Convention on Nuclear Safety
Questions Posted To United Kingdom in 2005

Seq. No	Country	Article	Ref. in National Report
1		General	Introduction §1.33

Question/ Comment: In section 1.33, it is said that: “Most of the expertise to regulate nuclear safety is available to the regulator through its own staff. To maintain this situation, the regulator periodically reviews its expertise and its likely needs for the near and intermediate term and adjusts its recruitment and training activities accordingly.” As the NII, which regulates the nuclear Installation, is part of the broader HSE, what is the freedom of NII to adjust its expertise and train its personnel? What is NII’s budgetary autonomy within HSE?

Answer: NII is responsible for defining the expertise it needs to carry out its regulatory functions and for identifying and organising the training needs of its staff. The NII staffing complements and all other budgetary items are agreed annually with the HSE. HSE negotiates budgets with our “sponsoring ministry” the Department of Work and Pensions. The Department of Work and Pensions receives an allocation of funding from the Treasury (finance ministry). The Treasury’s budget is agreed by parliament. Because HSE employees are civil servants, they are only allowed to spend funds appropriated by parliament. Once agreed, the NII chief inspector has delegated responsibility to manage the budget. Further information on funding NII is as follows:

The HSE is funded by UK Government via its sponsoring Department, the Department of Works and Pensions (DWP). It is funded on a ‘Grant in Aid’ basis i.e. the net difference after income has been taken into account. HSE is also required to adhere to stipulated spending limits for different categories of expenditure. The level of income is therefore crucial to HSE in balancing its accounts and remaining within the Grant in Aid limits. However, the NII is only one element of HSE and subject to HSE priorities in general, HSE can redirect resources to and from any part of HSE, as it feels necessary. In the case of NII therefore, the HSE may for example, determine that it requires additional resource. If that resource were to be employed on non chargeable activities HSE would have to reduce the funding allocation of one or more parts of HSE in order to increase NII’s funding allocation. It could alternatively approach DWP for an increase in its allocation. If the resource where to be used on chargeable activities then HSE could increase NII’s allocation commensurate with the amount of income to be generated without redistribution from elsewhere in HSE. Normally about 97% of NII’s activity is recoverable from the industry but because HSE’s overhead costs relevant to NII licensing activity are also recovered, income at least matches total expenditure for NII and the extent of the expenses recovered is always sufficient.

Seq. No 2		Article General	Ref. in National Report
Question/ Comment	The UK National Report adopted a interesting style using the comparison with the IAEA Safety Standards to demonstrate compliance. While the comparison with the standards was comprehensive, it made the Report difficult to read.		
Answer	The comment is noted		

Seq. No 3		Article General	Ref. in National Report Item 1.19 - pag.7
Question/ Comment	What is the scope of the Periodical Safety Review for Sizewell? Is there a document establishing guidelines for this review?		
Answer	For each of the chapters of the report on the Periodic Safety Review (PSR) for Sizewell B, the scope typically included the following, where appropriate: (i) The safety issue to be reviewed or considered (ii) Interfaces with other chapters of the report (iii) Specific exclusions and justification (iv) The assessment content ie: a. Summary of relevant features and details on the issue, including completed plant modifications b. Consideration of operating history and site licence compliance c. Consideration of internal and external review findings d. Consideration of relevant external experience and research e. Comparison with current standards f. For systems, structures and components · Integrity assessment · Assessment of ageing and degradation · Assessment of the impact of obsolescence (v) Review ConclusionsThe Nuclear safety Directorate (NSD) has produced an Assessment Guide for its assessors and it can be located on the NSD website a: http://www.hse.gov.uk/nsd/tast/tast050.pdf The Assessment Guide describes, inter alia, what should be expected in the scope of a PSR and it was given to the licensee before the commencement of the PSR.		

Seq. No 4		Article General	Ref. in National Report
Question/ Comment	The UK report describe in details the “national requirements” for ensuring safety. However is some aspects it lacks details on how these requirements are actually been implemented, and on the experience with their implementation.		

Answer	The comment is noted		
Seq. No 5		Article General	Ref. in National Report 1.33, p8; 8.13, p35
Question/ Comment	(Please see also Annexes 1 to 9) Paragraph 8.13 on page 35 states that “the resource profiles were compiled against current predictions of regulatory activities including ….. HSE’s cadre for nuclear installation inspectors is at present 179 with 166 in post. Recruitment campaigns are in progress to make up the difference.” How are the Industry and Regulatory demands for technical and engineering resources being jointly addressed? How significant is the risk of insufficient resources to meet such demands in the future? To what extent are the resource profiles based on national predictions versus international predictions?		
Answer	The important work of the OECD NEA has raised awareness about nuclear skills shortages in the UK and action is being taken following an agenda set by the Government. The Sector Skills Council, “Cogent”, has been chosen to progress a programme involving the industry, government departments and universities to address the nuclear skills shortages. The scale of manpower shortage has been assessed already but a survey underway aims to identify the individual skills mix required. Currently, there is no shortage but the age profile of nuclear workers leads us to predict a shortage in the medium to long term. In universities, the decline appears to have been stopped as indicated by new courses starting, especially in the area of waste and decommissioning and a consortium of universities winning a major EPSRC grant to coordinate teaching programmes.		
Seq. No 6		Article General	Ref. in National Report 1.33, page 8
Question/ Comment	The report indicates that “most of the expertise to regulate nuclear safety is available to the regulator through its own staff ... ….. the regulator has an extramural support budget and framework agreements, with some outside bodies known to be independent to enable contracts to be placed quickly.” To what extent is the UK regulator dependent upon external specialist advice or resources? What percentage of the budget is allocated for this purpose? Do the framework agreements secure ongoing availability of the specialists or resources even when there is no current demand for their support?		
Answer	The extent to which the regulator is dependent on external resources may be answered by the budget percentage, which is 7.5% - 10% (or about 2 million UK pounds per year). The dependency on particular specialisms will vary with the specific work in hand. Outside bodies are mainly used to supplement our own expertise at times of high demand. It should be noted that it is the responsibility of our own in house experts to specify, manage and challenge the work of outside resources. We adopt the “intelligent customer approach “ in a similar way to the way we encourage our licensees to manage their contractors. The framework agreements only facilitate procurement and have not been drawn up to guarantee availability. There are other mechanisms in		

place to ensure availability of independent advice.

Seq. No 7		Article General	Ref. in National Report 1.46, page 10

Question/ Comment: The report states that “license condition 36 (Annex 5) is used to ensure that licensees maintain adequate resources to ensure safety.”
How is the adequacy of the financial resources of the licensee determined? Does the regulator validate the economic assumptions used to predict future revenues and costs?

Answer: HSE is not a financial regulator and it relies upon the Department of Trade and Industry, which is the sponsor of the industry in the UK to monitor the financial well being of nuclear operators. In addition HSE's ongoing monitoring of each nuclear licensee's operational and safety performance informs regulatory judgments about its capability to continue to operate safely. If HSE concluded that safety was compromised by a lack of resources it could invoke its general power, under licence condition 31, to Direct the nuclear licensee to cease operations.

Seq. No 8		Article General	Ref. in National Report p. 1

Question/ Comment: The reports reviewed by in view of the third peer-review meeting were all examined according to a standard list of issues derived from the obligations of the Convention. If an issue appeared to be covered in an incomplete way by the report of a Contracting Party, this led to a question or comment. However recognizes that the corresponding information may be available in other existing documents.

Answer: The comment is noted

Seq. No 9		Article General	Ref. in National Report §1.1 - p. 2

Question/ Comment: The UK national report uses extracts of the relevant IAEA Safety Standards for developing the detailed requirements of each Article of the Convention, practice that seems very interesting. It could be useful that UK proposes to other Contacting Parties to build a common "assessment grid" for future national reports to be used at future review meetings based upon such quotation of the relevant IAEA Safety Standards.

Answer: We note ’s comments: the UK would like to explore the possibility of using an “assessment grid” with other Contracting Parties during the third Review Meeting

Seq. No 10		Article General	Ref. in National Report

Question/ Comment: The report by the United Kingdom comprehensively covers all obligations of the convention. It follows an approach making consequent use of the relevant IAEA Safety Standards documents. These documents are indeed based on the Safety Fundamentals, which essentially in turn form the core obligations of the convention. On the other hand, we understand that a report as required by Article 5 of the convention should also be easy to read by the public and by other persons who may not be familiar with the IAEA Safety Standards program. We understand the intention of the Guideline regarding National

	Reports to be in that sense.		
Answer	The UK notes the comments of Fand will consider what additional information would be helpful to those readers of the report who may not be familiar with the IAEA standards and their structure.		
Seq. No 11		Article General	Ref. in National Report
Question/ Comment	The report by the United Kingdom comprehensively covers all obligations of the convention. It follows an approach making consequent use of the relevant IAEA Safety Standards documents. These documents are indeed based on the Safety Fundamentals, which essentially in turn form the core obligations of the convention. On the other hand, we understand that a report as required by Article 5 of the convention should also be easy to read by the public and by other persons who may not be familiar with the IAEA Safety Standards program. We understand the intention of the Guideline regarding National Reports to be in that sense.		
Answer	The UK notes the comments and will consider what additional information would be helpful to those readers of the report who may not be familiar with the IAEA standards and their structure.		
Seq. No 12		Article General	Ref. in National Report Chap. 6.1, P. 12
Question/ Comment	A public body, the Nuclear Decommissioning Authority will take over the ownership of the Magnox reactors. How the articles of the convention (e.g. Article 9, 10, 11, 14) will be met by this body?		
Answer	The change in ownership of the Magnox sites from Magnox Electric, to the NDA, should not make any difference to the ability of the Licensee to fulfill its duties. We expect the Licensee companies to continue to operate the sites in a similar manner to that prior to the change of ownership. However, HSE is currently reviewing its Licence Conditions and will consider whether there are any amendments necessary to ensure that the same level of regulatory control can be exerted regardless of any changes in the ownership of nuclear licensed sites. That review should be complete by the end of the year (or possibly much sooner depending on resources).		
Seq. No 13		Article General	Ref. in National Report Introduction
Question/ Comment	It is noted from Paragraph 1.6 that the UK has no plans to build any new nuclear power plants but that the nuclear option should remain open. Given that any new plants are likely to be radically different to all the existing reactors in the UK, other than Sizewell B, what steps are being taken to ensure that the Regulatory authority will have the appropriate expertise to regulate them effectively? In asking this question cognisance has been taken of the expertise of existing staff, impending retirements and the difficulties experienced in many countries in recruiting suitably trained and experienced staff. We note that Paragraphs 19.25 – 19.28 provide information on initiatives in the UK to remedy problems relating to skills/expertise shortfall, but it is not clear to us the extent to which these initiatives relate to regulatory personnel as distinct from industry personnel.		

Answer	HSE recruits a significant proportion its nuclear installations inspectors from the nuclear industry in order to ensure a high level of knowledge of the nuclear industry it regulates. As a result any shortfall in skills and expertise within the currently industry will eventually reduce the ability of HSE to recruit suitable inspectors. Hence, though the initiatives are not specifically directed at regulatory personnel, they do have an effect on its future needs for recruiting experienced staff as time goes by.HSE has in the past and is keeping up-to-date with developments in nuclear power plant design including for example the generation 4 programme.

Seq. No		Article	Ref. in National Report
14		General	Introduction

Question/ Comment	It is noted from Paragraph 1.24 that, following the failure of gas circulators at Torness, monitoring activities relating to circulator behaviour are being brought up to “best practice standards” . Given the unique designs of the AGR gas circulators how have best practice standards been determined, i.e. what are they benchmarked against?
Answer	Although the AGR gas circulators are designed specifically for their purpose, there is general industrial experience of large gas flow machines. There is also a large body of experience of normal vibration characteristics of large rotating plant, including methods of monitoring for vibrations. For vibration behaviour there are in particular BS ISO 7919 (Mechanical Vibration of Non-Reciprocating Machines - Measurements on Rotating Shafts and Evaluation Criteria) and BS ISO 10816 (Mechanical Vibration - Evaluation of Machine Vibration by Measurements on Non-Rotating Parts).Torness and Heysham 2 have nominally identical design gas circulators. Hinkley Point B and Hunterston B have gas circulators which are similar in design to Torness / Heysham 2. Generally, the Hinkley Point B / Hunterston B gas circulator impellers have accumulated more operating hours than those of Torness / Heysham 2. Heysham 1 / Hartlepool have a common design different from Torness / Heysham 2 / Hinkley Point B / Hunterston B and Dungeness B has a different design.Reference to "best practice" in para 1.24 refers to comparison of practice within the Licensee at different stations. In large part this refers to recording and analysis of data for trends.For Torness / Heysham 2, as stated in para 1.26, the safety argument is now based on the presumption that impeller failure is a comparatively frequent failure mechanism. Practicable steps have been taken to limit the frequency of impeller failure. However, the fundamentals of the safety case are that an impeller failure will be contained within the machine and consequences will be limited (most likely) or consequences will be within those already considered in other parts of the station safety case.Heysham 2 Reactor 8 had a planned maintenance outage in April 2004. During the outage in-service examination of a gas circulator impeller revealed a small, surface-breaking fatigue crack (circa 6 x 3 mm) in the root region of one blade. The impeller was replaced. The presumption is this cracking is related to the sort of fatigue cracking seen in the Torness impellers, but at an earlier stage of progression. The cracked impeller from Heysham 2 Reactor 8 has been subject to further examination as part of the continuing root cause investigation

Seq. No		Article	Ref. in National Report

15		General	page 2,1.1,1.2

Question/ Comment: The UK's third national report refers the IAEA Safety Standard Requirements differing from the past two national reports.
This is useful to explain that UK considered all the important safety topics for the UK nuclear power plants.
We, however, estimate that all UK nuclear power plants (especially the Gas Cooled Reactors) do not always satisfy the IAEA standards, because almost UK nuclear power plants were designed and constructed before the IAEA standards were established.
We do not find that explanation in this third report.

Answer: Yes, you are correct in stating that most of the UK's gas-cooled reactors were built to standards that pre-dated not only the current IAEA standards but also the current NII safety assessment principles and the licensees' design safety guidelines. This position is not unique to the UK as standards are continually changing. This was one of the main reasons why UK started the process of Periodic Safety Reviews (PSRs) . One of the objectives of the UK PSRs is to identify and compare and NPP with current standards and make any necessary or reasonably practicable plant improvements.

Seq. No	Country	Article	Ref. in National Report
16		General	P.3,L.28

Question/ Comment: In 1.9 Calder Hall(4 Magnox reactors), it is stated that "a programme of modifications to improve the safety of fuel route has been investigated to prepare for defuelling that will commence in April 2005".

Could you explain the details of "a programme of modification"?
Is the programme special one for Calder Hall?

Answer: The programme of modifications to the fuel route at Calder Hall arose from an incident that occurred at its sister station, Chapelcross on 5/7/01, although the NII had been discussing modifications to the fuel route prior to the Chapelcross incident. The incident occurred when during the discharge of spent fuel from Chapelcross Reactor 3, operators failed to properly latch one of the baskets used to contain 24 discharged irradiated magnox fuel elements to a grab, and the basket fell inside the discharge machine. Defuelling occurs on the pile caps at both Calder Hall and Chapelcross, and the pile caps are about 25 m above ground level. When the fuel fell inside the discharge machine, a number of fuel elements fell out of the basket and fell to ground level down a discharge well. The discharged fuel was contained and there was no harm to personnel or disregard of UK Law. The licensee, BNFL, recovered the dropped fuel safely. The NII carried out an investigation of the event and this is contained in a published report: "An Investigation into the Dropped Fuel Element Incident at Chapelcross", published by the UK's Health and Safety Executive, February 2002. BNFL had carried out periodic safety reviews of the fuel routes at these plants in the past, and concluded that dropping fuel in the fuel route would not lead to a significant release of radioactivity. The investigation of this event confirmed that there had been no release of radioactivity. However, the NII considers that the dropping of fuel elements is not acceptable and that steps should be taken to prevent such an occurrence. Owing to the age and type of fuel discharge equipment at Calder

Hall and Chapelcross, the NII was not satisfied that BNFL could demonstrate that the dropping of baskets containing discharged fuel was a sufficiently low probability event within the NII's guidance on such issues that is set out in its Safety Assessment Principles. Therefore, the NII's report into the Chapelcross event recommended that BNFL review the Calder Hall and Chapelcross fuel routes against modern standards and propose modifications to improve fuel discharge at both plants. This has led BNFL to propose major modifications to the fuel discharge equipment at both plants that will involve single element discharge instead of the lowering of baskets containing 24 spent fuel elements down from the pile cap. Although both plants have now ceased electricity generation, BNFL is implementing the modifications and improvements at both plants to improve the safety and reliability of the final operational phase of defuelling both plants prior to the commencement of decommissioning. In this respect it is a "special" programme for both Calder Hall and Chapelcross and the NII does not expect licensees to modify fuel discharge routes prior to final defuelling of plants unless there is a safety concern. Defuelling of Calder Hall will not commence until the programme of modifications has been completed, which currently, is expected during 2006.

Seq. No	Country	Article	Ref. in National Report
17		General	P.4,L.8,L.18,L.32,37

Question/ Comment

In the description of Dungeness A (2 Magnox reactors),Sizewell A (2 Magnox Reactors),Oldbury (2 Magnox reactors) and Wylfa (2 Magnox reactors), it is stated that
"Magnox Electric has implemented many safety improvements following a Long Term Safety Review in the 1980s and a Periodic Safety Review completed in 1995. There are redundant and diverse safety provisions such that the design basis faults can be tolerated."

Could you explain the specific safety improvements?
What improvements or additions were performed to the specific systems?

Answer

Modifications included the following:
(i) Modifications to reactor protection systems
(ii) Provision of improved shutdown diversity
(iii) Improvements to the electrical, instrumentation and control systems
(iv) Improvements to the emergency feed systems
(v) Provision of improvements to protect against hot gas release
(vi) Modifications to improve protection against a seismic event
(vii) Additional programmes of inspection to allow better monitoring of the effects of ageing in several areas such as those associated with the reactor pressure circuit and reactor internals(viii) Completion of additional safety analyses to support the safety case for plant such as the reactor pressure vessel, reactor internals, graphite core, mitigation against a seismic hazard, fault studies and PSA.

More detail can be found in "Report by HM Nuclear Installations Inspectorate on the results of Magnox Long Term Safety Reviews (LTSRs) and Periodic Safety Reviews (PSRs)", Published by the Health and Safety Executive, September 2000, and its references. The report is also available on

the Nuclear Safety Division website at http://www.hse.gov.uk/nsd/magnox.pdf.

Seq. No	Country	Article	Ref. in National Report
18		General	P.9,L.22

Question/ Comment: It is stated that "The UK's nuclear safety regulator continue to strive for improvements in its effectiveness and efficiency through its use of the European Foundation for Quality Management model and programme."

What is the reason to adopt the EFQM instead of ISO9001 for the quality management of the NSD?

Answer: We considered that the ISO 9001 accreditation would place too many restrictions on our work and would cover items that, although useful, would be of minimal benefit for our business needs. In addition there was no external driver to direct us towards the ISO 9001 approach. We felt that that we needed a guidance and strategy to develop the totality of our business that did not have a prescriptive approach and something that could be readily “tailored” to a Regulatory Authority This we believed, and still believe, was offered by the EFQM.

Seq. No	Country	Article	Ref. in National Report
19		General	para 1.31, p. 7

Question/ Comment: The Summary report of the CNS second Review Meeting held in April 2002 raised a number of specific and general issues to be addressed in countries’ third reports. One of those issues (nr. 18) is mentioned here:
“(18) In situations where a nuclear power plant is scheduled to shut down in a few years time, appropriate measures have to be taken by, and resources provided to, both the operator and the regulator to ensure operational safety until closure. Contracting Parties were invited to report on the evolution of such situations at the next Review Meeting.”
The response of the UK is:
“The operators and regulator have recognised this as a potential problem for a number of years. Resources have been and continue to be available to ensure operational safety until closure and beyond. Licence condition 36 (see Annex 5) is used to ensure that adequate resources are maintained.”
Licence condition 36 (control of organisational change) states the requirements in general terms.Could you give some details about concrete measures taken to resolve this issue?

Answer: The maintenance of adequate resources within a Licensee’s organisation when significant changes to the operational status of a plant is planned can be controlled by the regulatory body through the application of Licence Condition 36

Licence Condition 36 requires the Licensee to make arrangements to control those changes to its organisational structure and resources that may have an effect on safety on its sites. Regulatory oversight of such changes is achieved by requiring the Licensee’s arrangements to include a system of classifying these changes according to their safety significance. The Licensee must seek the agreement of the Regulatory Body before the higher category changes can

be implemented. This prevents a licensee making organisational changes rapidly without allowing the regulatory body sufficient opportunity to assess the consequences.

A key component of the arrangements is the need for the Licensee to establish a process by which the baseline size and structure of its organisation is determined and substantiated. The baseline should substantiate the licensee's organisation and should develop an inventory of functions with the potential to affect safety. The baseline should then relate the structure and particularly the numbers of staff and their competencies needed to meet those functions. This baseline then forms the platform from which the effects of any individual changes can be assessed.

The arrangements to meet Licence Condition 36 must set out,

· The roles and responsibilities within the Licensee's organisation for planning and implementing organisational changes,
· A means of dividing these changes into appropriate stages,
· A process for proper assessment and review of implications of the changes,
· The allocation of effort for proper planning and
· The maintenance of records.

The Licensee's are also required to record all its proposals for organisational change in a register for each site.

The Regulatory Body expects Licensee's to apply their arrangements to structures and resources, including staffing levels, finance, improvement programmes and research. This should apply not only to the site but also to the corporate centre and the influences of other organisations upon whom the licensee relies on for support for licence compliance e.g.: support organisations; headquarters corporate organisation; holding companies or parent organisation; and the result of moving staff to other organisations as the result of diversification

Currently, NII is concentrating its efforts on changes to the organisational structure within the Licensee's, such as staffing levels, the use of contractors and ways of working, unless there are significant problems with changing resources, material assets or funding. Inspection of change registers and other Licensee's documentation associated with organisational change is now carried out on a routine basis

Seq. No	Country	Article	Ref. in National Report
20		General	para 1.46, p. 10

Question/ Comment: The Summary report of the CNS second Review Meeting held in April 2002 raised a number of specific and general issues to be addressed in countries' third reports. One of those issues (nr. 45) is mentioned here:
"(45) It was noted that a sound economic basis for the nuclear utility owning and operating the plant is a prerequisite for financing an effective safety programme. In the present changing energy market in many countries, it is important that utility managers as well as regulatory bodies understand the

potential effects on safety of severe financial constraints."
The response of the UK is:
"This issue is well understood in the UK as the nuclear utilities have been operating in a deregulated electricity market for many years. Licence condition 36 (Annex 5) is used to ensure that licensees maintain adequate resources to ensure safety. More information on this matter will be provided by the UK during its presentation at the third Review Meeting."
Could you give some details about the measures already taken to ensure that the financial constraints will not have a negative effect on the safety of nuclear installations?

Answer The key impact of financial constraints on a nuclear site licensee is likely to be on the licensee's ability to maintain adequate staff of the appropriate skills and to maintain investment in the safety of the plant. Both these areas are fundamental to NII's oversight activities which entails ensuring licensee's compliance with the whole range of Licence Conditions (LC).

This involves debate and discussion at all levels within the licensee's organisation to understand and influence longer term plans and actions. It also requires licensees to ensure the use and application of appropriate planning processes for the discharge of safety related work and the prediction of necessary resource requirements.

Specifically in relation to human resources the UK utilises LC 36 which requires licensees to have adequate arrangements to control changes in resources that may affect safety. This LC provides NII with the power to require the submission of a documented justification for a proposed change and, where appropriate, to direct that a particular change should not be implemented. Additionally the licensee's arrangements provide NII with a range of other powers linked to the potential impact of a change on safety. These require a licensee to seek NII's permission before high impact changes can be implemented. This "hold-point" provides an opportunity for the regulator to confirm that the licensee's process have been correctly applied and that the nuclear safety implications of a change have been adequately considered.

Monitoring the continued safe state of the plant is a routine aspect of NII's regulatory inspection activities. Regulatory powers enable NII to seek improvements and, in the extreme, require that unsafe plants are shutdown.

Seq. No	Country	Article	Ref. in National Report
21		Article 6	6.13, page 15

Question/ Comment The report indicates that "although all Maganox Station will be closed down by 2008, the requirement for a PSR still stands to cover post-operational safety."
Please expand on what is meant by "the requirement for a PSR still stands to cover post-operational safety." What is the basis for this requirement and what are the benefits that you expect from the PSR?

Answer The UK's Nuclear Installations Act 1965 (as amended) (NIA65) enables the regulator (NII) to attach conditions to nuclear site licences. Licence

Conditions (LCs) define areas of nuclear safety to which a licensee should pay attention to ensure safe operation of its site. While some conditions impose specific duties others require the licensee to devise and implement adequate arrangements in particular areas. The issues covered range from arrangements for ensuring the safety of plant and for controlling operations to management issues such as the supervision and training of staff. Breach of a LC is an offence under NIA65.A standard set of 36 LCs is in place covering all licensed sites at all stages of their life cycles. This includes Magnox reactors in the process of decommissioning. In particular, LC15 (Periodic Review) requires licensees to "make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases". It is NII policy that major reviews undertaken to comply with LC15 (termed Periodic Safety Reviews – PSRs) should be carried out at least every ten years.The purpose of these PSRs is to determine, by means of a comprehensive assessment against modern standards, whether the plants, processes, management, operations and facilities covered by the safety case are safe, and that ageing and other time-related phenomena will not render them unsafe before the next PSR. Where modern standards are not met, the PSR should assess the significance of the shortfalls, and identify reasonably practicable improvements. In addition the PSR should look forward over the remaining life of the facility (including decommissioning) and identify any foreseeable circumstances that could threaten the ability to maintain safe operation of the site.The requirement for PSRs at (at most) ten yearly intervals remains, even when a plant moves into its post-operational phases. However, if at any stage during these phases, the work done in producing a safety case reviews all aspects of the underpinning site safety case to the extent necessary for a PSR, then NII considers it acceptable for the next PSR to be ten years from the start of that stage.

Seq. No	Country	Article	Ref. in National Report
22		Article 6	6.21, page 17

Question/ Comment

This paragraph states that “… the PSRs confirm that the safety case will remain valid until the time of the next review, which is normally set at ten years. As stated above, the PSRs complement the normal operational monitoring of safety, which is also regulated by HSE. Therefore although the PSRs may conclude that the safety case is adequate for another ten years, this will be dependent upon continuing satisfactory results for routine inspections. Should any safety related factor emerge in the interim period that may throw doubt upon the continuing validity of the safety case, this would require the licensee to resolve the matter to HSE’s satisfaction."

Please provide additional information on why ten years was selected as the review period between PSRs.

How might the results from the “normal operational monitoring of safety” and “continuing … routine inspections” demonstrate safety conclusions different from those of the PSR?

Are sections of the PSR re-done in the consideration of emerging safety concerns or safety advances?

Answer

The rationale for selecting ten years as the review period was chosen by many member states, on the basis of experience, as striking a balance between a period long enough to capture significant developments important to safety

and any longer period where the loss of experienced staff by the operating and regulating organisations would lead to loss of continuity. This rationale is elucidated in the IAEA Safety Guide “Periodic Safety Reviews of Nuclear Power Plants, NS-G-2.10”. An example of where routine inspections might throw doubt upon the continuing validity of the safety case is if laboratory examination of materials samples suggested that an ageing mechanism could be proceeding at a faster rate than claimed in the PSR. Sections of the PSR are not re-done following emergence of safety concerns or advances. The PSR is a “snapshot” in time and is a review of the safety case for the plant but does not, in itself, constitute a safety case. Emergent safety issues would cause appropriate modifications to be made to the safety case and these would be taken account of in the next PSR. The PSR process complements the routine regulatory process; it does not replace it.

Seq. No	Country	Article	Ref. in National Report
23		Article 6	P12.Ch 6

Question/ Comment	Some nuclear installations in UK were built in 60’s of 20 century, and are coming to the end of life cycle. What measures are taken by the regulatory body to assure the operation safety for these installations?
Answer	The regulatory body in the UK requires that the licensees of all nuclear installations have appropriate arrangements in place to ensure that they are operated safely. This includes the need to have a plant maintenance, inspection and testing schedule. On older plants this places greater emphasis on the monitoring of ageing degradation processes. The UK regulatory body monitors licensees’ compliance with these arrangements by carrying out regular site visits and causing the licensees to review the safety of the plant on occasions such as reactor start-ups. Also, for each nuclear power plant, the licensee is required to carry out a Periodic Safety Review every 10 years of which ageing is an important facet.

Seq. No	Country	Article	Ref. in National Report
24		Article 6	§6.20 - p. 17

Question/ Comment	The report mentions that an "essential element of the review is for all structures, systems or components susceptible to ageing or wear-out to be examined…particularly for aspects that may eventually result in unacceptably reduced levels of safety". However the report does not mention any example of such an element nor any example of limit criteria. In , one of the criteria on which the decision of ceasing operation of natural uranium gas graphite reactors series was the loss of carbon mass of the graphite core structure due to oxidation by carbon dioxide flow. A corresponding limit was set in order to prevent safety concern due to possible graphite through wall cracks likely to induce gas coolant bypass from the fuel channel towards the control rod channel therefore leading to potential fuel elements melting. Could UK operator or regulator elaborate about the end of life criteria or equivalent in use for the Magnox reactors to prevent such problems?
Answer	Graphite reactor cores suffer from potential problems of both weight loss and graphite cracking. In the UK we operate two types of reactor with graphite cores. The Magnox reactors are fuelled with natural or slightly enriched uranium metal fuel clad in a Magnox can while the Advanced Gas Cooled Reactors (AGR’s) are fuelled with enriched uranium oxide in stainless steel

cans. In both cases the graphite core provides a lattice which allows the movement of control rods and the passage of carbon dioxide to cool the fuel. The fuel construction and gas flow are different in the two designs. The AGR design is much less sensitive to the effects of graphite brick cracking as the fuel is contained in an integral sleeve which maintains gas flow through the fuel even if the fuel channel graphite itself contains cracks. Cracking in Magnox reactors could lead to gas coolant bypass if wide enough cracks were to develop in the fuel channels.Loss of graphite mass leads to a loss of strength which combined with the build up of stresses due to irradiation increases the likelihood of brick cracking as the reactor cores get older. Unlike the AGR's where cracking has been found in the graphite bricks no significant cracking has been seen in any of the Magnox reactor cores. The UK has taken a multi legged approach to managing the potential cracking problem that consists of: predictions of component and core condition; assessing the tolerance of the core safety functions to any predicted damage; assessing the consequences of core damage for safety function; monitoring of core condition during plant operation; and inspection and sampling during reactor outages to ensure that the core is behaving as predicted. The precise limit criteria that would bring about an end to reactor operation would be based on an overall judgement about the strengths of the various legs of the safety case and the confidence that NII has in further safe operation. This is not a new approach in the UK. In the early 1990's the reactors at Trawsfynydd ceased operation following a lack of confidence that they could be operated with the steel reactor pressure vessels in a ductile state.The reactors with the most at risk cores have had their outages extended until sufficient information has been collected and analysed to give the NII the confidence to allow them to return to service.

Seq. No	Country	Article	Ref. in National Report
25		Article 6	Chap. 6.1, P. 12

Question/ Comment	Many Magnox reactors are in the state of shut down, defueling or decommissioning. What types of licenses are granted for these activities?
Answer	Decommissioning plant must comply with the same licence and licence conditions as operating plant. However the regulatory control for decommissioning is derived from licence condition 35 and the arrangements made by the licensee to comply with this condition. (See Annex 5 to UK national report). During the decommissioning phase the licensee must also comply with other licence conditions. The arrangements made under some of these conditions may change as the plant moves from operation to decommissioning. For example maintenance arrangement (licence condition 28), operating Rules (licence condition 23) will be different for a decommissioning station.

Seq. No	Country	Article	Ref. in National Report
26		Article 6	Paragraph 6.2

Question/ Comment	It is noted from Paragraph 6.2 that the first nine nuclear installations in the UK had steel pressure vessels. For those that remain in operation, what, in very brief outline, is the basis of the safety case that has been used to satisfy the regulator that the PVs remain fit for purpose? In particular what type of analysis has been undertaken to demonstrate that neutron embrittlement will

not compromise their integrity during the remaining projected operational lifetime?

Answer The current basis for the structural integrity safety case for the Magnox steel Reactor Pressure Vessels has been in place for a number of years. The current basis applies to the two remaining operating Magnox steel RPV stations, Sizewell A and Dungeness A and applied to the later of the closed stations. The Sizewell A and Dungeness A reactors are scheduled to close at dates in 2006.

The Licensee's basis for the structural integrity safety cases of the steel RPVs is to consider the following general aspects:
1. A qualitative review of design, construction and operation;
2. A quantitative analysis to show defect tolerability, that is the ability of the pressure vessel to tolerate the presence of defects, especially crack-like defects;
3. Consideration of the role of forewarning of failure, mainly the ability to detect leakage of CO2 gas;
4. Claims for demonstration of integrity through the proof pressure test done at the time of construction.

In considering items 2 to 4 above, the Licensee takes account of the changes in material properties due to neutron irradiation (and other ageing mechanisms e.g. thermal ageing) to the end of operating life.

In assessing such cases, NII has placed most emphasis on the quality of design, construction and operation, and defect tolerability.

Until 2001, the structural integrity safety cases for the Magnox steel RPVs were revised and re-issued annually. Now, for the two remaining operating stations, there is an annual review but not a complete re-issue of the safety case.

One output from the RPV safety cases is the definition of Operating Rules for the RPVs, in terms of maximum pressure, minimum and maximum temperatures of operation, and maximum temperature differentials between certain regions of the vessels. The Operating Rules are set to ensure operation of the RPVs is within the assumptions and limits of the safety case. NII takes a particular interest in the proposed Operating Rules. The last full safety cases for the remaining operating Magnox steel RPV stations set out Operating Rules which, subject to annual review of operations, will apply to the end of operations in 2006.

During the years of annual full re-issue of RPV structural integrity safety cases, there was considerable effort from the Licensee to locate and review detailed documentation from the time of construction. This information shows the vessels were built to good standards. The information reviewed covers such matters as the plate materials of construction, weld procedures and consumables, post-weld heat treatment and inspection of welds. The Licensee has also reviewed processes and procedures for construction against

current standards.

There was also detailed consideration of the steady-state temperature pattern around the RPVs, how this became established during start-up and declined during shut-down. This work included installation of extra arrays of thermocouples in specific regions.

Manufacturing inspection of welds was predominantly by radiography. One aspect of the Licensee's later safety cases was a programme of research to evaluate the ability of radiography as applied during construction to detect crack-like defects in welds.

The quantitative analysis of the ability of the Reactor Pressure Vessels to tolerate the presence of defects is based on:

- Operational loading conditions, including consideration of faults and hazards loadings;
- Evaluation of stress levels from the loading conditions;
- Knowledge of material properties especially strength (yield and ultimate tensile strength) and fracture toughness.

The fracture analyses demonstrate margins in hand for postulated defects of sizes which take account of the ability of the original manufacturing examinations. A particular feature of Magnox RPV operation is the absence of any credible, significant fatigue loading mechanism.

In recent years a typical safety case would include analyses for 20 or more locations around the RPV, representing characteristic combinations of material, stress condition, irradiation level and temperature.

Prediction of the effects of neutron irradiation on the fracture toughness of ferritic steel plates and welds of Magnox RPVs is based on a combination of:

- Surveillance and test specimen irradiations and mechanical and metallurgical testing of the specimens. Estimates of neutron doses to surveillance and test reactor specimens and the temperatures of irradiation are vital parts of this aspect;
- Statistical evaluation of the various test results;
- Estimates of neutron dose to the various locations on the RPV (in terms of displacements per atom (dpa) created by fast and thermal neutrons), and importantly the temperatures at these locations.

The basic parameters which are evaluated for change due to irradiation are:

- Temperature of the transition in toughness from brittle to ductile;
- Change of fracture toughness as temperature increases through the transition region;
- Upper shelf (that is ductile) toughness;
- Yield strength.

Parameter values are expressed on the basis of statistical lower bounds.

For some years NII has explicitly require normal steady-state operation of ferritic steel Reactor Pressure Vessels to be on the upper shelf of toughness ("Statement on the Operation of Ferritic Steel Nuclear Reactor Pressure Vessels", International Journal of Pressure Vessels and Piping Vol 64 pp307-310 (1995)).

The general mechanisms by which neutron irradiation causes embrittlement of ferritic steels have been studied for many years worldwide and are reasonably well understood. The material embrittlement arises from the precipitation of Copper particles, matrix damage and grain boundary segregation of trace elements such as phosphorous. The presence of Copper in base materials arises from the content of scrap in steelmaking feedstock and arises in Submerged Arc welds due to the past practice of coating SA weld consumables with Copper.

The nature of Magnox RPV steels, the neutron doses and irradiation temperatures mean that data collected worldwide for other reactor systems such as PWRs are not directly applicable. Accordingly the Licensee had to develop its own means for estimating the specific effects of neutron irradiation on the toughness and strength properties of Magnox steel RPV materials.

Classically, neutron irradiation embrittlement has been assumed to be dominated by the effects of fast neutrons. However for the relatively low neutron fluencies of Magnox steel RPVs, it was realised some years ago that thermal neutrons can have an embrittling effect. Accordingly, all materials data have been correlated with dpa evaluated from thermal neutrons ($E<1keV$) in addition to fast neutrons ($E>1keV$).

All the Magnox steel RPVs are made from medium-strength, Carbon-Manganese plate material and similar composition forgings. The base materials are joined with either Submerged Arc or Manual Metal Arc welds. The weld consumables are matched to the base materials and are also similar across the stations. The overall size and similarity of reactor core construction means peak neutron dose versus time of operation is similar across the Magnox steel RPV stations. All other conditions being constant, Submerged Arc Welds usually show the greatest sensitivity to neutron irradiation; due to the Copper content from the coating on consumables.

The materials surveillance programmes comprise Charpy and tensile specimens of the various material forms. For similar materials and irradiation conditions, the surveillance data has tended to be pooled. In addition to original surveillance specimens, in recent years material removed from the closed Trawsfynydd station steel RPV has been used to support and extend the surveillance programmes for the remaining stations (Curry A., Clayton R., "Remote Through-wall Sampling of the Trawsfynydd Reactor Pressure Vessel - An Overview", Nuclear Energy Vol 36 No1 pp59-64 (February 1997)). In particular, direct fracture toughness measurements have been made on Trawsfynydd RPV materials for a range of cumulative doses. This has

provided confirmation of the Licensee's methodology for estimating irradiated fracture toughness properties.

The last surveillance specimen withdrawal from an operating station was made at Sizewell A in 2004. With the maturity of the estimation methods, such surveillance specimen results are now used to confirm expected trends. For the remaining operating stations, the peak neutron doses of tested surveillance specimens exceed the predicted peak doses to the RPVs to end of life.

The approaches to predicting irradiation embrittlement in the UK (including Magnox materials) are summarised and reviewed in:

Knott J F., English C A., "Views of TAGSI on the Principles Underlying the Assessment of Mechanical Properties of Irradiated Ferritic Steel Reactor Pressure Vessels". International Journal of Pressure Vessels and Piping Vol 76 pp891-908 (1999).

Seq. No	Country	Article	Ref. in National Report
27		Article 6	Paragraph 6.4

Question/ Comment	According to Paragraph 6.4 , the UK’s gas cooled reactors (unlike light water reactors) do not need secondary containment because for design basis accidents the reactor transient does not precipitate large scale fuel failure. While accepting that gas cooled reactors are more forgiving than light water reactors in relation to loss of cooling accidents, what in very brief outline is the basis for this statement, in particular for reactors with steel PVs?
Answer	As you state in the question, the key factor is that primary circuit failure will not precipitate fuel failure. Analysis shows that, in the event of a guillotine failure of a gas duct, the resulting rarefaction pressure wave across the core will not initiate fuel failure. Analysis also shows that and flow stagnation following duct failure will not prejudice fuel integrity. In addition, during normal operation, the gas circuits on Magnox reactors run clean. Because Magnox reactors can be refuelled on load, any failed fuel can be dealt with immediately. This is not the case on LWRs. They may operate for long periods with failed fuel (between refuelling outages).

Seq. No	Country	Article	Ref. in National Report
28		Article 6	P.14-18

Question/ Comment	We are informed that in the UK, PSR is undertaken as a measure for Ageing. We would like to ask the following questions whether there is a legal requirements for PSR or not. (1) We would like to know the items, object and its outline of PSR and also would like to know whether PSR is regulatory requirements or not.If PSR is regulatory requirements, is there any penalty if a licensee violates the requirement of PSR? Is there any additional requirement for a ageing plant? (2) In the UK, is there any "management programme" for ageing to inspect, evaluate, repair and maintain an ageing plant? If you have such programme, is there any penalty if a licensee violates the

	programme? (3) If there is any falsehood in the report(s) according to this "management programme", is there any penalty for licensee? (4) We would like to know how you detect and evaluate such falsehood.
Answer	There is a legal requirement to carry out PSRs. This is specified in Licence condition 15 (see Annex 5 to the UK national report). For each PSR the scope and content of the work is agreed between the licensee and NII (the regulator). Once agreed the implementation of the programme becomes mandatory unless the regulator agrees changes. The licensees' arrangements for a PSR also specify a completion date. This date becomes a mandatory requirement. Although failure to complete a review satisfactorily is technically a breach of a licence condition the major sanction is that the plant would not be allowed to operate until the review had been completed to the satisfaction of the regulatory authority. The overall objectives of a PSR are to are to: - provide assurance that the plant is adequately safe; - look forward to the next 10 yearly review and ensure that programmes are in place to maintain safety (e,g ageing management); - identify, and compare with, current safety standards and implement any reasonably practicable safety improvements. Ageing management programmes will be part of the arrangements made by the licensee under licence condition 28 (see Annex 5 of UK report). Non compliance with any licence condition, or the arrangements made there under, constitutes an offence and could be dealt with by the courts. Detection of any false reporting would primarily rely on the planned inspection programmes carried out by NII site inspectors.

Seq. No	Country	Article	Ref. in National Report
29		Article 6	P.15,L.14

Question/ Comment	It is reported that "HSE reports the out come for the human factor items in the periodical safety review (PSR)". Does the PSR report for all the concerned nuclear power plants describe human factor items in each report? Please show the specific event. Is the safety culture reported in the human factor item?
Answer	PSRs are completed on an individual station basis, and comply with IAEA guidance on PSR. Safety Culture assessment is a component of the second PSRs on the UK AGRs

Seq. No	Country	Article	Ref. in National Report
30		Article 6	P.12,L.12

Question/ Comment	In the UK, 18 reactors were already decommissioned or shut down. In 18.1, it is stated that "In the UK no new nuclear power plants are planned or have been constructed since Sizewell B in the 1980s. " How does the UK fill up this deficiency of electricity? Does the UK consider that the nuclear power is not preferable?
Answer	It is true that over the next decade, some older nuclear plants are due to close.

But nuclear will continue to play an important part in the generation mix in the future. We also expect renewables and gas-fired generation to play an increasingly important part. And we haven't ruled out the option of new nuclear build in the futureWe must, of course, retain the option of new nuclear build for the future, and we are taking steps to ensure this. But new nuclear build is currently economically unattractive - no one is coming forward with proposals for new build. And of course, there are important and difficult issues around the disposal of nuclear waste to be resolved. In the UK's liberalised energy market, in common with all generation options, the initiative for bringing forward proposals to construct new plant lies with the market.

Seq. No	Country	Article	Ref. in National Report
31		Article 6	P12

Question/ Comment	A list of nuclear power plants is provided in this article. It is noted that several plants have been shutdown or are being de-fueled or decommissioned. Please provide information on the knowledge management programs being pursued by the regulator or the industry to cope with the situation.
Answer	NPPs' organisational and technical arrangements change when the NPP moves from the operation phase, via de-fuelling, to decommissioning. NPPs have gone some way to standardise arrangements and there has been learning from the changes resulting in the application of common methods. In addition to arrangements for the control of plant and process modifications all licensees have a requirement, under Licence Condition 36, to manage organisational change. Part of this is to ensure that sufficient technical skill is retained within the licensee's organisation and that the NPP can remain as part of a competent licensee organisation and have sufficient and appropriate resources to control and supervise contractors used to support the work of the NPP. The site licence (licence condition 6) for each site requires documentation related to plant safety to be preserved for 30 years or such period as approved by the regulator. The period of 30 years would commence when decommissioning and decontamination was complete. In respect of the knowledge and experience of plants and their management, arrangements are in place to ensure effective communication and common standards based on best practice. Significant movement of staff also takes place so that, for example, staff from a site where decommissioning work is well advanced transfer to sites approaching the end of the operational phase. Other examples of knowledge management concern the maintenance of key knowledge and skills. Procedures are in place to ensure that for all nuclear safety related competencies, staff are always available within the licensee organisation to act in the role of intelligent customer. Lastly, all licensed sites have a nuclear safety committee that considers all key matters affecting safety; these committees have a number of independent members from outside the licensee organisation with industry experience at a senior level. Under current arrangements the Committees have a substantial degree of common membership, which facilitates the transfer of knowledge and experience between sites.

Seq. No	Country	Article	Ref. in National Report
32		Article 6	

Question/ Comment	Have any state, public or private organisations analysed the effect of NPP decommissioning, and what are the main findings of the analysis? What power generating facilities are to substitute NPPs?
Answer	Substitution generating sources is not a matter for the Convention on Nuclear Safety. However it is true that over the next decade, some older nuclear plants are due to close. But nuclear will continue to play an important part in the generation mix in the future. We also expect renewables and gas-fired generation to play an increasingly important part. We haven't ruled out the option of new nuclear build in the future. We must, of course, retain the option of new nuclear build for the future, and we are taking steps to ensure this. But new nuclear build is currently economically unattractive - none of the utilities are coming forward with proposals for new build. And of course, there are important and difficult issues around the disposal of nuclear waste to be resolved. In the UK's liberalised energy market, in common with all generation options, the initiative for bringing forward proposals to construct new plant lies with the market. This issue of decommissioning may be covered by the UK’s second report of the Joint Convention.

Seq. No	Country	Article	Ref. in National Report
33		Article 7	§7.27 to 7.29

Question/ Comment	In sections 7.27 to 7.29, it is explained how the HSE controls the budget of the NII. However, the NII is not the only body that depends from the HSE for its budget. How is it ensured that the NII gets adequate staffing and financial resources independently of the priorities in other bodies?
Answer	Please see answer to Question Sequence number 1 also asked by

Seq. No	Country	Article	Ref. in National Report
34		Article 7	Item 7.30/53 pag.29

Question/ Comment	Since the Town and Country Planning Act was issued in 1990, after all plants have been constructed, what legal environmental requirements were used to licence the initial construction? What was the real impact of the new legislation in the existing plants? What was done to adapt old plants to the new legislation?
Answer	Section 71A of TCPA (added by the Planning and Compensation Act 1991 s 15) provides for regulations to be made requiring consideration of the environmental effects of a proposed development before planning permission is granted. No such regulations have been made, except that the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 prohibit the granting of planning permission for an installation for the production of nuclear fuels, unless the granting authority have taken the environmental considerations into account.There are no obvious provisions in TCPA for the retrospective application of planning requirements to nuclear plant already in existence at the time the Act came into force.The Nuclear Installations Act 1965 provides for new nuclear installations to be licensed by the HSE and conditions which apply include provision with respect to the design, siting and construction of any plant, as well as the measures for dealing with an emergency. Therefore, prior to the TCPA legal environmental

requirements already existed to licence the initial construction of plants and these remain in force now.

Seq. No	Country	Article	Ref. in National Report
35		Article 7	7.28, page 25

Question/ Comment	Paragraph 7.28 states that “Section 24A of the NIA65 enables HSE to impose a financial charge on the nuclear licensees to recover the expenses incurred …” How does the capability of the HSE, or its funding allocation, depend upon the extent of the expenses recovered from the nuclear licensees?
Answer	The HSE is funded by UK Government via its sponsoring Department, the Department of Works and Pensions (DWP). It is funded on a ‘Grant in Aid’ basis i.e. the net difference after income has been taken into account. HSE is also required to adhere to stipulated spending limits for different categories of expenditure. The level of income is therefore crucial to HSE in balancing its accounts and remaining within the Grant in Aid limits. However, the NII is only one element of HSE and subject to HSE priorities in general, HSE can redirect resources to and from any part of HSE, as it feels necessary. In the case of NII therefore, the HSE may for example, determine that it requires additional resource. If that resource were to be employed on non chargeable activities HSE would have to reduce the funding allocation of one or more parts of HSE in order to increase NII’s funding allocation. It could alternatively approach DWP for an increase in its allocation. If the resource where to be used on chargeable activities then HSE could increase NII’s allocation commensurate with the amount of income to be generated without redistribution from elsewhere in HSE. Normally about 97% of NII’s activity is recoverable from the industry but because HSE’s overhead costs relevant to NII licensing activity are also recovered, income at least matches total expenditure for NII and the extent of the expenses recovered is always sufficient.

Seq. No	Country	Article	Ref. in National Report
36		Article 7	P19Ch7

Question/ Comment	There are two important Acts in UK’s nuclear safety regulatory system, The Health and Safety at Work (1974) and Nuclear Safety Act (1965). Are there any modification or revision for these two Acts? Can they meet the current regulatory requirements for Nuclear industry in UK?
Answer	Nuclear Installations Act 1965 Only minor and administrative additions and amendments have been made to the NIA65, including by the legislation detailed below, but essentially the same framework exists as in the original Act. Atomic Energy Authority Act 1971 s 17 - Changes to the administration of permits provided for by Section 2 of NIA65. Nuclear Installations Act 1965 (Repeals and Modifications) Regulations 1974 - made as a result of the creation of HSE and HSW Act in 1975, and having the effect of transfering responsibility for licensing and enforcement from the Secretary of State to HSE.

Health and Safety at Work etc Act 1974

The Act has been largely unchanged by amendments and modifications since its implementation and remains as goal setting legislation. The Act places general duties on an employer to protect so far as is reasonably practicable the health, safety and welfare of his employees, and other persons who are not his employees but who may be exposed to risks arising from his work activities. HSWA is an enabling Act and more recent secondary legislation that has been introduced has improved the framework for controlling health and safety risks in all workplaces including nuclear plant, such as the Management of Health and Safety at Work Regulations 1999, Provision and Use of Work Equipment Regulations 1998, Workplaces (Health, Safety and Welfare) Regulations 1992.

In summary, the extracts given in the UK's third report are up-to-date. The acts provide a flexible system of regulation, which meet current requirements for the UK's nuclear industry. If in the future this is found not to be the case the UK will investigate ways of meeting the potential new situations before the situations present adverse nuclear safety conditions.

While it is true to state that the Acts have not changed much overtime, the same cannot be said for the conditions attached to the licences. These legally enforceable conditions have evolved over time and will continue to do so as new nuclear site safety requirements become evident.

Seq. No 37	Country	Article Article 7	Ref. in National Report

Question/ Comment: The Nuclear Installation Act (NIA65) is nearly 40 years old. Please, give some information regarding its amendments and reasons for them.

Answer:

NIA65

Only minor and administrative additions and amendments have been made to the NIA65, including by the legislation detailed below, but essentially the same framework exists as in the original Act.Atomic Energy Authority Act 1971 s 17 - Changes to the administration of permits provided for by Section 2 of NIA65.Nuclear Installations Act 1965 (Repeals and Modifications) Regulations 1974 - made as a result of the creation of HSE and HSW Act in 1975, and having the effect of transfering responsibility for licensing and enforcement from the Secretary of State to HSE.

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Seq. No 38	Country	Article Article 7	Ref. in National Report

Question/ Comment	The Safety Assessment Principles (SAP) and Tolerability of Risk (TOR) documents were translated and published by the Czech regulatory body in early 90-ties and they are very valuable document. Is their status similar to TAG and represents the envelope of TAGs?
Answer	The TOR document was written by HSE to provide a framework for addressing how tolerability of risk considerations should be taken into its decision-making. For operational purposes, HSE inspectors use the framework as a basis for negotiation with duty-holders when deciding the question of whether and what 'more should be done' by duty-holders to reduce risks ALARP. It is important to remember that the TOR framework has no legal status; HSE uses it, as a matter of policy, to decide how hard inspectors should push duty-holders to do more, i.e. to determine what measures are to be considered as not involving grossly disproportionate cost and, therefore, required of the duty-holder. The SAPs were written not as policy but as guidance to inspectors when making judgements as to the adequacy of safety cases submitted under the requirements of a nuclear site licence. It was written with the aim of being consistent with the TOR policy framework. The TAGs were written to provide additional detailed guidance when that was found necessary and in some instances where gaps had been identified in the SAPs. Many aspects of the SAPs have no supporting TAGs. The SAPs should not therefore be thought of as the envelope of TAGs.The SAPs are currently under revision. Subsequently the TAGs will also be revised. The SAPs and TAGs have been benchmarked against IAEA Requirements and Guides. When reissued it is intended that in addition to providing assessment guidance to inspectors the SAPs should also provide operators with guidance as to the expectations of the regulator for the safety cases submitted to it.

Seq. No 39	Country	Article Article 7	Ref. in National Report

Question/ Comment	Can you provide some examples where the introduction of LC36 was effective and in details NII practical steps in this area.
Answer	The maintenance of adequate resources within a Licensee's organisation when significant changes to the operational status of a plant is planned can be

controlled by the regulatory body through the application of Licence Condition 36.

Licence Condition 36 requires the Licensee to make arrangements to control those changes to its organisational structure and resources that may have an effect on safety on its sites. Regulatory oversight of such changes is achieved by requiring the Licensee's arrangements to include a system of classifying these changes according to their safety significance. The Licensee must seek the agreement of the Regulatory Body before the higher category changes can be implemented. This prevents a licensee making organisational changes rapidly without allowing the regulatory body sufficient opportunity to assess the consequences.

A key component of the arrangements is the need for the Licensee to establish a process by which the baseline size and structure of its organisation is determined and substantiated. The baseline should substantiate the licensee's organisation and should develop an inventory of functions with the potential to affect safety. The baseline should then relate the structure and particularly the numbers of staff and their competencies needed to meet those functions. This baseline then forms the platform from which the effects of any individual changes can be assessed.

The arrangements to meet Licence Condition 36 must set out,
· The roles and responsibilities within the Licensee's organisation for planning and implementing organisational changes,
· A means of dividing these changes into appropriate stages,
· A process for proper assessment and review of implications of the changes,
· The allocation of effort for proper planning and
· The maintenance of records.

The Licensee's are also required to record all its proposals for organisational change in a register for each site. The Regulatory Body expects Licensee's to apply their arrangements to structures and resources, including staffing levels, finance, improvement programmes and research. This should apply not only to the site but also to the corporate centre and the influences of other organisations upon whom the licensee relies on for support for licence compliance e.g.: support organisations; headquarters corporate organisation; holding companies or parent organisation; and the result of moving staff to other organisations as the result of diversificationCurrently, NII is concentrating its efforts on changes to the organisational structure within the Licensee's, such as staffing levels, the use of contractors and ways of working, unless there are significant problems with changing resources, material assets or funding. Inspection of change registers and other Licensee's documentation associated with organisational change is now carried out on a routine basis

Seq. No	Country	Article	Ref. in National Report
40		Article 7	Paras 7.28 & 7.29

Question/ Comment: It is noted from Paragraphs 7.28 and 7.29 that the HSE and the EA are empowered to impose a financial charge on nuclear licensees to recover the

expenses incurred in regulatory activities. Are the NII and the EA satisfied that the charges actually levied cover the expenses incurred? What contribution, in round figures, do the charges make to the overall costs incurred by the licensee in running the plant?

Answer The NII Act states that HSE can recover its expenses with regard to its nuclear licensing activity. The system is therefore not the levy of a set charge or fee that carries a risk of over or under charging through its poor estimation but instead the recovery of actual expenditure. On this basis 100% of relevant expenditure is recovered from the industry. Relevant expenditure is calculated from information taken from NII's work recording system. The percentage of total effort recorded by HSE's Nuclear Inspectors on activity relevant to licensing work determines the percentage of NII's total expenses, which it can recover from the industry and is typically about 97%. In addition the number of staff NII has in post at any one time attracts a per capita overhead charge for HSE central services e.g. Personnel department functions, payroll services, accommodation, etc. This is also recovered from the industry using the same percentage calculation as for other expenses.

The environmental Agencies are required by government to recover its costs of regulation from those that are regulated. The agencies have the power, under the Environmental Act 1995 Section 41, to charge for environmental licences. For Authorisation for the disposal of disposal of radioactive waste from nuclear sites, charges are based on the actual time spent and the costs incurred in regulation. These charges cover both the regulatory officers' costs and the relevant organisational overheads such as central services.

We cannot say what element our charges represent of the licensee's total costs. There are 17 licensees from whom regulators recover expenses. Their overall costs will vary considerably but in the past larger licensees have indicated that regulatory charges are relatively small in comparison to other costs. As an example the fee BE pays to HSE is of order £7m per year, while EA fees are about an order of magnitude lower. The total regulatory bill is approximately £10m on an output of roughly 50TWh, the cost is equivalent to about 20p/MWh or around 1% of the total.

Seq. No	Country	Article	Ref. in National Report
41		Article 7	Paragraph 7.39

Question/ Comment According to Paragraph 7.39 the Nuclear Installation licensing system applies throughout the lifetime of the plant and can end only when the HSE has given written notice that in its opinion there has ceased to be any danger from ionising radiations from anything on the site. We understand that criteria for delicensing in terms of dose to critical groups have been drawn up. What is the current status of these criteria?

Answer Subject to no objections by the Health and Commission, a policy statement 'HSE Criterion for Delicensing Nuclear Sites' will be published this summer. The policy statement defines the criterion for 'no danger' – a requirement that needs be met under Sections 3(6)(b) and 5(3)(a) Nuclear Installations Act 1965 before the release of a licensee from his period of responsibility on the whole (or part) of a licensed site. HSE is drafting separate technical

assessment guidance, which will address the practical arrangements of applying the ‘no danger’ criterion, with a formal version expected to be published later in 2005.

Seq. No	Country	Article	Ref. in National Report
42	, Republic of	Article 7	

Question/ Comment	What is the exact criteria which you use to distinguish power reactor and research reactor ? What's the difference in licensing procedure, technical safety standards and regulatory inspection between the two?
Answer	We have no specific criteria to differentiate between the two categories of reactor. Research Reactors must comply with exactly the same licence conditions as power reactors. They are also subject to the same licensing procedures, must comply with the same safety standards and are subject to the same regulatory inspection programmes. Usually, because of the physical size and generally lower hazard the regulatory process on research reactors is less intensive.

Seq. No	Country	Article	Ref. in National Report
43		Article 7.2.2	P.30,7.53

Question/ Comment	What is the legal procedure that requests to the licensees of the modification of structure and components or amendments of operational procedure of existing NPPS when HSE noticed of new safety requirements based on the state of the art technology?
Answer	If a new safety requirement is identified during a PSR or at any other time, the regulator would in the first instance discuss and negotiate with the licensee a programme to implement the requirement. If this fails and, in the opinion of the regulatory authority, is still necessary in the interests of safety, the regulatory can use powers under the Health and Safety at Work Act to legally require a plant improvement. This is known as an “improvement notice”.

Seq. No	Country	Article	Ref. in National Report
44		Article 8	8.11, page 35

Question/ Comment	The report indicates that “most recent analysis showed projected recruitment needs were insensitive to a detailed understanding of the workload scenario beyond five years…” Please provide more details of the recent analysis of projected recruitment needs mentioned in this paragraph.
Answer	We have made a very detailed and careful analysis of our work and our resource projections. We have not only considered the work arising from the changing nature of the nuclear industry, but have also considered a realistic programme for halting and clearing the backlog of work over the next five years. To do this we have taken account of our expected retirement profile and a practical recruitment rate. The resource profiles have been compiled against current predictions of NSD’s activities based on our statutory responsibilities to administer nuclear licensing, existing government policy, known licensees requirements (such as the closure plan for reactors), the introduction of the NDA and nuclear site restoration programmes. The analysis did not address the possibility of any future new build programmes

in UK.

Seq. No	Country	Article	Ref. in National Report
45		Article 8	8.14, page 35

Question/ Comment	Paragraph 8.14 indicates that "GEMA has a duty to consult HSC on "…all electricity safety issues…" and to take account of the advice offered whether or not in response to such consultation. …. a Memorandum of Understanding has been drawn up between GEMA and HSE to provide a mechanism for consultation between the two parties where there is, or could be, an overlap of interests and particularly to ensure nuclear safety." Please expand on the means by which electrical safety or supply issues that may conflict with nuclear safety issues are resolved.
Answer	Both HSE and GEMA have their own well-defined statutory duties to perform. The Memorandum of Understanding(MoU) established between these two bodies sets out to ensure that there is a mutual understanding of the roles and responsibilities of each organisation, appropriate lines of communication are established and an effective working relationship is fostered and maintained. The implementation of the requirements of the MoU provides assurance to both bodies that they will not be adversely affected by the action or inaction of the other body. One of the principal means of implementing the MoU is through the regular liaison meetings that are held both at a senior management level and at a working level. These meetings provide a forum within which matters such as forward work programmes can be exchanged and issues of concern can be raised and addressed.

Seq. No	Country	Article	Ref. in National Report
46		Article 8	8.29, page 38

Question/ Comment	The report indicates that "it is approximately 10 years since the SAP's and other internal guidance like TAGs was last revised and HSE is currently undertaking a review of these documents by benchmarking them against relevant IAEA nuclear safety standards to identify potential gaps and shortfalls. This work is due to be completed by the end of 2005." What is the relationship between the timing of the review of the SAP's and that for the performance of the PSR's listed on table 6.1?
Answer	There is no relationship in the timing. The work to review and revise the SAPs is a project whose timing is purely related to available resources. When published there will be a period of public consultation followed by an implementation strategy. The latter is yet to be written but will recognise that it may be unreasonable to switch from the old SAPs to the new for the assessment of safety case submissions that are well advanced.

Seq. No	Country	Article	Ref. in National Report
47		Article 8	P31Ch 8

Question/ Comment	According to the report, some nuclear installations in UK will be decommissioned in near future. What regulatory measures will be taken by Regulatory Body for decommissioning nuclear installations ?
Answer	Regulation of decommissioning is a matter covered by the Joint Convention of the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. This will be covered in the UK's report to that Convention due for submission in October 2005.

Seq. No 48	Country	Article Article 8	Ref. in National Report

Question/ Comment	How often UK regulator and licensees have used the IAEA safety services - when NII will invite the IRRT mission?
Answer	The UK is closely involved in a wide range of activities in association with the IAEA. UK representatives participate in many IAEA working groups and events. These include that preparation of standards, advice and guidance on nuclear safety matters. In addition the standards developed nationally for the UK nuclear industry make extensive use of the IAEA nuclear safety standards and related documents. HSE does not currently have plans to request an IRRT mission. Similarly, the UK's nuclear power station licensees have not requested IAEA missions

Seq. No 49	Country	Article Article 8	Ref. in National Report

Question/ Comment	What is the difference between the position of HSE`s director for nuclear safety and HM Chief Inspector for nuclear Installations?
Answer	The Chief Inspector has delegated responsibility from the Health and Safety Executive to ensure the Nuclear Installations Act statutory provisions in the Health and Safety Act are met by nuclear site licensees. In addition, as a director on the Health and Safety Executive's Board, the Chief Inspector has additional responsibilities of a corporate nature. In this role he/she is referred to as the Director of the Nuclear Safety Division (of HSE).

Seq. No 50	Country	Article Article 8	Ref. in National Report

Question/ Comment	Majority of UK Magnox plants was closed or will be closed till 2010. Please describe the regulatory experience with this process particularly how the licensees have maintained the plant personnel motivation and safety culture of affected plants.
Answer	The Licensees ie ME and BNFL have applied LC 36 arrangements to move from operation through de-fuelling to decommissioning. This process has resulted in a staged reduction of site complement as the scale of site activities falls. Decommissioning will require a number of current ME staff to oversee the work much of which will be carried out by contractors. The individuals who have left the organisation have been given incentives or have been assisted in seeking other employment. The extended time scales culminating in closure have allowed individuals to come to terms with the situation and provided the licensees with sufficient time to manage the process. Site infrastructures have been maintained in line with the decline in staff such that personnel functions including training programmes have continued. Counselling programmes have been carried out for all personnel affected by the changes. As the stations progress from the generation phase through defuelling and into decommissioning preparation, the staffing levels reduce and the skills required changes. Given that the first Magnox station ceased generation in 1989, the staffing requirements are well understood by management and the work force. A major consideration is to ensure that as the work load reduces a

core of key skills are maintained to ensure that regulatory requirements continue to be complied with. It is essential to ensure that at all times the licensee organisation can act as an intelligent customer when goods and services are procured from outside the licensee organisation. In addition the infrastructure supporting safety that has been successful during the generation phase is maintained through to the decommissioning phase.

Many of the staff at the Magnox stations were recruited in the early years of operation so they are now approaching retirement. This makes it easier to mangage the run down in staff numbers because it limits the number of staff that will need to seek employment elsewhere. To encourage experienced staff to remain at the stations and not leave prematurely a commitment have been made by the company to provide favourable severance terms to staff who continue to work up to the time when their services are no longer required. This commitment has been successful in acheiving its objective to date and staff motivation has been maintained.

Seq. No 51	Country	Article Article 8	Ref. in National Report

Question/ Comment	How frequently the various (4 levels) meetings between UK regulator and licensees have been held?. What in the character of conclusions of such meetings?
Answer	Level 1 meetings between the UK regulator and each licensee are at the most senior level and are typically annual or biannual. They discuss safety policy, safety strategy, regulatory strategy and major safety issues. Level 2 meetings are a similar frequency. They involve a lower tier of senior management and consider programming and major or generic safety issues. The Level 3 and 4 meetings are much more frequent. They involve working level licensee staff and nuclear inspectors discussing safety issues as required. Level 1,2 and 3 meetings have agreed records and actions; level 4 meetings are informal and are used to exchange information.

Seq. No 52	Country	Article Article 8	Ref. in National Report

Question/ Comment	The National Report states that NII doesn’t use TSOs, which seems to be rather unique among regulatory bodies. Which type of technical expertise is not available at NII and how high is the support budget for this purpose?
Answer	NII has technical expertise that cover most situations. However there are occasions when we have not sufficient staff in a particular area or occasionally require very specialist advice. I these cases we have “call-off” contracts with several organisations that can be implemented quickly to supplement our resources. There are established procedures for doing this that includes a check on the independence of a proposed contractor. It should also be noted that it is our own specialists that would manage the external support and ultimately take any regulatory decisions arising from the work. The NII budget for this work is around two million UK pounds per year.

Seq. No 53	Country	Article Article 8	Ref. in National Report

Question/	The assistance programs to states of C/E Europe have been beneficial and

Comment contributed to safety enhancement of nuclear safety of nuclear facilities and strengthening and stabilisation of regulatory regime in those countries.
It has been always stated that the assistance program is both way process.
What have been major benefits of these activities for UK regulator and licensees?

Answer In addition to the exchange of views and practises with the states of C/E Europe, the programme provided a vehicle for Western European Regulators to compare and contrast practices with each other. However one of the major benefits arises from explaining national practises to someone else. It is at this time that one becomes aware of any possible national shortcomings and inconsistencies. The accession of countries of C/E Europe to the European Union also identified the need, and created the opportunity, to review nuclear standards within Europe. This is being taken forward in, for example, the WENRA forum. In UK we are currently reviewing our standards against IAEA requirements. Although it is not possible to attribute this directly to past work with C/E Europe, this probably influenced the timescale for carrying out this work.

Seq. No	Country	Article	Ref. in National Report
54		Article 8	

Question/ Comment The National Report states that NII has HF specialists available in its staff. Can you, please, describe in more details their recruitment, training, experience etc?

Answer NII's HF specialists all hold formal qualifications in either psychology and/or human factors, and these tend to be higher degree qualifications (MSc/PhD). The qualifications of our current HF specialists range from and include BSc Psychology, MSc in Human Factors and PhD in Training for Diagnosis. Our policy is only to recruit specialists with recognised formal qualifications, and a substantial nuclear industry background, or equivalent high hazard industry experience (all of our current HF specialists have a background in the UK nuclear industry). In addition our expectation is that they will be a professional member of the Ergonomics Society of Great Britain, or have the qualifications and the experience to apply for membership.

Seq. No	Country	Article	Ref. in National Report
55		Article 8	

Question/ Comment What are the measures taken by the regulatory authority in order to prevent occurrence of similar problems?

Answer The background to this question is not clear - it appears that part of this question is missing. Therefore we are unable to answer now but would be pleased to discuss at the CNS meeting in April.

Seq. No	Country	Article	Ref. in National Report
56		Article 8	8.2, page 31

Question/ Comment What criterion is applied as regards notifying the public of events at nuclear and radioactive facilities, and with what degree of social acceptance?

Answer There are four separate tiers of reporting events to the public. Firstly nuclear licensees operate their own arrangements to routinely publish information about events which have potential local media or public interest in a site

newsletter. Secondly information about events that meet long standing specified public interest criteria are collated and published quarterly by NII on behalf of the Health and Safety Executive. Past reports are available on the NII website at http://www.hse.gov.uk/nsd/quarterly-stat/index.htm Thirdly financial rules require that information about significant events or incidents which may affect the financial performance of the private sector owned operators are published promptly. Finally in the case of an event with radiological consequences which do, or which have the potential to, directly affect members of the public there are notification arrangements in place as part of the licensees emergency response procedures.These arrangements have all been in place for some time without having raised any particular public concern.

Seq. No	Country	Article	Ref. in National Report
57		Article 8.2	P.8,L.1

Question/ Comment: In 1.33, it is stated that "The nuclear safety regulator in the UK does not use TSOs. Most of the expertise to regulate nuclear safety is available to the regulator through its own staff." And it also is mentioned that "The regulator has an extramural support budget and framework agreements, with some outside bodies known to be independent, to enable contracts to be placed quickly."

Could you explain how UK assures the neutrality to regulate nuclear safety? What kind of outside bodies does UK contract with?

Answer: The regulator carries out an annual review of the access to independent technical advice. If problems are identified, there are mechanisms to address them, such as providing guarantees of minimum work volume or giving research contracts. On occasions, if there is no independent source in the UK, arrangements will be made with organisations or individuals in other countries. The review and any such arrangements are reported annually to an independent advisory committee. Typically, the outside bodies are research organisations, universities or consultancies companies

Seq. No	Country	Article	Ref. in National Report
58		Article 9	Item 9.7 -pag.42

Question/ Comment: What additional Conditions are typically attached in the case of a PWR, besides the 36 Standard Condition already listed in NIA65(appendix 5)

Answer: There are no addition conditions attached to a PWR licence. However the arrangements made by the licensees to comply with the licence conditions may vary considerably between reactor types. As an example see Licence condition 23 (Annex 5 to UK national; report). This requires a safety case that will clearly vary between reactor types. It also requires the development of operating rules (tech specs) which will also differ considerably between reactor types, It should be noted that licensees compliance with its own arrangements is mandatory.

Seq. No	Country	Article	Ref. in National Report
59		Article 9	page 42

Question/ Comment: Could you provide more information on the notification procedure and the criteria for reporting/notification of the Regulatory body following an

	incident?
Answer	For completeness there are several distinct tiers to this response. Where the incident has given rise to an emergency response – ie it significantly affects the conduct of operations on site or either affects, or potentially affects, the safety of people off site then the response procedures are contained within the licensee's LC11 arrangements for dealing with emergencies on the site. These include requirements that NII and other responding agencies are notified immediately so that their own pre-planned emergency response arrangements can be initiated.Any events below this significance level are dealt with under the licensee's LC7 arrangements for dealing with incidents. Significant incidents affecting the safety of the plant or of individuals are notified promptly to NII; either to a member of the site inspection team or (out of hours) to a nominated manager, and are logged and subsequently tracked by the licensee in a site incident register. This category would include any breaches of requirements of Licence Conditions relating to the operating envelope of the plant or of its maintenance requirements and would also address the specific reporting requirements of the Nuclear Installations (Dangerous Occurrences) Regulations. Events of lesser significance are logged and tracked in a site event register which is routinely inspected by NII during site visits.

Seq. No	Country	Article	Ref. in National Report
60		Article 9	9.11, page 43

Question/ Comment	Paragraph 9.11 states that "the licensees and HSE also have a formal hierarchy for meetings to address and resolve issues arising from the regulatory processes" as indicated in Table 9.1. Is it intended that the process will flow from lowest tier (Level 4) up?
Answer	Level 1 meetings between the UK regulator and each licensee are at the most senior level and are typically annual or biannual. They discuss safety policy, safety strategy, regulatory strategy and major safety issues. Level 2 meetings are a similar frequency. They involve a lower tier of senior management and consider programming and major or generic safety issues. The Level 3 and 4 meetings are much more frequent. They involve working level licensee staff and nuclear inspectors discussing safety issues as required. Any issue which cannot be resolved at a lower level meeting is raised at the next level up but most issues are resolved without the need to refer up.Level 1,2 and 3 meetings have agreed records and actions; level 4 meetings are informal and are used to exchange information

Seq. No	Country	Article	Ref. in National Report
61		Article 9	

Question/ Comment	How is the extent of the insurance for potential damages to the public and environment, caused by nuclear installation prescribed? It is made by general rule of strictly defined by legal way?
Answer	The extent of the insurance required for potential injury to persons and damage to property arising from occurrences covered by the Paris Convention is prescribed by Act of Parliament, via section 19 of the Nuclear Installations Act 1965.

Seq. No	Country	Article	Ref. in National Report

62		Article 9	A9.4 P41
Question/ Comment	It is stated that regarding the financial responsibilities of the operator for potential damages to the public or the environment, British Energy is insured against its liabilities and the Government has its financial responsibilities as a contracting party to the Paris and Brussels Conventions. HSE seeks assurance from DTI on the issue of liability before issuing a nuclear site licence but does not have any review responsibilities. Who has the power to fix the extent of civil liability for an operator in case of various nuclear incidents? How are the financial responsibilities regarding potential damages to environment determined?		
Answer	The potential extent of civil liability for personal injury and damage to property arising from an occurrence covered by the Paris Convention is fixed at present by statute (in the 1965 Act), rather than by any person, though the actual extent of liability in a given case is determined by the court. The 1965 Act doesn't cover liability for wider environmental damage and liability for such damage would be determined by the court.		
Seq. No	Country	Article	Ref. in National Report
63		Article 10	§10.1
Question/ Comment	In section 10.1, it is said that: "HSC's and HSE's business is to ensure that risks to people's health and safety from work activity are properly controlled, in ways that are proportionate to risk, allow for technological progress and pay due regard to cost as well as benefits." How does the regulator balance costs versus benefits? What are the guidance or criteria used?		
Answer	This is really 2 questions: (i) The HSE has provided guidance on its general approach to regulation across all industries in Regulating Risks, Protecting People (R2P2) (www.hse.gov.uk/risk/raindex.htm). This document explains how the regulatory regime and approach are chosen in a proportionate manner to the perceived hazard and risk of the situation being regulated. R2P2 also outlines the decision-making paradigm that is the basis of UK Health and Safety law and how it is used. This paradigm requires duty-holders (licensees in the nuclear industry) to reduce and control risks to workers and the public so far as is reasonably practicable. We typically say that this means risks must be ALARP (As Low As Reasonably Practicable) which is essentially the same as ALARA taking into consideration social and economic factors. (ii) The fundamental consideration is that the sacrifice (money, time and trouble) of implementing measures to avert risk must be compared with the benefit, in terms of the risk averted. If there is a gross disproportion, in that the sacrifice is much higher than the benefit, then the duty-holder does not have to implement the measures. It is important to note that this is not a balance – and the degree of grossness in the disproportion increases as the risk increases. HSE has provided more guidance on ALARP in three documents on the internet (www.hse.gov.uk/theory/alarp.htm). A fourth internet document builds on these and provides more specific guidance on demonstration of ALARP in the nuclear industry (www.hse.gov.uk/nsd/tast/tast005.pdf). Articles 7, 8, 14, 15 and Annexes 7		

and 8 cover some aspects of how ALARP is used in nuclear regulation. Various published papers have covered the approach also (eg. Vaughan GJ, Safety Goals for Nuclear Materials and Radioactive Waste – the UK Regulatory Approach. PSAM7, Berlin June 2004).

Seq. No	Country	Article	Ref. in National Report
64		Article 10	§10.5

Question/ Comment	In section 10.5, it is said that: "However, the licensee is responsible for safety and is required to be an intelligent customer to ensure that any proposed reactor design meets its safety requirements." How is that requirement actually realized? What are the tools used to identify deficiencies in that respects?
Answer	Under UK law a Nuclear Site Licensee is responsible for safety on its sites, this responsibility cannot be delegated to any other party. This means that the Licensee must be in effective control of all activities carried out on its site. Recently there have been moves within the nuclear industry for the Licensee's to become more efficient and to explore different ways of working. This has resulted in Licensee's outsourcing a range of their activities through the use of external contractors. However, in order to comply with the law a Licensee must maintain an adequate capability within its own organisation to be able to understand the nuclear safety requirements for all activities carried out on its sites including those performed by any of its contractors. The attributes that a Nuclear Site Licensee must display in meeting its duties under the law in these circumstances, is referred to as the intelligent customer capability. The important features of this capability requires that a Licensee should have within its own work force, sufficient numbers of staff with the appropriate managerial, supervisory, and technical skills to understand the safety significance of actions proposed and undertaken by any of its contractors. The necessary capabilities within a Licensee will vary from case to case depending on the nature of the activities being undertaken. The regulatory body has developed a broad framework of attributes which it uses to form a judgment on the intelligent customer capability of a Licensee. This framework includes the requirement for the Licensee to show that it has the capability to: (i) understand the nuclear safety requirements of all of its activities relevant to safety, and those of contractors, to take responsibility for managing safe operation; (ii) understand its duties under the law, particularly duties as a nuclear site licensee;(iii) set, interpret and deliver safety and engineering standards relevant to the business; (iv) have sufficient breadth and depth of knowledge and experience to understand the safety feature of its plant(s) and the hazards it (they) present; (v) understand and support all aspects of the safety case and the facility operation over the full facility lifetime - including decommissioning and disposal; (vi) maintain and develop the corporate memory; (vii) ensure adequate numbers of suitably qualified and experienced staff are available to make the judgements pertinent to safety both now and in the

future.
(viii) When using contractors to, in the context of safety:- specify the work;- assess tenders and proposals;- choose an appropriate contractor;- supervise and manage the work;- ensure contractors staff are suitable qualified, experienced and trained;- ensure the required product or work quality is delivered; and- monitor the performance of the contractor, taking appropriate action if it is inadequate.The process of verifying that a Licensee has an adequate intelligent customer capability is determined using the normal regulatory tools of inspection and assessment across a range of the legal requirements placed on the Licensee including, the production of safety documentation, training of staff and control and supervision of operations.

Seq. No	Country	Article	Ref. in National Report
65		Article 10	§10.7 to 10.10

Question/ Comment	In sections 10.7 to 10.10, the report mentions policy statements of the licensees at corporate level. These statements are rather general. How are these statements translated into the day-to-day activities of the facilities? In what extent are they verified?
Answer	The policies of the licensees are translated into day-to-day activities by way of company specifications and management procedures. These cover common processes across the whole organisation, supplemented as necessary by local procedures.In so far as the licensees' procedures affect safety, they are verified through inspection by the regulatory body.

Seq. No	Country	Article	Ref. in National Report
66		Article 10	10.14, page 49

Question/ Comment	The report mentions that "on all matters related to nuclear safety the UK nuclear operating companies take advice from their Nuclear Safety Committees." Please clarify whether or not the results of the reviews conducted by the Nuclear Safety Committees of the licensees are shared with the HSE.
Answer	The licensees' Nuclear Safety Committees meet regularly to consider and advise on matters affecting safety. The proceedings of each meeting are recorded as "minutes" and these are sent to the HSE within 14 days of the meeting taking place, as required by licence condition 13 (8).

Seq. No	Country	Article	Ref. in National Report
67		Article 10	10.23, page 51

Question/ Comment	The report indicates that "the licensees' arrangements provide an effective allocation of responsibility between corporate functions and the local managers." Where does the "Safety and Regulatory Division" - mentioned on page 49, paragraph 10.15 - fit within the allocation of responsibilities described in paragraph 10.23, page 51?
Answer	"Health and Safety Division" (in 10.23 and 10.26) is a defunct term for what is now the Safety and Regulation Division. The allocation of responsibilities is the same.

Seq. No	Country	Article	Ref. in National Report

68		Article 10	Paragraph 10.11

Question/ Comment: It is noted from Paragraph 10.11 that British Energy is currently restructuring and relicensing. How has the NII satisfied itself, given the reports on BE's financial situation, that an acceptable level of nuclear safety will be assured at plants operated by BE?

Answer: Ensuring that nuclear plants are adequately safe is fundamental to HSE's oversight activities and entails ensuring licensee's compliance with the whole range of Licence Conditions.In this regard BE is no different to other licensees and HSE engages in debate and discussion at all levels within the licensee's organisation to understand and influence longer term plans and actions.Monitoring the continued safe state of the plant is a routine aspect of HSE's site inspection activities. Regulatory powers enable HSE to seek improvements and, in the extreme, require that unsafe plants are shutdown.HSE is not a financial regulator and it relies upon the Department of Trade and Industry, which is the sponsor of the industry in the UK, to monitor the financial well being of nuclear operators. The establishment by UK Government of the Nuclear Decommissioning Authority will ensure that all nuclear plants will be safely decommissioned.

Seq. No	Country	Article	Ref. in National Report
69		Article 10	P.45,L.6.

Question/ Comment: References: page 45, 10.4, Annex 7, A7.2 and Annex 8
In the references, basic concept of regulatory approach for risk control to general public is explained,
What is the burden to regulatory body in taking risk assessment into regulatory activity? How do you assess the effective of the approach?
Do you have any cost benefit criteria in relation to A7.2?

Answer: NII does not itself normally carry out any risk assessment; the Inspectorate assesses the safety case provided by the licensee. Article 14 describes NII's approach to assessment. Consideration of risk is fundamental to the UK approach of targeted, proportionate regulation and the concept of risks being ALARP is all embracing (see eg. Para 8.2.3.), as is clear from the number of times it is mentioned in Articles such as 7, 8, 10, 14, 15 and the relevant appendices. Note that by risk assessment we do not restrict ourselves to numerical risk estimates that result from PSA or equivalent techniques (see para 14.45). Regulatory risk assessment is, therefore, the totality of the process of assuring that the licensee's safety case is adequate and in this sense the question of 'burdens' is not one that can be answered as it is so basic to what we do. The Inspectorate, however, does not apply the same level of scrutiny to all safety cases: we sample the case (see para 14.46) which the licensee must have already subjected to independent assessment (LC14).We believe that the approach of requiring a wide ranging safety case (e.g. para 14.4ff) covering all operations affecting safety [LC23(1)] which shows appropriate application of good engineering practices and safety management systems, backed by safety analysis demonstrating that the legal requirements of risks being ALARP provides a sound basis for ensuring safety is achieved and maintained. The important aspect is to ensure that the safety requirements identified in the safety case, eg. the limits and conditions for safe operations [the Operating Rules, LC23(1)], are implemented and maintained on the

plant. This is checked through inspection procedures (see para 14.53ff). Reviews of these inspections are undertaken to ensure that appropriate measures are being taken to rectify any shortcomings.The fundamental consideration is that the sacrifice (money, time and trouble) of implementing measures to avert risk must be compared with the benefit, in terms of the risk averted. If there is a gross disproportion, in that the sacrifice is much higher than the benefit, then the duty-holder does not have to implement the measures. It is important to note that this is not a balance – and the degree of grossness in the disproportion increases as the risk increases. HSE has provided more guidance on ALARP in three documents on the internet (www.hse.gov.uk/theory/alarp.htm). A fourth internet document builds on these and provides more specific guidance on demonstration of ALARP in the nuclear industry (www.hse.gov.uk/nsd/tast/tast005.pdf). Articles 7, 8, 14, 15 and Annexes 7 and 8 cover some aspects of how ALARP is used in nuclear regulation. Various published papers have covered the approach also (eg. Vaughan GJ, Safety Goals for Nuclear Materials and Radioactive Waste – the UK Regulatory Approach. PSAM7, Berlin June 2004).

Seq. No	Country	Article	Ref. in National Report
70		Article 10	P.46,L.20

Question/ Comment: There is the description in section10.4 NS-R-1 3.1(6) that “ensure that a safety culture is maintained”.
How is it confirmed that a safety culture is maintained ?

Answer: NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes. NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year.UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this.Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the prevailing safety culture.

Seq. No	Country	Article	Ref. in National Report
71		Article 10	P.46,L.22

Question/ Comment: References : However, the licensee is responsible for safety and is required to be an intelligent customer to ensure that any proposed reactor design meets its safety requirements.
Whose customer is the "intelligent customer"? Please clarify the definition of the "intelligent customer".

Answer: Under UK law a Nuclear Site Licensee is responsible for safety on its sites, this responsibility cannot be delegated to any other party. This means that the Licensee must be in effective control of all activities carried out on its site. Recently there have been moves within the nuclear industry for the Licensee’s to become more efficient and to explore different ways of working. This has resulted in Licensee’s outsourcing a range of their activities through the use of external contractors. However, in order to comply with the law a Licensee must maintain an adequate capability within its own organisation to be able to understand the nuclear safety requirements

for all activities carried out on its sites including those performed by any of its contractors. The attributes that a Nuclear Site Licensee must display in meeting its duties under the law in these circumstances, is referred to as the intelligent customer capability. The important features of this capability requires that a Licensee should have within its own work force, sufficient numbers of staff with the appropriate managerial, supervisory, and technical skills to understand the safety significance of actions proposed and undertaken by any of its contractors.

The necessary capabilities within a Licensee will vary from case to case depending on the nature of the activities being undertaken. The regulatory body has developed a broad framework of attributes which it uses to form a judgment on the intelligent customer capability of a Licensee. This framework includes the requirement for the Licensee to show that it has the capability to:
(i) understand the nuclear safety requirements of all of its activities relevant to safety, and those of contractors, to take responsibility for managing safe operation;
(ii) understand its duties under the law, particularly duties as a nuclear site licensee;(iii) set, interpret and deliver safety and engineering standards relevant to the business;
(iv) have sufficient breadth and depth of knowledge and experience to understand the safety feature of its plant(s) and the hazards it (they) present;
(v) understand and support all aspects of the safety case and the facility operation over the full facility lifetime - including decommissioning and disposal;
(vi) maintain and develop the corporate memory;
(vii) ensure adequate numbers of suitably qualified and experienced staff are available to make the judgements pertinent to safety both now and in the future.
(viii) When using contractors to, in the context of safety:- specify the work;- assess tenders and proposals;- choose an appropriate contractor;- supervise and manage the work;- ensure contractors staff are suitable qualified, experienced and trained;- ensure the required product or work quality is delivered; and- monitor the performance of the contractor, taking appropriate action if it is inadequate.The process of verifying that a Licensee has an adequate intelligent customer capability is determined using the normal regulatory tools of inspection and assessment across a range of the legal requirements placed on the Licensee including, the production of safety documentation, training of staff and control and supervision of operations.

Seq. No	Country	Article	Ref. in National Report
72		Article 10	A10.26 P51 & 52

Question/ Comment	It is stated that the monitoring program of Health and Safety Division includes independent on-site inspections and reviews of various health and safety performance indicators. Please provide a list of the health and safety performance indicators. Are these indicators selected and determined by the licensee? Are there some indicators that are specified by HSE also?
Answer	Based on the experience of BNFL the three key safety performance measures that are constantly monitored comprise:

(1) the dose levels from ionising radiation experienced by site staff (employees and contractors),
(2) the incidence of events at Level 1 of the International Nuclear Event Scale and
(3) the incidence of dangerous occurrences as defined in Reporting of Injuries Diseases and Dangerous Occurrences Regulations(1995) and the Electricity Safety, Quality and Continuity Regulations (2002).

More detailed indicators for radiological safety include collective dose, mean dose, employees subject to doses >15mSv and >2mSv and the number of unplanned exposures >15mSv.

More detailed indicators related to nuclear safety include reportable events, operating rule breaches, maintenance schedule breaches, summons/prohibitions and improvement notices from the regulator, unit capability factors and unplanned shutdowns.

Seq. No 73	Country	Article Article 10	Ref. in National Report

Question/ Comment: What safety culture characteristics and indicators have been adopted in the United Kingdom for assessing safety culture status at NPPs?

Answer: · NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes.

· NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year.

· UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this.

· Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the prevailing safety culture.

Seq. No 74	Country	Article Article 10	Ref. in National Report Sections 10.27-10.31

Question/ Comment: Sections 10.27-10.31 describe that all British Energy's AGR plants have reported an overall improvement in nuclear safety culture. The sections discuss the importance of well-structured operating rules and instructions for safe operation and mention good British Energy's experience with revising the structure of Operating Rules (OR) or Technical Specifications (TS). It is stated that the mentioned structure (format) is in accordance with that used at the majority of best performing NPPs worldwide. However, it is not quite clear what is the major difference of the proposed format from the generally accepted one.
1) Technical Specifications (TS) have been introduced at all NPPs. When was this process completed?

2) What documents had been used at NPPs instead of TS before?
3) Is there a major difference between Operating Rules (OR) and TS (in the context as it is stated in items 10.27-10.31)?
4) What is the essence of British Energy-proposed improvements to OR and TS format?
5) Has the conventional structure of OR (TS) been added with fundamentally new information (e.g. operating experience information or data on operational events at other AGRs)?
6) Have you performed document standardization (which is evidently possible since the reactors are identical)?
7) Is there a system for improving OR (TS) structure (e.g. computer system and data base for OR/TS handling)?

Answer 1. There is an error in 10.30; one Advanced Gas-cooled Reactor (AGR) station has yet to implement the change to Technical Specifications (TS). Nevertheless, it is expected that they will be in place by May 2005.

2. The documents which preceded TS on the AGRs were the Operating Rules (OR) and Identified Operating Instructions (IOI). These were the operational limits and conditions which defined the safe operating envelope within which the plant should be operated.

3. The major difference between ORs/IOIs and TS is that the TS set out more clearly what the operational limits and conditions are and specify the actions necessary when there are departures from them. There were no changes to the safety cases for the plants and no new limits and conditions were introduced. The TS are based on the format used at Sizewell B, whose TS are based on the "MERITS" TS for Westinghouse plants.

Seq. No	Country	Article	Ref. in National Report
75		Article 10	S7.3.6,7.5.1 P27,30

Question/ Comment The report indicates that the regulatory body adopts a tiered approach to appeal against regulatory decisions made by nuclear licensees. The report also indicates that the planning application process provides an opportunity to inform and obtain views from the public. As a follow-up to the previous meeting, is there a regulatory process for resolving allegations of safety concerns that could be raised by worker at nuclear station, regulatory staff, or from the public?

Answer All employees have available to them lines of communication with their employers that will allow them to raise concerns regarding safety. These lines of communication are required by law. They require the employer to consult employees either individually or collectively through employee representatives. In the first instance, HSE encourages employees to use these lines of communications with employers to resolve any safety concerns. However, employees can also raise their concerns on safety directly with HSE Inspectors on a nuclear site or to HSE directly by telephone or in writing. Members of the public are able to raise concerns on safety with HSE by telephone or in writing. They also have the opportunity to raise safety concerns through their elected representatives who participate in the regular nuclear site liaison committee meetings. HSE Inspectors also attend these

meetings. A procedure is in place within HSE to deal with concerns raised by employees and members of the public and all concerns are investigated.All HSE inspectors have been give statutory powers to deal with safety concerns they may have identified. HSE Inspectors are legally empowered to seek safety improvements within a specified period of time and they can prohibit specific activities from being carried out.

Seq. No	Country	Article	Ref. in National Report
76		Article 11	NS.R.2, 3.11

Question/ Comment: NS.R.2, 3.11: How does HSE/NII assure itself that the simulators are updated in such a way that they remain capable of simulating the incidents and accidents as required for training purposes?

Answer: Licence Condition 10 requires the licenses to make and implement adequate arrangements for suitable training of all those on site who have responsibility for any operations which may affect safety. Therefore it is the responsibility of the Licensees to ensure that the training of control room operators to deal with faults is adequate – this would include, where relevant, ensuring that the simulators provide adequate capabilities. In addition, any modification to the plant is carried out in accordance with procedures developed under licence condition 22. These arrangements require that updates are made to other arrangements such as operation, maintenance and training. This will include simulator updating.

NSD inspectors carry out the following tasks as part of their oversight activities:

- They inspect the Stations training schedules and activities with a view of ensuring that training is consistent with claims made in the safety case and that training takes into account events, incidents and other occurrences at the Stations and those of relevance at other Stations.

- They assess, as required and depending on the safety significance, modifications to the training programme and training capabilities (eg, simulator). They also assess, as required and depending on the safety significance, modifications to safety case or plant changes that are accompanied by enhancements or changes to training.

Seq. No	Country	Article	Ref. in National Report
77		Article 11	11.1, page 55

Question/ Comment: The report states that "… a registered company must have sufficient assets to meet all of its liabilities if it wishes to continue in business"
Which regulatory agency, HSE or an economic regulator, has accountability for determining the adequacy of the operating revenues described in the public accounts to support safe operation?

Answer: It is an offence not to maintain the necessary insurance (section 19(5)). The Secretary of State has the power to appoint inspectors under section 24 and could do so where a contravention of the insurance requirements appeared to be taking place. The Secretary of State and the Department of Public Prosecution (DPP) can prosecute the offence (in England and Wales at any rate) - as indeed could anyone else with the DPP's consent (section 25(3)).

Seq. No	Country	Article	Ref. in National Report
78		Article 11	11.5, page 56

Question/ Comment	It is reported that "… the operators' internal financial control processes determine the necessary authority required before commitments are made to make safety or any other improvements." What is the accepted method used by both the licensees and the regulatory agency or agencies to evaluate whether a safety improvement should be made?
Answer	The need for a safety improvement can arise from a number of different sources. It may arise from the licensee's ongoing safety assessment process, plant inspection and monitoring, the periodic safety reviews, an event on the plant, an event on another plant or as a requirement of the regulator. The guiding principle that determines whether an improvement is justified is the principle of As Low As Reasonably Practicable (ALARP). This requires that licensee to consider any safety modification in terms of the cost and safety benefit resulting. The UK Health and Safety Executive have issued a report on The Tolerability of Risk from Nuclear Power Stations (ref. HMSO 1992), which gives guidance on ALARP. In simple terms three regions of risk are defined as being 'unacceptable', tolerable and broadly acceptable. Criteria relating to the boundaries between these risk levels have been defined in terms of the likelihood and consequence. If the safety assessment shows that a risk is in the 'unacceptable' region, immediate action would be required to eliminate or reduce the risk. If the risk is assessed to be in the 'tolerable' region it will be subject to an ALARP assessment. This requires the licensee to consider the cost and safety benefit of safety improvement that would be submitted to the regulator. A process of debate between the licensee and regulator would then determine appropriate action. If the risk were at a low level in the 'broadly acceptable' region it would be a matter for the licensee to consider whether any safety improvement was ALARP. It should be said that although many of the factors in an ALARP assessment can be quantified, inevitably qualitative factors can play a significant part in the final decision on plant safety modifications.

Seq. No	Country	Article	Ref. in National Report
79		Article 11	11.19, page 58

Question/ Comment	It is stated that "Training and human resource issues are addressed by nuclear inspectors when they are reviewing safety documentation requirements against the SAPs. The requirement is that provisions are made for training staff who will have responsibility for the safety of the plant." What are the roles that have "responsibility for the safety of the plant," and what criteria are used to exclude roles from the listing?
Answer	(i) The UK does not operate a prescriptive regulatory regime, and therefore we do not prescribe the roles that have a responsibility for the safety of the plant. Each licensee defines what it requires to undertake its activities and meet licensing requirements. The needs will differ with the nature of the activity (e.g. an operating power station or a chemical reprocessing plant). (ii) One of our standard licence conditions states that suitably qualified and experienced persons (SQEPs) are required to perform duties that may affect the safety of operations. This is not confined to persons on site and includes,

for example, those involved in producing safety cases.
(iii) A further licence condition requires training of all those responsible for operations which may affect safety.
(iv) Checks on SQEP requirements or training of licensee staff are included in NII's licence compliance inspections but they can also be integrated into other regulatory activities such as assessment of safety cases (i.e. to look more broadly than the regulatory activities such as assessment of safety cases (i.e. to look more broadly than the technical content of the safety case and examine the process for producing the case including SQEP and training aspects for the people involved).

Seq. No	Country	Article	Ref. in National Report
80		Article 11	11.25, page 60

Question/ Comment: The report advocates that licensees should be "intelligent customer" when dealing with outside contractors.
How are the qualifications of the licensee to be an "intelligent customer" determined and verified?

Answer: Under UK law a Nuclear Site Licensee is responsible for safety on its sites, this responsibility cannot be delegated to any other party. This means that the Licensee must be in effective control of all activities carried out on its site. Recently there have been moves within the nuclear industry for the Licensee's to become more efficient and to explore different ways of working. This has resulted in Licensee's outsourcing a range of their activities through the use of external contractors. However, in order to comply with the law a Licensee must maintain an adequate capability within its own organisation to be able to understand the nuclear safety requirements for all activities carried out on its sites including those performed by any of its contractors. The attributes that a Nuclear Site Licensee must display in meeting its duties under the law in these circumstances, is referred to as the intelligent customer capability. The important features of this capability requires that a Licensee should have within its own work force, sufficient numbers of staff with the appropriate managerial, supervisory, and technical skills to understand the safety significance of actions proposed and undertaken by any of its contractors.

The necessary capabilities within a Licensee will vary from case to case depending on the nature of the activities being undertaken. The regulatory body has developed a broad framework of attributes which it uses to form a judgment on the intelligent customer capability of a Licensee. This framework includes the requirement for the Licensee to show that it has the capability to:
(i) understand the nuclear safety requirements of all of its activities relevant to safety, and those of contractors, to take responsibility for managing safe operation;
(ii) understand its duties under the law, particularly duties as a nuclear site licensee;(iii) set, interpret and deliver safety and engineering standards relevant to the business;
(iv) have sufficient breadth and depth of knowledge and experience to understand the safety feature of its plant(s) and the hazards it (they) present;
(v) understand and support all aspects of the safety case and the facility

operation over the full facility lifetime - including decommissioning and disposal;
(vi) maintain and develop the corporate memory;
(vii) ensure adequate numbers of suitably qualified and experienced staff are available to make the judgements pertinent to safety both now and in the future.
(viii) When using contractors to, in the context of safety:- specify the work;- assess tenders and proposals;- choose an appropriate contractor;- supervise and manage the work;- ensure contractors staff are suitable qualified, experienced and trained;- ensure the required product or work quality is delivered; and- monitor the performance of the contractor, taking appropriate action if it is inadequate.The process of verifying that a Licensee has an adequate intelligent customer capability is determined using the normal regulatory tools of inspection and assessment across a range of the legal requirements placed on the Licensee including, the production of safety documentation, training of staff and control and supervision of operations.

Seq. No	Country	Article	Ref. in National Report
81		Article 11	11.37, page 62

Question/ Comment	Referring to engineering and technical capabilities, the report indicates that “where it is economic and practicable, technical services may be procured from suitably qualified and experienced specialists in other utilities or organizations under appropriate contractual arrangements." Do the regulator and licensee utilize the same external organizations? If so, how are potential conflicts of interest addressed?
Answer	The specialist nuclear safety contractor base in the UK is quite small. Nonetheless, NSD has a principle of only using external expertise where it is independent of the licensees in order to get a true second opinion or advice which has not influenced a particular licensee’s safety justification. Fortunately, at the moment there is still an adequate number of sources to allow NSD to have access to the independent expertise it needs. Where there has been potential conflict, we have agreed a protocol of usage with licensees that aims to provide access to and to protect the independence of the expertise. We operate a strategic approach to maintain sources of independent expertise in short supply and on occasions this expertise may be supported abroad.

Seq. No	Country	Article	Ref. in National Report
82		Article 11	Ch11P55

Question/ Comment	Nuclear decommissioning regulatory body of UK was established in 2002, taking the responsibility of decommissioning regulation for nuclear installation. What roles and functions does the regulatory body play in UK’s regulatory system? How about its relationship with current regulatory body e.g. HSE?
Answer	The Nuclear Decommissioning Agency (NDA) is not a regulatory body. It is a new body charged with (amongst other things) the responsibility for safe decommissioning of NPPs. The NDA will be regulated by HSE/NII where appropriate. Responsibilities for decommissioning is a matter covered by the Joint Convention of the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. This will be covered in the UK’s report to

that Convention due for submission in October 2005.

Seq. No 83	Country	Article Article 11	Ref. in National Report Paragraph 11.8

Question/ Comment	It is noted from Paragraph 11.8 that the new arrangements for the clean up of Britain's nuclear legacy will, with the establishment of the Nuclear Decommissioning Authority, be funded by the taxpayer. How will the funding lines be established to ensure transparency in displaying the costs of clean up and the income from ongoing commercial activities including the sale of electricity and reprocessing in Thorp?
Answer	Figures relating to the cost of decommissioning and clean up and income from commercial activities are set out in the NDA's draft Annual Plan for 2005/06, on which consultation has just ended. The final version of the Plan, once approved by the Secretary of State and Scottish Ministers, will be published. Later this year, the NDA will publish for comment its long-term strategy. It will also publish Annual Plans on which comments will be invited. Figures relating to planned spend on decommissioning and on income from commercial operations will be included in each.

Seq. No 84	Country	Article Article 11	Ref. in National Report

Question/ Comment	A brief description of the status of the establishment of the Nuclear Decommissioning Authority and its planned work would be welcomed, especially with a view to whether the NDA will be responsible for maintaining the competence and experts needed for the decommissioning process and to the relation between the NDA activities and its funding and the funding allocated by the nuclear industry.
Answer	Decommissioning is a matter covered by the Joint Convention of the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. This will be covered in the UK's report to that Convention due for submission in October 2005.

Seq. No 85	Country	Article Article 11	Ref. in National Report

Question/ Comment	1. Could more detailed information be obtained on the main functions of the Nuclear Decommissioning Agency? 2. Has it been analysed how the change of the owner and its main activities would affect the safety in NPP decommissioning after transfer of MAGNOX NPPs to the possession of the Nuclear Decommissioning Agency? What are the main results of the analysis if any?
Answer	Regulation of decommissioning is a matter covered by the Joint Convention of the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. This will be covered in the UK's report to that Convention due for submission in October 2005. However, the change in ownership of the Magnox sites from Magnox Electric, to the NDA, should not make any difference to the ability of the Licensee to fulfill its duties. We expect the Licensee companies to continue to operate the sites in a similar manner to that prior to the change of ownership. However, HSE is currently reviewing its Licence Conditions and will

consider whether there are any amendments necessary to ensure that the same level of regulatory control can be exerted regardless of any changes in the ownership of nuclear licensed sites. That review should be complete by the end of the year (or possibly much sooner depending on resources).

Seq. No	Country	Article	Ref. in National Report
86		Article 11.2	P.62,L.35

Question/ Comment	References : During the initial licensing process, the licensee makes a safety case that identifies the need and demonstrates the availability of sufficient numbers of qualified staff. This case is reviewed as part of the Periodic Safety Review Process and at other appropriate times(such as relicensing). The licensee's case is reviewed by HSE and its nuclear installation inspectors regularly inspect and assess adequacy of resources. This is also carried out during targeted inspections by human factors specialist inspectors. Please explain the specific purpose and items of the inspection conducted by human factors specialist inspectors,and some specific case.
Answer	Licence Condition 36 – Control of Organisational Change provides NII with some assurance that the Licensees are not re-organising in such a way that manning levels are insufficient. NII regularly monitors compliance with LC36 as part of its Integrated Enforcement Strategy. Except for emergency planning purposes where the site must prescribe minimum manning levels as part of its procedures NII is not an advocate of rigid specified manning levels. As work levels at sites frequently fluctuate (and the capabilities of individuals and teams also vary) NII favours an approach whereby the Licensee monitors its own performance by a series of key performance indicators (KPIs). Careful selection of these KPIs should provide an early indication of circumstances where manning levels may be causing concerns. Examples of such KPIs are maintenance backlogs and late submission or rejection of safety cases. NII has tended to concentrate on examining performance against these KPIs but on some occasions has carried out targeted inspections to look at manning levels to carry out specific duties. For example NII has examined Licensees processes for determining the range of skills it needs to maintain its “intelligent customer” function. This function is an NII requirement of the licensee to ensure that it has the necessary expertise in-house to understand and develop its safety case. In such cases the range of skills and projected workload are considered against the licensee’s claims to contain the requisite expertise.

Seq. No	Country	Article	Ref. in National Report
87		Article 12	§12.19 and 12.32

Question/ Comment	In sections 12.19 and 12.32 reference has been made to the HSE’s Safety Assessment Principles (SAPs), which form a basis against which the regulatory assessment of human factors is carried out. Please provide more complete information on the range of human factor related aspects, which are covered by these SAPs.
Answer	Website http://www.hse.gov.uk/nsd/saps.htm provides the SAPs. The following contain a significant Human Factors element:Principles 39, 50, 77, 91, 92, 93, 94, 117, 118, 185, 186, 187, 201, 202, 293, 315, 316, 317, 319, 320, 321, 322, 328.

Seq. No	Country	Article	Ref. in National Report
88		Article 12	§12.37

Question/ Comment	Section 12.37 states that the regulatory approach is to seek information that allows HSE to make judgements about the licensees safety culture, by reviewing indicators of plant and personnel performance and to use these observations to encourage licensee initiatives to promote improvements. Please elaborate on the regulatory programs in place that allow generating indicator data of plant and personnel performance and on the indicators, which are presently used for assessing safety culture.
Answer	· NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes. · NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year. · UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this. · Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the prevailing safety culture.

Seq. No	Country	Article	Ref. in National Report
89		Article 12	Item 12.15 -pag.67

Question/ Comment	What mechanism is provided for the staff to contribute with ideas for improving safety? And what has been the experience on the use of such mechanism?
Answer	The licensee organisation needs to promote a safety culture that is questioning and seeks out improvements in safety and safety standards. Safety needs to be seen an integral part of the work of all staff. The organisation has a department that sets safety standards and monitors safety performance that is independent of the operating formations. The Director of the safety department has a reporting line directly to the Company Chief Executive. These arrangements are aimed at ensuring that safety standards are based on best practice and that safety performance is assessed in an objective manner. At the working level staff are encouraged to look for better safer ways of doing their jobs and training is given on safety matters. Staff are trained in behavioural safety, and behavioural safety observations are regularly carried out in the work place to identify sources of hazard and safety improvements. For British Energy, staff contribute ideas for improving safety in various ways, from suggestion schemes to the formal role of Suitable Qualified and Experienced Personnel Case Officers in driving safety enhancements as they develop safety cases on behalf of the Nuclear Power Stations.

Seq. No	Country	Article	Ref. in National Report
90		Article 12	Item 12.23/24-pag.68

Question/ Comment	Does HSE monitor the program of safety awareness of the utilities? What has been the experience with the use of STAR concept? What deficiencies have

been identified?

Answer STAR is a concept that is well embedded into reactor licensee organisations, and failure of the STAR principle is an event root cause in the licensee's root cause analysis/operational experience feedback system. Event investigations using barrier analysis techniques will identify the contribution of (failure to) STAR to the event.

Seq. No	Country	Article	Ref. in National Report
91		Article 12	Item12.31-pag.69

Question/ Comment What has been the number of events reported by UK to the IAEA IRS (Incident Reporting System) in recent years?

Answer Since the IRS system was instigated the UK have submitted 127 reports that are considered to contain useful learning points for the International Nuclear community (ie 4.9 events per year).In recent years the following number of events were submitted;

Year No. of Reports
2001 4
2002 4
2003 3*
2004 3*

*Note. The year refers to the date in which the event occurred, rather than when the report is submitted. As it is important to rigorously analyse the event to identify root causes etc, there can be a significant delay between the event occurrence and a report being submitted. There are currently 3 pending reports for 2004, which have not yet been submitted and one report (dated 2003) which has been submitted but not yet appeared on the IRS database

Seq. No	Country	Article	Ref. in National Report
92		Article 12	12.37, page 70

Question/ Comment What indicators and criteria does the HSE use for making judgments about the licensee's safety culture?

Answer (i) NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes.
(ii) NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year.
(iii) UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this.
(iv) Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the prevailing safety culture.

Seq. No	Country	Article	Ref. in National Report
93		Article 12	P31Ch12

Question/ Comment Please give more information on how to prompt nuclear culture construction and improvement in UK's nuclear industry.

Answer We assume you are referring to the development of a good safety culture

· NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes.

· NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year.

· UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this.

· Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the prevailing safety culture.

Seq. No	Country	Article	Ref. in National Report
94		Article 12	P.64,L26

Question/ Comment In 12.4, it is explained that the licensees ensured that all operator actions were identified in the PSA,

(1)How HSE(HSC) assesed the PSA results performed by licensees?
(2)How much time was necessary to the assessment? What was the assessment tool?

Answer The PSA performed as part of Sizewell B's Pre-Operational Safety Report was reviewed in detail by HSE/NSD with the support of PSA Specialists from the USA. Following start of commercial operation Sizewell B's Living PSA was also reviewed by NSD supported by the same team of PSA experts.The PSAs developed for the AGRs and Magnox reactors as part of their first Periodic Safety Reviews were assessed by NSD in the framework of its PSR assessment strategy.Two years ago, NSD started a project to review the current versions of the PSAs of the Gas Cooled Reactors against modern PSA practices, standards and guidance. For this purpose, a team of three international PSA specialists was recruited to provide support to two NSD's assessors specialised on PSA and reactor fault studies. So far three PSAs have been reviewed, ie, Hinkley Point B's, Hunterston B's and Wylfa's. The review method adopted follows closely the IAEA's IPSART (International PSA Review Team, previously known as IPERS) approach described in IAEA-TECDOC-832. The core of the review is carried out during two weeks at the Utility Headquarters in order to ensure maximum availability of documentation and of staff with sufficient experience to discuss the issues raised by the review team. Additional work is required from the team in advance in order to get familiar with the PSA to be reviewed. Following the review, a review report is prepared that compiles the questions raised by the review team, the answers provided by the Utility and the reviewers' recommendations on how to resolve the issues. The report is made available to the Utility. NSD then follows up the implementation of the required PSA enhancements. Following this approach and taking into

consideration the resources used, it is not possible to review in detail every aspect of the PSA. However, this is sufficient to perform surface checks of the total study regarding completeness, consistency and coherence of the overall model and supporting data, and detailed spot checks of selected PSA areas and elements. Thus, this apporach provides a reasonably good idea of the overall quality of the PSA and its suitability to support decision making.It should be noted that HSE/NSD currently only has one PSA specialist dealing with all the PSA matters for all the operating nuclear power reactors in the UK. Therefore, it would not be possible to deploy additional resources to carry out more extensive PSA review work.

Seq. No	Country	Article	Ref. in National Report
95		Article 12	P.65,L.5

Question/ Comment	It is reported that "tasks were feasible, and that they would be performed safety and reliably in the time available". How long is the "allowable time"? Is it same for all the reactor type?
Answer	The allowable time will depend entirely on the outcome safety analysis for a particular reactor. It will vary from task to task and also between reactor types.

Seq. No	Country	Article	Ref. in National Report
96	, Republic of	Article 12	p64

Question/ Comment	Human Performance may be incorporated in the Risk-Informed Implementation Plan. What kinds of human performance and methodology are required in relation with the implementation of Risk-Informed regulation in your country?
Answer	As explained in the UK report, UK regulation is not prescriptive. However, there is an expectation that Licensees follow good international practices when developing their safety documentation and their processes. The modelling of Human Failure Events in the PSAs in the UK follows internationally accepted practices such as the approach proposed in IAEA Safety Series No 50-P-10 “Human Reliability Analysis in Probabilistic Safety Assessment for Nuclear Power Plants: A Safety Practice” (1995). For the analysis of Human Error Probabilities the HEART methodology developed in the UK has been extensively used (Williams, J.C., 1988, “A data-based method for assessing and reducing human error to improve operational performance. In Hagen, E.W. (Ed). Proceedings of IEEE Conference on Human Factors in Power Plants”, pp. 436-450, Monterey, California, June 5-9). This is supported by extensive task analysis. For the analysis of dependencies between operator actions modelled in the PSA Licensees use well recognised methods such as the approach proposed in chapter 10 of NUREG/CR-1278 ‘Handbook of human reliability analysis with emphasis on nuclear power plant applications, (THERP)’ . When licensees make plant or operational modifications that have a potential impact on the modelling of Human Failure Events in the PSA or on the Human Error Probabilities, this is properly addressed in the safety documentation prepared to justify the modification via sensitivity analyses, actual model changes and new HRA analyses or, often, both.

Seq. No	Country	Article	Ref. in National Report
97	, Republic of	Article 12	p69

Question/ Comment

1. In para 12.27(p.69), it is described that licensees have conducted general staff attitude surveys and specialist safety culture surveys.
What are contents of these surveys and differences between the two? Are these surveys conducted periodically?

2. In para 12.37(p.70), it shows HSE's view toward safety culture assessment and we think every regulatory body might share that view more or less.
What are the information helpful for HSE to judge about the licensees's safety culture and those indicators?

Answer

Q1:Staff attitude surveys are wider than safety culture surveys and consider employee opinion on a range of matters, including those outside of the nuclear and industrial safety arena. They tend to be carried out by licensees on an annual basis. NII encourage licensees to undertake periodic self-assessment of their safety culture, using recognised tools that consider that accepted attributes of a safety culture.

Q2:NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes. NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year.UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this.Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the prevailing safety culture.

Seq. No	Country	Article	Ref. in National Report
98		Article 12	A12.36 P70

Question/ Comment

With regard to assessment of safety culture, UK may please provide more information on the regulatory approach to this issue specially on the information sought from the licensee that allows HSE to make judgments about the licensee's management of safety (safety culture). What is the frequency of such assessments? Do the site inspectors conduct it as a part of their surveillance duties or inspectors at the HQ assess it based on information submitted by the licensee?

Answer

· NII is in the process of developing a set of indicators using international experience, which will include safety culture attributes.
· NII is also in the process of developing a regulatory measurement tool for safety culture, again drawing on international experience to date. It is expected that this approach will be piloted this year.
· UK reactor licensees are undertaking safety culture self-assessments as part of their second Periodic Safety Reviews. Independent consultants, using a recognised tool, are undertaking this.
· Routine intelligence gathering from our range of interactions with the licensee provides direct evidence of attitudes towards safety and actual behaviours, which together with other inputs, informs our judgements on the

prevailing safety culture.

Seq. No	Country	Article	Ref. in National Report
99		Article 12	p 64

Question/ Comment	Paragraph 12.4 discusses PSA. Are the PSA results (identification of critical actions) used to define operators training?
Answer	As part of the PSA, a Human Factors assessment is carried out with the objective of demonstrating that the operators are capable of carrying out essential operations in the time required. This will take into account the adverse circumstances that may arise in the event of an accident or if a hazard occurs. Operators are trained to carry out these key actions. In some cases emergency exercises are staged to confirm that the actions are achievable.

Seq. No	Country	Article	Ref. in National Report
100		Article 12	p 70

Question/ Comment	Paragraph 12.32 states that the HSE's SAPs form a basis against which the regulatory assessment of human factors is carried out. Could you, please, explain the main elements of this basis? Which are inputs and outputs of the regulatory assessment of human factors? Which are the criteria for regulatory assessment of human factors?
Answer	The 'inputs' to our assessment are licensee safety cases, and our 'outputs' are judgements and regulatory decisions (permissioning). The criteria for assessment are our Technical Assessment Guides, Human Factors standards where available, and the SAPs.

Seq. No	Country	Article	Ref. in National Report
101		Article 13	Item 13.4 -pag.71

Question/ Comment	Does HSE audits also the QA program of licensee's contractors?
Answer	The HSE (NSD) QA audit/inspection programme does include inspection of selected licensees' contractors' quality arrangements particularly those carrying out work on the licensees' sites. In addition targeted inspections are carried out on QA arrangements and on other technical aspects of companies that supply safety related components and services

Seq. No	Country	Article	Ref. in National Report
102		Article 13	Item13.13 -pag.75

Question/ Comment	How does HSE performs verification of computer codes before the approval for usage?
Answer	HSE does not verify computer codes. This is the responsibility of the licensee. HSE's inspectors will sample the Licensee's files and supporting safety case looking for evidence that the verification process has been applied rigorously. For this purpose HSE's inspectors use the NSD Safety Assessment Principles (http://www.hse.gov.uk/nsd/saps.htm) (SAPs 47 to 55 and 86 to 89) and their internal Technical Assessment Guide on 'Validation of Computer Codes and Calculational Methods'.

Seq. No	Country	Article	Ref. in National Report
103		Article 13	Item 13.15 -pag.76

Question/ Comment	Is ISO9000 considered sufficient for assuring the quality of safety related items? Is the system of “N Stamp” also used in the UK?
Answer	Licensees use a graded approach to QA which takes into account the safety significance of the item or service being procured. Licensees consider ISO9000:2000 as an appropriate base level for items that are of limited safety significance. Factors such as ease of repair or replacement, degree of receipt inspection, maturity of design and reliability record are also taken into account. The main nuclear pressure systems for Sizewell B PWR were designed, manufactured and inspected to the requirements of ASME III. Within the UK the Licensee established a procedure to adapt ASME III general requirements (sub-section NCA) to United Kingdom institutions and practices. One aspect of this adaptation was to remove the requirements for the Owner and his suppliers to obtain Certificates of Authorisation from ASME and for the application of Code Symbol Stamps (eg. N stamp) to manufactured items.

Seq. No	Country	Article	Ref. in National Report
104		Article 13	P.71,L.12

Question/ Comment	References : Basic Requirement 1: QUALITY ASSURANCE PROGRAMME Please explain the quality assurance program items, which are regulated in view of the safety culture.
Answer	The regulation of licensees’ Quality Assurance arrangements is carried by the assessment and inspection of arrangements made under Licence Condition 17. The expectation is that the arrangements will include those elements traditionally associated with a Quality Management System, as detailed in national and international standards and codes eg. ISO 9000 series, IAEA 50-C-Q. In addition the QMS must describe the means by which the licensees document and audit their arrangements to satisfy all other 35 Licence Conditions. There is no attempt made to identify aspects that are related specifically to safety culture albeit there is an element of overlap eg training. Licensees’ approaches to the application of safety culture are inspected but not as part of the QA compliance process.

Seq. No	Country	Article	Ref. in National Report
105	, Republic of	Article 13	P77

Question/ Comment	With regard to the Basic Requirement 9, 'Management self-assessment' in your report, 1. When was the self-assessment program established? And what is the basis or guidelines of the self-assessment program? 2. What kinds of procedures have been developed for the self-assessment program of the workers or working groups, especially in NPPs? And how can the improvement of nuclear safety be evaluated after implementing the self-assessment program? 3. What is the method of management self-assessment? Please explain your experiences in applying it in UK's NPPs circumstances.
Answer	Management Self-Assessment (Management Review) is a fundamental requirement of any Quality Management System (QMS). The programme for

self-assessment should commence immediately the QMS is implemented. There is no prescription of what aspects to take into account but the programme should set out to gather active and proactive indicators that indicate the well-being or otherwise of the QMS and its continued suitability for the application for which it is being used. The extent of the self-assessment process is dependent on the nature of the enterprise particularly its size, complexity and the reliance it has on the effective operation of its management system. IAEA DS 338 does provide some guidance in this area above what was initially available in IAEA 50-C-Q. Licensees have systems in place that generate, collate and analyse information gathered on an ongoing basis. This is then used to assess the continuing effectiveness of the QMS. The findings may initiate changes to the management system or some of its elements. The areas generally used to generate the information include operational experience feedback (OEF), internal and external audits and inspections, incident and accident data, staff surveys, regulatory action (notices and prosecutions) and changes in legislation.

Seq. No	Country	Article	Ref. in National Report
106	, Republic of	Article 13	13.9

Question/ Comment: It is described in Sec. 13.9 that Electronic Document Management Systems(EDMS) was developed and has been used by licensees. We understand, however, there is no guidance regarding EDMS in the IAEA's requirement document 50-C-Q.

Is there specific regulatory position or detailed guidance on the use of EDMS in your country?
Did licensees develop and use EDMS in accordance with it?

Answer: As stated IAEA 50-C-Q does not include guidance on the use of Electronic Document Management Systems (EDMS) although it does recognise the use of media other than paper for records management and storage. HSE(NSD) is not prescriptive in the use of record systems or record storage media and has produced assessment and inspection guidance on the use of non-paper based record management systems, this does not include detailed guidance on the application of EDMS. Licensees are aware of this guidance that is based on British Standards Institution information and they take it into account when developing/modifying arrangements for the storage of nuclear licence related records.

Seq. No	Country	Article	Ref. in National Report
107		Article 13	

Question/ Comment: Please explain how do you ensure the quality of the regulatory work. Do you measure effectiveness/efficiency of regulatory work? At which success? Which criteria do you apply? Are the measured/evaluated trends positive?

Answer: The quality of regulatory work is determined through a combination of effectiveness and efficiency measures. NSD sets down what its goals are in a Strategic Plan. This describes the operating environment and an outline of our strategy to achieve the goals. Annual plans then provide more detail on what is to be done and the measures used to monitor progress. As part of the NSD’s Integrated Enforcement Strategy sites are inspected to a three year ruling programme and the results of licensees performance against this

captured and trended to identify where improvements have been made or are still required. These are then discussed at the regulatory review meetings to identify the most effective and efficient way of improving the situation.The quality of inspection and assessment work is overseen be line management and by two specific management groups. These are the Inspection Coordination Group (ICG) and the Corporate Assessment Liaison Meeting (CALM). These report to NSD's Management Board on any significant issues associated with the quality of its activities.Also in order to meet NSD's primary strategic goal of having no major nuclear accidents, precursors (events that potentially challenge nuclear safety) are identified and trended in order to learn lessons.

Seq. No	Country	Article	Ref. in National Report
108		Article 14	

Question/ Comment: The Chapter related to Article 14 gives a detailed overview of the principles and the processes applied for safety assessment and verification of safety. It describes requirements that have to be fulfilled by the applicants or licensees and the role of HSE in dealing with review and approval by HSE.
However, the description is kept to a level of overall principles. It does not allow to have good insights on how these principles are applied in practice. An inclusion of some practical examples would allow illustrating the application of these principles.
As an illustration to this general observation we have the following question. Section 14.43 refers to the application of the ALARP principle and the consideration of the installation's projected life when assessing the reasonable practicability of making improvements. Do decision criteria exist? Can the application of these principles be illustrated by a (few) example(s) on considered modifications that were finally not implemented and by a (few) example(s) of a modification that was finally decided to be implemented, based on these principles?

Answer: The fundamental consideration is that the sacrifice (money, time and trouble) of implementing measures to avert risk must be compared with the benefit, in terms of the risk averted. If there is a gross disproportion, in that the sacrifice is much higher than the benefit, then the duty-holder does not have to implement the measures. It is important to note that this is not a balance – and the degree of grossness in the disproportion increases as the risk increases. HSE has provided more guidance on ALARP in three documents on the internet (www.hse.gov.uk/theory/alarp.htm). A fourth internet document builds on these and provides more specific guidance on demonstration of ALARP in the nuclear industry (www.hse.gov.uk/nsd/tast/tast005.pdf). Articles 7, 8, 14, 15 and Annexes 7 and 8 cover some aspects of how ALARP is used in nuclear regulation. Various published papers have covered the approach also (eg. Vaughan GJ, Safety Goals for Nuclear Materials and Radioactive Waste – the UK Regulatory Approach. PSAM7, Berlin June 2004).

Seq. No	Country	Article	Ref. in National Report
109		Article 14	Item 14.25 -pag.88

Question/ Comment: Is the interval of 2 to 3 years between statutory outages also valid for PWR (Sizewell B) Plant?

Answer	Sizewell B currently has 18 month fuel cycles and this sets the statutory period.

Seq. No	Country	Article	Ref. in National Report
110		Article 14	Item 14.6 -pag.95

Question/ Comment	To whom are the inspection reports distributed? Do the licensee receives the inspection reports or just a list of enforcement actions?
Answer	The Visit reports produced by site inspectors as part of their routine compliance inspections are primarily for HSE/NII internal use. However technically these are publicly available following the Freedom of Information Act that came into force in UK on January 1 2005. The Site inspector will always discuss any required actions with the NPP management and this will be followed up, if appropriate, by a formal letter. The outcome of the larger team inspections are usually published and the licensees will have the opportunity to comment prior to publication. Similarly the outcome of the HSE/NII review of a PSR is published.

Seq. No	Country	Article	Ref. in National Report
111		Article 14	14.10, page 85

Question/ Comment	The report states that “currently, Sizewell B and the Advanced Gas Cool Reactors have, or are in the process of establishing, “Living PSA programmes.” Please expand on what are “living PSA programs.”
Answer	The Living PSA program concept in this context is consistent with the IAEA definition of Living PSA proposed in IAEA-TECDOC-1106 (http://www-pub.iaea.org/MTCD/publications/PDF/te_1106_prn.pdf) ie: "A Living PSA (LPSA) can be defined as a PSA of the plant, which is updated as necessary to reflect the current design and operational features, and is documented in such a way that each aspect of the model can be directly related to existing plant information, plant documentation or the analysts’ assumptions in the absence of such information. The LPSA would be used by designers, utility and regulatory personnel for a variety of purposes according to their needs, such as design verification, assessment of potential changes to the plant design or operation, design of training programmes and assessment of changes to the plant licensing basis". The Living PSA programmes established by British Energy follow closely the LPSA practices proposed in IAEA-TECDOC-1106.

Seq. No	Country	Article	Ref. in National Report
112		Article 14	14.35, page 90

Question/ Comment	Who is the licensee’s “internal regulator” mentioned in this paragraph?
Answer	The Licensees have a Corporate Nuclear Safety Department to advise the Board on safety matters. This includes having a nominated person on each site to carry out inspections that, an many ways, will mirror the inspection programme of the HSE/NII site inspector.

Seq. No	Country	Article	Ref. in National Report

113		Article 14	14.55, page 95
Question/ Comment	The report refers to “individual Site Inspection Plans are produced according to generic templates.” Please indicate public accessibility to Individual Site Inspection plans and the results from the performance of such plans.		
Answer	The individual site inspection plans are not publicly accessible documents, neither are the inspection results (but see also answer to next question on Article 14 from).		
Seq. No 114	Country	Article Article 14	Ref. in National Report 14.56, page 95
Question/ Comment	What factors are considered to require corrective actions from licensees subsequent to an inspection? Are the inspection reports published? How does the HSE inform the public of its activities and the safety of the facilities?		
Answer	An inspection normally assesses a licensees compliance with the Licence conditions and/or the adequacy of, and compliance, with arrangements made by the licensee to comply with the licence conditions. Corrective actions are required when a licensee fails to comply with its own arrangements or when, in the opinion of the regulatory authority those arrangements are no longer satisfactory. Routine site inspection reports are not published although since January 1 2005 a Freedom of Information Act has been in force in UK so technically they are available. The results of larger team inspections are published as are the HSE findings following Periodic Safety reviews. Our Site inspectors attend and make reports to the public at meetings of local liaison groups that are set up at each Nuclear Site. Press releases are issued as required and Quarterly newsletters are published on the HSE website.		
Seq. No 115	Country	Article Article 14	Ref. in National Report
Question/ Comment	PSA were carried out as part of PSR or at design stage. Some NPPs are in process of establishing “Living PSA Programmes”. Could you mention if the regulatory authority provides guidance and requirements related to Living PSA.		
Answer	As explained in the UK national report, UK regulation is not prescriptive. However, there is an expectation that Licensees follow good international practices when developing their safety documentation and their processes. In this regard, it should be indicated that the Living PSA programmes established or being established by British Energy generally follow the LPSA practices proposed in IAEA-TECDOC-1106 (http://www-pub.iaea.org/MTCD/publications/PDF/te_1106_prn.pdf		
Seq. No 116	Country	Article Article 14	Ref. in National Report
Question/ Comment	What is the regulatory approach to the use of PSA in operation and what are the acceptance criteria from regulatory point of view?		
Answer	As explained in the UK national report, UK regulation is not prescriptive. However, there is an expectation that Licensees follow good international practices. In addition, it should be noted that keeping the risk to both public		

and workers ALARP is the most important legal obligation for the nuclear licensees in the UK. All this points out to the regulator's expectation that licensees use the information coming from their PSAs to inform, to some extent, relevant aspects of the Stations operation. Examples of this are:
- Rules to control plant out-of-service (Technical Specifications).
- Risk monitors at Heysham 2 and Torness.
- Prioritisation of systems and components for safety reviews.
- Plant modifications- Assessment of the importance of operational occurrences
- Selection/prioritisation of simulator training exercises
- Modifications to the maintenance schedule

Regarding the acceptance criteria, NSD's Safety Assessment Principles (http://www.hse.gov.uk/nsd/saps.htm), in particular SAP 42 (Doses to public), SAP 43 (risk to workers), SAP 44 (large release), SAP 45 (plant damage) and SAP 46 (criticality incidents) provide a probabilistic framework used by the regulator to assess the acceptability of a proposed modification. The probabilistic framework of the SAPs is used by the UK regulator in combination with HSE's ALARP guidance, in particular NSD's Technical Assessment Guide T/AST/005 on 'Demonstration of ALARP' (http://www.hse.gov.uk/nsd/tast/tast005.pdf)

Seq. No	Country	Article	Ref. in National Report
117		Article 14	p 90

Question/ Comment	Paragraph 14.35 mentions that the licensees have systems for routine compliance monitoring self-check that they are respecting their Technical Specifications and Identified Operating Instructions. This includes plant surveillance, maintenance check and administrative checks. Could you provide more information on this system? How the Technical Specifications and Identified Operating Instructions are met by this system?
Answer	Compliance arrangements involve a very large suite of instructions and procedures at many levels on the nuclear power stations. These range from the Surveillance Requirements incorporated in Tech Specs, to very detailed Maintenance Schedule requirements which define what testing/inspection needs to be carried out on a wide range of plant, and at what frequency. Backing this up is an extensive training and authorisation programme for the staff, so that responsibilities for compliance are clearly allocated and defined.

Seq. No	Country	Article	Ref. in National Report
118		Article 14	

Question/ Comment	What is the frequency for verification of safety of nuclear installations?
Answer	The site inspector supported by specialists as appropriate carries out routine verification of safety. The Site inspector will spend about 30% of his/her time on the site and will plan to inspect compliance with each of the 36 licence conditions over a three year period. Compliance with some licence conditions will be inspected much more frequently than this such as compliance with operating Rules (Tech Specs), maintenance programmes, plant modification procedures and emergency arrangements. In addition to this there may be

specialist inspection to investigate incidents or areas identified as warranting specific attention. Major team inspections are occasionally carried out at licensees' corporate level. The status of update of the safety analysis report is inspected before reactor start-up after each statutory maintenance shutdown. Periodic safety reviews carried out at ten year intervals provide an overview of safety but do not replace the routine regulatory process.

Seq. No	Country	Article	Ref. in National Report
119		Article 14.1	P.86,L.22

Question/ Comment: There is description in section14.14 that "Thus the documentation that forms the safety case is subject to appropriate quality assurance procedures discussed under Article 13 and changes to the safety case are regulated as modifications."
Do you have any quality assurance procedures on PSA ?

Answer: In the UK there are no specific requirements or national guidance on QA for PSA. However, there is an expectation that Licensees follow good international practices. Licensees subject their PSAs to their own internal QA procedures that are relevant to such type of safety documentation. This is generally consistent with the QA practices for PSA proposed in IAEA-TECDOC-1101 "A framework for a quality assurance programme for PSA" (http://www-pub.iaea.org/MTCD/publications/PDF/te_1101_prn.pdf).So, in general, PSA work is subject to the same QA procedures as all other safety case support work. For example, a major review of the PSA for a plant is conducted at the time of a Periodic Safety Review (PSR). At that time the scope of the PSA is reviewed in the light of experience since the previous PSR and the data input is updated. The updated PSA is then subject to verification and an independent nuclear safety assessment (INSA) by experts who were not directly involved in the work. Comparisons are made with the PSA results for similar plants as a general check on the validity of the results. The PSAs are regularly reviewed in the light of operational experience to confirm that assumptions and data input are still valid. Where necessary the safety case and relevant part of the PSA are modified and subject to INSA in accordance with defined procedures.

Seq. No	Country	Article	Ref. in National Report
120		Article 14.1	S6,8,12,14P18,38,64,

Question/ Comment: Article 6, Section 6.22, page 18, Article 8, Section 8.26, page 38, Article 12, Section 12.4, page 64 and Article 14, Section 14.10, page 85; The report indicates that Levels 1 and 2 PSA are used by the licensee to provide a comprehensive, systematic and numerical analysis of the risk to safety arising from plant designs and operations. The PSA highlighted significant contributions to risk and took into account the impact of human activities and operations on safety. The report also indicates that although regulatory decisions are unlikely to be made on the basis of probabilistic analysis alone, the PSA provide an important aid to judging the relative importance of identified potential engineering shortcomings. As a follow-up to the previous meeting, how does the regulator use risk assessment data; for example in planning inspections, developing inspection procedures, developing technical specifications, and evaluating incidents?

Answer: Current approach:

In order to plan and focus their inspections, to evaluate theimportance of their inspection findings, and to understand the importance of events, NSD's inspectors use their own perception of the risk significance of issues (based on their knowledge of the station safety case). They often supplement this by backup information provided by NII's PSA specialists using information extracted from the Station-specific PSAs. Currently this process has not been formalised in procedures.

Future plans:
There are preliminary plans to use risk information to inform NSD's Integrated Enforcement Strategy. These will initially aim at establishing a formal process for the use of risk (PSA) information for the selection of systems, components, structures, training activities, maintenance processes, procedures, etc, on which to focus regulatory inspections. This process will consider the risk significance of individual component failures, groups of components, initiating events, human failure events, common cause failures, dominant cut-sets, dominant sequences, etc.Later, the project will aim at establishing a formal process for the use of risk (PSA) information for the analysis of risk significance of inspection findings and operational events.

Seq. No	Country	Article	Ref. in National Report
121		Article 14.2	P.85 14.9

Question/ Comment	In page 85, 14.9 it is mentioned that PSA is used as complementary to deterministic assessment in design stage of NPPs, (1)Do you have any approach to use PSA in In-Service-Inspection(RIISI)? (2)If you have, is it plant by plant approach or generic approach? (3)If you prepare RIISI, what are the code and standarads for RIISI? Do you prepare your own standarads? or Do you apply any existing international standards?
Answer	Currently none of the operating reactors in the UK has undertaken a Risk-informed optimization of their In-service Inspection programmes. However, given the complexity of this particular application and in order to be fully prepared to assess potential Licensee's RI-ISI submissions in the future, HSE/NII is developing an NPP RI-ISI review/audit procedure building on: - An audit tool developed by TWI and Royal & SunAlliance Engineering (for conventional plant Duty Holders) for HSE as part of "Best Practice for Risk Based Inspection as a Part of Plant Integrity Management" (http://www.hse.gov.uk/research/crr_htm/2001/crr01363.htm). - The Key Principles and Important Aspects of the EC-NRWG "Report on the Regulatory Experience of Risk-Informed Inservice Inspection of Nuclear Power Plant Components and Common Views" (http://europa.eu.int/comm/energy/nuclear/publications/doc/eur21320_en.pdf)

Seq. No	Country	Article	Ref. in National Report
122		Article 14.2	P.65,L.25,12.9

Question/ Comment	(1)What kind of assessment was performed in determining the dependencies between separate operastor actions?
Answer	For the analysis of dependencies between operator actions modelled in the

PSA Licensees use well recognised methods such as the approach proposed in chapter 10 of NUREG/CR-1278 ‘Handbook of human reliability analysis with emphasis on nuclear power plant applications, (THERP)’

Seq. No	Country	Article	Ref. in National Report
123		Article 14.2	P.85,L28

Question/ Comment: There is the description in section14.9 that “A comprehensive fault schedule that includes both
internal initiating events as well as internal and external hazards is the starting point of both
deterministic and probabilistic safety analyses.”
What area do you consider as external hazards for PSA?

Answer: According to NSD’s Safety Assessment Principles (http://www.hse.gov.uk/nsd/saps.htm) :

“External and internal hazards which could affect the safety of the plant should be identified. They should be treated as potential initiating events of fault sequences and, where appropriate, taken in combination with other plant faults” (SAP 72).

This is further expanded in SAPS 119 to 143.

SAPs 119 to 125 express the expectations regarding inclusion of hazard analyses in the safety analysis of the installation (probabilistic and/or deterministic).

Specific external hazards listed for consideration in the safety analysis are: Aircraft impact (P126 & 127), Earthquakes (P128 to 131), Electro-magnetic interference (P132), Extreme weather conditions (P133 & 134), External fire, explosions, missiles, toxic gases, etc (P136 & 137), External flooding (P138 to 140).

Currently, discussions are being held with the British Energy regarding the scope of, and level of detail for, the treatment of external hazard in the PSAs for the AGRs.

Seq. No	Country	Article	Ref. in National Report
124		Article 14.2	P.85,L37

Question/ Comment: Concerning 14.9,
(1)How PSA of later AGR and PWR were used and applied in design stage?
(2)Could you explain about "Living PSA Program"?

Answer: 1) When the Heysham 2 and Torness AGRs were completed in 1987, they were the first reactors to be built in the UK for which PSA¡¦s were developed as an aid to the design, construction and licensing process. In particular, design reliability targets were set for each of the reactor systems early in the design process. These design requirements were based on the probabilistic targets defined for an uncontrolled release from a single accident. The need to limit reliability claims due to common cause failure cut-off limits resulted in many additional design features that were not included on the earlier generation of AGR reactors (although some were subsequently back fitted at

the older stations as part of the PSR process). Examples of the safety systems that were added include the diverse shutdown system, the diverse guard line system, the diverse decay heat boiler system, the diverse X and Y post-trip sequencing equipment, and the diverse X and Y essential electrical systems. The design also called for the segregation on a quadrantised basis of the post-trip cooling safety systems and for the explicit consideration of internal and external hazards during the design process. Finally, these stations were also the first in the UK to use their PSA as the basis for developing risk monitors to help control plant availability requirements during reactor operation. The Sizewell B design is based on the Westinghouse Standardised Nuclear Power Plant System (SNUPPS). However, changes were required to meet the UK safety requirements which included deterministic requirements (for redundancy/ single failure criterion, diversity, etc.) and probabilistic/reliability targets. PSA work was carried out throughout the design and construction phases of the plant and continued into operation.The most important probabilistic target that influenced Sizewell B¡¦s design was the one related to the frequency for uncontrolled releases for single accidents. In addition, it was recognized that common cause failure limited the reliability that could be claimed for a safety system that incorporated redundancy only. This led to several safety systems being added to the SNUPPS design (eg, a Secondary Protection System diverse from the computer based Primary Protection System, an Emergency Boration System (EBS) to inject boron solution into the reactor following failure of control rods, the auxiliary feedwater system was replaced by two diverse systems, an Emergency Charging System (ECS) diverse from the Chemical and Volume Control System (CVCS), and a seismically qualified air-cooled Reserve Ultimate Heat Sink (RUHS) to provide diversity from the seawater cooling system). Further design changes were made as a result of the PSA carried out at Sizewell B¡¦s Pre Construction Safety Report stage. (eg, the provision of two battery charging diesels to give long term DC power for control and instrumentation following an extended loss of all AC power, additional diverse provisions for isolation of the containment mini-purge system,ƒnadditional isolation valves and interlocks to reduce the frequency of an interfacing-systems LOCA andƒnchanges to provide better protection for the containment following a severe accident).

2) The Living PSA program concept in this context is consistent with the IAEA definition of Living PSA proposed in IAEA-TECDOC-1106 (http://www-pub.iaea.org/MTCD/publications/PDF/te_1106_prn.pdf), ie:

"A Living PSA (LPSA) can be defined as a PSA of the plant, which is updated as necessary to reflect the current design and operational features, and is documented in such a way that each aspect of the model can be directly related to existing plant information, plant documentation or the analysts¡¦ assumptions in the absence of such information. The LPSA would be used by designers, utility and regulatory personnel for a variety of purposes according to their needs, such as design verification, assessment of potential changes to the plant design or operation, design of training programmes and assessment of changes to the plant licensing basis".

The Living PSA programmes established by British Energy follow closely the LPSA practices proposed in IAEA-TECDOC-1106.

Seq. No	Country	Article	Ref. in National Report
125		Article 14.2	P.91,L.36

Question/ Comment: Concerning 14.36
(1)Could you explain about "the tools that are user friendly interface and present risks in a way that can be appreciated by operators"?

Answer: This particular paragraph of the report makes reference to the Risk Monitors used at Heysham 2 and Torness.Special tools have been used at Heysham 2 and Torness since 1988 to assist operators in addressing compliance with the some of the stations' Operating Rules. These are the risk monitor ESSM (Essential Systems Status Monitor) at Heysham 2 and the companion programs ESOP1 and LINKITT at Torness'. British Energy has recently developed a more advanced tool called ESOP to replace ESSM and ESOP 1-LINKITT. ESOP assists the operator by indicating whether or not the current plant configuration is compliant with the predetermined permissible plant configurations and, in parallel, carries out a risk evaluation using the Living PSA. It has a user-friendly interface and presents risk in a way that can be appreciated by the operators. ESOP retains a log of all changes in plant configuration and the results of operating rule compliance which is periodically reviewed to confirm satisfactory operation.More information about these tools can be found in a report on Risk Monitors prepared jointly by the IAEA and the OECD/NEA soon to be published as an IAEA-TECDOC.

Seq. No	Country	Article	Ref. in National Report
126		Article 14.2	P.92,L.36,14.45

Question/ Comment: Concerning 14.45,
Could you explain about the relevant probabilistic SAP?

Answer: NSD's Safety Assessment Principles can be found in: http://www.hse.gov.uk/nsd/saps.htmSAP 32 to SAP 41 address the scope and quality of the PSAs. SAP 42 (Doses to public), SAP 43 (risk to workers), SAP 44 (large release), SAP 45 (plant damage) and SAP 46 (criticality incidents) provide a probabilistic framework used by the regulator to assess the adequacy of the safety case.

Seq. No	Country	Article	Ref. in National Report
127		Article 14.2	P.92,L.38

Question/ Comment: There is the description in section14.45 that "thus provides a very important input to the plant safety case. PSA acts as a crosscheck on the level of safety provision, so that the PSA and deterministic SAPs are complementary." What is the crosscheck on the level of safety provision in concrete ?

Answer: The value of PSA in safety assessment goes beyond the numerical estimate of risk. PSA provides a comprehensive logical analysis of the potential for things to go wrong on the plant and the role played by the safety provisions. PSA enables weaknesses in the design to be identified, anticipated and remedied at an early stage. It provides evidence that confirms the plant is balanced, that is, that no particular class of accident or feature of the plant makes a disproportionate contribution to the overall risk. Hence, PSA

analyses confirm that meeting the deterministic principles (eg, redundancy, diversity, segregation, single failure) results in adequately low risk levels. Otherwise implementation of additional safety provisions may be warranted if reasonably practicable

Seq. No	Country	Article	Ref. in National Report
128		Article 15	Item 15.12/13-pag100

Question/ Comment: Is the Radiation Protection Advisor(RPA) mentioned in 15.12 the same as the Radiation Protection Supervisor mentioned in 15.13? What are their tasks?

Answer: The roles of the Radiation Protection Adviser (RPA) and the Radiation Protection Supervisor (RPS) are quite separate and require, in most cases, different qualities and experience.The RPA role is to advise the employer who is involved in work with ionising radiation on the observance of the requirements of IRR99. Except for certain specified work, the employer must appoint an RPA, or several RPAs, each covering different topic areas in IRR99. The RPA would be expected to have a detailed understanding of the relevant parts of IRR99 and must be consulted by the employer on matters such as the requirements for designated areas, plans for installations and acceptance into service of new or modified sources of ionising radiation, calibration of monitoring equipment, the testing of engineered controls and systems of work to restrict exposures to ionising radiation. The RPA would normally be consulted on other matters such as prior risk assessments, investigations, contingency plans and dose assessment and recording.The RPS is also appointed by the employer working with ionising radiation and has a crucial role to play in helping to ensure compliance with the arrangements made by the employer under IRR99 in respect of any area made subject to local rules. Such areas must include those areas where a worker is likely to receive more than 3/10 of any dose limit specified in IRR99 (controlled areas) or where it is necessary for a worker to follow special procedures to restrict radiation exposures. The RPS will generally be an employee of the employer involved in work with ionising radiation, although this is not a legal requirement. They will usually be in line management positions, closely involved with the work being done, to allow them to exercise sufficient supervisory authority. The RPS does not need to have the same depth of knowledge or breadth of experience, as the RPA, in order to fulfil the supervisory role.The legal responsibility for compliance with IRR99 rests with the employer, and cannot be delegated to the RPA or RPS.

Seq. No	Country	Article	Ref. in National Report
129		Article 15	P96.Ch15

Question/ Comment: In UK, the annually dose limit for public is required less then 0.3mSv for one nuclear installation, .and 0.5mSv for the site with several nuclear installations. How to specify the annually dose limits for each nuclear installation at the site with several installations so that both requirements mentioned above are met?

Answer: Article 7(1) of the 1996 BSS Directive states that “dose constraints should be used where appropriate, within the context of optimisation of radiological protection”. The BSS Direction 2000 requires, in ensuring that exposures are ALARA, regard to the following maximum doses to individuals which may result from a defined source, for use at the planning stage in radiation

protection:

· 0.3 mSv/year from any source from which radioactive discharges are first made on or after 13 May 2000. A source is defined (Cm 2919) as “a facility, or group of facilities, which can be optimised as an integral whole in terms of radioactive waste disposals”. The doses to be compared with this source-related dose constraint are only those that can be altered by changes in the operating regime of a controlled source. This source constraint thus includes the radiological impact of current discharges and direct radiation from the source, but excludes the impact of historical discharges. It is intended to guide the process of optimisation relating to the design, construction and operation of the facility. Cm 2919 states that, in general, it should also be possible for existing facilities to be operated within the source constraint of 0.3 mSv/year. However, it recognises that in some cases a realistic assessment of doses might suggest that the facility could not be operated within this figure. In these cases the operator must demonstrate that the doses resulting from the continued operation of the facility are as low as reasonably achievable and within dose limits.

· 0.5 mSv/year from the discharges from any single site. This site-related dose constraint applies to the aggregate exposure resulting from discharges from a number of sources with contiguous boundaries at a single location. It includes the radiological impact of current discharges from the entire site, but excludes the impact of direct radiation and historical discharges. It is particularly relevant to complex sites such as those with more than one nuclear power station. The site constraint of 0.5 mSv/year applies irrespective of whether different sources on the site are owned and operated by the same or by different organisations.

One UK of the Magnox power stations (Dungeness A) does not comply with the source constraint applicable to new facilities, owing to direct radiation from the plant. Radioactive discharges were first made from these power stations before 13 May 2000 and thus the Government’s BSS Direction 2000 to the Agency places no requirement on them to comply. However, the operator is required to demonstrate that the doses resulting from the continued operation of these power stations are as low as reasonably achievable and within dose limits.

Seq. No	Country	Article	Ref. in National Report
130		Article 15	
Question/ Comment	Do you apply any financial equivalent of the collective dose by ALARA or ALARP analysis?		
Answer	Financial equivalent values are used in ALARP analyses. The values used are those recommended by the National Radiological Protection Board (Value of Unit Collective Dose). For the general public the value is £ 20,000 per manSv and for occupational exposed workers the value is £ 50,000 per manSv. The values may be subject to modifications to take account of gross disproportion and financial inflation		

Seq. No	Country	Article	Ref. in National Report

131		Article 15	Paragraph 15.32

Question/ Comment	It is noted from Paragraph 15.32 that doses to personnel working in UK Magnox reactors from 1995 to 2003 exclude doses to workers at Calder Hall. Why were doses to workers at Calder Hall excluded? Were they significantly different than those received at other Magnox stations?
Answer	The reason the doses for Calder Hall were excluded was because Calder is part of the Sellafield licensed site and data on doses for Calder are not separated out in standard reporting. There is no reason why Calder would have higher doses than other stations. In fact the doses would generally be lower because Calder has no fuel ponds and transfers spent fuel direct to the Sellafield fuel handling plant.

Seq. No	Country	Article	Ref. in National Report
132		Article 15	Paragraph 15.36

Question/ Comment	It is noted from Paragraph 15.36 that electronic personal dosemeters (EPDs) are now being used as the legal dosemeter at British Energy power stations (Apart from Hinkley Point B and Torness). What in general has been the experience to date in using EPDs? Have any particular problems been identified?
Answer	Generally, experience in using EPDs to date has been good. Occasional sensitivity of the instruments to radio frequency interference has been encountered but this has not caused any significant difficulties. Notwithstanding, there is action to address the situation. The sensitivity to interference will be overcome through the introduction of a Mark 2 version EPD that currently is progressing through the HSE approvals process. The Mark 2 EPD has also been shown to be much less prone to damage and this will be an added advantage from its introduction

Seq. No	Country	Article	Ref. in National Report
133		Article 15	P.104

Question/ Comment	ManSv for operating UK Magnox reactors are shown in the table 15.32. The data shows a considerably low value comparing to those of LWRs. For the reasons of this low value, the numbers of workers in each reactor may be different from those of LWRs, please show us of the numbers of workers for each reactors in table 15.32.
Answer	Each operating Magnox reactor site has around 400 operational, support and administrative staff working on two reactors. Different classes of staff are involved to varying degrees within the radiological controlled areas and it is difficult to draw conclusions from this information. The total ManSv per reactor is the best indication of exposure for inter-reactor comparisons. The reason that gas cooled reactors give rise to low total worker doses compared with liquid water reactors is generally accepted to be due to the relatively high concentration of dissolved radioactive isotopes found in liquid water reactor primary coolant.

Seq. No	Country	Article	Ref. in National Report
134	, Republic of	Article 15	

Question/ Comment	In relation to paragraph 15.10, it is stated that the limits on radioactive discharges are set on the basis of the 'justified needs' of the licensees.

	1. How do the licensees set and propose the limits on the radioactive discharges? 2. What are the criteria to judge the basis of 'justified needs'?
Answer	Licensees are required to take all reasonably practicable measures in the design and operational management of their facilities to minimise discharges and disposals of radioactive waste, so as to achieve a high standard of protection for the public and the environment. This includes the application of the concept of Best Practicable Environmental Option (BPEO), which is the outcome of a systematic and consultative decision-making procedure, which emphasises the protection and conservation of the environment across land, air and water. The BPEO procedure establishes, for a given set of objectives, the option that provides the most benefit or least damage to the environment as a whole, at acceptable cost in the long term as well as in the short term. The Environment Agencies have recently published guidance for their assessment of BPEO studies at nuclear sites:http://www.sepa.org.uk/pdf/radioactivity/bpeo_guidance.pdf

Seq. No	Country	Article	Ref. in National Report
135		Article 16	Item16.8-pag.108

Question/ Comment	Besides reviewing the licensee’s emergency arrangements, what is the role of HSE during a nuclear emergency?
Answer	UK’s response framework for any type of large scale emergency is known as multi-agency response which is explained in a government publication called “Dealing with Disasters.” Under this each responsible agency is required to respond and co-ordinate with other responding agencies under the strategic co-ordinating authority of a senior officer of the local civilian police. For civil nuclear sites a special version of this response is set out in the Consolidated Guidance (CG) which is co-ordinated by the Nuclear Emergency Planning and Liaison Group (NEPLG) – see response to Question Seq. 144 for more information. As set out in Chapter 4 and elsewhere in NEPLG-CG, NII has three principal functions during a nuclear emergency. Firstly it is required to determine the cause and likely prognosis of the emergency and to advise NII response teams (see next) and central government of this. It will also field two specific response teams. The first will seek to ensure that that the response actions of the operator are correct and, where necessary to permission such activities in real time. The other is known as the Government Technical Advisor’s team which will be headed by a technically competent senior manager from NII, appointed specifically by central government on the day to act as an independent source of authoritative, co-ordinated technical advice to the strategic co-ordinating authority

Seq. No	Country	Article	Ref. in National Report
136		Article 16	16.16, page 113

Question/ Comment	The report indicates that “… members of the public within or close to a detailed emergency planning zone … should receive certain prescribed information.” How are changes in the local population within the emergency planning zone monitored, and new residents informed shortly following residency?

Answer It must be noted at the outset that UK Detailed Emergency Planning Zones (DEPZ) are relatively small (see response to seq 139) and NPPs are sited in areas of relatively static population. It is the responsibility of the Local Authority (LA), but usually discharged in conjunction with the operator, to ensure that everyone living within the DEPZ is aware both of the actions that should be taken in the event of an emergency and of the notification arrangements. This information is usually set out in a calender which is distributed annually by hand to all residents in the DEPZ, at which time residency details are checked. Residents are asked to leave these details behind if they do move house and within the information packs new residents are encouraged to contact the operator or LA for information. Obligations for warning and informing are set out within the Radiation (Emergency Preparadeness and Public Information Regulations) 2001 (REPPIR). These Regulations are made pursuant to the Health and Safety at Work etc. Act of 1974 (HSW) and the duties on the operator and LA for warning and informing are not absolute but are bounded by the HSW limitations of "Reasonably Practicability".

Seq. No	Country	Article	Ref. in National Report
137		Article 16	P106Ch16

Question/ Comment What measures are taken for extreme weather conditions by nuclear power station in UK?

Answer The safety assessment principles dictate that for natural hazards the design basis event is one that conservatively has a predicted frequency of being exceeded no more than once in 10,000 years. It should also be demonstrated that there is no disproportionate increase in risk for hazards more severe than this.

For the UK, extreme weather hazards comprise the following.
· High Wind and wind blown debris
· Extreme Rainfall
· Extreme Drought
· Extremes of Air Temperature
· Extremes of Sea (or river) Temperature
· Lightning· Extreme Hail, Sleet or Snow
· Icing
· Flooding from external sources

The influence of global climate change on each of the hazards is also addressed. The magnitude of the hazards and the impact on safety systems and structures is reviewed as part of the Periodic Review process through the lifetime of the plant. It is common for operating rules to be related to extreme weather. For example, when high winds are forecast, all large doors will be closed. Other actions may be the erection of temporary flood barriers. In addition, following the incidence of hazards, inspection of key plant areas/ systems to confirm their status may be undertaken.

Seq. No	Country	Article	Ref. in National Report
138		Article 16	

Question/ What is the status of decision-support systems?

Comment	Which computerized decision-support systems are used? If RODOS is being used what is its status?
Answer	The primary responsibility for responding to nuclear accidents rests with the operator of the site having the accident. Each site operator is required to develop an emergency plan, and this emergency plan specifies triggers (directly measurable or observable quantities/events) that will enable the most urgent responses and protective actions to be initiated without recourse to computer decision support systems. Once these most urgent responses have been initiated, further responses are developed through dialogue between representatives of each of the responsible organisations (local and national). In accordance with UK model arrangements for major emergencies (see response to Seq 134) each of these organisations has different roles and responsibilities in the event of a nuclear accident. The representatives meet together at an Off-site Centre, under the oversight of the local Chief Police Officer (the police have the executive authority to implement countermeasures involving people). Therefore the UK does not rely on a single computer decision support system to support its response to radiological emergencies. Instead, each response organisation develops or procures systems and tools to support its own particular functions and statutory duties. The dialogue between different Agencies using a range of tools and computer support systems provides a wide perspective of understandings of the situation and of the likely consequences of implementing different protective options. This results in robust decision making, and enables the decision makers to be fully aware of the relevant uncertainties. RODOS is not used for emergency response in the UK. In addition to systems developed and used by individual response organisations, the following computer systems are used by a number of organisations in their emergency response role: the UK atmospheric dispersion code, ADMS (short range and at early times during the response); the UK Met Office atmospheric dispersion model, NAME(medium-long range, not available during the first few hours of an accident as it takes some time to set up and run); the NRPB system for scoping the likely consequences of decontamination options, CONDO. The UK RIMNET system is used for communicating automatic gamma dose rate measurements from permanent sites around the UK and for sharing other data collected by individual organisations between all the response organisations. Other operator specific systems for sharing information (TIIMS (British Energy), NARIMS (Ministry of Defence)) are also used, depending on the type of accident.

Seq. No	Country	Article	Ref. in National Report
139		Article 16	Paras 16.13 & 16.14

Question/ Comment	In regard to Emergency Planning, Paragraphs 16.13 and 16.14 refer to testing of emergency arrangements at three category levels. What are the main lessons that have been learnt to date from the three categories of exercise and what changes have been implemented in emergency procedures as a result of these lessons?
Answer	The process for the planning for, and assessment of, offsite emergency exercises is set out in NEPLG guidance. The Nuclear Emergency Planning

Liaison Group (NEPLG) is a forum which brings together, under Department of Trade and Industry (DTI) chairmanship, a wide range of organisations and Agencies with interests in off-site planning for an emergency at a civil nuclear licensed site. The Group identifies, discusses and finds solutions to common problems, and agrees improvements in planning, procedure and organisation which would form a framework of advice to emergency planners. NEPLG was established in 1990. Since then it has met twice a year and formulated guidance on a wide range of emergency planning issues, taking into account national and international best practice. This guidance, when taken in conjunction with the statutory requirements of the nuclear site licence and of the Radiation (Emergency Preparedness and Public Information) Regulations (REPPIR) constitute the UK's emergency response framework. UK's arrangements for dealing with any type of major incident are based on multi-agency response in line with a government framework known as "Dealing with Disasters." NEPLG's "Consolidated Guidance" (available publicly at http://www.dti.gov.uk/energy/nuclear/safety/neplg_guide.shtml) is a special form of multi-agency response adapted specifically for the needs of nuclear sites. NEPLG is made up from representatives of Government Departments and Agencies with roles in the response to an event at a nuclear site including NII, representatives of the Emergency Services and representatives of the main nuclear operators. It is chaired by the Department of Trade and Industry who are the sponsoring department for the nuclear industry. NEPLG has no role in the authorisation of sites or operators, but rather it has the delegated responsibility to set the policy framework for emergency response at UK civil nuclear site.

– see http://www.dti.gov.uk/energy/nuclear/safety/neplg5.pdf for details (Note that this document is currently under revision and reporting / lessons learned may well move shortly to …/neplg6).

This guidance also describes the process for dealing with matters arising from exercises. The process does not distinguish between categories of exercise. Broadly issues arising are divided into those which can be resolved within the local response plans and those which either have generic implications or raise policy issues. This latter category is managed through a sub group of NEPLG which is chaired by NII. The terms of reference of this group are set out in Annexe 5.4 of the above document. Recent key issues considered by Lessons Learned sub group include:-

a). The need to co-ordinate media messages to ensure consistency, and provision of pre-prepared material. A working group has met and produced revised guidance. Work is also progressing to produce prepared material.

b). The need to develop a suitable standard for co-ordination of the resources for radiological monitoring suitable for public reassurance. This is being addressed by the NRPB (UK’s expert group in this regard) who are producing a paper to clear this issue. This will include the use of aerial gamma spectrometry through a protocol with the UK’s Environment Agency who have suitable resources for this work.

c). How to integrate the role and resources of the newly formed Government Offices in the Regions (GORs) into the response at the Off Site Centres. NEPLG has engaged in discussions with the GOR's sponsoring government department and produced a protocol that includes certain specific roles for GORs during the acute phase of an emergency. Chapter 4 of NEPLG guidance is being revised to reflect this.

d). The need for guidance to ensure the provision of consistent and adequate facilities at Off-site Centres. Lessons Learned Sub-Group engaged an experienced member from the emergency services (police) to bring best practice from the various Off-site Centres around the UK. The guide subsequently produced is now available to the individual Off-site Centres as a generic model.

Seq. No	Country	Article	Ref. in National Report
140	, Republic of	Article 16	16.9 , p108

Question/ Comment: What are the rationale and the assumptions used for establishing "detailed emergency planning zone" in the case of postulated accidents and accident consequence assessment?
And what extent of accident severity is included in the postulated accident?

Answer: The response to this question has also taken into account the requirements of the very similar questions seq 140 & 141. The requirements for nuclear emergency response planning and preparadeness in the UK are long standing and predate both the current legal framework and indeed its predecessor. The Radiation (Emergency Preparadeness and Public Information) Regulations of 2001 (REPPIR) implement the relevant requirements of EC Council Directive 96/29. REPPIR applies to all operations in the UK where radioactive substances are used, stored or handled. It requires that operators assess their operations and in cases where it is "reasonably forseeable" that an accident could give rise to a 5 mSv consequence which would affect members of the public, operators must provide a summary of their assessment to HSE and to the relevant Local Authority (LA). HSE will confirm the size of the 5mSv consequence zone to the LA for use as the basis for the LA's obligations for co-ordinating Emergency Planning. REPPIR requires that the LA co-ordinate detail response plans within this 5 mSv consequence zone which is known as the Detailed Emergency Planning Zone (DEPZ). REPPIR defines "reasonably forseeable" as an accident that is credible but less than likely. In respect of civil nuclear licensed sites NII have determined that "reasonably foreseeable" should be interpreted as an accident in the infrequent range which, within the fault schedule which underlies the safety case for the operation of the plant, has an initiating frequency of greater than 10-5. There are two separate additional constraints imposed by Government Policy. Firstly a DEPZ in respect of an operating reactor site will be no less than 1km radius from the site. Secondly that at any site where there is a DEPZ established as above, there should also be an additional contingency planning zone imposed in respect of larger but non-reasonably foreseeable accidents. This obligation on the LA's planning process, described at http://www.dti.gov.uk/energy/nuclear/safety/neplg9.pdfis for outline plans to address evacuation to 4 km and shelter to 15km from the site.

Seq. No	Country	Article	Ref. in National Report
141		Article 16	

Question/ Comment: Please explain who and how determines the emergency planning zone around the nuclear facilities. What is the basis for the zone specification? Which criteria do you apply to specify the zone area? Do you use/accept any probabilistic arguments to determine the zone area?

Answer: The requirements for nuclear emergency response planning and preparadeness in the UK are long standing and predate both the current legal framework and indeed its predecessor. The Radiation (Emergency Preparadeness and Public Information) Regulations of 2001 (REPPIR) implement the relevant requirements of EC Council Directive 96/29. REPPIR applies to all operations in the UK where radioactive substances are used, stored or handled. It requires that operators assess their operations and in cases where it is “reasonably forseeable” that an accident could give rise to a 5 mSv consequence which would affect members of the public, operators must provide a summary of their assessment to HSE and to the relevant Local Authority (LA). HSE will confirm the size of the 5mSv consequence zone to the LA for use as the basis for the LA’s obligations for co-ordinating Emergency Planning. REPPIR requires that the LA co-ordinate detail response plans within this 5 mSv consequence zone which is known as the Detailed Emergency Planning Zone (DEPZ). REPPIR defines “reasonably forseeable” as an accident that is credible but less than likely. In respect of civil nuclear licensed sites NII have determined that “reasonably foreseeable” should be interpreted as an accident in the infrequent range which, within the fault schedule which underlies the safety case for the operation of the plant, has an initiating frequency of greater than 10-5. There are two separate additional constraints imposed by Government Policy. Firstly a DEPZ in respect of an operating reactor site will be no less than 1km radius from the site. Secondly that at any site where there is a DEPZ established as above, there should also be an additional contingency planning zone imposed in respect of larger but non-reasonably foreseeable accidents. This obligation on the LA’s planning process, described at http://www.dti.gov.uk/energy/nuclear/safety/neplg9.pdfis for outline plans to address evacuation to 4 km and shelter to 15km from the site.

Seq. No	Country	Article	Ref. in National Report
142		Article 16.1	p. 108, 16.9

Question/ Comment: Please expand on details regarding the "reasonably foreseeable event" which is used for the definition of emergency planning zones.

Answer: The requirements for nuclear emergency response planning and preparadeness in the UK are long standing and predate both the current legal framework and indeed its predecessor. The Radiation (Emergency Preparadeness and Public Information) Regulations of 2001 (REPPIR) implement the relevant requirements of EC Council Directive 96/29. REPPIR applies to all operations in the UK where radioactive substances are used, stored or handled. It requires that operators assess their operations and in cases where it is “reasonably forseeable” that an accident could give rise to a 5 mSv consequence which would affect members of the public, operators must provide a summary of their assessment to HSE and to the relevant Local

Authority (LA). HSE will confirm the size of the 5mSv consequence zone to the LA for use as the basis for the LA's obligations for co-ordinating Emergency Planning. REPPIR requires that the LA co-ordinate detail response plans within this 5 mSv consequence zone which is known as the Detailed Emergency Planning Zone (DEPZ). REPPIR defines "reasonably forseeable" as an accident that is credible but less than likely. In respect of civil nuclear licensed sites NII have determined that "reasonably foreseeable" should be interpreted as an accident in the infrequent range which, within the fault schedule which underlies the safety case for the operation of the plant, has an initiating frequency of greater than 10-5. There are two separate additional constraints imposed by Government Policy. Firstly a DEPZ in respect of an operating reactor site will be no less than 1km radius from the site. Secondly that at any site where there is a DEPZ established as above, there should also be an additional contingency planning zone imposed in respect of larger but non-reasonably foreseeable accidents. This obligation on the LA's planning process, described at http://www.dti.gov.uk/energy/nuclear/safety/neplg9.pdfis for outline plans to address evacuation to 4 km and shelter to 15km from the site.

Seq. No	Country	Article	Ref. in National Report
143		Article 16.1	p. 113, 16.18

Question/ Comment	What are the emergency reference levels applied for countermeasures (sheltering, iodine tablets and evacuation) in case of an emergency?
Answer	Currently, the ERLs are those recommended by NRPB in 1990 (Documents of the NRPB 1(4)). The ERLs are specified in pairs and represent a judgment on the levels of dose expected to be averted by the countermeasure, which, taken together with the other expected benefits (eg reassurance) would be just sufficient to outweigh the expected 'harmful' consequences in specified situations. The lower ERLs represent this balance for situations that are particularly amenable to the implementation of countermeasures (eg small numbers of people), whilst the upper ERLs represent this balance for situations that are much less amenable to the implementation of countermeasures (eg large numbers of people). NRPB's primary advice is expressed in terms of a few, a few tens and a few hundreds of mSv. This reflects the partially subjective nature of the judgments on where the appropriate balance lies. However, for planning purposes it is helpful to specify numbers. Therefore, NRPB interprets its ERLs in pairs as follows: Evacuation: 30, 300 mSv whole body (children) Sheltering: 3, 30 mSv whole body (children) Stable iodine prophylaxis: 30, 300 mSv thyroid (children) NRPB stresses that these ERLs do not represent boundaries between what is safe and unsafe, nor are they 'hard' numbers - ranges of 5-50 mSv etc would have been equally valid interpretations of 'a few' and 'a few tens'.The ERLs for stable iodine prophylaxis are currently under review

Seq. No	Country	Article	Ref. in National Report

144		Article 16.1	Chap. 16.1, P. 106

Question/ Comment	3/a How the emergency plan of a nuclear installation in shut down, defueling or decommissioning state change compared to the operating ones? 3/b When the effect of emergency preparedness related obligations terminates in the lifecycle of a nuclear installation?
Answer	The regulations covering preparadeness for nuclear accidents in the UK which have a significant offsite hazard potential is the Radiation (Emergency Preparadeness and Public Information) Regulations 2001 (REPPIR). These require that emergency preparadeness is based on the bounding fault identified from an analysis of the facility's fault schedule (see response to seq 139). This bounding fault is not expected to change significantly during the operational life of the facility and is intended to be independent of the day to day operational state of the plant. When the plant is finally shutdown and decommissioning it is for the operator to justify that the bounding fault sequence, and thus the basis of emergency plans has changed. Clearly the operator of a plant which has been shutdown permanently for more than 100 days could readily justify that an KI countermeasure was no longer appropriate. Equally when a permanently shutdown reactor has been completely defuelled and all of the spent fuel removed from the site the operator would be expected to revise the basis of his emergency planning again. However the new bounding fault and thus the revised basis of emergency planning will depend on an analysis of the remaining hazards at that site.Irrespective of whether the bounding fault can give rise to a "Reasonably Forseeable" (RF) consequence of 5 mSv to a member of the public (the threshold for transfer of responsibility of off site planning from the operator to the LA,) NII's Licence Condition 11 places a responsibility on the licensee for having arrangements to deal with the consequences of all accidents at the licensed site. Thus at an appropriate point during decommissioning process when the bounding fault no longer exceeds the RF threshold, the residual responsibility for appropriate emergency preparadeness reverts to the licensee for the duration of the period that the facility is licensed. The UK operates a "cradle to grave" licensing system and so the obligations for appropriate emergency preparadeness will remain until the licensee agrees with NII that licensing controls for the site can be removed

Seq. No	Country	Article	Ref. in National Report
145		Article 16.1	P.106,L.28

Question/ Comment	It is stated that "Consequently it chairs the Nuclear Emergency Planning Liaison Group (NEPLG), which brings together organizations with interests in off-site civil nuclear emergency planning. " What is the member(s) or organization(s) of this NEPLG? Does NEPLG authorize a licensed civil nuclear site in England and Wales in place of DTI?
Answer	The Nuclear Emergency Planning Liaison Group (NEPLG) is a forum which brings together, under Department of Trade and Industry (DTI) chairmanship, a wide range of organisations and Agencies with interests in off-site planning

for an emergency at a civil nuclear licensed site. The Group identifies, discusses and finds solutions to common problems, and agrees improvements in planning, procedure and organisation which would form a framework of advice to emergency planners. NEPLG was established in 1990. Since then it has met twice a year and formulated guidance on a wide range of emergency planning issues, taking into account national and international best practice. This guidance, when taken in conjunction with the statutory requirements of the nuclear site licence and of the Radiation (Emergency Preparedness and Public Information) Regulations (REPPIR) constitute the UK's emergency response framework. UK's arrangements for dealing with any type of major incident are based on multi-agency response in line with a government framework known as "Dealing with Disasters." NEPLG's "Consolidated Guidance" (available publicly at http://www.dti.gov.uk/energy/nuclear/safety/neplg_guide.shtml) is a special form of multi-agency response adapted specifically for the needs of nuclear sites. NEPLG is made up from representatives of Government Departments and Agencies with roles in the response to an event at a nuclear site including NII, representatives of the Emergency Services and representatives of the main nuclear operators. It is chaired by the Department of Trade and Industry who are the sponsoring department for the nuclear industry. NEPLG has no role in the authorisation of sites or operators, but rather it has the delegated responsibility to set the policy framework for emergency response at UK civil nuclear sites

Seq. No	Country	Article	Ref. in National Report
146		Article 17	Item 17.21-pag.120

Question/ Comment: How is the deterministic evaluation of severe accidents beyond the design basis performed? What is the scope of the evaluation?

Answer: According to NSD’s Safety Assessment Principles (http://www.hse.gov.uk/nsd/saps.htm):

- Fault sequences beyond the design basis which have the potential to lead to a severe accident should be considered, and analysed (by means of bounding cases if appropriate). The analysis should identify the failures which could occur in the physical barriers to the release of radioactive material or in the shielding against direct radiation, and should determine the magnitude and characteristics of the radiological consequences (SAP 28)
- The analysis of severe accidents should be sufficiently realistic to form a suitable basis for the accident management strategies in SAP331 et seq. Where the uncertainties are such that a realistic analysis cannot be performed with confidence, reasonably conservative assumptions should be made to avoid optimistic conclusions being drawn. (SAP 29)
- The severe accident analysis should also provide information relevant to the preparation of the site emergency plan for the protection of people outside the site in the event of a large release of radioactivity (SAP 30).
- Where severe accident uncertainties are judged to have a significant effect on the assessed risk, research aimed at confirming the modelling assumptions should be performed (SAP 31)

The above principles are used by NSD Inspectors to assess the adequacy of

the severe accident analyses performed by the licensee. More specific guidance is provided in NSD's Technical Assessment Guide on 'Severe Accident Analyses', which is currently not publicly available.

The Licensees have discretion in the way they plan and undertake their severe accident analyses, as long as they:

- Ensure that they are discharging their legal duty under the Health and Safety at Work Act section 3.(1) (Section 3.(1) of the Health and Safety at Work Act 1974 places a duty on the nuclear site Licensee, in common with all other employers, to: 'conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety')
- Demonstrate that they comply with the Fundamental Safety Assessment Principle No 5: 'all reasonably practicable steps shall be taken to minimise the radiological consequences of any accident'.
- Demonstrate that the risk presented by the plant is not intolerable (HSE's publication "The Tolerability of Risk from Nuclear Power Installations" proposed a quantitative level of risk to individual members of the public above which the risk would be regarded as intolerable and the operation presenting the risk prohibited)

To demonstrate that the risk presented by a plant is not intolerable, Licensees provide quantitative risk assessments. However, while the quantified risk predictions are important, the main contribution of these analyses to safety lies in their ability to reveal plant vulnerabilities to particular faults and thus aid the Licensee in reducing the risk to as low a level as is reasonably practicable.

In order to support the severe accident analyses licensees in the UK use computer codes such as MAAP (for Sizewell B) and UK-developed severe accident codes for the Gas Cooled Reactors.

Seq. No	Country	Article	Ref. in National Report
147	, Republic of	Article 17	17.32 , p122

Question/ Comment

It is stated that continued re-evaluation of external hazards is required under LC 15. Several NPPs in the UK started operation between the mid 1960s and the early 1970s, when the requirements for seismic design of NPP facilities and seismic qualification of equipment by test were not well established. Therefore it seems that the seismic safety of those NPPs should be re-evaluated.
1. Was the seismic re-evaluation of the NPPs carried out based on new geologic and seismologic information and newly-established seismic requirement?
2. If it was done, for which NPPs was the re-evaluation performed and what was the re-evaluation method and procedure?
3. What kind of new geologic and seismologic information was taken into account in the seismic re-evaluation?
4. What were the corrective actions after the seismic re-evaluation?

Answer

The UK's Magnox NPPs and the early AGR NPPs made no provision for

seismic capacity in their original design. The later AGRs made some provision for seismic design. The most recent NPP is the Sizewell B PWR, which was comprehensively designed to withstand earthquake loads. For those NPPs with no initial seismic design, all have had site-specific seismic hazard assessments undertaken. As a result, all have had extensive analysis work undertaken to NPP structures and equipment. A number of modifications have been made subsequently to engineer increased seismic resistance into these older NPPs.Presently, the regulator seeks evidence from NPP operators that seismic hazard assessments have been undertaken, in accordance with a number of high level safety principles provided in HSE's Safety Assessment Principles, especially Principles P120 and P128 to P131 [1]. License Condition 15 is the regulatory vehicle for requiring consideration of seismic issues for older plant with no initial seismic design.All UK operating NPPs now have a comprehensive site-specific seismic hazard assessment. These assessments, and the loading functions defined by the 1 in 10,000 year event, has lead to extensive deterministic structural and civil analysis work to demonstrate that the NPP plants and equipment are robust. Many modifications to strengthen NPP plant and equipment have been undertaken as a result. For some plants modifications to the structures were necessary, however these were generally to preclude local collapse. In some cases, the modifications have included the provision of new safety systems. Accompanying the physical modifications, operating instructions were also upgraded.

1) Seismic hazard assessments were undertaken for all existing NPPs over a period from the 1980s to 2003. Up to date geological and seismological data was used that was current at their time of production. New requirements are explicitly stated in the most recent SAPs (1992) [1], but NPP operators were considering the effects of seismic hazard before this.

2) A comprehensive method was developed by the NPP operators to undertake site-specific seismic hazard assessments. Seismic analysis of NPP plant and equipment generally follows best practice in the worldwide nuclear industry. This has included a mixture of analysis, test and use of experience data (SQUG) methodologies as appropriate.

3) The most up-to-date geological and seismological data was used to undertake seismic hazard assessments in the first place. Data on the seismological history of the UK and its immediate environment has been extensively and systematically gathered since the 1980's and continues to be updated using instrumented records. Subsequent periodic reviews will review this data and methodological developments to confirm the continued validity of the seismic hazard assessments.

4) For the older, non-seismically designed NPPs, consideration of seismic resistance prompted numerous modifications to structures, equipment and operating procedures. [1] HSE, Safety Assessment Principles for Nuclear Plants, 1992.

Seq. No	Country	Article	Ref. in National Report

148		Article 18	P125Ch18

Question/ Comment	Please give a brief introduction on current developing program of nuclear power industry in UK.
Answer	Currently there is no programme for new build in the UK. The Energy White Paper, Our energy future - creating a low carbon economy (published 2003), states that the UK Government's priority is for energy efficiency and renewables. We recognise that although nuclear power produces no carbon dioxide, its current economics make nuclear build an unattractive option and there are important issues of nuclear waste to be resolved. We have made it clear that any future decision to proceed with the building of new nuclear power stations will need to be based on the fullest public consultation and the publication of a further white paper setting out our proposals. The Government is committed to ensuring that the country continues to sustain its existing nuclear power stations, which will be running into the 2020s and, in the case of Sizewell B, beyond that. The initiative for bringing forward proposals to construct new plant lies with the market. A generator wishing to build a new nuclear station in the UK would be subject to a number of approvals processes under EU and UK legislation. The Government will not intervene in the operation of the market except in extreme circumstances such as to avert, as a last resort, a potentially serious risk to safety. The Government's skills and research initiatives will help maintain nuclear power as an option into the future and equally importantly, benefit current generation, decommissioning and waste issues.

Seq. No	Country	Article	Ref. in National Report
149		Article 18	p 131

Question/ Comment	Paragraph 18.35 states that at any point in time, the licensees' Design Safety Guidelines and the SAPs ensure that nuclear installations are designed to modern standards. Please, describe for Sizewell B, what plant systems relevant to safety have been upgraded based on international operating experience and the newest standards?
Answer	At the time that Sizewell B was designed, UK safety design requirements far exceeded the international norm. These required high degrees of both redundancy and diversity and, by virtue of the use of Probabilistic Safety Assessment in the design and licensing process, included consideration of severe accidents. As part of the first Periodic Safety Review British Energy have reviewed Sizewell B against modern standards including IAEA NS-R-1 & 2 and concluded that the design meets these standards. As a consequence of this, there have been no significant upgrades to safety related systems based on changes in these standards. There have been significant changes in international standards but these have narrowed the gap between international and UK design standards.There have obviously been issues coming from international experience that British Energy looked at including Inconel 600 cracking. As a result of this Sizewell B's RPV head will be replaced shortly.

Seq. No	Country	Article	Ref. in National Report

150		Article 18.1	p. 131, 18.30

Question/ Comment: Which acceptance criteria have been used for the regulatory review of the radiological consequences of design basis accidents? Are these criteria related to releases or related to radiological exposures? If dose limits are applied, which are the parameters (e.g. exposure pathways, integration times, distances) considered for the calculation?

Answer: The critieria for the regulatory review of design basis accidents are based on the radiological consequences and fault frequencies. For the most severe design basis accident no person outside the site should receive a dose >100 mSv and no person on the site should receive a dose >500 mSv with a frequency >10-5 per year. For more frequent design basis accidents the doses would be correspondingly lower, and for the most frequent design basis accidents the doses should not exceed the statutory limits in IRR99.

For design basis accidents leading to releases of radioactive material, the criteria are related to the radiological consequences of the releases. The radiological analysis should determine the maximum effective dose to a worker on-site and to a person off-site directly downwind of the release.

For persons off-site, the calculation of the dose should be performed on a conservative basis and assume:

a) the person remains at the point of greatest dose for the duration of the release, although for extended releases more realistic occupancy may be assumed after a suitable interval;

b) the weather conditions have characteristics which produce the highest dose to that person; and

c) no off-site emergency countermeasures are effected, other than certain food bans whose implementation is shown to be highly likely. For persons on-site, the calculation of the radiation dose should also be conservative but the assumptions will be dependent on the nature of each fault sequence.

Seq. No	Country	Article	Ref. in National Report
151		Article 18.2	P.125,L27

Question/ Comment: In 18.2, it is stated that
"Guidance was therefore prepared for designers and assessors on the nuclear safety principles to be used in the review of existing designs of nuclear installations and the preparation of proposals to modify them."

Who made the guidance?
Could you explain the contents of this guidance?
Is the guidance disclosed to public?

Answer: British Energy: the guidance is contained within its Nuclear Safety Principles, which are the successor to the Safety Review Guidebook. BE is reviewing this as part of PSR2, but also in the context of HSE's revised of its Safety Assessment Principles – it may be that BE choose in the future not to maintain its own standards if HSE's position moves to one of producing its

	own guidance to licensees.BNFL: The safety regulator has published a document entitled Safety Assessment Principles for Nuclear Plant (HMSO). These principles are applied by the regulator when assessing safety cases submitted by licensees. Licensees have prepared their own equivalent documents, referred to as safety review guidebooks, that provide advise on the preparation of safety cases. The licensees' guidebooks are more detailed than the general document issued by HSE but they are consistent. The licensees' guidebooks provide advice on the application of principles and refer to the process for the preparation and formal clearance of safety cases. Topics where detailed advice is given in the guidebooks include preparation of Periodic Safety Reviews, application of the ALARP principle, the formulation of structural integrity based safety cases, including incredibility of failure arguments, and the development of fuel route safety cases. Representatives from UK utilities have referred to the approaches described in the safety review guidebooks at numerous international conferences over recent years.

Seq. No	Country	Article	Ref. in National Report
152		Article 19	§19.19

Question/ Comment	In section 19.19, what are the criteria to discriminate between significant safety changes requiring HSE agreement before implementation and those requiring only notifications?
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.

Seq. No	Country	Article	Ref. in National Report
153		Article 19	§19.23

Question/ Comment	In section 19.23, what is considered as “sufficient in-house expertise? How is it verified that the licensees actually are “intelligent customers”?
Answer	This answer is similar to that for question 4 from . Under UK law a Nuclear Site Licensee is responsible for safety on its sites, this responsibility cannot be delegated to any other party. This means that the Licensee must be in effective control of all activities carried out on its site. Recently there have been moves within the nuclear industry for the Licensee’s to become more efficient and to explore different ways of working. This has resulted in Licensee’s outsourcing a range of their activities through the use of external contractors. However, in order to comply with the law a Licensee must maintain an adequate capability within its own organisation to be able to understand the nuclear safety requirements for all activities carried out on its sites including those performed by any of its contractors. The attributes that a Nuclear Site Licensee must display in meeting its duties under the law in these circumstances, is referred to as the

intelligent customer capability. The important features of this capability requires that a Licensee should have within its own work force, sufficient numbers of staff with the appropriate managerial, supervisory, and technical skills to understand the safety significance of actions proposed and undertaken by any of its contractors.

The necessary capabilities within a Licensee will vary from case to case depending on the nature of the activities being undertaken. The regulatory body has developed a broad framework of attributes which it uses to form a judgment on the intelligent customer capability of a Licensee. This framework includes the requirement for the Licensee to show that it has the capability to:
(i) understand the nuclear safety requirements of all of its activities relevant to safety, and those of contractors, to take responsibility for managing safe operation;
(ii) understand its duties under the law, particularly duties as a nuclear site licensee;(iii) set, interpret and deliver safety and engineering standards relevant to the business;
(iv) have sufficient breadth and depth of knowledge and experience to understand the safety feature of its plant(s) and the hazards it (they) present;
(v) understand and support all aspects of the safety case and the facility operation over the full facility lifetime - including decommissioning and disposal;
(vi) maintain and develop the corporate memory;
(vii) ensure adequate numbers of suitably qualified and experienced staff are available to make the judgements pertinent to safety both now and in the future.
(viii) When using contractors to, in the context of safety:- specify the work;- assess tenders and proposals;- choose an appropriate contractor;- supervise and manage the work;- ensure contractors staff are suitable qualified, experienced and trained;- ensure the required product or work quality is delivered; and- monitor the performance of the contractor, taking appropriate action if it is inadequate.The process of verifying that a Licensee has an adequate intelligent customer capability is determined using the normal regulatory tools of inspection and assessment across a range of the legal requirements placed on the Licensee including, the production of safety documentation, training of staff and control and supervision of operations.

Seq. No	Country	Article	Ref. in National Report
154		Article 19	Item 19.19-pag.140

Question/ Comment	What is the definition used for “significant safety changes” that should be agreed by HSE before implementation?
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.

Seq. No	Country	Article	Ref. in National Report
155		Article 19	Item 19.37 -pag.144

Question/ Comment: Are the events reported by WANO and INPO also reviewed by the licensee? How does HSE ensures that the all relevant events are reviewed by the licensee?

Answer: British Energy has a Central Operating Experience Feedback team which monitors and communicates WANO INPO Operating Experience.
For BNFL each nuclear licensed site has a designated Operations Experience Feedback (OEF) Engineer who is required to act on behalf of the site to ensure that lessons are learned from nuclear plant operations experience nationally and internationally. This involves monitoring nuclear plant events, carry out screening, commission assessments and be involved with remedial and preventive action. The procedure followed has been defined in the WANO Performance Objectives and Criteria on Operational Experience. WANO is provided with information from the UK on plant operation and reportable events and equivalent information is received from WANO on experience worldwide. Arrangements are in place for the OEF Engineers at all sites to collaborate in the review of events and determine any action to be taken.

Seq. No	Country	Article	Ref. in National Report
156		Article 19	19.25, page 141

Question/ Comment: The report indicates that "… there are fewer scientists and engineers choosing careers in the nuclear industry … unless the situation is reversed, there could be significant future problems, particularly if there is a decision to build new nuclear installations."
How significant are the future problems, particularly if there is a decision to build new nuclear installations; can it be quantified?

Answer: The important work of the OECD NEA has raised awareness about nuclear skills shortages in the UK and action is being taken following an agenda set by the Government. The Sector Skills Council, Cogent, has been chosen to progress a programme involving the industry, government departments and universities to address the nuclear skills shortages. The scale of manpower shortage has been assessed already but a survey underway aims to identify the individual skills mix required. Currently, there is no shortage but the age profile of nuclear workers leads us to predict a shortage in the medium to long term. In universities, the decline appears to have been stopped as indicated by new courses starting, especially in the area of waste and decommissioning and a consortium of universities winning a major EPSRC grant to coordinate teaching programmes.

Seq. No	Country	Article	Ref. in National Report
157		Article 19	

Question/ Comment: How often UK regulator and licensees have used the IAEA safety services - how many OSARTs have been carried out?

Answer: The UK is closely involved in a wide range of activities in association with the IAEA. UK representatives participate in many IAEA working groups and events. These include that preparation of standards, advice and guidance on

nuclear safety matters. In addition the standards developed nationally for the UK nuclear industry make extensive use of the IAEA nuclear safety standards and related documents. HSE does not currently have plans to request an IRRT mission. Similarly, the UK's nuclear power station licensees have not requested IAEA missions

Seq. No	Country	Article	Ref. in National Report
158		Article 19	

Question/ Comment: All UK nuclear installation licensees are required periodically shutdown the plant for examination, inspection, maintenance and testing of systems that may affect safety. HSE issues consent to restart the plant after such outage. What documentation had to be submitted by licensee to HSE for evaluation before HSE´s consent issue?
What is the time period in which the consent should be issued?

Answer: The licensee prepares a preliminary report of the examination, inspection, maintenance and testing for discussion at a meeting with the regulator towards the end of the outage. This meeting takes place usually about one week before the reactor is due to be started up. The preliminary report and its references have to provide enough information to allow issue of the Consent. The detailed outage report is sent to HSE about one month later.

Seq. No	Country	Article	Ref. in National Report
159		Article 19	Para 19.48 & 19.49

Question/ Comment: It is noted from Paragraphs 19.48 and 19.49 that the licence condition on accumulation of radioactive waste (LC 32) places an obligation on the licensee to minimise, as far as reasonably practicable, the rate of production and the total quantity of radioactive waste on the site, and that LC 33 requires the disposal of radioactive to be in accordance with an Authorisation granted under RSA93.

Magnox fuel reprocessing is a significant contributor to both the build up (at Sellafield) and discharge to the environment of radioactive waste in the UK. On what basis has the UK decided that reprocessing of spent Magnox fuel is the best option, has this option been recently reviewed, what other options have/are being considered and what were the outcomes to such policy review.?

Answer: The management of spent nuclear fuel is a matter for the Joint Convention of the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. This issue was covered in our report for that Convention and will be covered again in the UK's report to that Convention due for submission in October 2005

Seq. No	Country	Article	Ref. in National Report
160	, Republic of	Article 19	

Question/ Comment: (19(vii) Analysis of Operating Experience)
In the section 19(vii) of the report, it is stated that an analysis of operating experience is a key part of the periodic safety reviews. Would you explain the analysis methods in more detail?

Answer: For BE, this involves reviewing its operating experience over the period since the last PSR in terms of plant data, events, etc., but also taking account of

relevant OEF from around the world. The analysis method is largely about review, rather than anything more quantitative – except where it involves plant failure rate data for feeding into safety assessments.Similarly for BNFL, the starting point for a PSR, which is carried out every 10 years, is the previous PSR. In updating the previous PSR the factors that have to be taken into account include changes that have arisen in the light of experience, the effect of ageing in the next 10 years and consideration of changes in standards. Operating experience provides valuable data that can ensure that assumptions about the plant made in formulating the safety case are soundly based. For example the reliability of plant items can be based on a substantial amount of accumulated data. Monitoring information obtained over 10 or more years can provide a reliable basis for estimating the effects of plant ageing in future operation. A review of maintenance data can provide a basis for optimising maintenance activities so that they are concentrated in key areas. Over the years a significant amount of data can accumulate on operator action. A review of these data can indicate that significant benefit can result, in terms of ease of operator action or speed of operator action, if plant modifications are introduced.

Seq. No 161	Country , Republic of	Article Article 19	Ref. in National Report

Question/ Comment: Since 1980s, problems related to sizing or control switch setting of safety-related motor-operated valve in nuclear power plants have been identified and programs have been established for solving these problems. For example, United States issued Generic Letter 89-10(Safety-Related Motor-Operated Valve Testing and Surveillance) and 96-05 (Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves) to solve these problems.

Did you experience similar problems in MOV? Is there any plan to cope with the problems about safety-related motor-operated valve? If yes, please explain the plan briefly.

Answer: No generic problem with safety related motor operated valves have been reported. It should be noted that in the UK most reactors are gas cooled where the timescale for corrective action in the event of a fault is much longer than that for a PWR reactor, for example. The need for fast acting high reliability motor operated valves is therefore less of an issue.

Seq. No 162	Country	Article Article 19	Ref. in National Report

Question/ Comment: Could you provide some useful information on the initiatives to remedy loss of design knowledge and reduction of expertise in nuclear industry.

Answer: The important work of the OECD NEA has raised awareness about nuclear skills shortages in the UK and action is being taken following an agenda set by the Government. The Sector Skills Council, Cogent, has been chosen to progress a programme involving the industry, government departments and universities to address the nuclear skills shortages. The scale of manpower shortage has been assessed already but a survey underway aims to identify the individual skills mix required. Currently, there is no shortage but the age profile of nuclear workers leads us to predict a shortage in the medium to

long term. In universities, the decline appears to have been stopped as indicated by new courses starting, especially in the area of waste and decommissioning and a consortium of universities winning a major EPSRC grant to coordinate teaching programmes.

Seq. No 163	Country	Article Article 19	Ref. in National Report

Question/ Comment: Do you implement (or plan to implement) risk-informed regulation (RIR)? Do you allow a performance of the scheduled maintenance and repair during normal plant operation at full power or it is limited during shut down of the plant?

Answer: The UK regulator's equivalent of RIR is the Integrated Enforcement Strategy (IES), which is still being developed. When 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. Where there is sufficient redundancy and depending on accessibility, certain systems or components can be taken out of service for scheduled maintenance during normal operation.

Seq. No 164	Country	Article Article 19	Ref. in National Report

Question/ Comment: 1. Does the reports developed by the operating organisation contain results of the NPP operational experience analysis? If so, what are the main components of these reports: objective of development, customer and developer of the report; target organisations; structure; application in practice?
2. Is there a unified national list of safety performance indicators for the regulatory body and operating organisation? If so, what are the main areas for monitoring of these indicators? If such unified list (system) of indicators does not exist, is it planned to develop this system? What performance indicators are used in regulatory and operational practices (in addition to international systems of indicators, for example, WANO indicators)?

Answer: Operation experience is a component part of Periodic safety Reviews (see section 6 of National report). The PSRs are prepared by the operators themselves and are reviewed by the regulator. Opertional experience will cover not only the experience at the site in question but also other sites in UK and abroad.

UK nuclear utilities are members of WANO and report operating experience and events in accordance with a standard procedure that is available internationally. The information reported concerns plant output, shutdowns events, their root causes and other analysis of events.

Regarding performance indicators:

Based on the experience of BNFL the three key safety performance measures that are constantly monitored comprise:
(1) the dose levels from ionising radiation experienced by site staff (employees and contractors),
(2) the incidence of events at Level 1 of the International Nuclear Event Scale

and
(3) the incidence of dangerous occurrences as defined in Reporting of Injuries Diseases and Dangerous Occurrences Regulations(1995) and the Electricity Safety, Quality and Continuity Regulations (2002).

More detailed indicators for radiological safety include collective dose, mean dose, employees subject to doses >15mSv and >2mSv and the number of unplanned exposures >15mSv.

More detailed indicators related to nuclear safety include reportable events, operating rule breaches, maintenance schedule breaches, summons/prohibitions and improvement notices from the regulator, unit capability factors and unplanned shutdowns.

Seq. No	Country	Article	Ref. in National Report
165		Article 19.2	P.137,L.27

Question/ Comment: References ; Under these arrangements, the training of operations personnel includes familiarisation with the background to operating limits and conditions.
The operator training to have full knowledge for operating limits and conditions are required.

Please explain specifically how such training is conducted.
In what manner does the regulator evaluate and deal with the results of the required training?

Answer: Operators are provided with training at a centrally based training facility and at the site where they work. The central training facility provides general training on the basic principles on which the plant is designed, plant technology and the safety case for the plant. In addition control room simulators are available for more practical hands on training. At site, operators gain detailed knowledge of their plant from experienced site based engineers. Only when an engineer has demonstrated that he/she has achieved sufficient understanding of the plants operation, the safety case, operating rules and plant operating instructions is he/she permitted to take responsibility for plant operations. Particular emphasis is given to regular refresher training for experienced operators.

Seq. No	Country	Article	Ref. in National Report
166		Article 19.5	P.141,L.34

Question/ Comment: In 19.25, It is stated that
"there are fewer scientists and engineers choosing careers in the nuclear industry. ...There are several initiatives in UK to try and remedy this situation."

Could you explain these initiatives concretely?

Answer: The important work of the OECD NEA has raised awareness about nuclear skills shortages in the UK and action is being taken following an agenda set by the Government. The Sector Skills Council, Cogent, has been chosen to progress a programme involving the industry, government departments and universities to address the nuclear skills shortages. The scale of manpower

shortage has been assessed already but a survey underway aims to identify the individual skills mix required. Currently, there is no shortage but the age profile of nuclear workers leads us to predict a shortage in the medium to long term. In universities, the decline appears to have been stopped as indicated by new courses starting, especially in the area of waste and decommissioning and a consortium of universities winning a major EPSRC grant to coordinate teaching programmes.

Seq. No	Country	Article	Ref. in National Report
167		Article 19.6	P.141,L21

Question/ Comment: In the event of an incident on site, arrangements made under LC7 require that the licensee, notifies HSE,records, investigates and reports such incidents. If appropriate, HSE will enforce corrective actions.

In the event report prepared by the licensee, what kind of human factor related items are required to be reported to regulator?

Answer: Reactor licensees undertake Root Cause Analysis depending on the level of investigation to be undertaken. There are a wide range of Human Factors/Performance and Safety Culture related root causes used by the licensees. The principal investigative technique adopted is the Human Performance Evaluation System (HPES). Such investigation reports are available to the Inspectorate as required.

Seq. No	Country	Article	Ref. in National Report
168		Article 19.7	Sec 1.23-1.27 P6

Question/ Comment: The report indicates that in the spring of 2003, final safety report incorporating all the findings on the fatigue related crack of gas circulator impeller at Torness reactors will be produced. Please provide an update on the subject findings of this issue including their potential generic safety implications, if any.

Answer: Although the AGR gas circulators are designed specifically for their purpose, there is general industrial experience of large gas flow machines. There is also a large body of experience of normal vibration characteristics of large rotating plant, including methods of monitoring for vibrations. For vibration behaviour there are in particular BS ISO 7919 (Mechanical Vibration of Non-Reciprocating Machines - Measurements on Rotating Shafts and Evaluation Criteria) and BS ISO 10816 (Mechanical Vibration - Evaluation of Machine Vibration by Measurements on Non-Rotating Parts).

Torness and Heysham 2 have nominally identical design gas circulators. Hinkley Point B and Hunterston B have gas circulators which are similar in design to Torness / Heysham 2. Generally, the Hinkley Point B / Hunterston B gas circulator impellers have accumulated more operating hours than those of Torness / Heysham 2. Heysham 1 / Hartlepool have a common design different from Torness / Heysham 2 / Hinkley Point B / Hunterston B and Dungeness B has a different design.Reference to "best practice" in para 1.24 refers to comparison of practice within the Licensee at different stations. In large part this refers to recording and analysis of data for trends.

For Torness / Heysham 2, as stated in para 1.26, the safety argument is now

based on the presumption that impeller failure is a comparatively frequent failure mechanism. Practicable steps have been taken to limit the frequency of impeller failure. However, the fundamentals of the safety case are that an impeller failure will be contained within the machine and consequences will be limited (most likely) or consequences will be within those already considered in other parts of the station safety case.

Heysham 2 Reactor 8 had a planned maintenance outage in April 2004. During the outage in-service examination of a gas circulator impeller revealed a small, surface-breaking fatigue crack (circa 6 x 3 mm) in the root region of one blade. The impeller was replaced. The presumption is this cracking is related to the sort of fatigue cracking seen in the Torness impellers, but at an earlier stage of progression. The cracked impeller from Heysham 2 Reactor 8 has been subject to further examination as part of the continuing root cause investigation.

Seq. No	Country	Article	Ref. in National Report
169		Article 19.7	

Question/ Comment: The December 2, 2004, Global Nuclear Open Source Information System, (GNOSIS) contains an article about graphite cracking identified in all eight of the British Energy company’s advanced gas cooled reactors. The article indicates that the risk associated with this issue may have potential impact on the currently assumed nuclear power station lifetime. Please discuss this cracking issue including the current findings and their potential generic safety implications, if any.

Answer: The graphite core of an Advanced Gas Cooled Reactor (AGR) consists of stacks of graphite bricks keyed together into a regular lattice. The lattice defines the vertical channels containing the fuel and control rods. Removal of heat from the fuel and insertion of the control rods is crucial for safe operation. To guarantee this, the graphite lattice must not distort excessively as this may prevent either adequate gas flow for cooling or may stop the control rods from entering the core.

During reactor operation, loads arise within the lattice and the individual graphite bricks from a number of sources. The most significant of these arises from a combination of temperature changes during operation and changes in the brick dimensions from the neutron irradiation. At the same time, the radioactive and chemical environment also leads to changes in the graphite material properties. One effect of this environment that is particularly important is radiolytic corrosion. This occurs because AGR cores operate in carbon dioxide gas used to transport heat away from the fuel. Under irradiation, carbon dioxide reacts with the graphite resulting in a loss of weight from the graphite brick. Consequently as the graphite core ages, the strength of the material reduces.

If the loads in the bricks and the lattice become too great, or the material too weak the graphite bricks will crack. If this cracking becomes severe, the keying system which holds the core in shape, will eventually fail to function in accordance with the design intent. Failure of the keying system to function may lead to core distortion that may challenge the safe operation of the

reactor core. This will be either by preventing a control rod from fully entering the core or by forcing a gap in the graphite fuel sleeves which control the flow of coolant past the fuel pins.

Since 2000, during routine inspection during reactor periodic shutdowns, British Energy have been observing cracks at the brick bores of the fuel channels in the Hinkley Point B/Hunterston B, Hartlepool/Heysham 1 and Torness reactor cores. These cracks have been of various shapes and sizes. To date, the most severe of these observations is the appearance of two cracks in one brick. Both of the cracks are the full height of the brick and positioned opposite to each other within the brick such that the brick may be in two halves.

During routine inspections British Energy carry out visual inspection of fuel channels using a remote camera, they measure channel and brick shapes using specially developed equipment and cut small graphite samples from the fuel channel walls to measure material properties for the graphite. Following the recent observations of more severely cracked bricks at Hartlepool, British Energy, intend to increase the extent and frequency of inspection beyond their previously accepted levels for all reactor cores at Hartlepool and Heysham 1.

British Energy have been able to show that a whole core with a single full height crack in each brick and a limited number of bricks with two full height cracks will not lead to distortions that can challenge the removal of heat from the fuel or insertion of control rods. NII currently accept these arguments and support British Energy's decision to increase the extent and frequency of reactor core inspections at Hartlepool/Heysham 1. NII will ensure British Energy achieves similar increases in inspection for the other AGR cores if the need arises.

Seq. No	Country	Article	Ref. in National Report
170		Article 19.8	19.46, 19.47, P.146

Question/ Comment	Are there regulations for addressing the treatment and storage of spent fuel on the site of a nuclear installation?
Answer	The management of spent nuclear fuel is a matter covered by the Joint Convention of the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. This will be covered in the UK's report to that Convention due for submission in October 2005.