

Response to the Consultation on the proposed justification process for reuse of plutonium (Ref URN 12D/075)

Introduction

The Nuclear Institute (NI) is the leading Professional Body for the Nuclear Sector, and we welcome the opportunity to respond to this consultation.

This response covers each of the 4 questions in the consultation document, attached as Annex A.

In addition to the consultation we have set out below:

- A summary of the key issues in the NI response
- A brief description and summary of how we've involved the NI membership in preparing the response
- How the NI could support the plutonium reuse justification process in the future
- An overview of the Nuclear Institute, and its role

The Nuclear Institute is content for this response to be made public by the Government in its entirety.

An Overview of our Key Points

The main issues/key points are:

- The NI welcomes the proposed Government approach providing generic guidance to potential applicants.
- The NI believes that the approach should focus on justifying plutonium reuse generically as a type of practice, rather than separately justifying how reuse may be effected (eg as MOX in LWRs, in CANDU or fast reactors, or other).
- The NI believes the proposed application and decision making processes are generally clear and appropriate, but do not agree that the process is proportionate. It is far more onerous and burdensome than the equivalent process operated by other EU Member States under the same EU legislation. We recommend the Government benchmarks its process against that operated in other EU Member States with the aim of identifying enabling actions to achieve consistency while preserving clarity and appropriateness.
- The NI does not consider the indicative list of information required (set out in Table 2 and 3) is sufficient or appropriate. We have identified a number of omissions, and areas where unnecessary information is required (particularly related to non-proliferation and security) in response to question 3 in Annex A. We recommend that DECC reconsiders the list of information in the light of our comments.

- The NI believes that the process should include some framework within which the balance comparison (between benefits and health (and other) detriments) that is at the core of justification will be made. This would make the process clearer than leaving it to the discretion of the applicant. We have set out our initial thoughts in response to question 4 in Annex A but we believe this could best be developed by a suitable dialogue between DECC and the NI (and others?).

NI Response Process

The NI is a national organisation, with ten UK regional branches together with a national Young Generation Network (YGN); the latest UK Branch, based in Central London was established in late 2011. For this consultation the NI planned to set up a Working Group led by a NI trustee to co-ordinate the overall response under the direction of the Board of Trustees. The consultation was publicised to the membership through the NI Journal, Nuclear Future and a members' e-newsletter. The resulting Working Group consisted of a breadth and depth of experience across the nuclear sector:

David Whitworth (lead)	NI trustee responsible for coordinating NI consultation responses, including on the New Nuclear build justification Process
Dame Sue Ion	ex-BNFL Technology Director
Dr Bahram Ghasseer	Lecturer on Legal and Nuclear Topics at Surrey University and Kingston University London. Author on articles on nuclear legal matters, including the UK Justification process
Chris Procter	10 years experience (within CEBG/Nuclear Electric/British Energy) on strategy development for the management of separated civil plutonium
Dr Peter Wilson	Editor of 'The Nuclear Fuel Cycle' (Oxford University Press 1996) and technical adviser to Dame Sue Ion on some issues related to plutonium management

This group was supported by expert guidance from other NI members, such as Prof. Laurence Williams on nuclear security matters, and the response was reviewed by Rear Adm (ret.) Tim Chittenden, NI Vice President and non-executive director of Sellafield Ltd. and Mark Lyons (North East Branch Chair; coordinated NI response to plutonium reuse options consultation).

All those involved were acting as individual members of the Nuclear Institute; any views expressed are not necessarily those of the other non-NI organisations that employ them or with which they are or were associated.

An initial draft response was prepared following an internal NI workshop, and progressively refined within the working group. A 'final' draft was then circulated around the UK branches and the YGN for their comments/endorsement. The resultant response was then endorsed by the Nuclear Institute Board of Trustees.

Future NI Support to DECC

The NI has demonstrated in the process developed to respond to this consultation that it can bring together an authoritative, knowledgeable and experienced group of nuclear professionals, independent of DECC and potential applicants.

In our response in Annex A to Question 4 on how to improve the process, we have given some initial thoughts as to how a robust comparison process could be structured which would add clarity to the process.

We believe the NI could play a valuable role in helping DECC to develop this, as an independent technical adviser.

We would welcome discussing and developing our thoughts further with DECC.

Overview of NI

The Nuclear Institute (NI) is a registered charity and operates as both a professional institution and a learned society. It was formed on 1st January 2009, following the merger of the British Nuclear Energy Society and the Institution of Nuclear Engineers, both of whom have origins going back to the 1950's.

The NI aims are:

- The promotion of the public understanding of nuclear sciences and the impact on society and the environment;
- The advancement of education relating to nuclear energy and its applications, and ancillary subjects;
- The advancement of nuclear science, engineering and technology;
- In the interests of public safety, the promotion of high standards of education and professional performance amongst those engineers, scientists and others working within the nuclear industry.

The NI has a licence from the Engineering Council to qualify Engineering Technicians, Incorporated Engineers and Chartered Engineers and in 2010 received a licence from the Science Council to qualify Chartered Scientists. Anybody who has an interest in nuclear technology can join the NI as a learned member. The NI has approximately 2000 members including a thriving group of over 1400 younger professionals, the Young Generation Network (YGN). The YGN are active across the UK and internationally promoting the advancement of nuclear technology, sharing of best practices and the education of the public in promoting nuclear understanding and science and technology as a career path.

The NI operates 10 regional branches in the UK, one in South Africa and one in UAE for MENA region. We have many international links to develop and promote better practice in all aspects of nuclear. The NI is a member of the European Nuclear Society, with a membership second in size only to the French Nuclear Society. Further information can be obtained at www.nuclearinst.com or from the Executive

Submitted and Signed on Behalf of the Nuclear Institute

Norman Harrison

President, Nuclear Institute

The Nuclear Institute (NI) Response on: Consultation on the proposed justification process for reuse of plutonium (Ref: URN 12D/075)

Annex A: Response to Consultation Questions

Question 1

Do respondents agree with the Government's view that it is sensible to issue generic guidance for the reuse of plutonium? We welcome comments on this proposed approach.

NI Response to Question 1

Yes. We agree with the Government's view that it is sensible to issue generic guidance for the reuse of plutonium. This will allow potential applicants considering alternative technologies from the Government's preferred policy of reuse as MOX to assess the needs for a Justification decision.

The NI has two comments:

1. We believe the generic guidance should be based on a staged approach, with initial assessment as to whether plutonium reuse is justified generically.
2. The generic guidance should build upon documents previously promulgated by DEFRA.

NI Response to Question 1 Comment 1

We believe strongly that the approach should be based on initially assessing whether plutonium reuse (as opposed to storage and eventual immobilisation and disposal) is justified generically, effectively regarding 'plutonium reuse' as a 'type or class of practice'. The key issue is that reuse is justified as a primary action, consistent with justification being a strategic high level process. How it is reused, ie whether in an EPR or AP-1000, or maybe even a PRISM or other fast reactor, or even in a CANDU reactor, is secondary. The alternative approach of making each potential reuse application subject of a separate justification process is not in our view proportionate, as much of the argument and supporting evidence would be common, leading to multiple reassessments of much the same material. We also note that it was never the intention of the ICRP, nor of the EU Basic Safety Standards Directive that each application of a practice be separately justified. Therefore, we believe that the generic guidance should be based around this staged approach. Once generic reuse is justified, justification of a particular reuse application is assured as long as the applicant can demonstrate that the parameters of specific reuse are covered by the generic reuse justification assessment.

NI Response to Question 1 Comment 2

Each application made to the Secretary of State for Energy & Climate Change (the Justifying Authority) for a 'Justification Decision' would be decided on its specific merits. In addition, the public, Statutory Consultees, and other interested parties are consulted on the 'Draft Decision Document'. Moreover, Justification Decisions are given effect by Secondary Legislation (Statutory Instruments) which require Parliamentary Approval.

However the 'Generic guidance' should build upon documents previously promulgated by DEFRA, viz, Explanatory Memorandum (July 2004) in relation to the Justification of Practices Involving Ionizing Radiation Regulations 2004 (SI 2004 No 1769), and Guidance on the Application and administration of the said Regulations (May 2008).

Question 2

Are the proposed application and decision-making processes clear, appropriate and proportionate? If not, how can they be improved?

NI Response to Question 2

The proposed application and decision making processes are generally clear and appropriate, but we do not believe they are proportionate. We set out below why we do not believe the process is proportionate and potential areas of improvement (to aid clarity and completeness as well as proportionality).

Overall, we recommend that the Government benchmarks its justification process with those adopted by other EU Member States with the aim of identifying enabling actions required in the UK to achieve a consistent level of proportionality, clarity and appropriateness.

The Government has not set out how it would propose to assess whether a practice is new or existing. (We are aware that reuse of overseas Plutonium in the form of MOX has already been justified in the original case for the Sellafield MOX Plant (SMP); we also understand that the new MOX plant in France was not the subject of a separate justification).

There are two stages of decision-making:

1. Whether the applicant's proposed type of practice is existing or new (Table 1 stage 3)

2. If determined to be 'new', whether it is Justified (Table 1 stages 4 to 10).

To ensure the process is proportionate, it is important that the process does not unnecessarily determine proposed types of practice are new when they are a variant of an existing practice. We would expect as part of this determination that the Justifying Authority would consider whether the applicant has provided sufficient information to make this determination and/or seek technical advice from third parties.

If it is determined that the type of practice proposed is an existing practice under the regulations, then we would expect this to be subject to public consultation as a draft decision.

The justification process followed in the UK is not proportionate. Justification should be a high level strategic assessment, based on requirements set out by the ICRP and, for EU member countries, formalised within EU legislation. The UK process may be regarded as far more onerous and stringent as compared to some of the other EU Member States.

This can be seen clearly by comparing the process used in the UK to justify new nuclear build with the equivalent process in other EU Member States. In Finland, France, Germany, Spain and Sweden, as regards Nuclear New Build, Justification constitutes a part of the overall licensing procedure, and falls within the ambit of the Licensing Authority. None of these countries impose a legal obligation upon the potential nuclear power developers to submit a separate application for a Justification Decision, in addition to a license application, as is the case in the UK.

This is why we recommend that the Government benchmarks its justification process with those adopted by other EU Member States. The aim should be to identify enabling actions required in the UK to achieve a consistent level of proportionality, clarity and appropriateness.

The one area where we believe the process could be clearer is the approach to assessing justification, comparing the benefits of the type of practice with its health and other detriments. We note that the draft generic guidance leaves it to the

applicant to propose how this is to be done (Paragraph 41). We consider this in more detail (in terms of a possible improvement) in our response to question 4.

It would be helpful to add a further step (Stage 11) in table 1: Draft Secondary Legislation (draft Statutory Instrument) shall be laid before Parliament for approval.

Question 3

Is the indicative list of information in Table 3 sufficient and appropriate to assist in the making of justification applications and justification decisions? Does the indicative list omit any relevant information, or include any unnecessary information?

NI Response to Question 3

In our response, we have considered the information identified in Table 2 as well as that in Table 3. In responding, we have initially considered whether we believe relevant information has been omitted (response Part 1), or whether any unnecessary information has been included (response Part 2). We have then addressed a number of issues with items which we believe appropriate to include, but maybe not in the form described (response Part 3).

In the NI's view, the indicative list does omit some potentially relevant information (response part 1 below). The indicative list also includes unnecessary information (response part 2 below). Given also our other comments (response part 3 below), we do not consider that the indicative list of information is sufficient nor appropriate, and we recommend that the Government reconsiders the content of Tables 2 and 3 in the light of our comments.

NI Response to Question 3 Part 1 – Omission of any potentially relevant information

1.1 Similarity to or differences from existing types of practice already Justified? This should at least cover existing practices in the UK. It should also be relevant to any justification decision for a practice new to the UK whether it is an existing (justified) practice overseas, particularly if it is a justified practice in other EU Member States. (as an example MOX production and use in fast reactors has been an existing practice in the UK for decades, as it has also been in the USA, France, Russia, India and Japan. MOX production and use in thermal reactors (PWRs) is an existing practice in France.).

We recognise that justification of a practice overseas (even in another EU Member State) does not imply justification as a practice in the UK. This has been reinforced as recently as May 2012 by the European Commission: 'The application of the principle of justification remains a national responsibility.'

1.2 Likelihood of benefits being realised (eg in the case of MOX production, the applicant may be seeking a third party to use the MOX; there may be no guarantee that such use will be forthcoming).

One of the biggest difficulties is that whilst the UK has large stocks of separated plutonium, its current reactor fleet would find it difficult to use MOX fuel, with the exception possibly of Sizewell B. To implement the policy requires reactor owners/operators willing to use the fuel. Are EDF prepared for MOX to be used in Sizewell B and their proposed new reactors? Are the other potential UK operators willing? Or are there willing reactor operators overseas? We recommend that the applicant is requested to provide evidence of a credible and robust market place for the fabricated fuel. The alternative may be to justify MOX production 'for stock', recognising that unused fuel would need to be ultimately disposed of to the GDF.

1.3 Information on the 'Transboundary Environmental Impact' of the proposed practice would be required. This is, indeed, a requirement under both EU law and International law for projects which may have a significant environmental impact.

Nuclear power plants and other nuclear facilities are required to provide this assessment, as they are listed in Appendix 1 (paragraphs 2 & 3) of the *Convention on Environmental Impact Assessment in a Transboundary Context, 1991 (Espoo Convention 1991)*, http://www.unece.org/env/eia/about/eia_text.html .

NI Response to Question 3 Part 2 – Inclusion of any unnecessary information

2.1 Why is it necessary to provide information on the design, operation and mitigation strategies that will reduce the risk and magnitude of accidental exposures to below a regulatory limit? (Table 2 Radiological Health Detriments bullet point 3 and Paragraph 37) – this is a licensing matter not a justification requirement. An applicant may offer such information to support a justification application based on exposures significantly below a regulatory limit.

2.2 Why is it necessary to include design features for decommissioning? (Table 2 Radioactive Waste and Decommissioning bullet point 3) Decommissioning is subject to separate regulations and subject to regulatory control via licensing regulators. It should not be part of a justification decision. Why are mitigation strategies etc. included? – again covered by licensing and should not be part of a justification process.

2.3 We recommend that the whole section on non-proliferation and physical protection (security) should be removed (Table 2).

The UK is party to the Non-Proliferation Treaty (NPT) and is subject to IAEA and EURATOM regulation. Security is a regulated activity and should not be part of justification.

What does a Risk profile mean for security changes, and how can an applicant (even if it understood what is meant) be in a position to make a judgement on this? (Table 2 Non-proliferation and physical protection (security) bullet point 2) Regarding the UK stockpile of plutonium, this ‘practice’ has been in existence long before the Basic Safety Standards directive came into force and predates the 13 May 2000 implementation date and as such the storage and management of the UK plutonium stockpile is an existing practice for the purposes of the Regulations. Therefore the management of the UK plutonium stockpile is a strategic national issue and **not** a justification matter. Non-proliferation is the responsibility of the State not a particular user. Failure to comply with EURATOM safeguards requirements would be an issue for the Government not the licensee (or applicant). Therefore it is unreasonable to expect an applicant to provide risk profiles for non-proliferation issues. Similarly, an applicant is not the ‘controlling mind’ for security. The Government defines the Design Basis Threat (DBT) and hence an applicant would not be able to produce security risk profiles.

It may be appropriate to seek information from the applicant of any proliferation-sensitive features of the proposed practice. However, it would be for the Government to determine whether this may imply a potentially significant detriment. This would only be the case if the features may make compliance with international non-proliferation obligations impossible or so costly as to impact on the potential benefits of the proposed practice.

In the same way it may be appropriate to seek outline information on the way security threats are to be managed. It would be for the government to determine whether this provides sufficient assurance that the costs of compliance would not be disproportionately large.

NI Response to Question 3 Part 3 – Other comments on Tables 2 and 3

3.1 Does not the applicant need to specify whether the type of practice proposed involves building new facilities, which will require eventual decommissioning as part of the practice, or reuse or adaptation of existing facilities which might deliver a delta (greater or less) in terms of decommissioning and waste generation? (Table 2 Radioactive waste and decommissioning)

3.2 Why are the carbon emissions over the full lifecycle to be compared with those equivalent from UOX use? (Table 2 Environmental bullet point 1) This would only apply if the practice involved substituting UOX use in an existing reactor by (presumably) MOX use. This would not be appropriate if the practice involved MOX use in a mission-dedicated additional reactor, or a different type of fuel fabrication and use (eg fast reactor use). Therefore this is not generic guidance. (It should be noted that the total carbon emissions will depend on whether the use of MOX fuel is part of a closed or open fuel cycle and hence this information may be impossible to produce without knowing the long-term government policy on plutonium reuse).

3.3 We note in Table 3 (Fuel Irradiation Stage paragraph 3) the requirement for applicants to state whether or not the used fuel can be disposed of in the GDF. We suggest that the applicant also give an estimated footprint size for use of GDF space, compared say to the GDF footprint required for immobilised Plutonium without reuse, or in the specific case of MOX with UOX fuel that would have been used instead (or with the reprocessing of MOX and its waste footprint). (We note that the consideration of potential GDF footprint was a feature of the new nuclear build justification application).

Strictly speaking, plutonium cannot be ‘placed permanently beyond reach’ while it remains within range of drilling from the Earth’s surface (as for example in the GDF). To the extent it is too inconvenient to reach, it remains a wasted asset that may well be needed in the future, in which case the inconvenience will be a penalty on our successors.

The plutonium content of irradiated MOX fuel would be less valuable than that currently in store unless fast-neutron reactors come into use, but that is a possibility that cannot be excluded in the present state of knowledge.

Question 4

Are there any other ways that the draft justification process can be improved? If so, how?

NI Response to Question 4

The justification process seeks to assess the net economic, social or other benefits against the health detriments. Paragraph 41 suggests that the comparator against which net benefits and detriments are assessed is at the discretion of the applicant. Without a sensible comparator, how can the justifying authority make a balance decision? It would therefore seem sensible to both the applicant and the justifying authority to specify the comparator, or at minimum a framework within which the comparison should be developed.

We recognise (as we did in our response to the new nuclear build justification process consultation) that making such a balance assessment is not straightforward, as the assessment seeks to compare actual and potential benefits both short term and long term with actual and potential health (and other) detriments, again both short term and long term. The analogy of comparing apples and oranges comes to mind (particularly as many of the benefits are not directly realisable as health benefits to offset the potential health detriment). We recommend a number of stages in developing such a framework:

1. What is the 'status quo' against which the type of practice is to be compared? For example, for plutonium reuse, the status quo option is continued safe, secure storage of separated plutonium followed by eventual immobilisation and disposal in the GDF.
2. Identify the generic types of benefit and detriment associated with the 'status quo' option. This can be broadly drawn from parts of Table 2, but should distinguish between actual benefits/detriments and potential benefits/detriments, and potentially timing (is it a short term feature, or is it a long term or even legacy feature).
3. The applicant identifies whether there are any additional types of benefit or detriment involved in their proposed practice.
4. An initial balance comparison could then be carried out for each type of feature. It may be that this initial balance comparison can determine whether or not the practice is justified.
5. If it cannot, then the assessment should be developed as far as possible to balance compare like with like (eg legacy benefit with legacy detriment). Only if that is insufficient should the assessor seek to reduce each feature to one or more common denominators (such as cost, or health benefit/detriment).

Clearly one possible common denominator to which other features can be reduced is cost or value, with timing differences reflected if one used a net present value approach. However, the NI would only advocate this approach if, as far as practicable, other non-money metrics such as health detriment are used as well. The framework approach should also seek to test the robustness of the assessment with suitable sensitivity analysis to allow for potential uncertainties in data or methodology.

The Nuclear Institute would be happy to discuss further with DECC how such a framework could form part of the process and be reflected in the generic guidance to potential applicants.

Submitted and Signed on Behalf of the Nuclear Institute
Norman Harrison
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