Design Assessment is based on several factors which include availability of resources in HSE. Para 10 and 11 of our document "Nuclear Power Station Generic Design Assessment - Guidance to Requesting Parties" (see www.hse.gov.uk/newreactors/guidance.htm) set out the overall timescales for reviewing 3 designs and some of the factors that the timescales depend on.

This process is presented in Table 1 (see support document attached) with approximate timescales. Phase One is divided into 4 steps, as proposed in the Energy Review. These steps, which culminate in the issuing of a Design Acceptance Confirmation, are described in detail in this document. Specific assessment timetables will be drawn up and agreed by the HSE and those requesting the work at the beginning of Phase One.

SEE SUPPORT DOCUMENT

The indicated timescales set out in Table 1 will depend on factors such as:
• the quality and timeliness of the safety submissions received;
• the significance of any issues arising;
• the responsiveness of requesting parties to HSE issues and questions;
• the availability of resource in HSE;
• the ability to make best use of information from overseas nuclear regulators;
• the number of designs being assessed in parallel by HSE;
• HSE's experience with similar reactor designs.

Support Documents: » Answer to Question posted by France to UK

Q.No	Country	Article	Ref. in National Report

47	France	Article 8.1	p. 46, §8.15
Question/ Comment	HSE currently has 165 nuclear safety inspectors and plans to recruit a further 35 inspectors this year, that is in 2007: were those recruitments done? Can UK provide information on the recruitment needs for the years to come?		
Answer	In 2007 HSE's Nuclear Directorate failed to recruit any nuclear safety inspectors, although we did transfer 9 conventional health and safety inspectors to train as nuclear safety inspectors from other parts of HSE. HSE has recruitment campaigns for nuclear safety inspectors running currently (Feb 08) and will have further campaigns during 2008. We plan to recruit to reach and maintain our target of around 230 full time equivalent safety inspectors.		
Q.No	Country	Article	Ref. in National Report
48	France	Article 8.1	p. 46, § 8.15
Question/ Comment	Can UK give their views on the possibility/ difficulties to recruit staff with adequate levels of education in the context of nuclear "renaissance" where a competition exists with operators and industry contractors? Can UK explain how they intend to address possible problems		
Answer	The Regulatory Body provided a lead to address the problem of skills shortage in the UK by engaging other Government departments and ultimately Ministers to respond to the skills shortage. This led to two detailed studies being undertaken to assess the scale of the problem and resulted in Government and industry joining together to adopt strategic solutions to meet the future needs of the industry. These studies continue to be updated to take account of changes occurring in the nuclear industry. On behalf of Government the Sector Skills Council, Cogent, was given responsibility to coordinate a cross-industry response to the skills shortage and this has led to several initiatives being implemented to attract and retain the right skills in the nuclear sector. Recently, the prospects of employment in the nuclear sector has improved considerably as a result of changes in Government policy to accelerate the decommissioning of nuclear plant and drive to find solutions for nuclear waste. The Energy Act has provided an opportunity to industry to build more civil nuclear power plants to replace those that are closing and with major new Government nuclear programmes in the defence sector, opportunities for long term careers are good. At higher education the closure of nuclear courses has been turned around and now there are a wide range of degree and postgraduate options leading to nuclear qualifications. Universities have benefited also from a significant increase in research funding from the nuclear industry and the Research Councils. It is too early to draw concrete conclusions, but there are a number of outputs that indicate the decline in nuclear graduates is beginning to reverse. Recently the Government has established a National Skills Academy for Nuclear (NSAN) and this has been tasked with revitalising the apprenticeship training and Foundation Degree courses. The nuclear industry is fully committed to the NSAN and has provided half of the funding and many companies are committed to make use of the new facilities for training workers. Although prospects for employment in the nuclear sector are very good in the future and this will help fuel a growing interest for those entering the employment market, there is strong competition for engineers and scientists across all industry sectors. It is recognised that a skills shortage still exists and this can be seen in the difficulty many nuclear companies have in recruiting the right skills and there are specific specialisms such as safety case writers and criticality experts that are difficult to replace. It is predicted that it will take 5 years or longer to restore the balance of nuclear skills in the		

UK.
The Regulatory Body has experienced difficulties recruiting in recent years because it requires its nuclear inspectors to have substantial experience of working in the nuclear industry in order that they are able to make sound regulatory decisions. This smaller pool of expertise tends to be of high value to the industry and therefore more difficult to attract to the Regulatory Body. The Regulatory Body continues to support and participate in developing long term and sustainable solutions which will provide the nuclear skills it and the industry require to meet future needs.

Q.No	Country	Article	Ref. in National Report
49	Ireland	Article 8.1	Article 8.34 page 49

Question/ Comment	Can the UK comment on its endeavors to achieve the WENRA (2010) harmonization of national safety practices?
Answer	In common with other WENRA countries, the UK plans, and expects, to be able to show harmonisation to the WENRA references levels has been achieved by 2010. In terms of regulatory requirements, this is being done by taking full account of the WENRA reference levels in a range of published documents including the SAPs and the Technical Assessment guides (TAGs) that support the SAPs at a more detailed level. The ongoing programme of TAG revision is central to the UK action plan for harmonization and it has been designed to take explicit account of the WENRA references levels.

Q.No	Country	Article	Ref. in National Report
50	Japan	Article 8.1	Para.5.11 p24

Question/ Comment	Could you provide us information about what kind of action/measures to licensee is going to be enforced for accomplishing the target?
Answer	The target is a surrogate measure for the effectiveness of regulatory activities. A regulatory screening panel considers notified events from all licensees for nuclear safety significance (and, therefore, for contribution to the Public Service Agreement target) against generic guidelines on actual or potential consequences of events and their causal factors. On a quarterly basis, ND tracks progress against the target, with a breakdown of licensee performance and basic causation. This information is input to ND's system of "Regulatory Reviews" (together with results from assessment, inspection and other relevant inputs), which operates progressively at all levels within ND and makes decisions on regulatory priorities and targeting of resource.

Q.No	Country	Article	Ref. in National Report
51	Japan	Article 8.1	Para.8.27 p48

Question/ Comment	Could you explain whether you had experienced any case who asked support from outside bodies to cope with a high workload? If there were experience, could you explain about the case?
Answer	Other than using its own laboratory HSL and external contractors to provide technical support to the regulatory process, ND has not needed to draw on other outside bodies to cope with high workloads. The support provided by these organisations supplements the expertise of ND’s own staff and there is a clear distinction between the support they provide and the development of a regulatory decision made by ND based on that support. Examples of the support gained through these external organisations are; support on Luders Phenomena in RPV Steels, access to the information produced by the Finnish VTT Gas Gun project and the creation of the Graphite Technology Advisory Committee at Manchester University.

In each of these cases the organisation undertaking the work has provided technical advice or information which then has been taken into account by ND’s own staff in reaching a regulatory judgement.

Q.No	Country	Article	Ref. in National Report
52	Canada	Article 8.2	Page 48, Paragraphs 8.28, 8.29

Question/ Comment	When extramural support is needed, how is it ensured that the consultant does not have a conflict of interest involving earlier work that they may have done for the industry?
Answer	ND makes use of its own technical specialists (Assessment Inspectors) to assess safety submissions from licensees and make appropriate regulatory decisions. These submissions can be prepared by the licensees themselves or by contractors working for the licensee. ND recruits and retains experienced specialists in all the technical disciplines relevant to nuclear safety, most of these specialists having gained their technical training and practical experience from the nuclear industry itself. However it is often necessary to procure technical support for our Assessment Inspectors, in particular where: Specific specialist expertise is needed that does not exist in ND. An independent or more eminent opinion on a safety issue is needed To undertake research for ND that is outside the scope of the Health and Safety Commission Coordinated Programme of Nuclear Safety Research such as plant specific research to support a regulatory decision or research into methods to improve regulation. Attending meetings of international organisations on behalf of ND. Where a regulatory decision is needed, only an ND inspector can make and implement it. An organisation providing support to that inspector can only provide the technical advice that the Inspector will need to take into account when making a decision. A specialist who provides support or advice to ND should not have worked or be working for a licensee on the same issue. ND's Assessors will make every effort to find a reputable contractor that has not been used by a licensee, to provide the required advice. However, in some of the technical areas where ND lets support contracts, there are relatively few technical specialists available for ND to call upon and ND cannot insist that a specialist that provides it with advice must be excluded from providing advice to the nuclear industry's licensees. Where expertise that ND needs to call upon is very scarce or under threat, it has been proactive in establishing and supporting sources of independent technical capability in that technical specialism, through placing research contracts with the specialist team under the Health and Safety Commission Coordinated Programme of Nuclear Safety Research, so that the team can maintain up to date their skills and knowledge and implement succession planning. An example of where ND has developed independent technical capability is Graphite science and technology, to support the regulation of operating of gas-cooled reactors. A Graphite team was established in the materials department of a large UK university using these arrangements. That team now supports ND's Graphite specialist inspector. An example of where ND is currently being proactive in securing independence is in the area of reactor water chemistry and plant corrosion. ND is supporting the building up of water chemistry and corrosion expertise in two UK contracting organisations. In future, if one of these organisations is advising a licensee, ND will be able to turn to the other for independent advice. In some highly specialised areas, it may not be possible to use a separate contractor to the one used by the licensee to advise on the same issue. Under such circumstances, the contractor will be asked to use different members of its specialist team to advise ND and the licensee. The specialists advising ND will then not be allowed to communicate

with those advising the licensee. In one of our major framework contractors, this is achieved by having the specialists advising ND to be working for its 'Regulator Support Division'. This Division is independent of and insulated from, the normal commercial interests of the company, so that the objectivity of the advice given to ND can be assured.

Q.No	Country	Article	Ref. in National Report
53	Germany	Article 8.2	

Question/ Comment	The following question is of special interest for Germany for the further development in this field. As this item may already be covered by your report or by other questions posted by Germany, we do not expect repetitions of information already delivered. Please just give additional information as appropriate. It was decided at the Third Review Meeting to discuss this topic at the Fourth Review Meeting. Is the principle of effective separation (as given in Art. 8 Para 2) laid down explicitly in any binding national law or is this principle met by a sum of state organisational measures?
Answer	The principle of effective separation is not explicitly set down in UK nuclear legislation, but it covered by the overarching UK health and safety legislation and is described in paragraphs 8.2 to 8.5 and 8.16.

Q.No	Country	Article	Ref. in National Report
54	Germany	Article 8.2	

Question/ Comment	The following question is of special interest for Germany for the further development in this field. As this item may already be covered by your report or by other questions posted by Germany, we do not expect repetitions of information already delivered. Please just give additional information as appropriate. It was decided at the Third Review Meeting to discuss this topic at the Fourth Review Meeting. Is there any difference to your point of view between “effective separation” and “independence” as referred to in your report?
Answer	We see no difference in UK law between the two terms. Whilst the principle of effective separation is not explicitly set down in UK nuclear legislation, it is covered by the overarching UK health and safety legislation and is described in paragraphs 8.2 to 8.5 and 8.16.

Q.No	Country	Article	Ref. in National Report
55	Netherlands	Article 8.2	p.48

Question/ Comment	Technical support: Why has ND concluded (8.29) that the approach of technical support will not work for the future? In EU-countries without dedicated TSOs (like GRS, IRSN, AVN) the procurement rules are making it quite difficult to organize sustainable, flexible external support. How is the UK going to cope with this situation?
Answer	The increased volume of support work that ND is predicting will occur in the medium to long term and current procurement arrangements are such that they may not secure the external technical support that ND requires and in the timescale it requires it. Therefore ND is engaged in developing longer-term partnerships with commercial and academic, organisations to provide scientific and technical support. These relationships will be developed through individual agreements with contractors to provide detailed technical expertise in a key area and proposals to allow contractors, or consortia of contractors, to bid for significant areas of the support work. These

arrangements will be maintained for a 3 – 5 year period and are aimed at providing predictability on ND's capability needs and the contractor's capacity to take on ND's work.
By continuing with these developments ND believes that it will have sustained access to the external technical support it requires to assist it in making its regulatory decisions.

Q.No	Country	Article	Ref. in National Report
56	Canada	Article 9	Pages 50–51, paragraph 9.7

Question/ Comment	Please describe the set of activities that are carried out by inspectors to check that the licensee is complying with the licence conditions. Does the licensee have to submit specific reports during the year, and do they have to carry out and report on any specific self-assessments?
Answer	For each nuclear power reactor site NII inspectors produce an annual inspection plan. This plan identifies the licence conditions, plant systems and other site activities important to safety which the inspections will cover. The site licensee must have a set of site licence compliance principles, which for each of the 36 nuclear site licence conditions will contain a set of arrangements against which they operate and maintain the plant. NII Inspectors inspect the licensees' arrangements and how they are implemented to establish whether their performance is adequate. Where necessary, the outcome from inspections may require licensees to make improvements to licence compliance arrangements or the way in which they are implemented. The inspection process does not generally require the licensee to submit specific reports. However, the licensee's carry out their own internal licence compliance reviews which are made available to NII. In addition Licensees' internal regulation departments oversee licensee compliance with regulatory requirements.

Q.No	Country	Article	Ref. in National Report
57	Germany	Article 9	page 51

Question/ Comment	HSE requires that the licensee has a documented safety policy and safety organisation. What are the requirements of NII regarding the content of the safety policy as well as the structures and processes of the safety organisation, respectively?
Answer	HSE does not set out detailed expectations of a licensee's Safety Policy. However, it is expected that the Policy should give a clear statement of the overriding priority that the licensee gives to safety and a commitment to strive for high standards of safety. In a similar way, the structures and processes of the safety organisation are determined by the licensee and HSE, as a non-prescriptive regulator, does not set out how these should be defined. HSE expects the licensee to be able to demonstrate that its safety structures and processes are adequate to understand nuclear safety issues and to manage them effectively. HSE expects that safety matters will be represented at Board level. HSE will assess the licensee's safety processes and inspect their implementation to confirm that they are adequate. In doing this, HSE uses both internal guidance and also relevant guidance from bodies such as IAEA.

Q.No	Country	Article	Ref. in National Report
58	Germany	Article 9	

Question/ Comment	The following question is of special interest for Germany for the further development in this field. As this item may already be covered by your report or by other questions posted by Germany, we do not expect repetitions of information already delivered. Please just give additional information as appropriate. It was decided at the Third Review Meeting to discuss this topic at the Fourth Review Meeting.

	Is the principle, that prime responsibility for the safety of nuclear installations rests with the holder of the relevant license laid down explicitly in any binding national law or is this principle met by a sum of regulatory requirements?
Answer	It is a specific requirement of the Nuclear Installations Act 1965 (NIA) that apart from certain exemptions, no site may be used for the purpose of installing or operating a nuclear installation unless a licence has been granted by HSE and is in force. The safety of nuclear installations in the UK is secured primarily through the nuclear site licence. NIA65 allows HSE to attach to each nuclear site licence such conditions as it considers necessary or desirable in the interests of safety or with respect to the handling, treatment or disposal of nuclear materials. HSE also has power to add, vary or revoke conditions, so providing scope for the licence to be tailored to specific circumstances and the phase of the installation's life. The NIA 65 makes it an offence for the licensee to fail to comply with the conditions attached to the licence so the licensee has prime responsibility for safety.

Q.No	Country	Article	Ref. in National Report
59	Hungary	Article 9	Annex 5, p. 143
Question/ Comment	Please clarify for the Magnox sites owned by the NDA, how the licensee is able to control granting of licences related to the site by the NDA - required by the paragraph (1) of LC3, or the property transactions – as required by paragraph (3) of LC3.		
Answer	The licences referred to are property licences which, like leases, enable a third party tenant to occupy part of the site: consequently they fall within the term 'property transactions' as used in Licence Condition 3(3). The phrase "No person…." as used at the beginning of Licence Condition 1(1) means, in UK law, a legal 'person', which includes a company or corporate body such as the NDA. Under contractual arrangements introduced by the NDA in 2005, the site Management and Operation (M&O) contract between the NDA and the Site Licensee Company (SLC) includes a property licence enabling the SLC to occupy the nuclear licensed site. However that property licence specifically excludes any areas occupied by third party tenants under leases or property licences: such leases / licences are between the NDA as owner of the freehold and the tenant. The NDA also grants to each SLC, for the duration of the latter's M&O contract, an exclusive Landlord's Agent Agreement. Under that agreement all property transactions sanctioned by the NDA, including the granting of leases and property licences to third parties , are managed by the SLC on behalf of the NDA. Consequently no new property licences / leases can be granted by the NDA without the involvement and agreement of the SLC. The SLC remains responsible for applying to HSE / NII for the consent required by LC3(1). HSE / NII is content that, taken together, the combination of the NDA / SLC property licence and Landlord's Agent Agreement give the SLC adequate security of tenure for, and control of access to, the nuclear licensed site commensurate with its duties under the Nuclear Installations Act and the nuclear site licence.		

Q.No	Country	Article	Ref. in National Report
60	Hungary	Article 9	Annex 5, p.143.
Question/	Please give brief clarification on the Civil Nuclear Police Authority and its main duties		

Comment	to understand paragraphs (1) and (2) of LC3 for the Magnox sites owned by the NDA – mainly "occupancy of any part of the site … taken by the Civil Nuclear Police Authority".
Answer	The Energy Act 2004 created the Civil Nuclear Police Authority (CNPA) as an Executive Non-Departmental Public Body (NDPB) sponsored by the Department of Trade and Industry (DTI), now the Department for Business, Enterprise and Regulatory Reform (BERR). Members of the CNPA are appointed by the Secretary of State. The Police Authority has an independent Chairman, two independent members and four representatives from the nuclear industry. The function of the Civil Nuclear Police Authority is to ensure that the Civil Nuclear Constabulary (CNC) is efficient and effective and meets the policing requirements of stakeholders in the nuclear industry in accordance with the strategic direction set by the Police Authority. The Constabulary was established on 1 April 2005, as directed by the Energy Act 2004. The CNC is a specialist armed police service dedicated to the civil nuclear industry with Operational and Support Units based at civil nuclear sites in England, Scotland and Wales and over 800 Police Officers and Staff. The purpose of the Constabulary is to protect nuclear licensed sites and to safeguard nuclear material in transit: its core role is the armed protection of nuclear facilities, materials and escorts. In 2006/07 the Constabulary expanded services to civil nuclear power stations, in addition to nuclear sites where the Constabulary was already deployed. The Constabulary works in partnership with the appropriate Home Office and Scottish Executive police force at each site. Policing services required at each individual site are agreed with nuclear operators in accordance with the Nuclear Industries Security Regulations 2003 (NISR) and ratified by the UK regulator, the Office for Civil Nuclear Security (OCNS). Since the presence of the CNC is now a statutory requirement HSE / NII concluded that any property transactions relating to the presence of CNPA / CNC on licensed nuclear sites should be exempted from the requirement for consent under LC3(1). However LC3(2) ensures that HSE / NII is notified if occupancy of any part of a licensed site is taken by CNPA / CNC.

Q.No	Country	Article	Ref. in National Report
61	Canada	Article 10	Page25, Paragraph 5.18

Question/ Comment	What indicators are being used to detect deteriorating safety culture?
Answer	The NII principles on Leadership and Management for Safety define expectations of licensees in terms of actions/outcomes that are indicative of a good safety culture. These principles will provide the basis for continuous monitoring of a licensee's safety culture. Work is being undertaken in two related areas: development of a strategy for applying the principles to focus on leadership and safety culture within licensees; and development of suitable cultural indicators for NII's Safety Performance Indicator framework. The work will encompass a Corporate Integrated Intervention Strategy (CIIS). The CIIS framework sets out the key factors relating to each of the four principles on Leadership

and Management for Safety, highlights specific areas for inspectors to focus on, identifies what they should expect to see in terms of good practice along with supporting guidance notes. One of the principal functions of the CIIS is to ensure that attention is given to the top echelon of management in a licensee and corporate functions as part of planned, regulatory activities.

Q.No	Country	Article	Ref. in National Report
62	Germany	Article 10	pages 54, 55

Question/ Comment: Paragraphs 10.8 to 10.10 describe the safety policies and management commitments of two British licensees. Therein, the priority of safety is described differently compared to the respective IAEA safety standards. Please explain why HSE is not requiring a clear commitment to the priority of nuclear safety overriding all other demands (GS-R-3) within the licensee's policy.

Answer: The UK licensees' policy statements are written in their own words, a practice that NII considers important, rather than prescribed by the regulator. The NII Principles on Leadership and Management for Safety recognise that there will be conflicts between safety and other goals. The key issue is not simply what licensees have written down but how, in reality, they reconcile these conflicts and ensure they deliver their commitment to nuclear safety.

Q.No	Country	Article	Ref. in National Report
63	Germany	Article 10	

Question/ Comment: Reference to the Summary Report of the 3rd Review Meeting, item 36, 38, 42 and 43
The following set of questions is of special interest for Germany for the further development in this field. As some of these items may already be covered by your report or by other questions posted by Germany, we do not expect repetitions of information already delivered. Please just give additional information as appropriate. It was decided at the Third Review Meeting to discuss this topic at the Fourth Review Meeting.

1. Is a safety management system (SMS) planned or implemented?
2. What is the basis of the SMS (IAEA Requirements, other criteria)?
3. Is the implementation of a SMS voluntary or obligatory? (Does the regulator require the implementation of the SMS? If yes, how detailed are the requirements for the contents of the SMS?)
4. How is the SMS assessed and approved? (Does the regulatory body check whether the appropriate processes are implemented or available in the SMS? Does the regulatory body check whether and to which extent the applicable criteria for a safety management system are fulfilled? Is the authority entitled to inspect the results of the SMS assessment and if so, to which extent?)
5. How is an external review process performed?
6. What are the key elements of an SMS? (Indicators, Integrated or stand alone system, Continuous improvement and treatment of deviations (Are there regulations how to handle deviations from the specified process?); Participation on benchmarks exercises of licensees

Answer: Licensees' safety management systems have been developed and implemented for some years. These are subjected to ongoing review as part of continuing improvement programmes.

The NII's expectation is that Licencees' SMSs are based on a number of standards including IAEA. Amongst other things the SMSs must provide an adequate set of

arrangements to meet Licence Conditions including 17 QA.

Compliance with a licensee's SMS (or equivalent arrangements) is obligatory on those carrying out work under the control of the licensee.

NII does require the implementation of an SMS which must detail how the Licensee is organised to ensure that safety is adequately managed and the arrngements are in place for the licence conditions.

The SMS is approved by the Licensees' senior management and is assessed for effectiveness by periodic review by the Licensee, by internal and external audit and inspection by a number of organisations including NII. The NII frequently inspect the results of the Licensees' own internal audits to check that the SMS is operating satisfactorily.

The external review process is performed in different was. Generally by the Licensee's headquarters function, by 3rd party certification bodies and in some part the NII's inspection activities which inform the Licensee's review function.

The key elements of the SMS are an organisational description, a clear and unambiguous commitment to safety, with clear responsibilities, the development of people, procedures and processes and the provision of an effective monitoring system.

Q.No	Country	Article	Ref. in National Report
64	Germany	Article 10	

Question/ Comment	The following question is of special interest for Germany for the further development in this field. As this item may already be covered by your report or by other questions posted by Germany, we do not expect repetitions of information already delivered. Please just give additional information as appropriate. It was decided at the Third Review Meeting to discuss this topic at the Fourth Review Meeting. Is the principle of priority to safety laid down explicitly in any binding national law or is this principle met by a sum of regulatory requirements?
Answer	There is no legal requirement which specifically requires that priority be given to safety. Where the law has requirements which are qualified by "so far as is reasonably practicable" then case law and guidance requires that a dutyholder must make a computation of the risk on one hand and the sacrifice in terms of money time or resources on the other required to avert the risk. If it can be shown that there is gross disproportion between them ie the risk is insignificant in relation to the sacrifice then the dutyholder discharges the burden of proving that compliance was not reasonably practicable. HSE guidance is available at http://www.hse.gov.uk/risk/theory/alarp.htm

Q.No	Country	Article	Ref. in National Report
65	Netherlands	Article 10	pp. 54, 55

Question/ Comment	Magnox, etc... What are the regulatory reporting requirements about nuclear safety performance?
Answer	There are no direct regulatory reporting requirements covering the totality of a licensees' nuclear safety performance. However, regulatory oversight of licensees' nuclear safety performance is maintained though site inspection against licence conditions and assessment of safety cases. In addition, regulatory / licensee reviews of

licensees' nuclear safety performance are held annually to reflect on the previous years' performance and to take a forward look. ND also has work underway across the UK nuclear licensed sector on the development of licensee safety performance indicators, which will provide further information on licensees' nuclear safety performance.

Q.No	Country	Article	Ref. in National Report
66	Romania	Article 10	paragraph 5.19, page 26

Question/ Comment	Are such interviews planned to be conducted for all licensees and on a regular basis?
Answer	The NII strategy is being developed on how to address leadership and culture, including the concept of 'corporate inspection' of licensees (i.e. more focus at Board and senior management levels and corporate functions). Extension of the pilot work involving interviews with Directors and senior managers is likely to be an integral part of this strategy.

Q.No	Country	Article	Ref. in National Report
67	Slovenia	Article 10	Art. 10.3, p. 53

Question/ Comment	The inspectors were free to choose the methodology and the way of evaluating evidence, within broad terms of reference chosen by the Secretary of State. How do involved organizations (inspectors/experts vs. licensee/manufacturer) prove that their used methodology is more convenient and competent than the methodology used by the opposite party?
Answer	The word "inspector" in this context may caused a misunderstanding. The "inspector" (Sir Frank Layfield) was a senior member of the legal profession and not a nuclear safety regulator. He was required to advise the Secretary of State on whether it was appropriate to build a power station of any type at Sizewell. As it happened, the chosen type was a nuclear power station. As can be see from the date of the Act (1909), it became law long before any nuclear power station was proposed.

Q.No	Country	Article	Ref. in National Report
68	United States of America	Article 10	

Question/ Comment	In the UK, many nuclear installations are being closed because of aging issues. The report states that the UK recognizes the importance of ensuring the motivation of the workforce during the latter stages of operation. What is being done from a nuclear safety perspective to ensure that as nuclear units are shutdown, the management team will still ensure that nuclear safety remains an overriding priority?
Answer	It is fair to say that most of the plants are closing at the end of their planned life (40 years) rather than because of any specific aging issues. The key issue is to ensure that staff remain focussed on Nuclear Safety after the plant has shut down. The first part of this is to ensure that all the staff are aware of what their future is when the plant closes. It is imperative that they are not worrying about this issue to prevent distraction from nuclear safety issues. This is accomplished by counselling all members of staff at least twice prior to shutdown to identify their aspirations. These include early retirement, relocating or training for a different role after the plant is shut down. A significant proportion of the workforce will carry out similar roles after the plant is shut down, especially whilst irradiated fuel remains on site. Also, standards relating to nuclear safety (including the Nuclear Oversight standard used by the CNOO and standards on Conduct of Operations and Conduct of Maintenance) all apply equally to on-load and shut down plants to ensure that focus remains on Nuclear Safety. Indeed, additional arrangements for management of alarms have recently been incorporated into the Conduct of Operations standard, as this can be

an issue with a shut down plant.
Local management teams are well aware of the need to maintain a focus on Nuclear Safety. Magnox Electric have shut down eight plants and therefore have experience in what the issues are for future sites to learn from.
In summary, people who remain on site after shutdown are re-energised with the new mission of decommissioning, and the operators are re-focussed on the importance of the remaining plant systems.

Q.No	Country	Article	Ref. in National Report
69	United States of America	Article 10	

Question/ Comment	Magnox Electric Ltd. is now managed by Energy Solutions. Do Energy Solutions safety policies differ from those of Magnox Electric Ltd.?
Answer	The safety policies of Energy Solutions and Magnox Electric are entirely consistent, though not identical. In addition, the implementation approach for Energy Solutions is based on the same fundamental principles as Magnox's, e.g. safety being led from the very top of both organisations and being declared as the number one priority. In addition, the regulatory framework in the UK requires the site licence company (Magnox Electric Ltd) to be in day-to-day control of operations on the site. This prevents any organisation outside the site licence company from imposing changes on the site licence company if their policies and values differ. This applies to the Energy Solutions / Magnox relationship although, as the two organisations are consistent, such protection is not required.

Q.No	Country	Article	Ref. in National Report
70	Ireland	Article 11.1	Article 11.40

Question/ Comment	It is noted that simulators are capable of simulating a range of accident conditions. Can the UK provide a more information in relation to the range of scenarios simulated? In particular can the UK comment on whether beyond design basis accidents are simulated and if so provide details of such scenarios? Can the UK also summarise the level of performance of staff in response to a serious accident and actions taken to improve performance where required.
Answer	For each nuclear power reactor site a programme of simulator training of operators is carried out to challenge their response to a wide range of accident conditions. The training covers a range of both design and beyond design basis scenarios e.g. large number of fuel failures and depressurisation. As part of the process performance of the operators is evaluated and the necessary follow up action taken to address any further training perceived to be appropriate. In addition routine planned emergency exercise training of staff also makes use of the simulator to confirm the adequacy of the arrangements for a range of design basis and beyond design basis scenarios. These exercises are also evaluated to establish areas of good practice and those where improvements are considered appropriate.

Q.No	Country	Article	Ref. in National Report
71	Korea, Republic of	Article 11.1	Paragraph 11.2 & 11.10

Question/ Comment	(Article 11-1, Paragraph 11.2 & 11.10) In paragraph 11.2, "The nuclear power plant and facilities originally operated by BNFL are beyond their initially assumed operating lives but the assets and liabilities have now been transferred (with effect from 1 April 2005) to the NDA which has strategic oversight of its operations." 1) Is NDA responsible for the regulation on operating NPPs beyond their design lifetime?

2) What is the reason for a half budget of NDA from government and the other half from commercial income receipts of the NPP operations?
3) Who will be responsible for the decommissioning cost of NPPs?

Answer 1) No, NDA is not a regulator and therefore has no regulatory role.

2) and 3) The arrangements establishing NDA recognised that the cost of decommissioning these publicly owned facilities was the responsibility of UK Government. Some explicit financial provisions had been made (for example where the predecessor organisation was structured as a plc) but it was recognised that these did not cover all of the relevant decommissioning liabilities. In accordance with UK Government funding practice, as a Government organisation NDA is funded annually directly from centrally allocated funds which are reviewed on a 3 yearly basis. These funds cover all of NDA's costs, but as above NDA is expected to continue to ensure the operation of relevant facilities, subject to regulatory controls, to offset decommissioning costs. In return for public funding of decommissioning all income generated by continued operation of the assets is returned to Government. Of note is that these funding arrangements have been examined and agreed by EU under its state aid controls.

Q.No	Country	Article	Ref. in National Report
72	Russian Federation	Article 11.1	

Question/ Comment How is the plant decommissioning budget formed?

Answer The question could be answered in two ways, depending on the interpretation of the word 'budget'. Each interpretation (and corresponding answer) is shown below.

1. If the word 'budget' is used to describe the provision of funding, therefore interpreting the question as being 'how is the funding for plant decommissioning formed?', then the following explanation is to be used.
The funding for the decommissioning and clean-up of the UK civil nuclear liabilities is formed from three sources;

i. Generation of income from facilities that are still in operation, which are owned and operated by the Nuclear Decommissioning Authority. These currently consist of electricity generation plants, fuel manufacturing plants, and fuel reprocessing plants.
ii. Government provisions, in the form of 'grant-in-aid'. These are made available to the Nuclear Decommissioning Authority by Her Majesty's Treasury.
iii. Finally, any income which can be generated by each individual site, by means such as leasing of land or office buildings etc, to third parties.
The Nuclear Decommissioning Authority (NDA) compiles a financial report each year, entitled 'Annual Report and Accounts', which provide greater detail on each of the above composite funding elements. This document is available from the NDA website, http://www.nda.gov.uk/

2. If the word 'budget' is used to describe the process of compiling a liability estimate, therefore interpreting the question as being 'how is the plant decommissioning estimate formed?', then the following explanation is to be used.
The estimate for the decommissioning and clean-up of the NDA estate is compiled by contractors (employed by the NDA), who manage / operate / maintain / decommission each of the NDAs 20 licensed nuclear sites.

	The contractors, termed site-license-companies (SLCs), are contractually obliged to provide annually to the NDA a plan detailing the scope, schedule, costs, and resources required to deliver the site to an end-state agreed with all stakeholders. The plans are underpinned by technical baselines and scoping statements (detailing how the scope will be performed, the processes and technology being used), detailed estimates, schedules, and resource plans (detailing the quantities, resources, & timeframes required), risk registers, assumptions and exclusions, contract and procurement strategies etc. The plans, termed lifetime plans (LTPs), are compiled in alignment with project controls procedures (PCPs) issued by the NDA, which detail what the NDA requires to be included in a LTP. The SLCs have internal processes and procedures which are designed to state how the NDAs requirements will be met. To ensure that all 20 NDA sites are able to be aggregated, thus allowing the NDA to produce a 'national-roll-up' for its entire estate, the NDA uses a coding structure which, at its higher levels, is common to all sites. Additionally, the NDA requires assurance that the liability estimates provided by its SLCs are robust, and underpinned. The NDA seeks this assurance as follows; i. Each SLC performs its own assurance checks on LTP submissions in alignment with its respective quality plan. ii. The NDA performs assurance checks using internal (NDA) processes and resources. iii. The NDA employs external third-parties to provide independent evaluation. iv. The NDA is subject to audit by government bodies, such as the National Audit Office, or third-parties appointed on behalf of the government. All NDA documents related to the compilation of liability estimates mentioned above (LTPs, PCPs, etc) can be found at the NDA website; http://www.nda.gov.uk/documents/

Q.No	Country	Article	Ref. in National Report
73	France	Article 11.2	p. 66
Question/ Comment	Maintaining sufficient and adequately qualified staff in the nuclear industry over the next years might be an issue.What is the average age of the staff in NPPs ? How many people are due to retire over the next 10 years ? Is the situation of staff the same in NPPs and in sub-contractors working for NPPs, or are there some differences ?In particular, because it takes time to train people, which measures are taken to anticipate and prevent problems of staffing within the next 10 years ?		
Answer	See attached report support document		
Support Documents	» Report to answer question Posted by France to UK		

Q.No	Country	Article	Ref. in National Report
74	Germany	Article 11.2	page 69
Question/ Comment	According to Paragraph 11.20 and the following it is the responsibility of the licensee to care for the appropriate competence of its personnel. HSE's role is to monitor the adequacy of, and compliance with, the arrangements made under the licence conditions. Under normal circumstances, HSE does not have any specific role in the selection, training and authorisation of staff to perform safety related duties. As the information on the respective activities by the licensee is relatively general, we would appreciate more detailed information on what the licensee does in connection with, e.g. - the selection of personnel for special positions (e.g. plant management or, in particular, responsible shift personnel) with regard for instance to the initial qualification, - the training of in particular responsible shift personnel (including simulator training)		

or maintenance personnel,
- procedures for examination or evaluation of personnel, in particular responsible shift personnel,
- measures for maintaining the competence of the personnel, in particular responsible shift personnel.

Answer

Licensees have various standards on recruitment of staff which cover the role profile and all training and experience necessary to fulfil the role. These standards have been in use for many years and are continually updated. Key nuclear-related staff are required to undergo authorisations against a series of criteria, including the following elements:

• An individual's previous training and experience must be sufficient to meet initial requirements;
• Comprehensive training is carried out to satisfy each element of a detailed role profile;
• After training is completed, the individual acts in the role under supervision for a trial period to ensure that the necessary level of experience is achieved;
• Staff who supervise individuals undertaking key nuclear safety roles must be separately authorised and appointed.
• Refresher training is specified in role profiles (including simulator training as appropriate)
• Each individual is formally assessed by their team leader on a monthly basis, including training and experience requirements.

Q.No	Country	Article	Ref. in National Report
75	Netherlands	Article 11.2	11.25 and 11.46, pp. 63, 66,

Question/ Comment

adequate staff resources:
How does the licensee demonstrate this exactly (description of the contents of information and analysis by the operator) during the operating phase and with what frequency? How does the regulator review or monitor this (subjects, criteria)?

Answer

Under the licence condition on management of change NII maintains regulatory oversight of organisational change affecting nuclear licensed sites including power reactors. Thus any organisational change proposed by the operator will be required to comply with the licence condition requirements. The arrangements provide for the classification of changes to staff structures or resources according to their safety significance. NII inspectors will review proposed changes of significance and sample others to ensure the classification process is being used appropriately. Where change is not considered appropriate NII may take appropriate regulatory action. In many cases, licensees' internal regulation departments also oversee proposed changes to organisational structures.

Q.No	Country	Article	Ref. in National Report
76	Pakistan	Article 11.2	Section 11.31, Page 64 & 65

Question/ Comment

It is stated that Licensees are therefore responsible for ensuring, amongst other things, that its contractors are suitable for the work that they do. HSE has guidance for its inspectors on judging whether licensees and contractors meet
their safety responsibilities and this guidance is available to licensees. HSE is requested to give some detail/indicators to explain how they judge the performance of contractors? Have these guidelines been independently assessed for it's adequacy e.g. by IRRS ?

Answer

As stated in article 11.2, section 11.31, HSE does not usually have separate assessment or inspection programmes for contractors. Work carried out by contractors for nuclear licensees is seen as part of licensees' own work and is judged as such during the normal

assessment and inspection of the relevant activities of the licensee. HSE expect licensees to have adequate control of the safety implications of all work for their business whether carried out by their own staff or by contractors. This includes requiring licensees to be able to show us that they have the competence ('intelligent customer'), resources and management arrangements necessary to be in control of safety.
The internal guidance on the management of contractors was peer reviewed within HSE when drafted some years ago, and presented as a paper to an industry forum. It is currently being redrafted and updated, and will be combined with our guidance on 'intelligent customer' arrangements. The new guidance will be put out to consultation with the UK nuclear industry and other 'stakeholders' such as fellow regulators, when complete.

Q.No	Country	Article	Ref. in National Report
77	South Africa	Article 11.2	General

Question/ Comment	With the resurgence of nuclear power worldwide, which could result in competition for experienced human resources (both locally within your country and internationally) what strategies/steps are being taken in your country by both the regulatory body and the operators to ensure that sufficient numbers of qualified staff remain available for all safety-related activities in or for each nuclear installation, throughout its life.
Answer	The Regulatory Body provided a lead to address the problem of skills shortage in the UK by engaging other Government departments and ultimately Ministers to respond to the skills shortage. This led to two detailed studies being undertaken to assess the scale of the problem and resulted in Government and industry joining together to adopt strategic solutions to meet the future needs of the industry. These studies continue to be updated to take account of changes occurring in the nuclear industry. On behalf of Government the Sector Skills Council, Cogent, was given responsibility to coordinate a cross-industry response to the skills shortage and this has led to several initiatives being implemented to attract and retain the right skills in the nuclear sector. Recently, the prospects of employment in the nuclear sector has improved considerably as a result of changes in Government policy to accelerate the decommissioning of nuclear plant and drive to find solutions for nuclear waste. The Energy Act has provided an opportunity to industry to build more civil nuclear power plants to replace those that are closing and with major new Government nuclear programmes in the defence sector, opportunities for long term careers are good. At higher education the closure of nuclear courses has been turned around and now there are a wide range of degree and postgraduate options leading to nuclear qualifications. Universities have benefited also from a significant increase in research funding from the nuclear industry and the Research Councils. It is too early to draw concrete conclusions, but there are a number of outputs that indicate the decline in nuclear graduates is beginning to reverse. Recently the Government has established a National Skills Academy for Nuclear (NSAN) and this has been tasked with revitalising the apprenticeship training and Foundation Degree courses. The nuclear industry is fully committed to the NSAN and has provided half of the funding and many companies are committed to make use of the new facilities for training workers. Although prospects for employment in the nuclear sector are very good in the future and this will help fuel a growing interest for those entering the employment market, there is strong competition for engineers and scientists across all industry sectors. It is recognised that a skills shortage still exists and this can be seen in the difficulty many

nuclear companies have in recruiting the right skills and there are specific specialisms such as safety case writers and criticality experts that are difficult to replace. It is predicted that it will take 5 years or longer to restore the balance of nuclear skills in the UK.
The Regulatory Body has experienced difficulties recruiting in recent years because it requires its nuclear inspectors to have substantial experience of working in the nuclear industry in order that they are able to make sound regulatory decisions. This smaller pool of expertise tends to be of high value to the industry and therefore more difficult to attract to the Regulatory Body. The Regulatory Body continues to support and participate in developing long term and sustainable solutions which will provide the nuclear skills it and the industry require to meet future needs.

Q.No	Country	Article	Ref. in National Report
78	Switzerland	Article 11.2	page 66, 11.40

Question/ Comment	Are there any regulatory requirements to the duration of simulator training (a) for initial training (b) for periodic retraining?
Answer	The site licence conditions require licensees to have adequate arrangements for training and qualifying staff, and to ensure only trained personnel carry out duties on the site. The type and extent of the training deemed necessary is determined by the duties to be performed. In some cases, like reactor operators, persons have to be duly authorised. Internal guidance to inspectors provide more detail on what the regulatory expectations are for training and authorisation arrangements. For reactor operators, simulator training is an integral part of the licensees' arrangements. No duration for simulator training is specified by the regulator. However, for the practical purposes of becoming an authorised reactor operator the licensees provide initial training over an 18 month period which includes a minimum of 45 days spent on simulator training. In addition the licensees provide reactor operators with continuing simulator refresher training between periodic re-authorisations.

Q.No	Country	Article	Ref. in National Report
79	Canada	Article 12	Paragraphs 12.13 to 12.25

Question/ Comment	Please provide more information on the pilot use of a regulatory tool for examining a licensee's safety culture. Has there been a systematic assessment of the contribution of human errors in events, and near misses? If so, have the identified human errors been categorized (i.e., design, maintenance, procedural adherence)?
Answer	ND piloted an approach to examining aspects of licensee safety culture in December 2006. The primary means of data gathering was through structured interview of licensee staff. This was carried out using a question set developed by ND which in turn drew upon work by IAEA and the Canadian regulator, CNSC, together with input from earlier ND work. The ND question framework therefore has a pedigree based on an international consensus on the attributes of safety culture. The question set is designed to probe some 28 attributes grouped under IAEA's 5 dimensions of safety culture. In the pilot work, it was not practicable to gather information against each indicator in the time available, so a reduced question set was derived. In addition to the question set, the pilot approach also involved focus groups, review of plant documentation and plant visits. The inspection showed the data gathering methodologies can provide useful insights into licensee safety culture. However, the methodology is resource-intensive for both regulator and licensee. ND concluded that it may therefore best be used sparingly – for example, following a precursor event(s) or other concerns about deteriorating licensee safety culture.

ND is now in the process of developing an approach to understanding and influencing licensee safety culture which can be integrated into its day-to-day regulatory activities. Our current thinking is that this is likely to involve the development of a Corporate Inspector role, which has the responsibility for engaging with licensee leaders and others to influence their safety culture. This would be complemented by improved gathering of information during site inspection and other interactions with the licensee. ND is working on a safety culture training programme for its inspectors to support this. The approach will be further developed during the coming year.

There has not been a systematic assessment of the contribution of human error in events and near misses. However, licensees do categorise the causal factors contributing to events. ND has developed generic criteria based on event causal factors (including human factors issues) for screening events and near misses reported by licensees. Although the criteria are too generic for systematic assessment, ND's screening activities, together with the results of regulatory interventions, have highlighted the significant contribution to events and near misses that is made by human action. This information is input to ND's system of Regulatory Reviews which operates progressively within ND and makes decisions on regulatory priorities and allocation of resources.

ND has work in hand with licensees to improve UK operating experience feedback processes. This work should give improved quality and consistency of licensee event reporting, including contributory causal codes, and enhance ND's subsequent assessment of this information.
In addition, ND has ongoing work on development of licensee safety performance indicators across the nuclear sector. This should provide further information on licensees' safety culture in terms of "Attitude to Safety", "Striving for Improvement" and "Leadership and Management".

Q.No	Country	Article	Ref. in National Report
80	Czech Republic	Article 12	
Question/ Comment	How does your regulatory body assess organizational changes with regard to human factors?		
Answer	Licensees are required to put in place arrangements to ensure that organisational changes that could impact on nuclear safety are adequately considered and implemented (Licence Condition 36). As part of these arrangements, they should consider all changes, including headquarters and corporate roles, as well front-line operational roles. HSE would therefore expect the licensee's management of change process to be applied to proposed organisational changes that could impact upon a licensee's human factors resources. The aim would be for the licensee to provide itself – and HSE - with reassurance that there is no detriment to the licensee's capability to maintain a suitable and sufficient treatment of human factors to support its nuclear safety activities. In this sense, human factors is considered in the same way as any other role that could impact upon nuclear safety.		

Q.No	Country	Article	Ref. in National Report
81	Germany	Article 12	page 70
Question/ Comment	The development of a tool by the Nuclear Directorate to examine the licensees' safety culture and the development of the regulatory intervention strategy are interesting. Details on first experiences are appreciated.		

Answer ND piloted an approach to examining aspects of licensee safety culture in December 2006. The primary means of data gathering was through structured interview of licensee staff. This was carried out using a question set developed by ND which in turn drew upon work by IAEA and the Canadian regulator, CNSC, together with input from earlier ND work. The ND question framework therefore has a pedigree based on an international consensus on the attributes of safety culture. The question set is designed to probe some 28 attributes grouped under IAEA's 5 dimensions of safety culture. In the pilot work, it was not practicable to gather information against each indicator in the time available, so a reduced question set was derived. In addition to the question set, the pilot approach also involved focus groups, review of plant documentation and plant visits.

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Q.No	Country	Article	Ref. in National Report
82	Ireland	Article 12	Article 12.13 page 70

Question/ Comment It is noted that the ND has developed a tool for examining a licensee's safety cultures. Can the UK explain how this process quantifies safety culture? Has this process

identified any areas of major concern requiring attention?

Answer Please see below for a more detailed information about the ND approach to examining licensee safety culture. The approach does not seek to quantify safety culture. ND does not consider that safety culture as a concept is amenable to quantification using currently available methods. Instead, ND's focus has been on gaining insights which can then be used to engage licensees. Interestingly, this was also a conclusion of an international workshop on regulatory approaches to oversight of safety culture which ND hosted in 2007 on behalf of the OECD/NEA's Committee on the Safety of Nuclear Installations (CSNI) – see http://www.nea.fr/html/nsd/csni/wghof.html

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In addition, ND has ongoing work on development of licensee safety performance indicators across the nuclear sector. This should provide further information on licensees' safety culture in terms of "Attitude to Safety", "Striving for Improvement" and "Leadership and Management".

Q.No	Country	Article	Ref. in National Report
83	Korea, Republic of	Article 12	Paragraph 12.4

Question/ Comment
(Article 12, Paragraph 12.4)
"Application of ergonomic principles" in page 68 states that task analysis is carried out to identify the operator actions required to monitor the plant, diagnose plant state, make decisions and implement necessary actions.
- Do you perform the task analysis for local control panels?
- What kinds of methodologies are used for the task analysis on local control panels?

Answer
HSE does not carry out the analysis work – it is up to the licensee organisation to provide the safety justification. HSE's expectation when assessing the justification is that the level of (task) analysis is proportionate to the reliability required of the operator action, regardless of where the operator action is carried out (control room or local to plant etc). This is reflected in our safety assessment principle EHF.5 on task analysis.

HSE does not prescribe methods to be used for analysis; our expectations are that methods are recognised, valid, current and relevant to the task being considered.

Q.No	Country	Article	Ref. in National Report
84	Korea, Republic of	Article 12	Paragraph 12.13

Question/ Comment
(Article 12, Paragraph 12.13)
Please provide the significant commitment and major improvements in safety culture from the successful pilot use in 2006.

Answer
ND piloted an approach to examining aspects of licensee safety culture in December 2006. The primary means of data gathering was through structured interview of licensee staff. This was carried out using a question set developed by ND which in turn drew upon work by IAEA and the Canadian regulator, CNSC, together with input from earlier ND work. The ND question framework therefore has a pedigree based on an international consensus on the attributes of safety culture. The question set is designed to probe some 28 attributes grouped under IAEA's 5 dimensions of safety culture. In the pilot work, it was not practicable to gather information against each indicator in the time available, so a reduced question set was derived. In addition to the question set, the pilot approach also involved focus groups, review of plant documentation and plant visits.

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ND is working on a safety culture training programme for its inspectors to support this. The approach will be further developed during the coming year.

There has not been a systematic assessment of the contribution of human error in events and near misses. However, licensees do categorise the causal factors contributing to events. ND has developed generic criteria based on event causal factors (including human factors issues) for screening events and near misses reported by licensees. Although the criteria are too generic for systematic assessment, ND's screening activities, together with the results of regulatory interventions, have highlighted the significant contribution to events and near misses that is made by human action. This information is input to ND's system of Regulatory Reviews which operates progressively within ND and makes decisions on regulatory priorities and allocation of resources.

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In addition, ND has ongoing work on development of licensee safety performance indicators across the nuclear sector (see responses to Q127, 128, 157). This should provide further information on licensees' safety culture in terms of "Attitude to Safety", "Striving for Improvement" and "Leadership and Management".

Q.No	Country	Article	Ref. in National Report
85	Lithuania	Article 12	

Question/ Comment

1. Are the Regulator's human factor specialists supported by specific guidance for human factor assessment?
2. What is the role of HSE to ensure that human factor considerations are taken into account in early stage of design process (for new NPP's)?
3. What human resources are dedicated on Regulator's side for Human factors issues?
4. Is the Corporate integrated intervention strategy (CIIS) mainly based on implementation of SAP principles on Leadership and Management of safety? Could you please clarify the purpose and main principles of CIIS application?

Answer

1) The safety assessment principles on human factors are the basis of our assessment. These cover:
• Time for human intervention;
• Human factors integration with design, assessment and management;
• The allocation of safety functions between humans and technology;
• Identification of human actions that impact safety;
• Identification of administrative controls;
• Task analysis;
• Workspace design;
• User interfaces;
• Personnel competence;
• Procedures; and
• Human reliability.

The safety assessment principles are supported by technical assessment guides. Technical assessment guides in human factors are currently being developed. In addition we use recognised and accepted international standards and guidance to feed

into our assessments.

2) Our safety assessment principles in human factors cover the complete design lifecycle. Our initial expectations for early design is that consideration is given to the allocation of function, the role of the operator, and production of the human factors integration plan, which should cover the complete design and safety case development.

3) Our human factors specialists are deployed according to the Inspectorate's needs and priorities. Currently we have four qualified human factors specialists regulating a range of the nuclear industry's operations. The Inspectorate is currently recruiting and looking to increase resources in the area of human factors. We have additional numbers of specialists in the area of management for safety.

4) Yes. The Corporate Integrated Intervention Strategy (CIIS), which is still being developed, is based on the principles on Leadership and Management for Safety. The CIIS framework sets out the key factors relating to each of the four principles, highlights specific areas for inspectors to focus on, identifies what they should expect to see in terms of good practice along with supporting guidance notes. The primary purpose of the CIIS is to ensure that attention is given to the top echelon of management in a licensee and corporate functions as part of planned, regulatory activities.

Q.No	Country	Article	Ref. in National Report
86	Pakistan	Article 12	Section 12.23 , Page 72
Question/ Comment	It is mentioned that the HSE's human factors inspectors proactively identify areas of the licensees' operations for examination based on their awareness of issues which have been raised from a variety of sources, including national and international operating experience, developments in human factors techniques and research, and discussions with HSE and the licensee's personnel. Please describe what specialized qualification or trainings the specialist human factors inspectors possess?		
Answer	HSE is cognisant of the importance of competency assurance in the inspectorate across all disciplines and the human factors discipline is subject to the same expectations regarding the levels of competency to be achieved and retained as other disciplines. Therefore, HSE/ND Human Factors Inspectors must possess a relevant degree, the capability to gain corporate membership of a relevant professional body and be able to demonstrate a suitable level of practitioner experience on entry into HSE. Whilst in post, this is supplemented by continuous professional development through a combination of training courses, attendance and participation in international working groups such as CSNI/WOGHOF and HALDEN, attendance at conferences and participation in HSE's Major Hazards Programme, which shares best practice information on human factors and seeks to address knowledge gaps through a combination of research and communication. In addition, each human factors inspector is a member of the Human Factors Nuclear Topic Group. This group meets to share operational experience, to develop assessment guides in order to promote consistency in NII's approach to inspection and to support each inspector in gaining knowledge and expertise across the human factors discipline.		

Q.No	Country	Article	Ref. in National Report
87	Russian Federation	Article 12	
Question/ Comment	How do you address the problem of training new personnel for Great Britain's nuclear industry?		
Answer	The Regulatory Body provided a lead to address the problem of skills shortage in the		

UK by engaging other Government departments and ultimately Ministers to respond to the skills shortage. This led to two detailed studies being undertaken to assess the scale of the problem and resulted in Government and industry joining together to adopt strategic solutions to meet the future needs of the industry. These studies continue to be updated to take account of changes occurring in the nuclear industry.

On behalf of Government the Sector Skills Council, Cogent, was given responsibility to coordinate a cross-industry response to the skills shortage and this has led to several initiatives being implemented to attract and retain the right skills in the nuclear sector. Recently, the prospects of employment in the nuclear sector has improved considerably as a result of changes in Government policy to accelerate the decommissioning of nuclear plant and drive to find solutions for nuclear waste. The Energy Act has provided an opportunity to industry to build more civil nuclear power plants to replace those that are closing and with major new Government nuclear programmes in the defence sector, opportunities for long term careers are good.

At higher education the closure of nuclear courses has been turned around and now there are a wide range of degree and postgraduate options leading to nuclear qualifications. Universities have benefited also from a significant increase in research funding from the nuclear industry and the Research Councils. It is too early to draw concrete conclusions, but there are a number of outputs that indicate the decline in nuclear graduates is beginning to reverse.

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Although prospects for employment in the nuclear sector are very good in the future and this will help fuel a growing interest for those entering the employment market, there is strong competition for engineers and scientists across all industry sectors. It is recognised that a skills shortage still exists and this can be seen in the difficulty many nuclear companies have in recruiting the right skills and there are specific specialisms such as safety case writers and criticality experts that are difficult to replace. It is predicted that it will take 5 years or longer to restore the balance of nuclear skills in the UK.

The Regulatory Body has experienced difficulties recruiting in recent years because it requires its nuclear inspectors to have substantial experience of working in the nuclear industry in order that they are able to make sound regulatory decisions. This smaller pool of expertise tends to be of high value to the industry and therefore more difficult to attract to the Regulatory Body. The Regulatory Body continues to support and participate in developing long term and sustainable solutions which will provide the nuclear skills it and the industry require to meet future needs.

Q.No	Country	Article	Ref. in National Report
88	Slovenia	Article 12	Art. 12.7, p. 69
Question/ Comment	The licensees ensure that relevant operator actions are identified and modelled in the PSAs, and suitable methods are used to assess the potential errors associated with these		

	actions and to determine the consequent human error probabilities. Which methods have been used? To which extent the data from simulator have been used or you rely more on generic data in the PSA modelling?
Answer	In UK PSAs, the principal tool used to quantify the reliabilities of human interactions has been the Human Error Assessment and Reduction Technique (HEART). Established in the late 1980's, although it has had some minor modifications, it has remained principally the same technique, based on the same original data. An internal industry review of the application of HEART usage in nuclear PSAs revealed some shortcomings of the technique; in particular that HEART does not always 'fit' very well with the NPP tasks being assessed. Since 1992, a human error probability (HEP) database called CORE-DATA (Computerised Operator Reliability and Error Database) has been under development in the UK, and it was considered that a new tool should be developed along the same lines as HEART, but based on the more recent and relevant data, and more tailored to the needs of UK NPP PSAs and Human Reliability Analyses (HRA). This has led to the development of a NPP specific HRA approach called NARA (Nuclear Action Reliability Assessment). The NARA development project is now nearing completion. In 2005 NARA was the subject of a NII sponsored international peer review which raised various issues for further consideration. These issues have now been addressed. Workshops have been conducted to disseminate the NARA methodology to potential users. British Energy intends to make more use of NARA in future updates of the PSAs. Regarding the use of simulator data, some of the data points in NARA came from crew simulator trials well documented in literature. In addition, licensees in the UK use simulator exercises to gather general information on operator performance (rather than specific data).

Q.No	Country	Article	Ref. in National Report
89	Slovenia	Article 12	Art. 12.13, p. 70
Question/ Comment	ND has developed a tool for examining a licensee's safety culture, which is based largely on IAEA work in this area. … … ND will be developing the mechanism for continuous monitoring of cultural indicators using the leadership and management for safety SAPs. Can you explain in more detail this tool? What will be source for indicators?		
Answer	The safety culture assessment tool utilises structured interviews of licensee staff. This is carried out using a question set developed by NII which draws upon work by IAEA and the Canadian regulator (CNSC). The question set is designed to probe some 28 attributes grouped under IAEA's 5 dimensions of safety culture. In the pilot work, it was not practicable to gather information against each indicator in the time available, so a reduced question set was derived. In addition to the question set, the pilot approach also involved focus groups, review of plant documentation and plant visits. The NII principles on Leadership and Management for Safety provide the basis for defining cultural indicators for continuous monitoring of a licensee's safety culture. This work is being undertaken in two related areas: development of a strategy for focusing on leadership and culture within licensees; and development of suitable indicators for NII's Safety Performance Indicator framework.		

Q.No	Country	Article	Ref. in National Report
90	Switzerland	Article 12	page 68, 12.3

Question/ Comment	The sentence "...where it is not reasonably practicable to provide an engineered safety system ..." conveys a very technical view on the socio-technical system and a view of the humans mainly as sources of errors. The design of the whole socio-technical system should be driven by a more integrated view. I.e. operators' tasks and their interaction with the technical systems should be designed so that they allow the operators to maintain control over the system. This is not necessarily the case if their tasks comprehend only what is left over after all engineering possibilities have been exploited.
Answer	HSE's expectation in this area, relevant to the human factors aspect of the question, is that a licensee will demonstrate an appropriate allocation of function between humans and engineered systems. This allocation should not purely be based on a 'Fitts List' (see below) consideration, and should consider wider implications (e.g. ensuring that operators maintain their situation awareness, do not de-skill, do not become bored etc). This is reflected in our safety assessment principle EHF.2. In addition, HSE expects that this allocation be applied at the systems level (rather than the sub system or component level), and that in general an integrated approach is taken to the design of systems (safety assessment principle EHF 1 refers). ******* 'Fitts lists' is a term used to describe a generation of lists intended for summarising the relative advantages of human and machines with respect to ability to perform a variety of functions. The original list was developed by Fitts in 1951 and served as the basis for the development of more elaborate lists (e.g. Bekey 1970; Nof, Knight and Salvendy, 1980). Such lists provide a basic starting point of statically assigning task functions to either humans or machines. If the advantage in performing a particular system function rests either with the human or machine, then that function is allocated accordingly. However, it is expected that the sum total of such allocations are taken into account, to ensure that imbalances in work assignments do not occur. For example if the result was that humans are potentially overloaded, then functions can be shifted across the two resource classes until a viable solution is reached. Application of this strategy generally considers functions in isolation; and as such may produce over-simplistic allocation of function solutions. On this basis, human factors theory guards against using such lists as the sole basis of allocating function.

Q.No	Country	Article	Ref. in National Report
91	Switzerland	Article 12	page 70, 12.13
Question/ Comment	Do criteria exist to identify a weakening in safety culture or a need to send a clear regulatory signal? How does HSE proceed?		
Answer	The principles on Leadership and Management for Safety define expectations of licensees in terms of actions/outcomes that are indicative of a good safety culture. NII is developing a strategy for continuous monitoring of licensees' safety culture, using the principles and other ideas.		

Q.No	Country	Article	Ref. in National Report
92	Canada	Article 13	Paragraphs. 13.5 and 13.17
Question/ Comment	Please describe the technical bases for graded QA, and determination of the safety significance of activities. What criteria are used to measure the effectiveness of the quality management system?		
Answer	The graded application of QA is an established principle within the UK. IAEA supports this approach. It allows for the application of controls that are proportional to the safety		

significance of the activity being undertaken. Factors that will influence the level of control include the safety category of the equipment on which the activity will be carried out and the consequences of the proposed activity if it is ill conceived and/or executed. Controls that are applicable include the level of procedures, the degree of training and experience of the person undertaking the activity, the level of supervision and the application of any independent verification, the use of quality plans and audit and surveillance programmes. The use of graded application of QA allows for the targeting of important areas rather than rely on a blanket application which is resource expensive. Also it clearly labels the activities that require the greatest controls as important which a blanket approach fails to do. The principle is also consistent with the way in which NII inspect in targeting aspects that are of particular importance to safety and applying levels of inspection, assessment and challenge as appropriate.

Licensees carry out periodic reviews of the effectiveness and continued suitability of their QMSs. The information that is taken into account for these reviews includes audit results, incident and accident statistics, output of any staff surveys, analysis of procedural and/or process failures, reviews of organisational changes and results of continuing improvement initiatives. It is recognised that these measures are subjective.

Q.No	Country	Article	Ref. in National Report
93	Korea, Republic of	Article 13	Paragraph 13.5
Question/ Comment	(Article 13, Paragraph 13.5) Paragraph 13.5 addresses that licensees use a well established process that allocates a QA grade to an activity. Please explain how the QA grade is allocated and applied to an activity?		
Answer	QA grade is allocated based on the safety implications of the activity being carried out and will be affected by the safety category of the plant on which the activity is being performed. For example if the activity being graded has significant safety implications, if badly conceived and/or executed, then a high QA grade will be allocated accordingly. For high grade activities those carrying them out will have had formal training, have detailed work instructions, have direct supervision and will have a quality plan with hold/independent inspection points requiring full records of the work to be documented. The quality plan, prior to commencement of the work, will be approved and the degree of control agreed.		

Q.No	Country	Article	Ref. in National Report
94	Romania	Article 13	
Question/ Comment	Could you please provide more information on the progress that the licensees have made up to date in implementing integrated management systems in line with the requirements of GS-R-3 and in mapping and defining the processes of their management systems?		
Answer	Licensees, as part of the application of the ALARP principle, review the application of national and international standards particularly when these change. UK reactor operators have undertaken reviews of the implications of developing integrated management systems in line with GS-R-3. Some progress has been made by all operators. Some Licensees have undertaken GAP analyses of their established QMS against the requirements of GS-R-3 and DS 349. From this programmes of work have been developed and are ongoing.		

Q.No	Country	Article	Ref. in National Report
95	Spain	Article 13	

Question/ Comment	Have every nuclear power plant implemented a Management System? Every one of them fulfils all requirements of IAEA GS-R-3?
Answer	Licensees operating nuclear power plants in the UK have management systems which describe the organisational and procedural arrangements to manage their safety related activities and to maintain compliance with the Nuclear Site Licence Conditions. Currently operators are considering the changes required to meet the additional requirements IAEA GS-R-3 with some more advanced than others in this process. The NII does not require that licensees operate to specific QA/Integrated management standards, however we require adequate arrangements. There is an expectation that licensees will periodically review their management systems and further develop these in line with developing best practices. The NII expect that licensees will take account of the IAEA standard to the extent that they apply feel is necessary for their business.

Q.No	Country	Article	Ref. in National Report
96	Spain	Article 13	

Question/ Comment	Toward what standard are addressed the quality requirements of the Management System that has been implemented: 10 CFR50 Appendix B, IAEA 50-C/SG-Q, ISO 9001, other?
Answer	UK Licensees have to meet LC17 (QA) which requires them to develop and implement adequate quality assurance arrangements. NII does not require that a specific standard or code be met, however, it is expected that Licensees will implement good practice through the application of appropriate current national and international codes and standards and refine their Quality Management arrangements further as these codes and standards are themselves developed. The expectation is that the applicable parts of IAEA 50-C/SG-Q, ISO 9001 and 10CFR 50 will be satisfied. Some Licensees have programmes to move to meet the requirements of GS-R-3.

Q.No	Country	Article	Ref. in National Report
97	Spain	Article 13	

Question/ Comment	What steps and activities had been necessary for the transition to Management System (IAEA GS-R-3), from Quality Management System? What changes had been necessary to implement the Management System (IAEA GS-R-3)? - Documental changes? Which? - Organizational changes? Which? - Other changes? Which?
Answer	Gap analyses have been undertaken by Licensees to identify the aspects detailed in GS-R-3 that were not already covered in their quality management arrangements. The leadership and positive safety culture aspects for example, although not formally documented, were part of the management ethic of the organisations to varying degrees. Information of any necessary changes to Licensees' documents or structures is better obtained from them as these may be detailed.

Q.No	Country	Article	Ref. in National Report
98	Spain	Article 13	

Question/ Comment	In the Management System, the quality requirements are described into the Management System Manual or into of the previous Quality Assurance Manual?
Answer	The Quality Assurance Manual and the Management Systems Manual are effectively the same document and contain essentially the same information. It is the Licensee's responsibility to devise and establish an adequate quality management system, what the top document is called is of less importance. The NII expects that the MSM or QAM

will show the organisational and procedural arrangements to ensure that activities carried out by the Licensee take due regard of nuclear safety. It is not significant as to the title the Licensee places on the document.

Q.No	Country	Article	Ref. in National Report
99	Spain	Article 13	
Question/ Comment	Could you please describe the contents of Management System Manual?		
Answer	NII does not specify what should be contained in a Licensee's Quality Management System (QMS). The Management Systems Manual, which describes the Licensee's organisational and procedural arrangements to support safe operations. The NII's expectation is that the arrangements will take into account good practices in quality management and also meet the requirements of the nuclear site licence.		
Q.No	Country	Article	Ref. in National Report
100	Spain	Article 13	
Question/ Comment	Has the Management System Manual been approved by the Nuclear Regulatory Body?		
Answer	No. Licensees' MSMs are not approved by the NII. However, there are specific elements of a Licensee's arrangements that are approved, for example the terms of reference of the Nuclear Safety Committee and the Site Emergency Plan. Inspections and audits are carried out on the arrangements detailed in the Management Systems Manual where these have an impact on nuclear safety.		
Q.No	Country	Article	Ref. in National Report
101	Spain	Article 13	
Question/ Comment	Has it been necessary to implement changes in the Nuclear Regulatory Body in order to adapt and improve the inspection activities of the Management System (IAEA GS-R-3)?		
Answer	The NII has been heavily involved in the development of IAEA GS-R-3 and as such is aware of and understands the areas where developments have been made. The NII's Safety Assessment Principles (December 2006) recognise the roles that leadership and a positive safety culture play in a Licensee's organisation and achievement of its stated goals, one of which is to ensure safe operations. With respect to NII's inspection activities these are developing to include these aspects of the Licensees' organisations and consideration of this has commenced.		
Q.No	Country	Article	Ref. in National Report
102	Canada	Article 14.1	Section 3, 3.5, p.12, & 3.11, p 13
Question/ Comment	Under "Significant and/or ageing issues", what shortfalls were identified in the PSRs for Hinkley Point B and Hunterston B, and what were the bases for continued operation of these reactors in view of such shortfalls? What were the specific criteria used in assessing the case for continued operability for any NPP?		
Answer	British Energy (BE), the licensee, identified a number of shortfalls which led to corrective actions. BE initiated a programme to discharge these actions. About 75% of these were completed prior to the date at which a regulatory decision was made on the adequacy of the periodic review process. BE had also submitted a summary paper on the PSR process, which went through it's due process, including submission to it's Nuclear Safety Committee. This concluded that the station(s) adequately met modern standards, and that the shortfalls identified were to maintain the safety case (i.e. they did not invalidate the safety case for operation).		

Shortfalls identified by BE included:
• The need to revisit a number of time-limited integrity cases.
• Changes to operational procedures at the stations, including formal operator instructions (Tech Specs), maintenance instructions, and also station QA processes, and analytical processes. This includes some changes to operational limits and conditions, changes in maintenance frequencies for some components, etc. Some systems with explicit safety claims had not had formal entries in the maintenance schedule, the PSR has rectified this.
• Identification of additional areas for review against modern standards.
• Identification of some learning issues from operational experience. Identification of some mechanical components reaching end of useful life, identification of some obsolescence issues, development of improved strategies for obsolescence.
• Plant modifications and improvements, including to the CO2 storage and distribution system, repairs to certain civil structures, some pipework refurbishment or replacement, identified need for further inspections on tanks, pipework subject to internal corrosion.
The UK regulator, NII, then carried out its assessment of the PSR. This concluded with a regulatory decision as part of which NII required BE to complete an Action Plan of further work. Timescales for each work element have been agreed, and BE are being monitored against programme milestones.
NII findings were made public in a report available from the HSE website. Example of findings that led to entries on the Action Plan included:
• Areas where the PSR was not felt to be a comprehensive review. An example was in the review of Instrumentation and Control, especially in the fuel route. BE have embarked upon a major work programme, which may lead to engineering changes /procedural changes at a later date.
•A challenge to the safety case against a particular low-probability fire which required to be investigated. Improvements in this area have now been carried out. Additionally, NII have required BE to carry out a Fire PSA for one of the stations, to demonstrate its value as a discipline for other reactors in the fleet.

Q.No	Country	Article	Ref. in National Report
103	Canada	Article 14.1	Page 24, Paragraph 5.11

Question/ Comment	How the “potential to challenge a nuclear safety system” is defined? What does a reduction in the challenge by “7.5%” mean? Are they related to near misses, inappropriate human actions, configuration management issues in addition to actual failures?
Answer	The potential to challenge a nuclear safety system is defined in terms of numbers of events reported by licensees which an HSE Nuclear Directorate(ND) Screening Panel considers to be nuclear safety significant (and hence contribute to the Public Service Agreement target) against guidelines on actual or potential consequences of events and their causal factors, that is, they relate to potential as well as actual failures. The 7.5% reduction relates to a reduction in numbers of nuclear safety significant events to 2010/11 from a baseline year of 2001/02. ND has developments underway for clarifying its expectations from licensees’ event reporting processes and for improving ND’s screening of reported events.

Q.No	Country	Article	Ref. in National Report
104	Canada	Article 14.1	Page 61, Paragraph 11.5

Question/ Comment	At what step in the licensing process does HSE/NII approve or agree to the licensee’s cost-benefit methodology, including decision-making criteria? Please explain whether NSE/NII itself considers cost/benefit analysis when requesting safety improvements.

Answer	In the context of decision-making regarding making safety improvements, HSE/NII would consider any arguments based on CBA at the time a specific submission is made. NII have reviewed the procedures which nuclear licensees have developed against HSE's own expectations (which are available on the website at www.hse.gov.uk/risk/theory/alarpcba.htm) and commented on them where there were potential non-alignments. However, this did not imply formal approval or agreement and in assessing a submission the way the procedures had been applied would need to be considered also. HSE/NII would not normally carry out its own CBA for specific improvements, but HSE do use CBA when developing new safety Regulations, which may require additional safety measures (see Reference 69, para 102, in UK 4th National Report).

Q.No	Country	Article	Ref. in National Report
105	Canada	Article 14.1	Page 80, Paragraph 14.21

Question/ Comment	What are the categorization criteria for assessing the safety significance of safety cases and proposals to modify the safety case?
Answer	In accordance with licence condition 22 (1) the licensees have arrangements to control modifications or experiments on plant or processes which may affect safety Also, in accordance with licence condition 22 (4), those arrangements shall provide for the classification of modifications according to their safety significance. Typically, the licensees classify modifications according to what could happen, in terms of a radiological release, should they be inadequately conceived or executed. HSE agreement is required for the most serious of these, whereas it only requires notification of those in lesser classes.

Q.No	Country	Article	Ref. in National Report
106	Canada	Article 14.1	Page 83, Paragraph 14.36

Question/ Comment	What types of deviations are reportable? Is there a significance-rating system for reportable deviations, as well as for the ensuing course of action by the licensee and the regulatory body?
Answer	All licensees, including power reactors, must have arrangements under the licence conditions to respond to incidents on the site, and these include suitable means for notifying the regulatory body of events as necessary. The arrangements include provision to allocate licensee's event categorisations which they then use to decide how widely the event should be notified. The regulatory body is informed of events which are deemed to be appropriate for such notification. In addition, notification of specified events on nuclear licensed sites is required by separate regulations and these events are allocated to categories within the arrangements having greater significance and reported accordingly. UK also participates in international programmes for dissemination of information on nuclear events, which includes IRS and INES. The UK national INES officer currently resides within the regulatory body. Included in the operators' arrangements is a system of assigning appropriate levels of investigation and for subsequent corrective actions to be placed. The regulators' internal arrangements allocate responsibilities to site inspectors to investigate events on site depending on their safety significance. Following initial investigations by the regulator any subsequent enforcement action taken is in accordance with established enforcement guidelines.

Q.No	Country	Article	Ref. in National Report
107	China	Article 14.1	Article 14 ipage 88-89 j

Question/	This article of the report mentioned three safety reports for different stages of nuclear

Comment	facilities: Pre-construction Safety Report (PCSR), Pre-operation Safety Report (POSR) and Station Safety Report (SSR), what are the differences and emphasis for the three Reports respectively?
Answer	HSE-NII's expectations for the content and scope of nuclear safety cases is given in Technical Assessment Guide T/AST/051, available from: www.hse.gov.uk/foi/internalops/nsd/tech_asst_guides/tast051.pdf. This explains the different types of safety cases with typical contents and their relationship to the overall life-cycle of a facility.

Q.No	Country	Article	Ref. in National Report
108	France	Article 14.1	p.79, § 14.14

Question/ Comment	The national report indicates that PSA was part of PSR and living PSA are established for AGR and for Sizewell B.Could UK indicate if the Magnox and earlier AGR PSA were updated and when (what is the updating frequency)? Could UK provide information on the results from updated and/or living PSAs: do they indicate some trends relating to plant ageing?
Answer	The PSAs for all the Magnox reactors were completed and updated as part of the PSR process. Currently only two Magnox reactors remain operational; Oldbury (due to close shortly and for which no further updates of the PSA will be required) and Wylfa. In 2004 the Wylfa PSA was subjected to an NII-led international review. The Wylfa PSA has been updated since to include the NII review findings. In addition the Wylfa PSA is currently being expanded to include a more detailed fire PSA; this work, due to be completed in mid-2008, makes significant use of plant&fleet-specific data. PSA results cannot be provided (and, in any case, it is not considered helpful to provide numerical results without all the accompanying information that would be necessary to interpret those results correctly). However, it should be noted that PSAs updates are conducted to reflect current reliability data but also to include plant modifications, to reflect current knowledge of plant behaviour, and also to enhance the scope of the PSA as required. Therefore, any changes in the results of the PSA would not be directly representative of component degradation.

Q.No	Country	Article	Ref. in National Report
109	Japan	Article 14.1	Para.6.9 p30

Question/ Comment	In order to obtain the grant for the re-start of NPP, review of specific aspect known to have safety significance is conducted. Could you explain any example for specific aspect in case of PWR plant? Is the specific aspect is chosen after discussion between HSE and the owner of NPPs?
Answer	Consent by the UK regulatory body is required for reactor start-up following all periodic shutdowns to carry out maintenance, examination, inspection and test of any power reactor, and will only be granted when the licensee has satisfied himself that all necessary safety work has been completed and the regulator is also content. In the case of the UK PWR, the recent shutdown to replace the pressure vessel head is an example of improvement work which required specific safety justification before it could be undertaken, and the unit returned to service. Other matters which may be selected for more detailed consideration prior to Consent to restart a reactor, frequently arise from discussions with the licensee, the results of outage work or regulatory assessment of outage activities.

Q.No	Country	Article	Ref. in National Report
110	Japan	Article 14.1	Para.6.24 p33

Question/	Could you explain some examples of areas that improvement was necessary after the

Comment	PSR. If possible could you show any example for Sizewell B?
Answer	Areas of improvement arising from the Sizewell B PSR were reported in the report of work by the regulatory body. These covered the following areas: safety management systems; control and instrumentation and safety systems; radioactive waste management; structural integrity; probabilistic safety analyses; human factors; civil works and structures; external hazards; and radiological protection. A programme of work to address these issues was prepared by the licensee and this has been subject to routine monitoring by the regulator.

Q.No	Country	Article	Ref. in National Report
111	Romania	Article 14.1	page 79, paragraph 14.14

Question/ Comment	It is stated that licensees have established Living PSA Programmes. Please provide some information on any risk-informed applications used by the licensees (other than the “risk-monitors” referred to in paragraph 14.36).
Answer	The SZB PSA has been used to provide operational support in a number or areas including the following: • increasing the enrichment of the fuel used in the reactor • increasing the time defined in the Technical Specifications for refuelling from 18 months to 2 years • evaluation of Action Completion Times • considering the best options available for managing the risk during refuelling outages • optimization of the in-service testing intervals for Motor Operated Valves • hardware modifications • safety case support For the AGRs, the PSAs have been used to support justifications to design and operational changes, such as: • change from 2 to 3 year outages • extending the duration of shifts from 8 to 12 hours • provision of diverse safety systems • changes to operating procedures and training • change to the Maintenance Schedule definition of a calendar month from 30 to 35 days • safety system improvements and other hardware modifications • safety case support.

Q.No	Country	Article	Ref. in National Report
112	Pakistan	Article 14.2	Section 5.3 ,Page 23

Question/ Comment	It is mentioned that in 2004, HSE started a pilot project with BEGL to examine how safety performance indicators could be developed for mutual benefit to deliver improved safety performance. HSE is requested to elaborate the out come from this project? In addition some detail may be provided about the methodology adapted for the development of safety performance indicators?
Answer	Nuclear Directorate (ND) is using BEGL safety performance indicator data to inform (together with the results from its assessment, inspection, operating experience feedback and other findings) its regulatory intervention strategies and allocation of resources. This position has been reached through ND and BEGL working in partnership to develop a shared understanding of BEGL nuclear safety performance through

workshops on selection of safety performance indicators, data interpretation, technical details and strategic decision making. In addition, ND has conducted an inspection of BEGL to gain confidence in data provided. Learning from this inspection has been used to derive a licensee self evaluation checklist for use by all licensees.
The approach taken for BEGL is being extended, taking due account of varying degrees of hazard, across the UK nuclear licensed sector. ND has worked with industry and other stakeholders in adapting the IAEA TECDOC1141 safety performance indicator framework developed for power reactors for applicability to all types of facilities. The framework sets out which areas need to be measured. Evidence is showing that the adapted framework caters well for regulatory needs, and has been extended to the Oil and Gas Sector via the North Sea Operators' Forum.

Q.No	Country	Article	Ref. in National Report
113	Pakistan	Article 14.2	Section 5.10 ,Page 24

Question/ Comment	It is stated that the licensee SPIs also give a year-on-year indication of safety improvement (or degradation) in key areas. However, at present, they do not provide a reliable means of identifying a Regulatory Authority's specific contribution to changes in the SPIs. HSE is requested to give some more detail with examples in this regard?
Answer	Licensee SPIs, against key areas set out in a licensee / regulator agreed SPI framework (attached), should provide meaningful measures of risk control. Key areas against which SPIs are to be provided include: maintenance, plant modifications, challenges to safety systems, radiological protection, learning from experience and human performance. ND is working with licensees on use of developed SPIs, in addition to results from ND's inspection, assessment, operating experience feedback and other relevant inputs, to provide information on control of nuclear risks. The responsibility for nuclear safety remains with the licensee. However, the SPI work should result in a more reliable means of identifying ND's specific contribution to nuclear safety that the current PSA metric (see answer to Q118) which is based on events reported by licensees.

Q.No	Country	Article	Ref. in National Report
114	Canada	Article 15	Page 91, Paragraph 15.2

Question/ Comment	How were the financial equivalent values for the general public and for occupationally exposed workers derived?
Answer	The financial values referenced in Article 15 of the UK submission were recommended by the National Radiological Protection Board (NRPB) (now the Radiation Protection Division of the Health Protection Agency, HPA-RPD) in 1993 [1]. They were derived on the basis of a review of 'Willingness-to-Pay' (WTP) studies carried out jointly between the NRPB and the University of East Anglia, and comparison of the risks considered in these studies with the risk posed by unit collective dose. This derivation was inevitably subject to considerable uncertainty, and therefore a cautions approach was adopted in the specification of values to be adopted. A value of £20,000 for unit collective dose was advised for members of the public, and a corresponding value of £50,000 for workers. The difference in value between the two populations reflected an expectation that individual exposures of the public would typically be lower than those of workers, for the same level of collective dose. NRPB advised that these values would be appropriate for application during the 1990s. NRPB also stressed that 'these ... values are rounded and should be regarded only as broadly reasonable numerical reference levels'. A detailed explanation of how these values were derived is provided in the Annex to this response. NRPB/HPA has not provided more recent guidance on these values. As indicated in the

UK submission document, where appropriate, Regulators have scaled these valuations to take account of inflation and/or applied the concept of ‘gross disproportion’ to allow for the uncertainties inherent in the initial values recommended and in the influence of financial inflation since the values were published.

When it published its advice in 1993, NRPB recognised that whilst cost-benefit analysis was ‘a useful input to decisions on radiological protection’, it would ‘only give a rough indication of whether protection options [were] worth pursuing or not’ and the results would have to be ‘tempered by judgement and considered together with other relevant aspects of the decision’. Since that time, a number of UK court judgements have demonstrated the limited role of this technique, as far as the law is concerned. Rather, those causing the exposures are required to demonstrate that the cost of further reduction in exposure is excessive when compared with the risk averted (effectively, this is similar to the application of the concept of ‘gross disproportion’ applied in some regulatory decisions), and, more recently, that the ‘best available technologies’ have been applied. NRPB/HPA has informally advised for some time that the use of a cost for unit collective dose in decisions concerning exposure of the public should be avoided, or at least, that any results from the analysis should be interpreted with care.

Reference
1. NRPB. Values of unit collective dose for use in the 1990s. Docs NRPB 4(2). Chilton (1993).

Q.No	Country	Article	Ref. in National Report
115	Canada	Article 15	Page 92, Paragraph 15.6
Question/ Comment	It is commendable that the requirement that a person can be exposed to a maximum of 50 mSv in any one year only if the licensee can demonstrate to HSE’s satisfaction that an annual limit of 20 mSv is impracticable for that person.		
Answer	Noted – no response required.		
Q.No	Country	Article	Ref. in National Report
116	France	Article 15	p. 95
Question/ Comment	Could UK indicate if there are some dose recording system for the workers whose whole body exposure is lower then 6 mSv ?In which controlled areas are they allowed to work ?		
Answer	Sub question 1 – UK workers who are not designated as classified persons by their employer are known as non-classified persons (workers). The annual radiation dose to a non-classified person should be kept below 6 mSv whole body effective dose or 3/10ths on any other annual dose limit in IRR1999. Under IRR1999 Regulation 18, non-classified persons are only allowed conditional access to Controlled Areas. The employer in control of the Controlled Area should set out these conditions in the written arrangements for entry into that area i.e. a “Written Scheme of Work”. These conditions are aimed at ensuring adequate restriction of their exposure to ionising radiation and may include close supervision, the use of PPE and restrictions on the type of work done or the time spent in the area. There is no legal requirement under IRR1999 for the individual monitoring and recording of radiation doses to non-classified workers who enter controlled areas. Nevertheless the employer in control of the area must not allow the entry by the non-classified person unless he/she can demonstrate, by personal dose monitoring or other suitable measurements, that the radiation doses are restricted to less than that which would require that person to be designated as a classified person e.g. a whole body effective dose likely to be over 6mSv in a calendar year. IRR1999		

Regulation 18(5) requires the employer who carried out the monitoring or measurements to keep the results for a period of two years from when they were recorded. Also that employer, at the request of the person who has entered the controlled area, has to make the results available to that person.
In the nuclear sector each individual employee, who may need to enter Controlled Areas, is usually provided with a personal issue dosimeter. HSE recommends that any personal dosimetry for non-classified workers is provided by an appropriate HSE Approved Dosimetry Service – Dose Assessment. In addition, the employer may decide to keep dose records for his/her non-classified employees. Some employees make arrangements with an HSE ADS - Co-ordination and Record Keeping (C&RK) for the keeping of separate dose records for their own non-classified employees.

Sub question 2 - Legally, non-classified persons could be allowed conditional access to any controlled area provided there are appropriate and adequate conditions included in the Written Scheme of Work. These conditions being aimed at keeping the radiation exposures as low as reasonably practicable and below the level that would be require designation as a classified worker.

Q.No	Country	Article	Ref. in National Report
117	France	Article 15	p. 98 § 15.36

Question/ Comment	The report states that “Doses were higher in the 2005/2006 year because a greater number of higher dose statutory activities were necessary”. Could UK give some example of “higher dose statutory activities” observed in 2005/2006?
Answer	The higher doses primarily are due to significant ageing issues that have arisen at two nuclear power plant Hunterston B and Hinkley Point B, plus customary PWR maintenance at Sizewell B. As presented within the UK’s 4th National Report, sections 3.6 to 3.8, significant ageing issues had arisen at these two nuclear power plants during the 2006 statutory outages, a higher number of defects than expected were found in the Hunterston B and Hinkley Point B boiler tubes. The boilers are located within the reinforced concrete pressure vessel necessitating manned in-vessel working. Hunterston B and Hinkley Point B are twin reactor power stations and one reactor at each underwent a scheduled statutory outage in 2006. However evaluation of the inspection findings led BEGL to shut down the four operating reactors so that their boiler tubes could also be inspected. All four reactors were shut down by October 2006. A programme of boiler tube inspection and repair was undertaken at both power stations. The number of defects found in boiler bifurcations and tailpipes was much greater than anticipated. Consequently in-vessel inspections and repairs required a much larger dose burden than originally planned (although well within the statutory requirements). The defects in the boiler tubes were caused by creep damage induced as a consequence of operation at a high temperature for a long period. A safety case for return to service was produced by the licensee and submitted for assessment by HSE. HSE gave permission to start up in May 2007. All four reactors were returned to service at 70% full power and at a reduced boiler steam outlet temperature. This will significantly reduce further creep damage to the boilers. To make the safety case, 100% inspection and verification was required for all accessible bifurcations. Repairs had to be undertaken where the safety case could not be met. The elevated dose contribution at the BEGL Sizewell B site is covered within the UK’s

4th National Report at paragraph 3.36.
In line with worldwide practice, the Reactor Pressure Vessel Head was replaced during the refuelling outage in mid 2006. This was a major project. The project went well and there were no significant issues with the acceptance of the RPV head for service, reinforcement of the lifting and load paths, the disassembly of the old head and the reassembly of the control rod drive mechanisms (CRDMs) onto the new head. Commissioning of the CRDMs and other instrumentation went to plan. BEGL chose to re-use the existing CRDMs and that increased the dose burden for this project. However through careful control, Sizewell B's head exchange was completed with one of the lowest dose burdens within the PWR community (109 man.mSv or 22% of the total outage dose), compared with more than 60 head replacements word wide. The old RPV head has been put into medium term shielded storage on site pending final disposal when activity levels have reduced.

Q.No	Country	Article	Ref. in National Report
118	Ireland	Article 15	Article 15.32 page 97

Question/ Comment	Can the UK outline how the doses received by external contractors (UK based and/or foreign) working on UK nuclear sites are monitored? Specifically, what measures are in place to ensure their doses remain below the legal limits?
Answer	Sub-question 1 - UK employees who are designated as classified persons (equivalent to Category A Workers) and who work in Controlled Areas (other than Controlled Areas of their own employer) are "Outside Workers". Outside Workers are required to posses a Radiation Passbook and present this to the Licensee prior to being given permission to enter Controlled Areas on the Licensed Site. The Outside Worker should wear any dosimeter issued by his own employer's HSE Approved Dosimetry Service for all entries into Supervised and Controlled Areas during that visit. The results from this dosimetry would be entered onto the Outside Worker's Dose Record kept by the HSE Approved Co-ordination and Record Keeping Service. The Licensee would need to have an appropriate equivalent set of arrangements for foreign contractors (especially Category A workers) working on the Licensed Sites. IRR1999 Regulation 18(4) requires the employer who has designated a Controlled Area (for Nuclear Licensed Sites this is usually the Licensee) to make arrangements for estimating the dose of ionising radiation received by the Outside Worker whilst in the controlled area. This employer (Licensee) must enter the estimated dose into the Outside Worker's Radiation Passbook as soon as is reasonably practicable after the Outside Worker has completed his work for that visit. Usually, the Licensee obtains an estimate of the dose of external radiation to the Outside Worker by issuing him/her with an electronic personal dosimeter. Generally, internal dose uptake estimates are obtained using the Approved Dosimetry Services' arrangements used for the employer's (Licensee's) own workers. Under these circumstances, the estimated dose may not be available before the Outside Worker leaves the site. In which case the employer (Licensee) [in whose area the Outside Worker worked] would need to make arrangements to forward the estimated internal dose to the Outside Worker's employer. The Outside Worker's employer must arrange for the estimated dose to be entered into the Outside Worker's Radiation Passbook. A properly completed and up to date UK Radiation Passbook would contain sufficient information to provide the Licensee with a reasonable estimate of the Outside Worker's dose uptake during the current calendar year. This information would be made up of two components. The first being the doses entered for the routine monitoring periods so

far in the current year and the second being the estimated doses from any subsequent entries into Controlled Areas. The Radiation Passbook should also contain the Annual Dose Limits applicable to that Outside Worker. In GB, for the whole body effective dose the annual limit would be 20 mSv.

For contractors from outside the UK, the Licensee would require to see the equivalent of the UK Radiation Passbook or a document provided by the contractor's employee giving similar information. This information should include that person's dose to date (which could include estimated doses for the period since the last routine dose assessment entry). The Licensee would not grant permission to enter Controlled Areas on the Licensed Sites without seeing appropriate and acceptable information. Where a contractor from outside the UK already has received a dose more than 20mSv in a year, the licensee would need to make a special case for HSE's agreement.

Sub-question 2 - Under IRR99 Regulation 11(1) employers must ensure that their employees are not exposed to ionising radiations to an extent that any dose limit is exceeded in a calendar year. However, IRR Regulation 4(3) places a duty on the holder of a nuclear site licensee as if the licensee was the employer of all employees working on the Licensed Sites. Consequently, the Licensee has a duty to ensure that no one exceeds an annual dose limit as a result of work on the Licensed Site. To meet this duty, the Licensee needs to ensure that the radiation dose uptake of all classified persons (Category A Workers), including "Outside Workers" and non-classified persons, are adequately monitored and assessed. And that their dose uptake does not exceed any of the annual dose limits in IRR1999.

Q.No	Country	Article	Ref. in National Report
119	Japan	Article 15	Para.15.36, p98
Question/ Comment	Could you explain what kind of activities are contributing to the increase of the collective dose? Is that due to unordinary activities?		
Answer	The higher doses primarily are due to significant ageing issues that have arisen at two nuclear power plant Hunterston B and Hinkley Point B, plus customary PWR maintenance at Sizewell B. As presented within the UK's 4th National Report, sections 3.6 to 3.8, significant ageing issues had arisen at these two nuclear power plants during the 2006 statutory outages, a higher number of defects than expected were found in the Hunterston B and Hinkley Point B boiler tubes. The boilers are located within the reinforced concrete pressure vessel necessitating manned in-vessel working. Hunterston B and Hinkley Point B are twin reactor power stations and one reactor at each underwent a scheduled statutory outage in 2006. However evaluation of the inspection findings led BEGL to shut down the four operating reactors so that their boiler tubes could also be inspected. All four reactors were shut down by October 2006. A programme of boiler tube inspection and repair was undertaken at both power stations. The number of defects found in boiler bifurcations and tailpipes was much greater than anticipated. Consequently in-vessel inspections and repairs required a much larger dose burden than originally planned (although well within the statutory requirements). The defects in the boiler tubes were caused by creep damage induced as a consequence of operation at a high temperature for a long period. A safety case for return to service was produced by the licensee and submitted for assessment by HSE. HSE gave permission to start up in May 2007. All four reactors were returned to service at 70% full power and at a reduced		

boiler steam outlet temperature. This will significantly reduce further creep damage to the boilers. To make the safety case, 100% inspection and verification was required for all accessible bifurcations. Repairs had to be undertaken where the safety case could not be met.

The elevated dose contribution at the BEGL Sizewell B site is covered within the UK's 4th National Report at paragraph 3.36. In line with worldwide practice, the Reactor Pressure Vessel Head was replaced during the refuelling outage in mid 2006. This was a major project. The project went well and there were no significant issues with the acceptance of the RPV head for service, reinforcement of the lifting and load paths, the disassembly of the old head and the reassembly of the control rod drive mechanisms (CRDMs) onto the new head. Commissioning of the CRDMs and other instrumentation went to plan. BEGL chose to re-use the existing CRDMs and that increased the dose burden for this project. However through careful control, Sizewell B's head exchange was completed with one of the lowest dose burdens within the PWR community (109 man.mSv or 22% of the total outage dose), compared with more than 60 head replacements word wide. The old RPV head has been put into medium term shielded storage on site pending final disposal when activity levels have reduced.

Q.No	Country	Article	Ref. in National Report
120	Korea, Republic of	Article 15	paragraph 15.2

Question/ Comment: (Article 15, paragraph 15.2)
Please explain the actual results from the use of "Monetary value of a unit exposure" and effect, if any.

Answer: Ensuring a risk has been reduced ALARP is about weighing the risk against the sacrifice needed to further reduce it. The decision is weighted in favour of health and safety because the presumption is that the duty holder should implement the risk reduction measure. To avoid having to make this sacrifice, the duty holder must be able to show that it would be grossly disproportionate to the benefits of risk reduction that would be achieved. Thus, the process is not one of balancing the costs and benefits of measures but, rather, of adopting measures except where they are ruled out because they involve grossly disproportionate sacrifices.
The costs of measures are essentially the monetary costs associated with implementing the measures. The benefits are primarily the dose reduction to an individual or a group of individuals. For the purposes of comparing the costs and benefits, the dose reduction is converted to a monetary equivalent value using the appropriate factors recommended by the Health Protection Agency.
When considering ALARP, a measure must be adopted unless the monetary value of the sacrifice is grossly disproportionate to the monetary value of the risk reduction. So, the costs can outweigh benefits and the measure could still be reasonably practicable to introduce. How much costs can outweigh benefits before being judged grossly disproportionate depends on factors such as how big the risk is to begin with (the larger the risk, the greater can be the disproportion between the cost and risk).

Q.No	Country	Article	Ref. in National Report
121	Korea, Republic of	Article 15	Paragraph 15.7

Question/ Comment: (Article 15, Paragraph 15.7)
In relation to paragraph 15.7, it is stated that the "outside worker" who receives exposure from a number of sites operated by different employers is required to carry a radiation passbook and the licensee can control combinations of exposure using information in the radiation workbook properly.

- Who is responsible for issuing and controlling a radiation passbook?
- In case of losing his radiation passbook, what is your the tracking system of exposure to be recorded?

Answer

In Great Britain, the Radiation Passbooks can only be issued by an HSE Approved Dosimetry Service for Co-ordination and Record Keeping (C&RK). The employer of an Outside Worker must arrange for his/her ADS C&RK to issue a passbook for the sole use of that worker. The worker can continue to use that Radiation Passbook if he works for a new employer (or additional employer) who designates him as a classified person. The employer(s) of the Outside Worker has (have) the responsibility to keep the Passbook up to date.

In the case of losing a passbook, the only information contained in that book which the employer does not have easy access to are the doses estimated for each of the entries into an another employer's Controlled Areas since the last routine dose assessment entry, i.e. the dose up to the last routine issue period of the employees routine dosimeter. The employer would need to obtain a new Radiation Passbook from his/her C&RK Service, enter the result of the last Health Review, routine dose assessments for the issue periods available and enter a reasonable estimate of the doses receive as a result of subsequent entries into Controlled Areas. Subsequently, on entering the results of the current routine dose assessment period, when available, the Radiation Passbook would be up to date. The only information lost would be the original individual dose estimates for each visit included in the lost passbook.

The Radiation Passbook is used as a means to control the doses to an individual Outside Worker during a given calendar year. The classified person's dose record is maintained by the employers appointed ADS C&RK. The dose records for an individual classified worker must be kept by the ADS C&RK until 50 years from the last entry or until the person would have reach 75 years of age. In addition, each ADS C&RK sends the annual dose information for individual classified persons to HSE for inclusion on the HSE's Central Index of Dose Information (CIDI).

Q.No	Country	Article	Ref. in National Report
122	Korea, Republic of	Article 15	Paragraph 15.35

Question/ Comment

(Article 15, Paragraph 15.35)
In relation to 15.35, HSE approved to use EPDs as the legal dosemeter. Most of EPDs have a function to measure dose rate. Therefore, it is possible to misuse EPDs as a survey meter. Do you have any measure to prevent this situation?

Answer

HSE does not approve an individual type/model of dosimeter. In practice, HSE approves a Dosimetry Service using named types of dosimeter for stated types of radiation and energy ranges. HSE assesses the ADS against "HSE's Requirements for Approved Dosimetry Services", and to date HSE has only approved one Dosimetry Service to provide approved dosimetry services using EPDs. Much of HSE's assessment of the ADS, approved to use EPDs, considered the adequacy and acceptability of the procedures used by the ADS. This included the instructions given by the ADS to the clients on how to correctly wear and use the EPD dosimeters. In addition, the display function on the EPD to show the dose rate measured by the EPD can be disabled. Consequently, a wearer can look at the accumulated dose uptake during that wear period but not the dose rate. This would make it difficult to use the dosemeter as a survey meter, but would not prevent the dose rate information being electronically down loaded from the EPD at the end of the wear period where this may be helpful to aid operational dose control.

It is expected that licensees would have established the radiological status of all areas

where people may work by use of proper survey instruments; this is required so that permits for entry can be produced which specify the necessary precautions such as personal protective equipment. Since proper survey instruments would have been used there is little temptation for individuals to use their EPD as a survey meter.
ND has not been made aware of any misuse of the EPD dosimeters as hand held survey meters. An operator using them in such a way would probably be increasing the dose uptake recorded on his/her own dose record. The Licensee's arrangements would include the review of any unusual dose uptake resulting from a single entry to the Controlled Area.

Q.No	Country	Article	Ref. in National Report
123	Korea, Republic of	Article 15	Figure 15.2

Question/ Comment: (Article 15, Figure 15.2)
Fig 15.2 shows that the trend of radiation dose (manSv/reactor) to staff at BEGL reactors is rapidly increasing about 8.6 times from 2004/5 to 2006/7.
- What is the reason to increase?
- What are measures to decrease?

Answer: The higher doses primarily are due to significant ageing issues that have arisen at two nuclear power plant Hunterston B and Hinkley Point B, plus customary PWR maintenance at Sizewell B.
As presented within the UK's 4th National Report, sections 3.6 to 3.8, significant ageing issues had arisen at these two nuclear power plants during the 2006 statutory outages, a higher number of defects than expected were found in the Hunterston B and Hinkley Point B boiler tubes. The boilers are located within the reinforced concrete pressure vessel necessitating manned in-vessel working. Hunterston B and Hinkley Point B are twin reactor power stations and one reactor at each underwent a scheduled statutory outage in 2006. However evaluation of the inspection findings led BEGL to shut down the four operating reactors so that their boiler tubes could also be inspected. All four reactors were shut down by October 2006. A programme of boiler tube inspection and repair was undertaken at both power stations. The number of defects found in boiler bifurcations and tailpipes was much greater than anticipated. Consequently in-vessel inspections and repairs required a much larger dose burden than originally planned (although well within the statutory requirements). The defects in the boiler tubes were caused by creep damage induced as a consequence of operation at a high temperature for a long period. A safety case for return to service was produced by the licensee and submitted for assessment by HSE. HSE gave permission to start up in May 2007. All four reactors were returned to service at 70% full power and at a reduced boiler steam outlet temperature. This will significantly reduce further creep damage to the boilers. To make the safety case, 100% inspection and verification was required for all accessible bifurcations. Repairs had to be undertaken where the safety case could not be met.
The elevated dose contribution at the BEGL Sizewell B site is covered within the UK's 4th National Report at paragraph 3.36.
In line with worldwide practice, the Reactor Pressure Vessel Head was replaced during the refuelling outage in mid 2006. This was a major project. The project went well and there were no significant issues with the acceptance of the RPV head for service, reinforcement of the lifting and load paths, the disassembly of the old head and the reassembly of the control rod drive mechanisms (CRDMs) onto the new head. Commissioning of the CRDMs and other instrumentation went to plan. BEGL chose to re-use the existing CRDMs and that increased the dose burden for this project. However

through careful control, Sizewell B's head exchange was completed with one of the lowest dose burdens within the PWR community (109 man.mSv or 22% of the total outage dose), compared with more than 60 head replacements word wide. The old RPV head has been put into medium term shielded storage on site pending final disposal when activity levels have reduced.
It may help to explain that BEGL has 3 distinct "reactor families" (i) Sizewell B as a PWR (ii) Hinkley Point B and Hunterston B – who routinely undertake in-vessel work and (iii) the remainder of the AGRs. Doses from (ii) dominate BEGL annual dose statistics and (i) also make a significant contribution. In 2005 neither (i) nor (ii) performed outage work and as a consequence BEGL dose for that period appear "artificially low". Reactor family (ii) will revert to bi-annual outages and it would be difficult to envisage BEGL doses at 2004/5 levels in the near future. Radiation dose rates at reactor family (ii) continue to increase with operation, the requirement to secure the nuclear safety case is placing elevated inspection and verification. Due to the plants age there is a higher maintenance and repair burden with consequent impact on radiation dose. Dose rates over the years are increasing; this is as expected due to neutron activation of steel and the increase in the build up of radioactivity within the AGR vessel. Similar work is planned in 2008, where 1.1 mSv per entry is being used for planning in-vessel work activities, with an estimate of 3 manSv. This issue is unique to these four reactors, the remaining BEGL AGRs are of different design and build and do not suffer from similar defects.

Q.No	Country	Article	Ref. in National Report
124	Latvia	Article 15	

Question/ Comment	Does the concept of Best Practicable Environmental Option includes only options, which adopted in the UK or ~ best realised option in the world?
Answer	BPEO studies should not be restricted solely to options which are already adopted in the UK, the studies should include relevant options used or being developed outside the UK. We have published guidance on BPEO studies, it can be found at the following link: http://publications.environment-agency.gov.uk/pdf/PMHO0204BKHK-e-e.pdf In this guidance we state that "The BPEO study begins with the identification of a broad list of strategic options that are potentially capable of addressing the defined study objectives. The degree of detail to which options are specified and the range of options that need to be taken into account will vary according to the particular problem under consideration. Nevertheless, a diverse range of alternatives helps to provide confidence that the identification of a preferred solution has been identified on the basis of a process that was sufficiently comprehensive and transparent. Options should not be unreasonably restricted; imaginative and innovative thinking is to be encouraged. In practice, options are likely to be defined on the basis of currently available, or foreseeable, technological alternatives; however, it may be appropriate to consider untried or less familiar solutions. A systematic approach to options identification, which breaks down strategic alternatives according to fundamental issues and choices, can help to ensure that a comprehensive range of candidate solutions is taken into account. Thus, the environment agencies would normally expect licensees to demonstrate that the selection of a preferred option was based on a suitable, comprehensive BPEO study and that this would extend to an international comparison and review of options.

Q.No	Country	Article	Ref. in National Report
125	Latvia	Article 15	Part 15.13, P.94

Question/ Comment	What reason is to establish limit for whole-body dose greater than 15 mSv (or a lower dose established by the employer) for the year to initiate investigations? How this limit correlates with the dose and site constraint?
Answer	Sub-question 1 - IRR 1999 Regulation 8(7) sets a trigger level of effective dose of ionising radiation received by of his/her employees above which the employer must immediately carry out a formal investigation. This level is not a dose constraint. Rather it relates to a formal investigation being required well before the approach to the annual dose limit of 20mSv so that the employer reviews the working conditions of an employee (or a group of employees undertaking similar work) to make sure that exposures are being restricted as far as reasonably practicable. The default value of effective dose in the Regulations is "where for the first time in any calendar year exceeds 15mSv". However, the regulation also contains "or such lower effective dose as the employer may specify". HSE expects that most employers are able to specify a dose level lower than 15 mSv. The annual dose limit for employees over 18 years of age still remains at 20mSv per year. Nuclear Licensees have arrangements for reviewing any unusually high doses reported in dose summaries for classified persons by their approved dosimetry service or for other people entering controlled areas. Such arrangements will provide an early warning if an employee's cumulative dose for the year is approaching the formal investigation level. In these cases, the employer may decide it is appropriate to take further measures to restrict exposure before a formal investigation becomes necessary (i.e. when the employer's Investigation Level is exceeded for the first time in any calendar year). Sub-question 2 - HSE's Guidance to Regulation 8(3) of IRR1999 states that a dose constraint is an upper level of individual dose specified by the employer for use at the design or planning stage. It is one of many tools for helping to restrict individual exposures as far as reasonably practicable. Dose constraints may be used to consider the best plan or design for an individual task or event or the introduction of a new facility. However, they are not intended to be used as investigation levels once a decision has been taken about the most appropriate design or plan. Nuclear Licensees usually set an operational target for the annual dose uptake by individual employees on their Sites. The formal investigation dose level set by the Licensee (employer) would usually be less than this target dose.

Q.No	Country	Article	Ref. in National Report
126	Pakistan	Article 15	Article 15 Fig 15.2 , Page 98

Question/ Comment	Fig 15.2 shows that the Radiation Doses to staff at BEGL is substantially higher in 2006/2007 as compared to the preceeding years. Were Statutory maintenance activities the reason for this higher dose value as in 2005/2006?
Answer	The higher doses primarily are due to significant ageing issues that have arisen at two nuclear power plant Hunterston B and Hinkley Point B, plus customary PWR maintenance at Sizewell B. As presented within the UK's 4th National Report, sections 3.6 to 3.8, significant ageing issues had arisen at these two nuclear power plants during the 2006 statutory outages, a higher number of defects than expected were found in the Hunterston B and Hinkley Point B boiler tubes. The boilers are located within the reinforced concrete pressure vessel necessitating manned in-vessel working. Hunterston B and Hinkley Point B are twin reactor power stations and one reactor at each underwent a scheduled statutory outage in 2006. However evaluation of the inspection findings led BEGL to shut down the four operating reactors so that their boiler tubes could also be inspected. All four reactors were shut down by October 2006. A programme of boiler tube

inspection and repair was undertaken at both power stations. The number of defects found in boiler bifurcations and tailpipes was much greater than anticipated. Consequently in-vessel inspections and repairs required a much larger dose burden than originally planned (although well within the statutory requirements). The defects in the boiler tubes were caused by creep damage induced as a consequence of operation at a high temperature for a long period. A safety case for return to service was produced by the licensee and submitted for assessment by HSE. HSE gave permission to start up in May 2007. All four reactors were returned to service at 70% full power and at a reduced boiler steam outlet temperature. This will significantly reduce further creep damage to the boilers. To make the safety case, 100% inspection and verification was required for all accessible bifurcations. Repairs had to be undertaken where the safety case could not be met.

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It may help to explain that BEGL has 3 distinct "reactor families" (i) Sizewell B as a PWR (ii) Hinkley Point B and Hunterston B – who routinely undertake in-vessel work and (iii) the remainder of the AGRs. Doses from (ii) dominate BEGL annual dose statistics and (i) also make a significant contribution. In 2005 neither (i) nor (ii) performed outage work and as a consequence BEGL dose for that period appear "artificially low". Reactor family (ii) will revert to bi-annual outages and it would be difficult to envisage BEGL doses at 2004/5 levels in the near future. Radiation dose rates at reactor family (ii) continue to increase with operation, the requirement to secure the nuclear safety case is placing elevated inspection and verification. Due to the plants age there is a higher maintenance and repair burden with consequent impact on radiation dose. Dose rates over the years are increasing; this is as expected due to neutron activation of steel and the increase in the build up of radioactivity within the AGR vessel. Similar work is planned in 2008, where 1.1 mSv per entry is being used for planning in-vessel work activities, with an estimate of 3 manSv. This issue is unique to these four reactors, the remaining BEGL AGRs are of different design and build and do not suffer from similar defects.

Q.No	Country	Article	Ref. in National Report
127	Slovenia	Article 15	p. 94

Question/ Comment

In addition, the exposures of members of the public from all pathways resulting from aerial and liquid discharges, and exposure to direct radiation from nuclear licensed sites remains below the dose limit of 1 mSv.

The 1 mSv a year limit relates to public exposure to all current and historic man-made radiation except medical exposures. Alongside the general limit of public exposure is a

	0.3 mSv a year dose constraint for exposure to a single source, excluding the impact of historic man-made radiation. Does it mean that for the Dungeness site the dose constraint of 0.3 mSv a year was exceeded? (see report RIFE 2006, p.232, public exposure of 0.54 mSv in 2005 is stated)?
Answer	Yes. The total dose value for exposure of the reference member of the public from Dungeness in 2005, 0.54mSv, exceeded the dose constraint of 0.3mSv but was below the annual dose limit for members of the public of 1mSv. The requirement of the Ionising Radiations Regulations 1999 (IRR99) is for the dose to be below the dose limit and as low as reasonably practicable (ALARP). Dose constraints are concepts expected to be used for new sources of ionising radiation at the planning /design stage, regulation 8(3) IRR99 and paragraphs 119-125 and 134-135 of 'work with ionising radiation approved code of practice and guidance', HSE 2000, ISBN 0 7176 1746 7. The dose constraint recommended by the Health Protection Agency (HPA) [formerly the National Radiological Protection Board (NRPB)] is 0.3mSv per year for new sources. For all sources of ionising radiation the regulatory requirement is that the dose has been reduced below the dose limit and is ALARP. The value of 0.54mSv for Dungeness in 2005 represents a value that was considered to be ALARP for that source of ionising radiation, given the age and type of the plant involved. The majority of the dose was from direct radiation from the Dungeness A Magnox power station. It should be noted that this plant was permanently shut down on 31st December 2006.

Q.No	Country	Article	Ref. in National Report
128	Switzerland	Article 15	pages 91 - 92
Question/ Comment	Do the regulations include a notion of a dose below which the principle of optimisation is regarded as satisfied (100 microSievert per year for an occupationally exposed individual and 10 microsievert per year for an individual not occupationally exposed)?		
Answer	No. The Ionising Radiations Regulations 1999 (IRR99) do not include a notion of a dose below which optimisation is regarded as satisfied. The duty on the radiation employer (for nuclear sites this is the licensee) given in regulation 8(1) is to restrict so far as is reasonably practicable the extent to which his employees and other persons are exposed to ionising radiation. This requirement has no lower dose boundary and is satisfied when the radiation exposures are as low as reasonably practicable. The Health and Safety Executive has published Safety Assessment Principles for Nuclear Facilities (http://www.hse.gov.uk/nuclear/saps/saps2006.pdf). This includes some lower dose targets called Basic Safety Objectives (BSO) such as 1 mSv/y for employees working with ionising radiation, and 0.02 mSv/y for any person off the site. The BSO represents a dose value below which the regulator will not use its resources to seek further improvements provided it is satisfied with the validity of the licensees arguments. It does not represent a notional value of optimisation and a radiation employer (licensee) at a nuclear licensed site would still have to seek further dose reduction below the BSO if these would be reasonably practicable.		

Q.No	Country	Article	Ref. in National Report
129	France	Article 16.1	p. 104, § 16.15
Question/ Comment	Three levels of emergency situations are tested. These levels are defined according to the gravity of accidental situations but can UK give more detailed information on the criteria (qualitative or quantitative) which determine the level of an emergency situation.In particular, level 3 exercises could involve an active participation of populations. Is it the case?		

Answer	Emergency arrangements are tested regularly under three categories known as levels 1, 2 and 3. The levels refer to the scale/level of participation in the exercise and not the scale of the actual incident. In the UK we use a modular approach to test our emergency plans; • Level 1 exercises are held at each nuclear installation site once a year and concentrate primarily on the operator's actions on and off the site. Thus the focus is on the Operators On Site Plan. • Level 2 exercises are aimed primarily at demonstrating the adequacy of the arrangements that have been made by the local authority to deal with the off-site aspects of the emergency, particularly the functioning of the SCC where organisations with responsibilities or duties during a nuclear emergency also exercise their functions. Here the focus is on the Off Site Plan operating in the region around the site. • Level 3 Exercises involve central government departments and thus the focus here involves the national response. The public do not normally play an active part in these exercises.

Q.No	Country	Article	Ref. in National Report
130	Hungary	Article 16.1	16.12, p.103
Question/ Comment	Please clarify how many off-site facilities (Strategic Coordination Centres – SCCs) do exist in the UK: only one, or several for different nuclear sites (or group of sites). Throughout the main text SCC is mentioned only in singular, while in the Annex 9 (paragraph A9.6) it is in plural.		
Answer	There is not a simple answer to the question since there are a number of Strategic Coordination Centres (SCCs); each site has an SCC but some sites share SCC's.		

Q.No	Country	Article	Ref. in National Report
131	Hungary	Article 16.1	16.14,15, p.104
Question/ Comment	Please give further information on the off-site duties of licensee in a case of a nuclear emergency. [What are the operators actions off the site mentioned in paragraph 16.15.? Do they make radiological assessments (paragraph 16.14.) off the site?		
Answer	The operator has two roles • To monitor the environment on and around the site for radioactivity • To provide (prior to the appointment of the GTA) advice to the off site organisations on any measure that should be taken to protect the public as a consequence of radiological effects, e.g. sheltering, taking of potassium iodate tablets, evacuation, monitoring.		

Q.No	Country	Article	Ref. in National Report
132	Hungary	Article 16.1	16.5, 16.24, Annex 9
Question/ Comment	Which organizations do provide the off-site contamination control (requested in paragraph 16.20.) and personal radiation monitoring – both referenced in paragraph A9.16 of Annex 9 - complementing the 94 gamma dose rate monitoring stations of the RIMNET network (mentioned in paragraphs 16.5. and 16.24.) also to be used in case of an overseas nuclear emergency having implications in the UK?		
Answer	There are a number of organizations which are capable of carrying out this kind of work, including teams from industry, the Environment Agency and so forth. For example, contractors to the Food Standards Agency (FSA) are available to carry-out monitoring of the terrestrial and aquatic environment. These include CEFAS (Centre for Environment, Fisheries and Aquiculture Science), VLA (Veterinary Labs Agency), RPA (Rural Payments Agency).		

The Health Protection Agency – Radiological Protection Division (HPA-RPD) coordinates all the radiological monitoring off the site shortly after the Strategic Coordination Centre (SCC) is set up. The Radiological Monitoring Strategy is approved by the SCC. Prior to the setting up of the SCC, offsite monitoring is carried out by units deployed by the operator. These are supplemented by further units provided by other sites under mutual aid. The data provided by the RIMNET sites is also supplied to HPA-RPD.

Q.No	Country	Article	Ref. in National Report
133	Ireland	Article 16.1	Article 16

Question/ Comment	Is further information available on emergency preparedness arrangements in relation to iodine prophylaxis? Specifically, has there been pre-distribution of iodine tablets to residents living close to nuclear sites and what arrangements are in place for large institutions (e.g., schools)?
Answer	For nuclear power station sites, as part of emergency preparedness, automatic countermeasures have been put in place. These plans require pre-distribution of potassium iodate tablets to all people who live and work within the detailed emergency planning zone associated with the site. Locally held stocks are available for distribution, under the control of the Strategic Coordination Centre (SCC), to those who live and work outside the DEPZ if that is required to protect public health.

Q.No	Country	Article	Ref. in National Report
134	Ireland	Article 16.1	Article 16.21

Question/ Comment	For an emergency at a nuclear installation in the UK, BERR's responsibility for notifying other countries and initiate requests for international assistance is noted. What is the realistic time foreseen between an emergency being declared and BERR being in a position to inform the European Community, the IAEA, and countries with which the UK has bilateral agreements and arrangements? Are arrangements outlined under these bilateral agreements tested during national exercises? In the case of an emergency with the potential for a release with potential trans-boundary consequences, can the UK provide details on the methods in place to determine properties of the release (source term). Can the UK state whether this information would be made available to the European Community, the IAEA, and countries with which the UK has bilateral agreements and arrangements and if so how soon after the time at which an emergency is declared?
Answer	The realistic time foreseen between an emergency being declared and BERR being in a position to inform the European Community, the IAEA, and countries with which the UK has bilateral agreements and arrangements would depend on the timing of an emergency. Should an emergency occur during office hours, it would realistically take 2 -3 hours. Outside office hours, it might take 2-4 hours. Aspects of BERR's international liaison arrangements, including the process of notification, are routinely tested during the UK's annual Level 3 exercises. Specific arrangements outlined in bilateral agreements are not routinely tested, although it should be noted that the process of collating the information is tested for every Level 3 exercise. The bilateral agreement in place between the UK and Ireland was tested during exercise OSCAR 8, based on the Sellafield site, on 3 October 2006. Potential release/source terms are known to operators prior to any emergency. To

determine the actual release in an emergency would take about 2 hours for initial assessment. BERR would make this information available to the international community as soon as possible. To determine a final figure, which would also be made available to the international community, would take days or weeks.

Q.No	Country	Article	Ref. in National Report
135	Russian Federation	Article 16.1	

Question/ Comment	Who is responsible for initiating an emergency plan and based on what information is it initiated?
Answer	The operator is responsible for declaring an Off Site Nuclear Emergency in accordance with arrangements previously agreed with the Regulator. These arrangements follow the precautionary principal in that in some cases it is appropriate to declare an off site nuclear emergency even when an actual off site radiological release has not yet occurred.

Q.No	Country	Article	Ref. in National Report
136	Ukraine	Article 16.1	Para 16.6, page 102

Question/ Comment	Which provisions of the Directive of the Council of European Communities 89/618/Euratom can be considered as not implemented in the full scope?
Answer	The Public Information for Radiation Emergency Regulations 1992 (PIRER) implemented the Council Directive 89/618/Euratom in the UK on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiation (radiological) emergency. These duties are now covered in the UK by the Radiation Emergency Preparedness and Public Information Regulations (REPPIR) 2001 and the Carriage of Dangerous Goods and use of Transportable Pressure Equipment Regulations 2007.

Q.No	Country	Article	Ref. in National Report
137	Ireland	Article 16.2	Article 16.22

Question/ Comment	Its is noted that the UK regularly takes part in emergency exercises with other countries to test emergency arrangements, should there be a nuclear emergency in another country that has the potential to affect the UK. Can details be provided of all such exercises since the last report and a summary experience gained and lessons learnt?
Answer	Emergency Exercises since September 2004 IAEA, Vienna ConvEx-3 exercise – 11 May 2005 Cernavoda NPP Romania Early notification test and consequence management assessment UK has also participated in the following ConvEx exercises to test the notification arrangements during the period. ConvEx-2a – 29102004 ConvEx-2c – 26022005 ConvEx-2b – 31082005 ConvEx-2a – 29102005 ConvEx-1a – 27022006 ConvEx-2c – 16112006 ConvEx-2b – 18102007

European Commission
ECURIE Level 3 exercise – 4 October 2006
Ringhals 1 NPP Sweden
Early notification test and consequence management assessment

ECURIE Level 3 exercise – 12 December 2007
Fictitious nuclear submarine in Irish Sea
Early notification test and consequence management assessment

OECD NEA
INEX-3 exercise – 26 April 2006
Monts d'Aree NPP - France
Consequence management assessment

France
Bilateral agreement test
Gravelines NPP – 13 March 2007
Early notification test and consequence management assessment

Bilateral agreement test
Flammanville NPP – 27 November 2007
Early notification test and consequence management assessment

Lessons learned from these exercises will be taken forward by the Government and eacH participating agency into their own procedures. Lessons and experience gained with international implications will be taken forward by the Government Departments with responsibilities for nuclear accidents and in consultation with international partners.

Q.No	Country	Article	Ref. in National Report
138	Ireland	Article 16.2	Article 16.23

Question/ Comment	It is noted that the UK has a well developed programme of site, regional and national exercises of emergency plans. Can an overview of experience gained from exercises since the 3rd Review Meeting be provided along with outcomes of assessment processes and any areas for improvement which have been identified?
Answer	NEPLG has a process via its Lessons Learned Subgroup chaired by the Nuclear Directorate to review the reports of the Level 2/3 exercises every calendar year and to produce an overall report identifying any generic lessons learned. These reports are discussed annually by NEPLG and where appropriate actions generated to address the issues raised. These reports are placed on the Department of Business Enterprise and Regulatory Reform website. It is planned as part of a programme of continuous improvement to in future produce a summary report on lessons learned from all Level 1, 2 and 3 Exercises, this will be presented to the Nuclear Safety Advisory Committee (NuSAC) in the Autumn of each year starting in 2008.

Q.No	Country	Article	Ref. in National Report
139	Canada	Article 17.1	Page 110, Paragraph 17.15

Question/ Comment	Please provide an update on the review of the technical basis for the government siting policy.
Answer	In 'Meeting the Energy Challenge: A White Paper on Nuclear Power', the UK

Government set out the Strategic Siting Assessment (SSA) process to determine a set of criteria and potential sites that meet the criteria. The UK Government is proposing to consult on the criteria Spring 2008. The criteria will include eg population density criteria and other technical criteria. The government will set out its position in relation to the review of the technical basis for this siting policy at that time, given its close link to the development of the SSA criteria.

Q.No	Country	Article	Ref. in National Report
140	Canada	Article 17.1	Page 112, Paragraph 17.29

Question/ Comment: The practice of placing restrictive controls out to 8 km from the nuclear site once planning permission is granted is quite commendable. How many years is planning permission granted prior to site preparation activities commencing? Are development controls put in place if a site is under consideration, but the planning permission is not yet granted?

Answer: Since large population centres lying in the range 8<x<30 km from a nuclear site can influence allowable limits in the immediate vicinity of the site, it is recommended that the current 8 km limit in Hansard (1988) be extended to 8<x<30 km as the practical range of interest for demographic analysis to determine the general site characteristics.

Current custom and practise in the UK, requires that general site demographic characteristics as they exist at the time of licensing, are maintained throughout the entire life cycle of the plant. For residential and commercial developments therefore, planning control guidelines are in place with local authorities to ensure that the general site characteristics are preserved.

Once a site has been accepted for a nuclear station, arrangements are made to ensure that residential and industrial developments are so controlled that the general site characteristics of the site are preserved, and local authorities consult the Inspectorate with regard to any proposed new development falling outside guidelines which have been laid down. These guidelines were laid down in letters sent by the Department of the Environment in 1961 to local authorities.
R.D. Anthony: Transcripts, Sizewell B Public Inquiry.

Planning Control Guidelines
The genesis of the present arrangements for the control of development around nuclear sites goes back to 1961. The arrangements applied to commercial power reactors, which at that time were all of the Magnox type. A letter from the Ministry of Housing and Local Government, dated 6 June 1961, to all relevant local councils, sets out the reasons for the controls and identifies the areas in which the controls would operate. The letter identifies three zones around each site, and refers to an accompanying map of the area. The local councils were asked to consult the Minister on certain proposed developments within the three zones:

(a) in an area immediately surrounding the site (the ‘pink’ zone) consult on any development leading to an increase in residential accommodation, or likely to lead to an influx of non-residential population;

(b) in the next zone (coloured blue on the map) consult on developments involving an increase of more than 50 persons;

(c) within a 5 mile radius any development bringing an increase of 500 people or more in the population.
The pink and blue zones were based on nominal 1 and 2 mile radii, with the contours adjusted to avoid cutting through centres of population and to follow natural boundaries. The basis for the 1, 2 and 5 mile zones and the population increments associated with them, was the need to ensure the Government's reactor siting policy was not invalidated by increases in the population around the site. It was considered at the time that the control given by the above criteria would be sufficient to ensure that creeping in population around the sites would not take place without the knowledge of the regulators.
Guidance is issued to Local Authorities and made available on HSE's web-site at www.hse.gov.uk/landuseplanning/nuclear.htm.

Q.No	Country	Article	Ref. in National Report
141	China	Article 17.1	Article 17 ipage 108 j

Question/ Comment: What are the most important factors to be considered in the siting of nuclear facilities in UK? Are the regulations and standards adopted in UK in accordance with or similar to the IAEA standards in respect to the siting of nuclear facilities?

Answer: The UK government has had in place a siting policy for some years, the primary basis of which is to limit the population within a 12km range of the facility to given levels, and to ensure that this is maintained throughout the lifetime of the facility. As part of the licencing regime for new sites, extensive review of the local geological conditions, availability of cooling water and other site related factors will be considered. In addition, the capability of the local infrastructure to support effective off site emergency response will be considered. There have not been any new licenced power reactor sites in the UK for many years. As part of the broader UK government plans to facilitate nuclear new build, a Strategic Siting Assessment (SSA) consultation is underaway. This is examining those criteria, which are seen as exclusionary, inclusionary or discretionary. This includes social, economic, physical, environmental and demographic criteria. The UK regulations and standards are compatible with IAEA standards.

Q.No	Country	Article	Ref. in National Report
142	France	Article 17.2	p. 109, § 17.6

Question/ Comment: The report states that "proposals for stations with a heat output over 300 MW must be accompanied by an assessment of the environmental impact".Could UK explain the reason for the 300 MWth limit?

Answer: EC Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment classes significant power stations as Annex 1 projects. For an Annex 1 project an environmental impact assessment in conformity with the requirements of the Directive is required as part of the consideration of the project. The class definition in Annex 1 is:

Thermal power stations and other combustible installations with a heat output of 300 megawatts or more and nuclear power stations and other nuclear reactors (except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load).

Q.No	Country	Article	Ref. in National Report
143	Hungary	Article 17.4	17.38, p. 114

Question/ Comment: Please give information on whether the UK is a Party to the Espoo Convention, and as such did have experience in application of provisions of that Convention related to

NPPs.

Answer: The ESPOO Convention entered into force on 10 September 1997. The Convention was ratified by both the European Union and the United Kingdom in 1997. The UK has not built or commissioned any nuclear power stations since the Convention came into existence and consequently has no experience of implementing it in relation to new nuclear power plants.

Q.No	Country	Article	Ref. in National Report
144	Finland	Article 18.1	

Question/ Comment: What is your national policy concerning need for Severe Acci-dent Management (SAM) procedures or back-fitting measures at operating facilities, aiming to protect the reactor containment integrity after a possible severe core damage? Are SAM proce-dures in place at the operating nuclear power plants? Has back-fitting been completed that addresses all physical phenomena, which might endanger containment integrity?

Answer: NII's expectation is that all nuclear power plants should have Severe Accident Guidelines. Where it is reasonably practicable, NII would expect modifications to be made to plant where the technical work underpinning the Severe Accident Guidelines has identified the need to do so.

All the operating nuclear power plants have Severe Accident Guidelines.

In the case of the UK's PWR at Sizewell, studies of severe accidents were performed as part of the licensing application of the reactor site and the advice on severe accidents was incorporated directly into the station operating instructions. These have been reviewed as part of the stations recent periodic safety review, but no need for the back-fitting of safety measures has been identified. In the case of the gas-cooled reactors, where the technology is solely UK based with little scope for international collaboration, there was an extensive research programme in late 1980s and early 1990s that resulted in the production of the Severe Accident Guidelines. Further research work and reviews have been performed to confirm the adequacy of this advice.

As noted in the section of our report in response to Article 6.4, the UK's Magnox and AGR gas-cooled reactors do not have a conventional containment building like a PWR. Nevertheless, one reasonably practicable modification has been implemented to support arrangements for accident mitigation strategies and emergency plans. This was the incorporation of suitable connection points on the boiler feed pipes with the aim of allowing the restoration of feed through the use of flexible hoses, temporary pumps and alternative water sources in the event of failure of all the engineered feed water safety systems. The provision of this modification takes advantage of the long timescales available for restoring the feed on gas-cooled reactors when compared with PWRs due to their low power density and large thermal inertia. It should be noted that at the request of the NII, the licensee is currently reviewing the technical basis of the AGR Severe Accident Guidelines.

Q.No	Country	Article	Ref. in National Report
145	Slovenia	Article 18.1	Art. 18.9, p. 116

Question/ Comment: The design standards used by multinational vendors may not be in the direct control of a UK organisation particularly if potential licensees are not UK based. However, during the generic design assessment process, it will still be incumbent on HSE to ensure that the safety aspects of design are acceptable in the UK.
What if some foreign design standards are already acceptable and used in the UK, for

example in other branches of industry? Do the acceptability of these standard still need the HSE concordance? Is the HSE concordance the only one that is demanded? What about the concordance of other UK institutions?

Answer

In the UK there is an overall requirement to demonstrate that the risks from work activities, including nuclear facilities, are reduced as far as is reasonably practicable (ALARP). To help achieve this, the standards that we expect to see used in the engineering of any new nuclear plant should reflect good modern international standards.

Unlike other countries we in the UK NII do not prescribe which standards must be used – we leave that choice to the designers. We just expect to see their choice of standard justified to convince us that this standard is relevant and represents good practice. Standards used in reactor design may not necessarily meet our requirements, for example, a reactor may have been designed some years ago and the standards used may have been updated and improved since then. So this is something we would need to check – we would not want to accept anything that was not representative of good practice, or that was outdated.

Even if the standard is accepted and used in the UK for other industries, we would still expect its application to a nuclear facility design to be justified as representing good modern practice.

HSE assess the safety of nuclear facilities before granting nuclear site licences. There are other permissions that are required before nuclear facilities are built and these are given by other UK authorities (eg the Environment Agency, or Planning Authority) and they will make their own judgements about the adequacy of any proposals made.

Q.No	Country	Article	Ref. in National Report
146	China	Article 18.2	Article 18 ipage 115 j

Question/ Comment

The report mentioned that the technologies incorporated in the design and construction of a nuclear installation should be proven by experience or qualified by testing or analysis, we ask, whether or not UK will build a first-of- a-kind (FOAK) unit with advanced reactor technology? For large capacity nuclear power plant, is it more likely that large nuclear plant will be built in existing site instead of new site?

Answer

The UK has built many first-of-kind nuclear facilities in the past and may well do so in the future. The choice of which reactors or other facilities to build is one for the Government or Industry to take – that decision does not rest with HSE. However, HSE will carry-out a nuclear safety assessment of any new proposed nuclear facility before it is built and we will expect to see that UK requirements are met. The safety documentation submitted to us will have to justify the safe operation of the plant, by reference to analyses, tests, and previous experience, together with commissioning plans and operating and maintenance procedures. Where there is no previous experience, this will put more emphasis on the need for appropriate analyses and tests. We are currently assessing four Generation 3 reactors and these do contain some advanced features that we will expect to see justified appropriately.

There is currently a siting review underway in the UK. This is looking at siting policy and will lead to identification of which new or existing sites will be suitable for new nuclear power stations. Existing sites do have advantages such as grid connections and existing nuclear infrastructures, but new sites may also be suitable. British Energy has recently announced that four of their existing sites are ready and suitable for new nuclear power plant construction.

Q.No	Country	Article	Ref. in National Report

147	Finland	Article 18.2	
Question/ Comment	Have you met specific problems to find spare parts or replace-ment components properly qualified to a high safety class, as needed for plant lifetime management? If yes, how have you addressed the problem?		
Answer	Licensees must meet the requirements of the safety case for operation of the plants, including power reactors, therefore plant and equipment must continue to meet availability and reliability claims made by the safety case. In order to achieve this they must ensure that adequate spares remain available to keep equipment in an operable state, or justify the replacement of components by alternatives and this is usually done using the arrangements to control modifications to the plant. Periodic reviews of safety carried out by licensees should identify components which have become difficult to resource or are in danger of becoming obsolete so that alternative arrangements can be identified in advance.		
Q.No	Country	Article	Ref. in National Report
148	Pakistan	Article 18.2	Section 18.29 , Page 119
Question/ Comment	It is stated that the fault analysis process leads to the determination of the Design Basis Accidents (DBA) for the nuclear installation. Could HSE indicate some examples in which the results of these analyses have caused any modifications in the design or procedures?		
Answer	There are many examples where shortfalls against the requirements of the design basis accident analysis SAPs such as the need for appropriate use of diversity and redundancy have resulted in significant modifications to the design and procedures of the older AGRs and Magnox stations. Specific examples include the provision at a number of stations of the following safety systems: enhanced shutdown systems, diverse guard-line systems, back-up feed systems, electrical overlay systems, alternate indication centres, vessel overpressure protection systems, steam release trip systems, hot gas temperature trip systems, segregation walls in the gas circulator halls and at Dungeness B installation of a single fuel channel trip system and a new seismically qualified CO2 gas make-up plant.		
Q.No	Country	Article	Ref. in National Report
149	Russian Federation	Article 18.2	
Question/ Comment	Article 18 of the Report shows the requirements set in Great Britain’s regulatory documents, in particular those applied to accident analysis. Could you please describe concrete results of accident analysis, for example, at AGR plants taking account of the above mentioned requirements to accident analysis?		
Answer	For each of the AGR stations a list of design basis faults has been developed as required by the SAPs (FA.5). The individual faults have been grouped into the following fault categories; spurious reactor trip, feed system faults, steam system faults, water ingress and overpressure faults, primary coolant flow faults, reactivity faults, quadrant faults, loss of grid connection, depressurisation faults, essential system faults, refuelling faults, internal hazards and external hazards. For each of these faults transient analysis is carried out to provide adequate understanding of the behaviour of the reactors under fault conditions taking into account the need to consider consequential failures, common cause failures, single failures, worst normally permitted configuration of plant and most onerous permitted operational state as required by the SAPs (FA.3 and FA.5). To give a concrete example, the protection against symmetric reactivity faults to prevent clad melt at the Heysham 2 and Torness AGRs will be discussed. These are faults in		

which a group of control rods distributed across the core are assumed to simultaneously withdraw. It is conceded that these faults could occur with a frequency of 10-2 per year, and so these faults are within the design basis.

The protection provided for these faults consists of flux detectors which measure changes in the power of the reactor core and channel gas outlet temperature thermocouples which detect changes in the gas temperature in each of the individual fuel channels. When either of these systems detects an increase in flux or channel gas outlet temperature associated with the fault condition they cause the main guard line to drop the control rods making up the primary shutdown system into the core to control the fault. In the event of main guard-line failure, the secondary guard-line provides a diverse means of initiating reactor trip. Likewise, in the event of the primary shutdown system failure, the secondary shutdown system provides a diverse means for reactor shutdown by injecting nitrogen gas into the core.

The licensee has analysed these faults using its own in house PANTHER neutronic and thermal hydraulic analysis code for various fault sequences including failure of either the flux detection system or the channel gas outlet temperature thermocouples to detect the fault, failure of the main guard-line and failure of the primary shutdown system to operate. In the case of the failure of the flux detection system, where the second line protection is based upon temperature protection, it is assumed that a number of the best placed thermocouples for detecting the fault also fail so as to demonstrate that the single failure criterion is met. In the case of failure of the primary shutdown system and the main guard-line, the secondary shutdown system and the diverse shutdown system are modelled. These are both highly redundant systems and so meet the single failure criterion.

The faults are analysed for a range of reactivity insertion rates and initial reactor power conditions including low power operation with the bulk rods deeply inserted. Uncertainties within the methodology are covered for by allowances in the calculated peak clad temperature which is assessed against the appropriate clad melt temperature, which depends on the fault sequence but is typically 1350¢ªC. The operating conditions and trip set point values are identified to ensure that the reactor is tripped before the peak clad temperature exceeds the clad melt temperature such as to ensure that none of the physical barriers to prevent a release of reactivity is breached so meeting the requirements of the SAPs (FA.7). These findings are then used to identify the safety limits and the operating limits and conditions for the reactors as required by the SAPs (FA.9). In the case of symmetric reactivity faults, these cover the trip set points on the flux detectors and channel gas outlet thermocouples as well as the operating limits for reactor power, bulk rod insertion as a function of power, channel gas outlet temperature, fuel enrichment and reactor radial form factors.

Q.No	Country	Article	Ref. in National Report
150	Slovakia	Article 19.1	

Question/ Comment

In response to Slovakia’s question in 2005 the following was stated by UK “The UK regulator’s equivalent of RIR is the Integrated Enforcement Strategy (IES), which is still being developed. Then it is fully implemented, it should take account of the relative risks posed by particular installations when deciding where to put inspection and assessment resource”.
Could UK summarise the main development in this regard? Are there any negative

	experiences with the application of IES?
Answer	The Integrated Enforcement Strategy has been further developed and has become the Integrated Intervention Strategy (IIS). This process has been implemented for each nuclear power reactor site to ensure that NII regulatory resource is appropriately targeted through planned interventions to focus on areas of safety significance. The individual site inspection plans are routinely reviewed to establish where the interventions identify areas for improvement. Where appropriate further intervention strategies are developed and implemented to ensure the licensee implements a programme of work to address the improvements necessary. In addition, where specific site areas for improvement suggest that similar improvement opportunities may exist at other sites the licensee may put generic improvement measures in place. At this stage, evidence suggests that the IIS has provided a more rigorous process to target areas of safety significance by the regulatory body.

Q.No	Country	Article	Ref. in National Report
151	Romania	Article 19.2	paragraph 10.29, page 58
Question/ Comment	What was the overall duration of the programme for the AGR stations of BEGL to make the transition to Technical Specifications? Could you please provide more information on the generic review performed upon completion of this programme?		
Answer	The overall duration of the programme was 5 years from the conversion of the first station in 2000 to the final one in 2005, although preliminary work began in 2008. The generic review basically compared the LCOs across all the AGR stations to identify differences or gaps. These differences or gaps were then analysed and classified according to their significance. Although differences and gaps exist they are not necessarily significant; it should be borne in mind that the design of the AGRs varies quite markedly from one to the other and this is reflected in the differences in the safety cases and thus the LCOs. Where changes were needed they were prioritised according to the significance and added to each station's work programme.		

Q.No	Country	Article	Ref. in National Report
152	France	Article 19.3	p. 125, §19.17
Question/ Comment	"The intervals between Maintenance Schedule activities are determined by the safety case…" Could UK explain how the relationship between the safety case and the intervals between two maintenance activities is established?The periodic safety review is mentioned in the Operation Chapter, but not the safety improvements deriving from this process. Which is the interval between two PSRs in the UK and what were their benefits in terms of safety improvement for the eldest plants?		
Answer	As stated in paragraph 19.17, the intervals between Maintenance Schedule activities are determined not only by the safety case but by operational experience engineering judgement and manufacturers' recommendations. The safety case will claim a level of reliability from a system, structure or component and that will influence maintenance and testing intervals. PSRs are carried out every 10 years for every plant. Plant improvements from the first tranche of periodic safety reviews included those identified from consideration of the safety cases against internal and external hazards. Additional cooling provisions were provided, to allow for low frequency sequences in which existing systems may be lost. Electrical systems were also improved, in many cases, the PSR led to the identification of benefits from providing additional diesels or other generators to supplement the initial provisions. There was also considerable investment in additional fire protection,		

including additional fire barriers, fire detection systems, extinguishing systems, etc. At the older stations, there was also investment in alternative indication systems to allow for accident mitigation in the case of severe accidents. The PSR acted as a vehicle to identify degradation issues affecting civil structure and improve the maintenance of civil structures. There were also a considerable number of “soft improvements”, such as improvements to operating instructions, maintenance instructions, operator training, etc. In some cases, the first PSR “recaptured” the design intent for older plant, and this has the benefit of formalising safety requirements, maintenance requirements, etc., and has led to improvements in the management of plant.

Q.No	Country	Article	Ref. in National Report
153	Romania	Article 19.3	paragraph 19.20

Question/ Comment: Please detail the procedures and criteria by which the safety changes are classified as safety significant, and need to be agreed by HSE, or not and need to be only reported to HSE.

Answer: In accordance with licence condition 22 (1) the licensees have arrangements to control modifications or experiments on plant or processes which may affect safety Also, in accordance with licence condition 22 (4), those arrangements shall provide for the classification of modifications according to their safety significance. Typically, the licensees classify modifications according to what could happen, in terms of a radiological release, should they be inadequately conceived or executed. HSE agreement is required for the most serious of these, whereas it only requires notification of those in lesser classes.

Q.No	Country	Article	Ref. in National Report
154	Korea, Republic of	Article 19.5	Paragraph 19.46

Question/ Comment: (Article 19-5, Paragraph 19.46)
In paragraphs 19.46, it is stated that an analysis of operating experience is a key part of the periodic safety review. please describe the salient results, if any, from carrying out such analyses during previous periodic reviews.

Answer: Earlier paragraphs within the UK’s Fourth National Response explain that operating experience is reviewed by a number of processes during operation, as required by several License Conditions. The analysis carried out as part of the periodic safety review builds on these processes, and is carried out partly as a higher-level review of the effectiveness of the licensee’s processes.
Reviews of operational experience as part of the PSR have been useful in identifying some systems with higher than expected failure rates. These have then been examined at a further level of detail to ascertain if the issues arise from:

• equipment ageing and degradation in duty ,
• faulty operation, or
• poor maintenance practices.

They have allowed the licensee to consider plant enhancement or equipment replacement options as well as possible changes to operating or maintenance procedures. Key outputs have included better ageing management and obsolescence strategies, as well as specific system or procedural enhancements.
The PSR review has been useful in providing a stand-back review of the condition of plant, and in particular of ageing and degradation issues. These have included degradation of systems due to environmental conditions more onerous than original design envelopes (e.g. graphite weight loss, enhanced temperatures, more frequent cold

shutdowns, increased salinity, etc.). Other ageing issues identified or reviewed within the PSR have included mechanisms where the understanding may have improved with time (e.g. irradiation of steels, graphitisation of Cast Iron, flow assisted corrosion, stress corrosion, etc.) resulting in the need to increase maintenance frequency or the extent of maintenance/inspection.
At a higher level, the PSR review of Operating Experience also feeds into considerations of the safety culture within the licensee organisation, and helps to define initiatives to improve safety culture and human performance.

Q.No	Country	Article	Ref. in National Report
155	Russian Federation	Article 19.5	p. 127

Question/ Comment: There is information concerning the Levy Research Programme aimed at maintaining/enhancing safety of operating reactors.
What has been done within the framework of this Programme? What are the main results?

Answer: Most of the UK's Nuclear Safety Research Programme is commissioned by the Reactor Licensees themselves, in response to concerns expressed by ND's technical specialists, based upon their regulatory perspective on safety issues likely to emerge in the short- and long term. These concerns are presented in the Nuclear Research Index, a document published by ND that can be viewed on the HSE Website.

A limited number of these issues are addressed by ND commissioning the work itself and recovering the costs of the research by levy from the operating reactor licensees. The biggest part of the Levy Programme is participation in international collaborative research programmes. The Levy has been used to pay the UK's subscriptions for participation in a number of OECD/NEA programmes such as The CABRI High burn up fuel behaviour programme, the Halden fuel behaviour and Man-Technology-Organisation programmes, the Studsvik Clad Integrity Project the OECD PKL and ROSA projects (thermal hydraulics), the International Common-cause Data Exchange Project and to secure UK access to the OECD/NEA nuclear properties databank.. The levy programme has also been used to support UK membership of the USNRC's CAMP programme and secure UK access to USNRC Computer codes. The Levy Programme has also been used to facilitate and part-fund participation by UK organisations in Euratom Framework Programmes such as the FP6 SARNET programme and the FP7 CARBOWASTE programme.

The other main use of the Levy Programme is to maintain independent technical capability, for ND to be able to use to support its regulatory safety case assessment activities. This support is usually provided by giving research contracts to specialist teams that both have a scarce skill and would not be economically viable, if they had to rely solely on regulatory support contracts to keep them going. In the past ND has supported capability in radiation chemistry, Graphite science and technology and Gas-cooled reactor protection systems through these arrangements. There is currently an initiative in place to use the levy arrangements to rebuild the UK's capability in reactor plant chemistry and corrosion by transferring the knowledge of a few remaining ageing world-class specialists in this technical area, to younger plant chemists. ND is also using the Levy to fund two Eng.D students at a major UK university. One student will undertake fundamental research into the microstructure and physical properties of irradiated Graphite and the other investigate the characterisation of reactor graphite to provide options for its treatment and disposal following the decommissioning of gas-

cooled reactors.

The third use of the Levy programme is punitive top-up of licensee research programmes, if they decline to undertake research to address an ND concern and cannot convince the ND specialist inspector that such work is not needed. It is rare to use the levy in this way.

Q.No	Country	Article	Ref. in National Report
156	Russian Federation	Article 19.6	

Question/ Comment	Subsection “Reporting of Incidents” contains information on how to do this according to rules of existing procedure. We would like to know (based on a concrete example) how these rules have been applied in practice and whether these rules are used in the Incident Reporting Procedure.
Answer	Each licensee has its own arrangements under LC7 that require all occurrences on site to be screened, primarily in terms of safety significance, and coded accordingly. As noted in the National Report, licensees’ arrangements have to ensure that the more significant occurrences are notified to the regulator. In addition, licensees also inform the regulator of many lower level events, even where the arrangements do not require notification. The nominated inspector for the site regularly examines the station operating log to check that incidents have been correctly codified and reported. There is also regulatory investigation and follow up of specific higher level events and subsequent actions taken by the licensee. Further confidence in licensees’ arrangements is obtained through themed LC7 inspections by specialist inspection teams. This reporting process is demonstrated by the example of the Hartlepool buried cast iron emergency cooling water main failure cited at Para 3.17 of the National Report. This event was screened and coded by BEGL as nuclear safety significant. As set out in its LC7 arrangements, BEGL notified the regulator of the event, which was subsequently reported internationally to the IRS system (IRS report no. 7875). ND has developments underway which aim to improve consistency of LC7 reporting arrangements between licensees.

Q.No	Country	Article	Ref. in National Report
157	Canada	Article 19.7	Page 23, Paragraphs 5.4, 5.5

Question/ Comment	Please elaborate on the licensee’s safety performance indicators (for example, which indicators were chosen and what has been the experience with their trial use).
Answer	The UK response to the Joint CSNI/CNRA Report on Regulatory Uses of Safety Performance Indicators, March 2006 (http://www.nea.fr/html/nsd/docs/2006/cnra-r2006-1.pdf) provides details on the safety performance indicators selected and their trial use. ND is now using BEGL safety performance indicator data to inform (together with the results from its assessment, inspection, operating experience feedback and other findings) its regulatory intervention strategies and allocation of resources. This position has been reached through ND and BEGL working in partnership to develop a shared understanding of BEGL nuclear safety performance through workshops on selection of safety performance indicators, data interpretation, technical details and strategic decision making. In addition, ND has conducted an inspection of BEGL to gain confidence in data provided. Learning from this inspection has been used to derive a licensee self evaluation checklist for use by all licensees.

The approach taken for BEGL is being extended, taking due account of varying degrees of hazard, across the UK nuclear licensed sector. ND has worked with industry and other stakeholders in adapting the IAEA TECDOC1141 safety performance indicator framework developed for power reactors for applicability to all types of facilities. The framework sets out which areas need to be measured. Evidence is showing that the adapted framework caters well for regulatory needs, and has been extended to the Oil and Gas Sector via the North Sea Operators' Forum.

Q.No	Country	Article	Ref. in National Report
158	Finland	Article 19.7	

Question/ Comment	Please explain the principles or criteria applied by the regulator and operator for screening other experience than incidents (e.g., management issues, unexpected degradation, design weak-nesses, external hazards not considered earlier), for the purpose of ensuring adequate sharing of important experience with in-ternational interested parties (regulatory bodies, operators, de-signers, international bodies). Identify the relevant guide docu-ments, if any, used for the screening.
Answer	This is an area under development. As chair of the CNRA Working Group on Operating Experience (WGOE) Task Group on International Operating Experience, ND is leading on the further development of international systems for sharing of experience other than incidents. In addition, ND has work underway with licensees to improve UK operating experience feedback processes such that they dovetail with international developments, encompass learning from a range of sources, including incidents and good practices, and share this learning with national and international stakeholders.

Q.No	Country	Article	Ref. in National Report
159	Finland	Article 19.7	

Question/ Comment	Please explain how the regulatory body ensures or verifies that the operators are informed and properly analyse the operating experiences reported through the well established international channels (e.g., WANO, IRS), and that they address the lessons learned by taking proper actions.
Answer	The regulator periodically inspects licensees' arrangements for operating experience feedback (OEF) through routine nominated inspector inspections and more detailed specialist inspector inspections, using the IAEA Safety Guide NS-G-2.11 benchmark which sets out good national level OEF practices. These inspections cover licensees' overall processes in the context of international learning and specific examples to ensure that relevant lessons have been considered and applied in the context of the licensees' operations. In addition, the UK has an industry-run Operating Experience Learning Group which allows UK licensees to share OEF ideas, practices and lessons learned to maintain and improve plant and operational safety and reliability in the Nuclear Industry.

Q.No	Country	Article	Ref. in National Report
160	Finland	Article 19.7	

Question/ Comment	Please explain your national policy and practice of sending feedback reports to the international interested parties on actions that have been taken in your country as response to significant events reported through international channels (e.g., WANO, IRS).
Answer	The UK supports the practice of sending feedback reports to International Interested parties in response to significant events reported through International channels, recognising, however, that this is an area which needs further development both within

the UK and internationally as identified in the report (http://www.nea.fr/html/nsd/docs/2008/cnra-r2008-3.pdf) prepared by the CNRA WGOE Task Group on International Operating Experience.
Follow up on WGOE Task Group recommendations and dovetailing national arrangements should enable progress in this area.

Q.No	Country	Article	Ref. in National Report
161	France	Article 19.7	p. 129, § 19.47

Question/ Comment: The report states that HSE brings to the attention of the licensees any international event of significance.Could UK give example of actions taken further to the analysis of international operating experience?

Answer: This is an area under development. At present, HSE brings to the attention of licensees significant events particularly from the international IRS system, although licensees do have access to this system. ND has work underway to improve its OEF processes (to dovetail with international WGOE OEF developments), to include analysis of international events from a range of sources, targeted dissemination of the results from this analysis and subsequent actions taken by the licensee and the regulator.

Q.No	Country	Article	Ref. in National Report
162	Germany	Article 19.7	

Question/ Comment: Reference to the Summary Report of the 3rd Review Meeting, item 36, 38, 42 and 43

The following set of questions is of special interest for Germany for the further development in this field. As some of these items may already be covered by your report or by other questions posted by Germany, we do not expect repetitions of information already delivered. Please just give additional information as appropriate. It was decided at the Third Review Meeting to discuss this topic at the Fourth Review Meeting.

1. Which are the screening criteria for the internal and external experiences to be considered? (Are audits and reviews performed by external experts for controlling the effectiveness of OEF? Which procedures, committees etc. are established for the review and exchange of operating experience at the plant operator level and the supervisory level?)
2. How is the implementation of lessons learned from operational experience monitored?
3. How are operating experiences handled that are below the statutory reporting threshold?

Answer: ND has work underway to improve its OEF processes. The planned work will include addressing the points raised in Q158. A summary of current arrangements is provided below.

1. Each licensee has its own arrangements under LC7 (Incidents on the Site) that require all occurrences on site to be screened, primarily in terms of safety significance, and coded accordingly. Screening criteria for external experiences are not so clearly defined. The nominated inspector for the site regularly examines the station operating log to ensure that incidents have been correctly codified and reported. In addition, specific higher level events are investigated by the regulator and subsequent licensee actions followed up. Further confidence in licensees' arrangements is obtained through themed LC7 inspections by specialist regulatory teams. In addition, a regulatory Screening Panel considers notified events from all licensees and external events for nuclear safety

significance and OEF against generic guidelines on actual or potential consequences of events and their causal factors, which then provide an OEF input to Regulatory Review meetings for targeting of regulatory effort.

2. Implementation of lessons by licensees is monitored by the regulator through routine inspection activity, as noted above.

3. Licensees inform the regulator of many lower level events, even where the arrangements do not require notification. At present, limited use is being made of this information. However, ND has work in hand to:
(a) improve consistency of event reporting between licensees,
(b) improve lower level event trending information provided to the regulator,
(c) improve its own analysis / trending of lower level events for targeting regulatory effort.

Q.No	Country	Article	Ref. in National Report
163	Russian Federation	Article 19.7	
Question/ Comment	Do the operating organization and regulatory body assess the operating experience feedback effectiveness? Who, in particular, performs this assessment and in what way?		
Answer	Under the nuclear site licence, the effectiveness of licensees' operating experience feedback arrangements is reviewed internally by licensees themselves and externally by the regulator, through routine compliance inspection by the site inspector, investigation and follow up of specific events and themed LC7 inspections by specialist regulatory teams.		

Q.No	Country	Article	Ref. in National Report
164	Russian Federation	Article 19.8	
Question/ Comment	Subsection "Radioactive Waste" states the regulations but it is not quite clear what is actually being done in the area of radwaste management. Could you please show how the above regulations are applied based on Great Britain's rich experience in radwaste management?		
Answer	The UK's report to the joint convention on the safety of spent fuel management and of the safety of radioactive waste management shows in detail, based on our experience, how regulations are applied in the UK. This report can be found on the IAEA's joint convention website and will be updated by UK as part of its submission for October 2008.		