Office for Nuclear Regulation

An agency of HSE

Civil Nuclear Reactor Programme

Radwaste & Decommissioning Work Streams – Hinkley Point C Licensing

Assessment Report: ONR-CNRP-AR-12-074
Revision 1
25 January 2013

Site:	Hinkley Point C
Project:	Hinkley Point C Licensing
Title:	Radwaste & Decommissioning Work Streams
Licence Number:	n/a
Licence Condition(s):	LC32, LC34 and LC35
IIS Rating:	n/a
COIN Service Order:	n/a

Document Identifier

Identifier	Revision	TRIM Reference(s)
ONR-CNRP-AR-12-074	1	2012/320218

Step-based Document Review

Step	Description	Role	Name	Date	TRIM Revision[1]
1	Initial draft, including identification and mark-up of SNI/CCI	Author	[redacted]	2nd August 2012	2012/0319828
2	Main editorial review	Author	[redacted]	6th August 2012	2012/0319828
3	Peer Review in accordance with AST/005 Issue 1	Peer Reviewer	[redacted]	8th August	2012/0319829
4	Assessor update / sentencing of comments and return to Peer Reviewer	Author	[redacted]	9th August 2012	2012/0319834
5	Final editorial / clean draft review	Author	[redacted]	9th August 2012	2012/0319834
6	Acceptance review in accordance with AST/003 Issue 4	AUH	[redacted]	10th August 2012	2012/0319836
7	Report Sign-off	Author / Peer Reviewer / AUH	[redacted]	10th August 2012	2012/0319836

Document Acceptance (Revision 0)

Role	Name	Position	Signature	Date
Author	[redacted]	HM Principal Inspector	[redacted]	10/08/2012
Peer Review				
Acceptance	[redacted]	HM Superintending Inspector	[redacted]	10/08/2012

[1] TRIM revision to be identified upon completion of activity and incorporation of any changes to document.

Document Acceptance (Revision 1)

Role	Name	Position	Signature	Date
Author	[redacted]	HM Principal Inspector	[redacted]	25 January 2013
Peer Review for Publication	[redacted]	HM Inspector	[redacted]	25 January 2013
Acceptance for Publication	[redacted]	HM Superintending Inspector	[redacted]	5 March 2013

Revision History

Revision	Date	Author(s)	Reviewed By	Accepted By	Description Of Change
0	10/08/2012	[redacted]	[redacted]	[redacted]	First formal issue.
1	05/03/2013	[redacted]	[redacted]	[redacted]	Review for publication

Circulation (latest issue)

Organisation	Name
ONR	[redacted]
ONR	[redacted]
ONR	[redacted]
ONR	[redacted]
ONR	[redacted]
ONR	[redacted]

COPYRIGHT

EXECUTIVE SUMMARY

This report presents the findings of Office for Nuclear Regulation's (ONR) assessment of the radwaste management and decommissioning work streams in support of the licensing of the Hinkley Point C (HPC) site to New Nuclear Build Generation Company (NNB GenCo).

This assessment was unusual for ONR because it was not an assessment of a safety case against the standard assessment criteria.

The main aim was to do sufficient assessment to gain reassurance that the overall strategies for decommissioning and management of both Intermediate Level Waste (ILW) and Spent Fuel (SF) at HPC are in accordance with national and regulatory policy and strategy, and whether the proposals are feasible, in the context of being able to respond to Department of Energy and Climate Change's (DECC) request for advice on the HPC Funded Decommissioning Plan (FDP). Whilst this element of the assessment was not, strictly speaking, required for ONR to grant a nuclear site licence for the HPC site, it has been recorded in this assessment report as it does provide confidence in the future acceptability of NNB GenCo's proposals for HPC in the radwaste management and decommissioning areas. It was concluded that the overall strategies for decommissioning and management of both ILW and spent fuel are in accordance with national and regulatory policy and strategy, and the proposals presented are feasible.

NNB GenCo's proposed arrangements for LC32 were assessed to establish whether they were developed to the stage that the eventuality of finding radioactive contamination on the HPC site during the post-licensing construction phase was addressed. This element of the assessment was required in support of licence granting, and it was concluded that the LC32 arrangements at this stage were sufficient for licensing.

In conclusion, ONR has not identified any issues in the course of this assessment in the radioactive waste management and decommissioning area that would preclude a nuclear site licence being granted for the HPC site.

Based on this assessment, from the radwaste management and decommissioning perspective, no issues have been identified that give rise to concerns over granting a nuclear site licence for the HPC site.

LIST OF ABBREVIATIONS

CNS	Civil Nuclear Security (part of ONR)
DECC	Department of Energy and Climate Change
DWMP	Decommissioning and Waste Management Plan
(D)DWMP	Detailed Decommissioning and Waste Management Plan
EA	Environment Agency
EDF	Electricity de France
FAP	Funding Arrangements Plan
FDP	Funded Decommissioning Plan
GDA	Generic Design Assessment
GDF	Geological Disposal Facility
HPC	Hinkley Point C (site)
HSE	Health and Safety Executive
ILW	Intermediate Level Waste
LC	Licence Condition
LLW	Low Level Waste
MoU	Memorandum of Understanding
NNB GenCo	New Nuclear Build Generation Company
ONR	Office for Nuclear Regulation (an agency of HSE)
PCSR	Pre-construction Safety Report
RMT	Radioactive Materials Transport (part of ONR)
RWMC	Radioactive Waste Management Case
SAP	Safety Assessment Principle(s) (HSE)
TAG	Technical Assessment Guide(s) (ONR)
TSC	Technical Support Contractor

TABLE OF CONTENTS

Tables

1 INTRODUCTION

1.1 Background

1 This report presents the findings of ONR's assessment of the radioactive waste management (radwaste) and decommissioning workstreams in support of the licensing of Hinkley Point C (HPC). This assessment was unusual for ONR because it was not an assessment of a safety case against the standard assessment criteria, however to some extent the Office for Nuclear Regulation (ONR) Safety Assessment Principles (SAP) [Ref. 1], together with supporting Technical Assessment Guides (TAG), [Ref. 2] have been used as the basis for this assessment.

2 At point of licensing, it has been confirmed (Ref. 3) that fully developed arrangements are not necessary for LC 32 (Accumulation of radioactive waste), LC34 (Leakage and escape of radioactive material and radioactive waste) and LC35 (Decommissioning). This is proportionate given these licence conditions are primarily applicable to the operational and decommissioning phases of the proposed power stations on the HPC site. It should be noted that the exception to this is that the arrangements for LC32 are required to be developed to the stage that the eventuality of finding radioactive contamination on the HPC site during the post-licensing construction phase is addressed.

3 It is relevant to this assessment to note that for new nuclear power stations, the Energy Act 2008 introduced a statutory requirement on nuclear site licence applicants, requiring them to have in place an approved Funded Decommissioning Plan (FDP) before first using the site for activities that need to be licensed. That programme will require operators to make adequate arrangements for covering the cost of decommissioning the site and managing any operational or decommissioning wastes. Before permitting the start of nuclear safety-related construction, ONR will seek confirmation from Department of Energy and Climate Change (DECC) that any requirements which are placed on the operator by the provisions of the Energy Act 2008 can be met.

4 The Decommissioning and Waste Management Plan (DWMP) is a key technical element of the FDP which NNB GenCo is required to submit to the Secretary of State for approval under the Energy Act 2008 and associated Regulations rather than under the Nuclear Installations Act 1965 (as amended). Technically, the DWMP is not part of site licensing, but in practice construction can not start till the Secretary of State has approved the FDP. ONR are statutory consultees for the FDP consultation, therefore interactions with NNB GenCo to date under the auspices of the radwaste and decommissioning work streams have focussed primarily on managing ONR's risk in the role of statutory consultee rather than on site licensing specifically.

1.2 Scope

5 The scope of this report covers the assessment undertaken by ONR under the radwaste and decommissioning work streams within ONR's HPC licensing project. Management of spent fuel is not covered within this assessment in any detail, as that is the subject of a separate work stream. However the high level spent fuel management strategy has been considered, as that falls under the scope of the FDP. Discharges and disposals are not covered within this assessment, they fall under the *vires* of Environment Agency (EA) rather than ONR.

6 ONR's radwaste management assessment strategy was to focus on Intermediate Level Waste (ILW) rather than Low Level Waste (LLW). The rationale for focussing on ILW rather than LLW was that ILW presents a far greater risk in terms of nuclear safety, and ILW arising from the operation of HPC has to be manageable (and disposable) in the UK,

using the infrastructure available in the UK, and has to be compliant with UK regulatory requirements. LLW does not present a significant nuclear safety risk, and, generally speaking, presents less of a waste management challenge than ILW.

7 At point of licence granting fully developed arrangements for LC32, LC34 and LC35 are not necessary. The arrangements for LC32 are required to be developed to the stage that the eventuality of finding radioactive contamination on the HPC site during the post-licensing construction phase is addressed. Without adequate arrangements for LC32 in place if radioactive contamination was found on the HPC site after a nuclear site licence was granted, there is the possibility that work would have to stop whilst suitable arrangements were put in place. Therefore ONR have assessed NNB GenCo's arrangements for LC32 at this stage. The arrangements for LC34 and LC35 have not been assessed. Arrangements for LC33 are not required for ONR to direct a licensee to dispose of radioactive waste from a licensed site with an environmental permit, as is the case of the HPC site, as ONR would use primary powers under the nuclear site licence.

8 Much of ONR's assessment in the radwaste and decommissioning area has focussed on managing ONR's risk in the role of statutory consultee to DECC on the FDP rather than on site licensing specifically.

1.3 Methodology

9 This assessment was unusual for ONR because it was not an assessment of a safety case against the standard assessment criteria. The main aim was to do sufficient assessment to gain reassurance that the arrangements for LC32 were sufficient for licensing, and that the overall strategies for decommissioning and management of both ILW and SF are in accordance with national and regulatory policy and strategy, and whether the proposals are feasible, in the context of being able to respond to DECC's request for advice on the HPC FDP.

2 ASSESSMENT STRATEGY

10 The intended assessment strategy for the radwaste and decommissioning work streams in support of the licensing of HPC is set out in this section. This identifies the scope of the assessment and the standards and criteria that have been applied.

2.1 Standards and Criteria

11 The relevant standards and criteria adopted within this assessment are principally the Safety Assessment Principles (SAP) [Ref. 1], internal ONR Technical Assessment Guides (TAG) [Ref. 2], relevant national and international standards and relevant good practice informed from existing practices adopted on UK nuclear licensed sites. The key SAPs and relevant TAGs are detailed within this section. National and international standards and guidance have been referenced where appropriate within the assessment report. Relevant good practice, where applicable, has also been cited within the body of the assessment.

12 To control and minimise radiological risks, radioactive waste arisings and accumulations need to be minimised (LC32), and any accumulations must be adequately controlled and contained to prevent leakage and escape (LC34).

2.2 Safety Assessment Principles

13 The key SAPs applied within the assessment are included within Table 1 of this report.

14 The management of radioactive waste is a function potentially spanning all of the stages in the lifecycle of a facility. Consequently, the minimisations and control of waste should be taken into account at all stages in the lifecycle of a facility, starting at the planning and design stage through operation, to decommissioning and site clearance. Issues to be considered by ONR include the site waste management strategy, waste characterisation, arrangements for segregation, disposability and passive safety (in relation to the form of the waste itself and its storage conditions) and the requirement for keeping of records.

15 Facilities should be designed and operated so they can be safety decommissioned. Issues to be considered by ONR include whether there are adequate strategies, plans and programmes for the decommissioning of nuclear plant and for the treatment and disposal of radioactive wastes.

2.2.1 Technical Assessment Guides

16 The following Technical Assessment Guides have been used as part of this assessment (Ref. 2):

- T/AST/024, *Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites.* Issue 3, March 2001, HSE
- T/AST/026, *Decommissioning on Nuclear Licensed Sites.* Issue 2, March 2001, HSE

2.2.2 National and International Standards and Guidance

17 The following international standards and guidance have been used as part of this assessment (Ref. 4):

- Joint Regulatory Guidance on Radioactive Waste Management

2.3 Use of Technical Support Contractors

18 No Technical Support Contractors (TSC) were used in support of this assessment.

2.4 Integration with other Assessment Topics

19 NNB GenCo have chosen to combine management of radwaste and spent fuel in one Pre-construction Safety Report (PCSR) chapter (Chapter 11). Detailed assessment of the proposals for the management of spent fuel is excluded from the scope of this assessment, however there is invariably some areas of overlap between the spent fuel and radwaste work steams – largely in the decommissioning area. The high level strategy for the management of spent fuel has been considered (advice on the high level strategy for the management of spent fuel was sought from ONR's fuel specialist) within this assessment insofar that management of spent fuel is included within the scope of the HPC FDP.

2.5 Out-of-scope Items

20 The following items are outside the scope of the assessment.

- Arrangements for LC33, LC34 and LC35.
- Management of spent fuel (with the exception of the high level strategy).
- Management of non-radioactive wastes.
- The HPC FDP and Funding Arrangements Plan (FAP).
- Costs and costing assumptions in the HPC DWMP and Detailed DWMP.
- Radioactive and non-radioactive discharges.
- Disposals of radioactive waste.

3 LICENSEE'S SAFETY CASE

21 As a result of the Energy Act 2008 potential nuclear operators are required to submit a FDP to the Secretary of State. The FDP comprises a Funding Arrangements Plan (FAP) and a DWMP. The DWMP (Ref. 5) sets out, at a high level, the decommissioning strategy and costs. Below the DWMP sits a Detailed DWMP [(D)DWMP] (Ref. 6) that provides an additional level of detail about how decommissioning will be undertaken. The (D)DWMP is almost analogous to the decommissioning plans for existing nuclear stations. When NNB GenCo submits the FDP for HPC, the Secretary of State (via DECC) will ask for ONR's views as ONR are statutory consultees.

22 The information ONR needs to respond to DECC's request is within the HPC DWMP and (D)DWMP documents. ONR need to do sufficient assessment to reassure themselves that the overall strategies for decommissioning and management of both Intermediate Level Waste (ILW) and Spent Fuel (SF) are in accordance with national and regulatory policy and strategy, and whether the proposals are feasible. Additionally, there is a requirement to confirm that any relevant findings from the Generic Design Assessment (GDA) have been closed out.

23 The DWMP and (D)DWMP are substantial documents, and inevitably contain some information that is relevant to the FDP and therefore of interest to DECC, but not to ONR. ONR therefore asked NNB GenCo to produce strategy documents for the management of operational radwaste (Ref.7), spent fuel management (Ref. 8) and decommissioning (Ref. 9) for HPC, the aim was for these three documents to summarise and present information of interest to ONR in determining whether NNB GenCo's proposals are aligned with national and regulatory policy and strategy, and whether the proposals are feasible.

24 NNB's arrangements for the control of contaminated land or groundwater on their sites and associated developments throughout construction, operation and decommissioning are set out in Reference 10.

4 ONR ASSESSMENT

25 ONR's aim was to do sufficient assessment to gain reassurance that the overall strategies for decommissioning and management of both ILW and spent fuel at HPC are in accordance with national and regulatory policy and strategy, and whether the proposals are feasible, in the context of being able to respond to DECC's request for advice on the HPC FDP. Whilst this element of the assessment was not, strictly speaking, required for ONR to grant a nuclear site licence for the HPC site, it is recorded here as it does provide confidence in the future acceptability of NNB GenCo's proposals for HPC in the radwaste management and decommissioning areas.

26 NNB GenCo's arrangements for LC32 were assessed to establish whether they were developed to the stage that the eventuality of finding radioactive contamination on the HPC site during the post-licensing construction phase are addressed. This element of the assessment was required in support of licence granting.

27 Both elements of the assessment are described in this assessment report.

4.1 Scope of Assessment Undertaken

28 This assessment comprised two main elements. The first was too assess the HPC (D)DWMP in support of providing DECC with advice on the HPC FDP in the capacity of a statutory consultee. This is presented in section 4.2. The second element was to assess NNB GenCo's LC32 arrangements for the HPC site to establish whether the eventuality of finding radioactively contaminated land was adequately covered. This is presented in section 4.3.

29 The Pre-Construction Safety Report (PCSR) chapters for radioactive waste management (covered in Chapter 11 'Waste and Spent Fuel) and Decommissioning (covered in Chapter 20 'Decommissioning') have not been assessed. NNB GenCo's approach to both is presented in section 4.4.

30 Section 4.5 presents the Generic Design Assessment (GDA) findings arising from ONR's GDA radwaste and decommissioning assessment (Ref 11) that fall under the auspices of the radwaste and decommissioning licensing workstream. Whilst none of these GDA findings have to be closed out for licence granting, NNB GenCo have presented their approach to closing out those GDA findings which are required to be addressed prior to the pouring of nuclear island safety related concrete, this is presented in Table 2 for completeness.

4.2 Assessment of the HPC (D)DWMP

31 ONR's assessment of the HPC (D)DWMP was primarily from a nuclear safety perspective, with input from ONR's Civil Nuclear Security (CNS) and Radioactive Materials Transport teams (RMT).

4.2.1 Assessment of Strategy for the Management of Operational Intermediate Level Waste

32 ONR's radwaste management assessment strategy was to focus on Intermediate Level Waste (ILW) rather than Low Level Waste (LLW). The rationale for focussing on ILW rather than LLW was that ILW presents a far greater risk in terms of nuclear safety, and ILW arising from the operation of HPC has to be manageable (and disposable) in the UK, using the infrastructure available in the UK, and has to be compliant with UK regulatory requirements. LLW does not present a significant nuclear safety risk, and, generally speaking, presents less of a waste management challenge than ILW. It should be noted that ONR worked closely with the Environment Agency (EA) on assessing the ILW

management strategy, in accordance with the Memorandum of Understanding (MoU) between HSE and EA (Ref. 12).

33 ONR requested a justification for the ILW management strategy from NNB GenCo because the ILW management strategy selected for HPC was the same as that used at EDF's French stations. There are very significant differences in national radioactive waste management infrastructure between the UK and France, the key difference being France has a disposal site for LLW and ILW (though it is worth noting that LLW and ILW are defined slightly differently). The justification did not initially meet basic expectations from a regulatory perspective, like waste minimisation. NNB GenCo originally proposed to process relatively short lived ILW promptly, rather than allowing it to decay to LLW whilst in safe storage, which would minimise the volume of packaged ILW destined for a future Geological Disposal Facility (GDF). ONR did not consider this initial proposal to be consistent with UK policy.

34 NNB GenCo revised their ILW management strategy to reflect the use of decay storage of short-lived ILW, and the revised strategy justification document (Ref. 7) was accepted by ONR and EA. NNB GenCo confirmed that the DWMP and (D)DWMP submitted to DECC would reflect the revised strategy.

35 The requirement to obtain Letters of Compliance (LoC) from the Nuclear Decommissioning Authority's Radioactive Waste Management Directorate (RWMD) in advance of processing ILW was not specifically included in NNB GenCo's ILW management strategy. Therefore ONR sought and received confirmation from NNB GenCo that LoCs would be obtained prior to the processing of any ILW.

4.2.2 Assessment of Strategy for the Management of Spent Fuel

36 NNB GenCo produced a strategy justification document (Ref. 8) to present the option studies and technical factors that drove their choice of spent fuel interim storage technology (wet interim storage), and also to present a high level 'case' for the Interim Fuel Store. This strategy justification document was reviewed and accepted by ONR's specialist fuel assessor. In summary, at this stage, based on the assessment undertaken, it was concluded that ONR has no significant objection to NNB GenCo's choice of a wet interim spent fuel storage facility for the HPC site. The ONR specialist fuel assessor identified a requirement for ongoing dialogue between ONR and NNB GenCo as their plans developed, this will take place under the auspices of the spent fuel work stream as spent fuel does not fall within the radwaste work stream.

37 NNB GenCo confirmed that the DWMP and (D)DWMP were consistent with the strategy justification document for spent fuel management.

4.2.3 Assessment of Strategy for Decommissioning

38 The decommissioning strategy (Ref. 9) selected for the HPC reactors is Early Site Clearance (i.e. prompt dismantling with no period of Care and Maintenance). This approach is in line with international practice for decommissioning similar reactors, and the declared decommissioning strategy for Sizewell B.

39 ONR's Radioactive Materials Transport (RMT) specialist noted that the ability to transport a range of materials away from the site is a key element of decommissioning, and it would be beneficial to have some discussion on how transport aspects have been designed into the decommissioning strategy. This is particularly relevant to the timing of decommissioning and the added value would be to provide an indication of the potential lead limes associated with the key risks identified as future uncertainties.

40 NNB GenCo confirmed that the DWMP and (D)DWMP were consistent with the decommissioning strategy.

4.2.4 Assessment of (D)DWMP

41 NNB GenCo presented the first draft of the HPC DWMP and (D)DWMP documents to the regulators (ONR and EA) and DECC in July 2011. NNB GenCo asked DECC and the regulators to undertake a review of the documents and return any comments by the end of September 2011 so that NNB GenCo would have time to review the comments, and make any changes prior to submitting the suite of FDP documents to DECC.

42 ONR returned comments (Ref. 13) to NNB GenCo in September 2011, confirming the (D)DWMP covered very much in the same material as a relatively early stage pre-decommissioning plan, which was deemed appropriate for this stage in the HPC lifecycle. The (D)DWMP sets out the 'story' of decommissioning in a clear and readable fashion. The decommissioning strategy is the same (prompt decommissioning) as that assessed by ONR within GDA, where it was concluded that a single reactor could be decommissioned in a 'safe and environmentally acceptable way. It was confirmed that changes to the (D)DWMP text regarding management of operational ILW have been agreed to reflect the use of decay storage where appropriate. It was confirmed that the rationale for the choice of wet interim storage of spent fuel had been explained.

43 Two potential issues were flagged up as a result of ONR's initial review of the first draft of the (D)DWMP. The first was for NNB GenCo to clarify how ILW resin from Unit 2 will be transported to the waste treatment building, if this is via underground pipe ONR would wish to explore the rationale for this decision with NNB GenCo. The second was whether sufficient oil-water separation capability has been designed into the effluent treatment system.

44 The version of the HPC (D)DWMP NNB GenCo submitted to DECC in March 2012 addressed many of the comments made by ONR, which demonstrated the value of going through this process, despite it being very resource intensive. DECC asked ONR for advice on the (D)DWMP (Ref. 14), clarifying they would be seeking a formal response from ONR (in the capacity of a statutory consultee) in October 2012. In addition to this a preliminary response was requested in May 2012 to inform DECC's preliminary response to NNB GenCo in June 2012, setting out the issues that will need to be taken forward prior to approval of the HPC FDP.

45 ONR returned preliminary comments (Ref. 15) to DECC on May 2012. In summary, the decommissioning strategy of Early Site Clearance was judged in line with international practice for decommissioning similar reactors, and the declared decommissioning strategy for Sizewell B. The operational ILW management strategy selected for the HPC site is based on that used at EDF sites in France, with a proportion of the ILW decay stored for processing and disposal as LLW. The proposal to use decay storage for short lived immobile ILW is in accordance with ONR's expectations, and represents an improvement from the previous version of the (D)DWMP reviewed by ONR. The spent fuel storage strategy that has been selected for the HPC site is wet (pond) storage. NNB GenCo have previously set out the features of the wet and dry options, and explained and justified to ONR the rationale for the choice of wet storage at HPC. Detailed design of the interim spent fuel storage facility is in progress; there will be ongoing interactions between ONR and NNB GenCo as part of normal regulatory business as the design develops.

46 It is worth noting that the HPC (D)DWMP had not been submitted to ONR by NNB GenCo to meet any of ONR's regulatory requirements. Therefore it had not been formally assessed against ONR's SAPs and other assessment standards, or in the depth that it

would be assessed had it been submitted in response to ONR's regulatory requirements. Despite this, from ONRs perspective the assessment undertaken was of value, as it served to identify potential issues early (to both ONR and NNB GenCo).

4.3 Assessment of the HPC LC32 Arrangements

47 NNB GenCo's proposed arrangements for LC32 were assessed to establish whether they were developed to the stage that the eventuality of finding radioactive contamination on the HPC site during the post-licensing construction phase are addressed. This element of the assessment was required in support of licence granting, with fully developed arrangements for LC32 required at a later stage.

48 The conclusion of ONR's initial assessment of NNB GenCo's proposed LC32 arrangements was that they were not sufficient for licensing, and the *vires* of ONR and EA were not accurately reflected within the arrangements. There was no allowance for the discovery of radioactively contaminated land during the construction phase of the HPC project. ONR provided detailed feedback on the proposed arrangements, this was followed by a Level 4 meeting to discuss NNB GenCo's revised LC32 arrangements. ONR advised that the revised arrangements were much improved, and suggested a number of further enhancements that would further strengthen the arrangements.

49 It is relevant to note that there is a planning condition (condition SP10) associated with the discovery of radioactively contaminated land in the site preparatory works (earthworks) phase. NNB GenCo have put in place a number of actions to manage this condition, which further strengthens their arrangements for LC32 with respect to the discovery of radioactively contaminated land (Ref. 16).

50 NNB GenCo presented their final arrangements for LC32 which ONR concluded were fit for licensing.

4.4 Pre-Construction Safety Report

4.4.1 Radwaste Management

51 NNB GenCo are producing PCSR2 specifically for the HPC site, based largely on the PCSR produced for GDA. Chapter 11 of PCSR2 deals with radwaste management and spent fuel. This assessment does not include spent fuel (apart from the high level management strategy), as this is covered under a separate work stream, so only radwaste management aspects are considered.

52 NNB GenCo's strategy for the production of PSCR2 generally was to look at the GDA PCSR and determine what was deemed non-applicable, and replace it, for each chapter. In the case of Chapter 11, much of the material required significant revision and replacement. The purpose of PCSR2 is to justify consent to construct, rather than fulfil any specific criterion for licensing. For Chapter 11 of PCSR2, the main difference from the GDA PCSR is that it is based on 2 reactors rather than one.

53 PCSR2 Chapter 11 reflects the agreed ILW management strategy (including decay storage were practicable) and is also consistent with the limits proposed in the RSR permit for Hinkley Point C. NNB GenCo do not see PCSR2 as a vehicle for justifying strategies, as this was one of the functions of PCSR3, which will be produced after completion of the GDA process.

54 NNB GenCo confirmed that the design changes necessary for the use of the agreed decay storage strategy are proving very onerous. A significant challenge is posed by the existing design of the concrete container lids, and also by the design of the plant that will

process spent filters. The challenge is to make the modifications in such a way that the process works safely and efficiently – this is in the forward work plan for the waste processing building.

55 The design of the waste management systems are considered by NNB GenCo to be sufficiently flexible that any foreseeable problems will not cause operational difficulties. A specific example is the size of the effluent tanks, which are very large.

56 Chapter 11 of PCSR2 has not yet been submitted to ONR, and has therefore not been assessed by ONR. Based on early interactions with NNB GenCo (Ref. 17), it should reflect the waste management strategy in the (D)DWMP which has been confirmed to meet ONR's regulatory requirements, based on sampling assessment.

4.4.2 Decommissioning

57 Chapter 20 of PSCR2 deals with decommissioning, and presents a strategy and methodology for decommissioning that is consistent with that presented in the HPC (D)DWMP. Chapter 20 of PCSR2 has not yet been submitted to ONR for assessment, based on ONR's assessment of the (D)DWMP it seems unlikely that Chapter 20 will not meet ONR's expectations.

58 Based on assessment of the (D)DWMP, ONR concluded that the decommissioning strategy selected for the HPC reactors of Early Site Clearance (i.e. prompt dismantling with no period of Care and Maintenance) is in line with international practice for decommissioning similar reactors, and the declared decommissioning strategy for Sizewell B.

4.5 GDA Findings

59 ONR's GDA radwaste and decommissioning assessment considered spent fuel as a waste, therefore management of spent fuel was included in the assessment, but treated separately from other wastes. ONR's GDA assessment findings are reproduced in Table 2.

60 For the purposes of licensing, NNB GenCo confirmed (Ref. 18) that they did not consider spent fuel to be a waste and would not declare it as such. However, NNB GenCo would demonstrate that they have the necessary safety, environmental and technical arrangements and funding to enable them to dispose of spent fuel to a GDF at some future date if they chose to. Spent fuel management is not included in the scope of this assessment, as it is covered in a separate work stream. Therefore of the 12 GDA assessment findings, 6 (AF-UKEPR-RW-07 to AF-UKEPR-RW-12) are not relevant to this assessment.

61 GDA assessment findings AF-UKEPR-RW-04 and AF-UKEPR-RW-05 are required to be closed out prior to loading of fuel and start of cold operations respectively, and so are not relevant to this assessment (which is for licence granting).

62 GDA assessment findings AF-UKEPR-RW-01, -02, -03 and UK-UKEPR-RW-06 are required to be closed out prior to nuclear island safety related concrete, so whilst they do not have to be closed out for licence granting, they do have to be closed out in the near future. On this basis, they have been included in the scope of this assessment, and NNB GenCo has developed a strategy for their close out, which is detailed in Table 2.

4.6 Comparison with Standards, Guidance and Relevant Good Practice

63 In a number of instances NNB GenCo's proposals have been usefully compared with ONR's understanding of what constitutes relevant good practice.

64 ONR consider it relevant good practice, in a UK context, to use decay storage where practicable (and safe to do so) to allow short-lived ILW to decay to LLW in preference to packaging short-lived ILW promptly. This is considered good practice because it is consistent with the waste hierarchy and because the UK does not have a disposal site for ILW, so minimising its generation when it is practicable to do so is sensible. ONR did not accept NNB GenCo's initial strategy for management of short-lived ILW as being consistent with relevant good practice, instead the agreed strategy for the management of short-lived ILW is considered by ONR to be consistent with relevant good practice.

65 ONR noted NNB GenCo's proposal to transfer ion-exchange resins between unit 2 and the waste treatment building via an underground pipe that was of considerable length. NNB GenCo demonstrated to ONR that their proposal was consistent with how resins are transferred in most of EDF's French power stations, and also at Sizewell B. ONR accepted this as relevant good practice.

66 The decommissioning strategy selected for the reactors at HPC is Early Site Clearance, this approach is in line with international practice for decommissioning similar reactors, and the declared decommissioning strategy for Sizewell B. ONR accept this as relevant good practice.

67 Based on sampling assessment, NNB GenCo's proposals in the radwaste and decommissioning area are consistent with relevant good practice.

5 CONCLUSIONS AND RECOMENDATIONS

5.1 Conclusions

68 This report presents the findings of the ONR assessment of the radwaste and decommissioning work streams in support of the licensing of the HPC site.

69 It was concluded that the overall strategies for decommissioning and management of both ILW and SF are in accordance with national and regulatory policy and strategy, and the proposals presented are feasible.

70 It was concluded that the LC32 arrangements at this stage are sufficient for licensing.

71 In conclusion, ONR has not identified any issues in the course of this assessment, from the radwaste management and decommissioning perspective, that would give rise to concerns for granting a nuclear site licence for the HPC site.

5.2 Recommendation

72 From the radwaste management and decommissioning perspective, no issues have been identified that give rise to concerns over granting a nuclear site licence for the HPC site.

6 REFERENCES

1 *Safety Assessment Principles for Nuclear Facilities.* 2006 Edition Revision 1. HSE. January 2008. www.hse.gov.uk/nuclear/SAP/SAP2006.pdf.

2 *Management of Radioactive Materials and Radioactive Waste on Nuclear Licensed Sites.* T/AST/024, Issue 3. HSE, March 2001

Decommissioning on Nuclear Licensed Sites. T/AST/026, Issue 2, March 2001, HSE www.hse.gov.uk/nuclear/operational/tech_asst_guides/index.htm.

3 *Civil Nuclear Reactor Programme – New Civil Reactor Build – NNB GenCo Ltd's Application for a Nuclear Site Licence to Install and Operate two EPR Reactors at Hinkley Point – Office for Nuclear Regulation Intervention Strategy,* February 2012

4 *Joint Regulatory Guidance on Radioactive Waste Management* www.hse.gov.uk/nuclear/wastemanage.htm

5 *Hinkley Point C Funded Decommissioning Programme: Decommissioning and Waste Management Plan*, March 2012 **[PROTECT – COMMERCIAL]**

6 *Hinkley Point C Power Station Detailed Decommissioning and Waste Management Plan – Volume 1*, NNB-PEA-REP-000002, Version 1.1, March 2012 **[UK RESTRICTED]**

7 *Operational ILW Management Strategy Justification*, NNB-PEA-REP-000004, Draft G **[PROTECT – COMMERCIAL]**

8 *The Choice of Interim Spent Fuel Management Storage Technology for the Hinkley Point C UK EPRs*, Issue 1), 26th October 2011, NNB-OSL-STR000034

9 *Justification for EPR Corporate Decommissioning Strategy and Plan*, NSL/B/TECH/10/NNN, Draft B, October 2010

10 *Company Procedure: Control of Contaminated Land and Groundwater*, NNB-OSL-PRO-000041, Version 0.6, NNB Generation Company Ltd, June 2012

11 *ONR GDA - Step 4 Report – UK EPR - Radioactive Waste and Decommissioning* – ONR-GDA-AR-11-030, Revision 0

12 *Memorandum of Understanding (MoU) between HSE and EA on Matters of Mutual Concern at Licensed Nuclear Sites in England and Wales,* www.hse.gov.uk/nuclear/nucmou.pdf

13 *Early comments from ONR and DfT RMTT on the Hinkley Point C Detailed Decommissioning and Waste Management Plan*, HPC 50060N, 30th September 2011

14 *Consultation of Health and Safety Executive under Section 46 of the Energy Act 2008*, D12/527653, 30th March 2012

15 *Preliminary Advice from Office for Nuclear Regulation on the Hinkley Point C Detailed Decommissioning and Waste Management Plan,* HPC.FDP.DECC.001, 31st March 2012

16 *LC32-34 Compliance during Construction.* Slides for level 4 meeting between ONR and NNB GenCo on 25th June 2012

17 *PSCR2.* Slides for level 4 meeting between ONR and NNB GenCo on 25th June 2012

18 *'Spent Fuel' Definition*, ND(NII)EDF20088N, 15th October 2010

Table 1

Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
RW.1	Strategies for radioactive waste	A strategy should be produced and implemented for the management of radioactive waste on a site.
RW.2	Generation of radioactive waste	The generation of radioactive waste should be prevented, or where this is not reasonably practicable, minimised in terms of quantity and activity.
RW.3	Accumulation of radioactive waste	The accumulation of radioactive waste on site should be minimised.
RW.4	Characterisation and segregation	Radioactive waste should be characterised and segregated to facilitate subsequent safe and effective management.
RW.5	Storage of radioactive waste and passive safety	Radioactive waste should be stored in accordance with good engineering practice and in a passively safe condition.
RW.6	Passive safety timescales	Radioactive waste should be processed into a passively safe state as soon as is reasonably practicable.
RW.7	Records for management of radioactive waste	Information that might be required now and in the future for the safe management of radioactive waste should be recorded and preserved.
DC.1	Design and operation	Facilities should be designed and operated so they can be safely decommissioned.
DC.2	Decommissioning strategies	A decommissioning strategy should be prepared and maintained for each site and should be integrated with other relevant strategies.
DC.3	Timing of decommissioning	Decommissioning should be carried out as soon as is reasonably practicable taking relevant factors into account.
DC.4	Planning for decommissioning	A decommissioning plan and programme should be prepared and maintained for each nuclear facility throughout its life-cycle to demonstrate that it can be safety decommissioned.

Table 1

Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
DC.5	Passive safety	The facility should be made passively safe before entering a care and maintenance phase.
DC.6	Records for decommissioning	Throughout the whole life-cycle of a facility the documents and records that might be required for decommissioning purposes should be identified, prepared, updated and retained.
DC.7	Decommissioning organisation	Organisational arrangements should be established and maintained to ensure safe and effective decommissioning of facilities.
DC.8	Safety arrangements	The safety management system should be periodically reviewed and modified as necessary prior to and during decommissioning.

…

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-01	The licensee shall produce a site specific Radioactive Waste Management Case for all of the wastes that their UK EPR will produce.	The site specific Radioactive Waste Management Case will be submitted to the regulators prior to milestone 3, nuclear island safety related concrete.	NNB GenCo proposed to produce a RWMC that will be a live document pulling together output from various completed and ongoing studies including waste management strategies, the evolving design, PCSR2, the environment case, and various disposability assessments. ONR were aware that EDF NG were proposing to use their radwaste safety cases to fulfil the requirements of the RWMCs, as many of the necessary information was present to a reasonable extent given EDF NG were not, in most cases, packaging ILW and were just storing it in the raw form. It was suggested that NNB GenCo considered adopting a similar approach, as they were even further from packaging ILW than EDF NG. In line with the proportionality principle, ONR did not consider using a safety case in this manner was inconsistent with the Joint Guidance.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-02	The licensee shall review the construction activities to identify any actions that could be taken during construction that would be beneficial to the decommissioning process.	A copy of the written review will be submitted to the regulators prior to milestone 3, nuclear island safety related concrete.	AF-UKEPR-RW-02 requires the licensee to review construction activities to identify any actions that could be taken during construction that would be beneficial to the decommissioning process. NNB GenCo do not intend to produce a standalone report for this AF, on the basis that the requirement to consider decommissioning is included in the various contractual requirements for the design of the EPR, and the EPR systems. NNB GenCo will review the various Technical Specifications and Invitations to Tender and assemble some evidence on this to be submitted to ONR, as the finding can not be closed out without evidence.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-03	The licensee to implement a records management procedure for waste management and decommissioning that incorporates the principles established in the AREVA report on the Management of Records and UKEPR-0016-001.	A copy of the procedure will be submitted to the regulators prior to milestone 3, nuclear island safety related concrete.	AF-UKEPR-RW-03 requires the licensee to implement a records management procedure for waste management and decommissioning that incorporates the principles established in the AREVA report on the Management of Records and UKEPR-0016-001. NNB GenCo confirmed they will develop procedures for waste management records as nenessary, but not necessarily prior to first concrete. PCSR2 Chapter 20 (decommissioning) sets out records requirements during decommissioning – this expands on what is described in the HPC Decommissioning and Waste Management Plan (DWMP). NNB GenCo will produce a matrix setting out when the various records management procedures would be developed by. ONR will consider whether it would be proportionate to accept this evidence, given how far away decommissioning of the HPC reactors is.
AF-UKEPR-RW-04	The licensee shall optimise the operation of the chemical volume control system and the liquid, gaseous and solid waste management processes to ensure that the risks associated with their operation and the management of the resulting wastes are as low as reasonably practicable.	A copy of the report on the optimisation process and outcomes will be submitted to the regulators prior to milestone 13, fuel load.	At the licensing stage specific strategy for closure of GDA findings that are linked to milestones falling after milestone 3 (nuclear island safety related concrete) have yet been agreed with NNB GenCo, this will be done as part of routine regulatory engagement as the HPC project progresses.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-05	The licensee shall identify the evidence necessary to underpin their ILW storage and disposal strategy, the activities needed to secure this evidence and the time needed for these activities. The provision of this evidence and associated activities will be detailed on a plan that will link the evidence needed with the construction activities for all on site facilities required to manage the ILW over its lifetime.	The plan will be submitted to the regulators prior to milestone 10, cold operations.	At the licensing stage specific strategy for closure of GDA findings that are linked to milestones falling after milestone 3 (nuclear island safety related concrete) have yet been agreed with NNB GenCo, this will be done as part of routine regulatory engagement as the HPC project progresses.
AF-UKEPR-RW-06	The licensee shall produce a safety report for the processing and long-term storage of the ILW. The report will contain information equivalent to that of a Preliminary Safety Case as defined in Guidance on the Purpose, Scope and Content of Nuclear Safety Cases.	The safety report will be submitted to the regulators prior to milestone 3, nuclear island safety related concrete.	AF-UKEPR-RW-06 requires the licensee to produce a safety report for the processing and long term storage of ILW that contains information equivalent to a Preliminary Safety Case. NNB GenCo do not intend to generate a stand along PSR for processing and storage of ILW to meet this GDA finding. ONR were asked whether the content of PCSR2 Chapter 12 was sufficient of the requested preliminary Safety Case, as NNB GenCo's plan would be to address any shortfalls in PCSR3. PCSR2 has not been submitted formally to ONR yet so it was not possible at this stage for ONR to confirm that what was in PCSR2 would be sufficient. Further interactions on this topic will be necessary after the submission of PCSR2 to ONR.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-07	The licensee shall identify the evidence necessary to underpin their spent fuel storage, transport and disposal strategy, the activities needed to secure this evidence and the time needed for these activities. The provision of this evidence and associated activities will be detailed on a plan that will link the evidence needed with the construction activities for all on site facilities required to manage the spent fuel over its lifetime.	The plan will be submitted to the regulators prior to milestone 3, nuclear island safety related concrete.	Spent fuel is not within the scope of this workstream, and is covered in another workstream.
AF-UKEPR-RW-08	The licensee shall produce a plan, with RWMD input, for the work necessary to reduce the on-site storage period for the spent fuel produced by the reactor so that the fuel can be transported as soon as reasonably practical.	The plan will be submitted to the regulators prior to milestone 13, fuel load.	Spent fuel is not within the scope of this workstream, and is covered in another workstream.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-09	The licensee shall produce a safety case for the adaptations on the storage containers and/or modifications of the UK EPR at-reactor spent fuel pool pit loading systems for dry storage containers or develop a pre-construction safety report, (Ref. 60) for an additional dry transfer facility for the purpose of spent fuel transfer from the transport container into the long term storage systems.	The safety case will be submitted to the regulators prior to milestone 3, nuclear island safety related concrete.	Spent fuel is not within the scope of this workstream, and is covered in another workstream.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-10	The licensee shall produce a safety report for the long-term storage of spent fuel. The report will contain information at least equivalent to that of a Preliminary Safety Case as defined in Guidance on the Purpose, Scope and Content of Nuclear Safety Cases The process optimisation will be against the principles set out in: section 2.4.3, Design Safety Principles, of the Longer Term Spent Fuel ISF. UKEPR-0009-001 Issue 00, July 2009; and section 3, Design Safety Principles, of the Human Factors in Long Term Waste Management, R10-006(A) Issue 2, February 2010. It shall also detail the proactive inspection regime for the spent fuel in on-site storage that builds on existing knowledge and experience, allows the spent fuel to be retrieved and inspected within a reasonable time frame and limits the number of fuel assembly lifts.	The safety report will be submitted to the regulators prior to milestone 13, fuel load.	Spent fuel is not within the scope of this workstream, and is covered in another workstream.
AF-UKEPR-RW-11	The licensee shall produce a disposability assessment for the spent fuel produced from the operation of their reactor.	The disposability assessment will be submitted to the regulators prior to milestone 13, fuel load.	Spent fuel is not within the scope of this workstream, and is covered in another workstream.

Table 2

GDA Assessment Findings to be Addressed During the Forward Programme as Normal Regulatory Business

Radioactive Waste and Decommissioning – UK EPR

Finding No.	Assessment Finding	MILESTONE (by which this item should be addressed)	NNB GenCo Strategy for Closure
AF-UKEPR-RW-12	The licensee shall substantiate why a conceptual stage Letter of Compliance is suitable and sufficient for the start of reactor operations.	The written substantiation will be submitted to the regulators prior to milestone 13, fuel load.	Spent fuel is not within the scope of this workstream, and is covered in another workstream.