Department of Energy & Climate Change

Government response to consultation

Management of Overseas Origin Nuclear Fuels Held in the UK

October 2014

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Executive summary

The Nuclear Decommissioning Authority (NDA) proposed to the UK Government that for some small quantities of remaining overseas origin spent fuels held at Dounreay and Sellafield, where it is not economic or not possible to reprocess them before reprocessing operations cease, they should be allowed to manage these materials by an alternative option.

The NDA has proposed that this alternative option should be by means of interim storage pending disposal, taking ownership where necessary. As part of the proposal, specifically to ensure that the UK does not become a net importer of nuclear waste, the NDA would enact "virtual reprocessing". This would mean that a radiologically equivalent amount of waste would be allocated and then returned to the customer as if the irradiated fuel had been reprocessed. Additionally, an equivalent amount of nuclear materials would be allocated to the customer pending agreement on their future management.

The proposed approach would allow the NDA to close out remaining overseas contracts in an efficient and timely way. With the passage of time, the original facilities that would have dealt with these fuels have either closed or, without significant infrastructure investment, will soon reach the end of their useable life.

The choice by the NDA of interim storage with virtual rather than actual reprocessing will be considered on a case-by-case basis and will be subject to a standard business case approach. At all times the management of any overseas origin nuclear fuels by the NDA's Site Licence Companies will have to meet all of the necessary safety, security and environmental requirements, whichever option is ultimately selected.

The UK Government was initially minded to agree with the NDA's proposal and, through the consultation published on 3 March 2014, sought views on possible consequences of the NDA's proposal which the UK Government might not have anticipated, and on whether there were any significant factors that we[1] had overlooked or over or underestimated.

Having taken into consideration the consequences, significant factors and comments from the public consultation, the UK Government has established the following:

- There are a number of potential major benefits of allowing the NDA to utilise an alternative option to reprocessing for some overseas origin fuels: it means more certainty with the future plans for the Thermal Oxide Reprocessing Plant (THORP) at Sellafield and its supporting plants, more certainty with the decommissioning plans for the Dounreay Site and more certainty for overseas customers.
- We remain content that we understand the consequences of agreeing to the NDA's proposal.
- We also remain content that the work by NDA, Site Licence Companies and regulators to determine and understand the significant factors relating to the proposal has not overlooked or under or overestimated the key issues and presents a true picture of what to expect by adopting the proposal.

[1] 'We' refers to the UK Government.

- The NDA's proposal is in line with existing UK Government policy on the economic operation of THORP. Additionally, as the quantity of any materials committed to interim storage would be small relative to overall UK stocks, retaining them in the UK will not materially add to the overall wastes to be disposed of in the UK.

Having considered the consequences of the NDA's proposal, the significant factors that might influence our position and the comments received in response to the consultation, the UK Government has concluded that employing interim storage with virtual reprocessing is an acceptable alternative management route that the NDA can potentially utilise to manage those overseas origin fuels in the UK that cannot be reprocessed prior to ceasing reprocessing operations.

Introduction

Background

1. THORP has completed over 95 percent of its overseas order book for reprocessing and is scheduled to complete reprocessing operations in 2018. There now remains less than 150 tonnes of overseas origin fuels to reprocess. Amongst these are relatively small amounts of prototype fuels, experimental fuels, Mixed Oxide fuels (MOX) and some materials leftover from research programmes to substantiate the in-reactor performance of irradiated fuels, amounting to about 30 tonnes of material. Also included in this 30 tonnes is a small quantity of overseas origin material, about 2 tonnes, leftover from operations at the Dounreay facility, which is scheduled to be transferred to Sellafield for future management in line with NDA's published strategy for this material[2].
2. The NDA proposed to the UK Government that for some small quantities of remaining overseas origin spent fuels, where it is not economic or not possible to reprocess them before reprocessing operations cease, they should be allowed to manage these materials by an alternative option. This alternative option should be by means of interim storage pending disposal, taking ownership where necessary. As part of the proposal, specifically to ensure that the UK does not become a net importer of nuclear waste, the NDA would enact "virtual reprocessing". This would mean that a radiologically equivalent amount of waste would be allocated and then returned to the customer as if the irradiated fuel had been reprocessed. Additionally, an equivalent amount of nuclear materials would be allocated to the customer pending agreement on their future management[3].
3. The proposed approach would permit the NDA to close out these remaining overseas contracts in an efficient and timely way, since with the passage of time, the original facilities that would have dealt with these fuels have either closed or, without significant infrastructure investment, will soon reach the end of their useable life.

Why the UK Government consulted

4. The UK Government was initially minded to agree with the NDA's proposal and through consultation, sought views on possible consequences of the NDA's proposal which the UK Government might not have anticipated, and on whether there were any significant factors that we had overlooked or over or underestimated.
5. The consultation was designed to provide an open, transparent opportunity for views and comments regarding the proposal submitted to the UK Government. The

[2] To support the clean-up and decommissioning of the Dounreay licensed site the NDA needs to close out the outstanding sixteen overseas legacy fuel contracts at this site. The options for dealing with these materials are extremely limited as there is no suitable facility elsewhere for completing the contracts as originally envisaged.

[3] That said, we noted that in a small number of cases the amounts of allocated waste would be so small that it would be neither practical nor cost-effective to return waste to the customer. In addition we noted that there are also a small number of cases where the contracts for the processing service relates to un-irradiated fuels, where there is no policy requirement to return waste.

consultation also satisfied a previous commitment[4] regarding the management of some fuels by advanced allocation, where we made it clear that if, for some reason, these fuels could not be reprocessed in THORP, we would consult publicly before a decision was taken to implement alternative options.

6. The selection by the NDA of the alternative option, rather than reprocessing, will be on a case-by-case basis and subject to a standard business case approach. At all times the management of any overseas origin nuclear fuels will have to meet all of the necessary safety, security and environmental requirements through formal regulatory approval, whichever option is ultimately selected.
7. However, the NDA's proposal would provide them with a mandate to work with their Site Licence Companies, the Regulators and in a small number of cases, their customers to secure alternative means of managing these fuels if they cannot be reprocessed before reprocessing operations cease.
8. Consequently the following questions were included:

    1. ***Are there any possible consequences of this proposal which the Government might not have anticipated?***
    2. ***Are there any significant factors that we may have overlooked or under / over estimated that would influence our decision on the NDA's proposal?***
    3. ***Are there any general comments that you would like to make?***

9. Fourteen responses were received to the consultation. These came from a range of respondents including individual members of the public, companies involved in the energy industry, Non-Governmental Organisations (NGOs), including local campaigning groups and local authorities.
10. Thirteen responses have been published on the Department's website. One organisation requested that its response was not published.

Format of the UK Government response

11. While all responses have been considered, this document does not attempt to set out the UK Government's response to every single point raised in response to the consultation. What follows is a high level summary of these consultation responses and the UK Government's response to these, organised under each question of the consultation.
12. In the UK Government response sections, 'we' refers to the UK Government[5].
13. **Annex A** contains the full list of consultation questions for reference. **Annex B** provides a list of the individuals and organisations who responded to the consultation.

[4] http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/files/file39759.pdf; http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/files/file42361.pdf

[5] The policy for the management of spent fuels and nuclear materials, including matters related to their safe and secure storage, is a reserved matter and is for the UK Government to determine. Management of radioactive waste is a devolved matter and therefore in relation to Scotland, it is for the Scottish Government to determine. The Scottish Government published policy for the management of higher activity wastes specifically excludes fuels and nuclear materials.

Responses to the specific questions

Question 1: Are there any possible consequences of this proposal which the Government might not have anticipated?

Summary of responses to question 1

14. The greater number of respondents were either strongly or broadly supportive, with one or more commenting that it reflected a pragmatic or more economic (value for money) approach to concluding the reprocessing programme, and that this would allow the NDA to focus its resources on clean-up and decommissioning as early as possible.

15. Some respondents commented that due to the non-standard and unique properties of the fuels, they may present particular technical difficulties or other risks to a strategy of interim storage and disposal which would have impacts potentially not considered by the UK Government or included in the NDA's assessment.

The UK Government response

16. The UK Government supports the NDA's position that the conclusion of the THORP programme by the end of 2018 represents a cost-effective means of managing the outstanding overseas and domestic reprocessing contracts and commitments. As explained in the consultation paper, the UK Government believes that the approach set out by the NDA will allow them to conclude reprocessing as soon as practicable and focus their resources on clean-up and decommissioning. Requiring the NDA to keep operating THORP solely to manage small amounts of overseas origin spent fuels would be an inefficient use of resources, and would potentially divert resources from the major clean-up and decommissioning projects at Sellafield. The NDA considers that the resources that would be committed to supporting interim storage of these fuels will be significantly less than those required for continued reprocessing.

17. The UK Government notes the points made about the nature of the fuels bringing specific technical challenges and uncertainties. Assessments undertaken by Sellafield Ltd and Radioactive Waste Management Ltd (RWM), on behalf of the NDA, have shown that the overseas origin fuels share many common characteristics with other oxide fuels managed by NDA. This means that these materials could be managed in much the same way[6]. Accordingly, the NDA and its estate are developing alternative proposals for the management of these spent fuels alongside UK-owned fuels. The UK Government also noted that the additional amount of overseas origin spent fuel to be interim stored pending disposal is very small compared with the amounts of spent fuel that the NDA owns[7] , which will also be interim stored pending disposal. This additional

[6] The NDA also holds a diverse range of UK-owned experimental and prototype fuels. Some of these fuels contain fissile enrichment levels much greater than these overseas fuels. Solutions developed to manage these UK-owned materials will also be appropriate to manage the overseas origin fuels subject to this consultation.

[7] The NDA estimates that depending on how long the UK's AGR fleet operates there may be 3,000 to 5,000 tHM of AGR spent fuel to be committed to long-term storage at Sellafield. Storing up to about 30 tHM of overseas origin spent fuel, instead of reprocessing will give rise to an increase of less than 1% of spent fuel to be stored at Sellafield.

overseas origin spent fuel does not materially add to the overall amounts of spent fuel that NDA manages and hence the consequences are assessed to be marginal.

Conclusion

18. ***The UK Government considers that the NDA's proposal is in line with existing UK Government policy on reprocessing and THORP. Providing the NDA with the mandate to consider an alternative option to reprocessing is likely to represent better value for money to the UK taxpayer and allow the NDA to focus its resources on clean-up and decommissioning. Additionally, the management of relatively small quantities of overseas origin fuel through interim storage pending disposal is technically viable.***

Question 2: Are there any significant factors that we may have overlooked or under / over estimated that would influence our decision on the NDA's proposal?

Summary of responses to question 2

19. Some respondents commented there was insufficient information in the paper to allow them to comment on whether reprocessing or interim storage is the better option for managing these remaining fuels. One respondent felt that future uncertainties would make it difficult to make sensible business decisions.

20. One respondent noted that due to the non-standard nature of some of the fuels, consideration should be given to treating them prior to interim storage but this would have to be balanced against storing them in a form that would enable their future re-use.

21. A few respondents noted that MOX spent fuel was potentially part of the inventory and due to its relatively high heat output and residual fissile content this would require additional work to underpin its disposal.

The UK Government response

22. The UK Government notes the comments about there being insufficient information in the consultation to allow someone to consider the relative merits of the two options of reprocessing or interim storage. It should be noted that the consultation was not proposing that a blanket approach be agreed at this time, but rather that the NDA could, in-principle, use an alternative option to reprocessing where it is economic to do so, is in the interests of the tax-payer and can be shown to be in-line with Regulatory requirements. The necessary business, safety and environmental cases and transfer of ownership of some fuels, as appropriate, will be required to support final decisions by NDA and implementation of any alternative option by its Site Licence Companies. This includes, for a very small number of cases, being able to talk to the overseas customers with a clear mandate on the available options.

23. The UK Government understands that work has already been undertaken by NDA and its Site Licence Companies to establish the credibility of interim storage and disposal for non-standard fuels such as MOX. The NDA with its Site Licence Companies is also continuing work on the dry storage of some irradiated fuels as an alternative to interim wet storage. Based on this, the UK Government believes there is sufficient merit in providing NDA with the flexibility to pursue this option compared to reprocessing and that it should provide the NDA with the mandate to do so.

Conclusion

24. ***The UK Government worked with the NDA, Site Licence Companies and regulators to determine the factors that were significant in terms of this proposal. These factors were described in the consultation document. We noted that there are factors such as compliance with regulatory requirements that will determine whether or not the NDA can employ the interim storage with virtual reprocessing option, but such factors will be for the NDA and the Site Licence Companies to address and do not influence our consideration of the NDA's proposal. Taking into account the responses received through the public consultation, we are content that no significant factors have been overlooked.***

Question 3: Are there any general comments that you would like to make?

Summary of responses to question 3

25. A number of respondents felt that the approach of "virtual reprocessing" should be extended to all of the remaining overseas origin fuels, arguing that such an approach would help to bring about the closure of THORP earlier and focus the NDA's mission on clean-up and decommissioning.

26. Some respondents felt that all remaining overseas origin fuels should be returned to their country of origin whereas others felt that neither spent fuels nor nuclear wastes should be transported at all.

27. Finally, one respondent noted that the consultation covered only residual overseas origin fuels and asked whether a similar consultation would take place for any domestic fuels left unreprocessed.

The UK Government response

28. The UK Government accepts the NDA's position that where practicable and economic the remaining overseas origin fuels should be reprocessed in THORP in line with existing commitment and agreements. The UK Government notes that the NDA's proposal is in line with existing policy regarding the operation of THORP which says that "THORP will therefore continue to operate until existing contracts have been completed or the plant is no longer economic". Agreeing to the proposal would give the NDA the means to implement that part of the policy which notes "it will continue to operate until it is no longer economic", and give them the policy framework to consider more cost-effective options where the fuels cannot be reprocessed in THORP before it ceases reprocessing operations[8].

29. In most cases the 'title' for the overseas origin fuel was transferred to the UK under the Advance Allocation agreements either recently or in some cases many years ago. In such circumstances, whether technically possible or not, there is no legal or commercial basis for the return to their country of origin of the great majority of the overseas origin fuels still remaining to be reprocessed.

30. The NDA also holds a diverse range of UK-owned experimental and prototype fuels which it is potentially not economic or not possible to reprocess before reprocessing operations cease. The NDA is also considering managing some of these materials through interim storage pending disposal. The UK Government believes there is a clear

[8] See NDA papers on the Oxide Fuel Strategy found at http://www.nda.gov.uk/publication/oxide-fuels-preferred-options-june-2012/

policy framework for the management of these domestic fuels and no change to this policy framework is implied by the proposals in this consultation therefore no further public consultation is necessary.

Conclusion

31. ***The UK Government considers that, where practicable and economic, the remaining overseas origin fuels should be reprocessed in line with existing commitments and agreements. It is the NDA's intention that the great majority of remaining overseas origin fuels will be reprocessed in THORP. In many cases ownership of the fuel has already been transferred to the NDA through, for example, Advance Allocation agreements, hence whether technically possible or not, there is no legal or commercial basis for the return of these fuels to their country of origin.***

Statement of UK Government policy on the management of overseas origin nuclear fuels held in the UK

32. The UK Government notes that the import and reprocessing of overseas fuels has been a controversial issue and that there are widely differing views on whether the remaining overseas fuels should continue to be reprocessed, stored or returned to the countries of origin.

33. The UK Government set up the NDA to deliver the decommissioning and clean-up of the UK's civil nuclear legacy in a safe and cost-effective manner. NDA's work is complex and challenging and it is therefore important that the UK Government provides the necessary support to enable the NDA to deliver its mission.

34. The UK Government considers that it is right for the NDA to assess on a case-by-case basis, and if appropriate, to implement alternative options for the management of overseas origin fuels to secure best value for the UK taxpayer, particularly:

    - to manage those contracts where no facilities exist in the UK to process the fuels and materials;
    - to support the NDA's early decommissioning programme at Dounreay through consolidation of fuels at Sellafield, in line with their recently published strategy[9];
    - because interim storage with virtual reprocessing is effectively neutral in terms of the total amount of radioactive material or waste that will be present in the UK, given the very small quantities involved when compared to the large UK nuclear programme, but recognising that in a small number of cases, commercial settlements may be reached without the return of products or waste;
    - because the amount of overseas origin fuel that the NDA expects to manage through interim storage with virtual reprocessing is very small compared with the amounts of spent fuel that the NDA owns, manages and may potentially dispose of to a GDF; and
    - since extending current facilities beyond their expected lifetimes, building new facilities or sending these materials overseas for processing would be an inefficient use of resources and divert resources from the NDA's clean-up and decommissioning programme.

35. ***Having considered the consequences of the NDA's proposals, the significant factors that might influence our position and the comments received in response to the consultation, the UK Government has concluded that the NDA's proposal to employ interim storage with virtual reprocessing is an acceptable alternative management route that the NDA can potentially utilise to manage overseas origin fuels in the UK that cannot be reprocessed before reprocessing operations cease.***

[9] http://www.nda.gov.uk/news/dsrl-exotics-preferred-option.cfm

Next Steps

36. Whether it is preferable for the remaining fuels to be reprocessed or managed through interim storage and virtual reprocessing will be decided by the NDA on a case-by-case basis using a standard business case approach. NDA will therefore:
    a. where appropriate, conclude contracts and agree to take ownership of customer owned fuels (in the small number of cases where the NDA does not already have title to the overseas origin fuel);
    b. ensure the physical and technical capability to implement an option is feasible through its Site Licence Companies; and
    c. subject to a business case approach, instruct its Site Licence Companies to implement the agreed preferred option in line with safety, security and environmental regulatory requirements.

Glossary

Advance Allocation	Advance Allocation allows the NDA to take ownership to customer's spent fuel and in return allocate to them from NDA's stocks the nuclear materials and wastes that would have been expected to be recovered from reprocessing the spent fuel, in advance of the actual reprocessing in THORP. Advance Allocation requires the NDA to reprocess the spent fuel at some point whereby the nuclear materials recovered and waste produced would go into NDA stocks.
AGR	Advanced gas cooled reactor. There are 14 AGRs at seven power stations in the UK.
Exotics	The NDA manages a smaller inventory of non-standard fuels, commonly referred to as 'exotics' which are a legacy from earlier nuclear industry activities such as the development of research, experimental or prototype reactors.
GDF	Geological Disposal Facility, a facility for the disposal of intermediate and high level wastes including spent fuel.
MOX	Mixed oxide fuel, comprising plutonium and uranium oxides.
NDA	The Nuclear Decommissioning Authority.
RWM	Radioactive Waste Management Limited, a wholly owned subsidiary of NDA.
THORP	Thermal Oxide Reprocessing Plant – a chemical plant owned by NDA and operated by Sellafield Ltd for the reprocessing of oxide spent fuels from AGRs and LWRs.
tHM	Tonnes heavy metal (mostly uranium plus plutonium) prior to irradiation.
Virtual reprocessing	Virtual reprocessing means swapping overseas origin spent fuel for UK nuclear materials and waste without subsequently reprocessing the spent fuel.

Annex A: Consultation questions

Consultation Question	
1.	**Are there any possible consequences of this proposal which the Government might not have anticipated?**
Consultation Question	
2.	**Are there any significant factors that we may have overlooked or under / over estimated that would influence our decision on the NDA's proposal?**
Consultation Question	
3.	**Are there any general comments that you would like to make?**

Annex B: List of respondents

Number	Respondent
1	Confidential respondent
2	Cumbria Opposed to a Radioactive Environment
3	Dounreay Stakeholder Group
4	Highland Council
5	Nuclear Free Local Authorities
6	Nuclear Legacy Advisory Forum
7	Parents Concerned About Hinkley
8	St Bees Parish Council
9	STOP HINKLEY
10	Swarthmoor SW Quakers
14	4 members of the public

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