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**File Ref:** 101006479  
**Unique Number:** ONR-HPC-21587Y  
**Your Ref.:**

31 May 2022

For the attention of [REDACTED] Senior Nuclear Regulator at Environment Agency

Dear [REDACTED]

**FOR CONSIDERATION: APPLICATION TO VARY NNB GENERATION COMPANY (HPC) LIMITED'S RADIOACTIVE SUBSTANCE REGULATION PERMIT (EPR/ZP3690SY) TO REFLECT A CHANGE OF INTERIM SPENT FUEL STORAGE TECHNOLOGY**

NNB Generation Company (HPC) Limited, hereafter referred to as NNB GenCo (HPC), was granted an environmental permit (EPR/7P3690SY) for the receipt and disposal of radioactive waste from the Hinkley Point C (HPC) power station in March 2013. NNB GenCo (HPC), for the reasons summarised below, has decided to change the technology by which it stores spent nuclear fuel. NNB GenCo (HPC) is therefore applying to the Environment Agency to vary its environmental permit with respect to this change.

No changes are sought to the current permitted discharge limits which are considered to remain appropriate for a site using dry Interim Spent Fuel Storage (ISFS) technology. NNB GenCo (HPC) has assessed the impact of the change of ISFS technology on its Radioactive Substances Regulation (RSR) permit and as a result seeks the removal/amendment of specific conditions that are no longer relevant following the change in ISFS technology.

NNB GenCo (HPC) considers this to be a minor variation for the reasons outlined below:

- NNB GenCo (HPC) is not seeking any change in the activities as described in Table S1.1 of the permit and as justified in Generation of Electricity by the EPR Nuclear Reactor, Justification Register reference number 09/08. SI 2010 No. 2844
- NNB GenCo (HPC) is not seeking any changes in permitted limits for gaseous and aqueous discharges as detailed in Schedule 3, tables S3.1 or S3.2
- There is not a change in the radiological impact to members of the public or non-human biota resulting from discharges
- NNB GenCo (HPC) is not seeking any changes in the permitted boundary for its activities; all activities are contained within the current permitted boundary as set out in Schedule 7
- NNB GenCo (HPC) is solely seeking the removal/amendment of specific conditions related to the old wet ISFS facility that are no longer considered relevant.

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Importantly, NNB GenCo (HPC) will not be generating any more spent fuel as a result of this change. Nor will HPC be storing any spent fuel derived from any other location, i.e., only spent fuel from HPC will be stored in the dry ISFS facility.

NNB GenCo (HPC) will be seeking the necessary changes to its Development Consent Order (DCO).

Additional information relevant to the variation application are outlined below and supporting information, including the relevant application forms which are appended to this letter.

### **Background**

Hinkley Point C's (HPC) two reactors will contain nuclear fuel in which a fission reaction occurs. Each reactor will consist of fuel assemblies providing a controlled fission reaction and a heat source for electrical power production. It is currently assumed that a maximum of 90 spent fuel assemblies will be removed every 18 months of operation from each reactor. With time included for planned outages for maintenance over the anticipated 60 years operation, a total of approximately 7346 fuel assemblies will be generated for the HPC site. This is unchanged from previous estimates.

The 2008 Government White Paper, Meeting the Energy Challenge: A White Paper on Nuclear Power (Cm 7296), concluded that in the absence of any proposals from the industry, any new nuclear power stations that might be built in the UK should proceed on the basis that spent fuel will not be reprocessed and that plans for, and financing of, waste management should proceed on this basis. The strategy for spent fuel management at the HPC site is, therefore, to store the spent fuel on-site, pending final disposal, in such a manner that does not foreclose the option for reprocessing should this become a viable alternative in the future.

There are two approaches that are widely used in the UK and internationally for the interim storage of spent fuel. One approach is to store the spent fuel elements in racks underwater in a pool. This approach requires the pool water to be cooled to remove the decay heat from the spent fuel. The second approach is to store the fuel dry, inside shielded casks above ground. Decay heat is removed passively from around the outside of the casks by air circulation. Both technologies have been assessed in detail by the HPC project with no significant differences in how they performed against relevant environmental criteria. The Environment Agency considers both technologies to represent Best Available Techniques (BAT) in minimising discharges and protecting the environment [Appendix 1].

An initial concept design was developed for a wet ISFS facility by the HPC Project and this was used as the basis for the original RSR permit and DCO application. Further design studies identified a number of technical challenges including the complexity of building an aircraft protection shell over such a large pool which meant that the original concept of a modular build was not considered technically feasible. Additionally, Sizewell B has since successfully licensed and begun to operate a dry ISFS meaning HPC obtained valuable experience in dry ISFS technology. The change of strategy impacted the design of certain structures, systems and components associated with spent fuel management on the HPC site. These design impacts have since been assessed and implemented via the HPC Project's modification process which includes consideration of environmental requirements. The Environment Agency has undertaken a review of the design modifications associated with the change from wet to dry ISFS [Appendix 1].



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### Permit Impact Assessment and Proposed Amendments

The current NNB GenCo (HPC) RSR permit (EPR/ZP3690SY) is based on wet ISFS. The table below summarises the aspects of the RSR permit relevant to ISFS; assesses the impact of the change to dry ISFS technology; and proposes amendments to the permit which NNB GenCo (HPC) considers necessary.

Permit Section No.	Aspects of Current Permit Relevant to ISFS	Impact	Proposed Amendment
Table S3.1	Major Outlet (A3) directs discharges from the wet ISFS facility's stack.	The dry ISFS facility will not have any gaseous discharges and therefore does not require a stack.	Removal of major outlet A3 from the permit.
Table S1.3B	A Pre-Operational Measure (POM) to install HEPA filtration on the storage facility stack.	The dry ISFS facility will not have any gaseous discharges and therefore does not require a stack. The requirement to install HEPA filtration in the stack is therefore no longer relevant.	Removal of Pre-Operational Measure (POM) requesting installation of the HEPA filter in the stack.
Table S1.2	An Information Condition (IC14) requesting that HPC provide a specification for the operational management of the wet ISFS facility (including, ventilation and chemistry control) together with a demonstration of how this contributes to the use of BAT to minimise the activity in discharges (addressing, in particular, fuel integrity and the minimisation of the discharge of tritium to air), to be completed six months before operation of relevant plant.	As there is no longer a need to consider evaporative losses and pool water chemistry, IC 14 is no longer directly applicable. The HPC Project will provide the EA with a specification for the operational management for the dry ISFS as part of normal business. This will address aspects of IC 14 which remain applicable to dry ISFS.	Amendment of IC14 to read: "The operator shall provide an assessment of the operational management of the dry ISFS facility to demonstrate the application of Best Available Techniques, to be completed six months before operation of relevant plant."

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### Operating Techniques and Demonstration of Best Available Techniques (BAT)

Demonstration of BAT, as already required under the RSR permit granted to NNB GenCo (HPC), will continue to be delivered through the operator's Environment Case. This will be maintained throughout the lifecycle of the plant from construction to decommissioning.

The dry ISFS building that will be required in the future to house dry storage casks will have a very simple structure. All cooling for the casks is passive and independent of the building, indeed at many other dry ISFS facilities internationally the casks are stored without any building. All necessary shielding and protection from external hazards is afforded by the design of the cask system.

The design changes associated with the adoption of dry ISFS have included BAT assessments proportionate to the radiological risk and demonstrate impacts are as low as reasonably achievable. Work undertaken by the dry storage cask supplier has demonstrated that the design of the storage casks is BAT. The EA has reviewed this documentation and concluded that "we [EA] find the change to be acceptable and the dry ISFS option being pursued by NNB GenCo (HPC) to represent BAT" (Appendix 1).

The application of BAT will continue to be demonstrated in the Environment Case through NNB GenCo (HPC)'s established, business-as-usual processes and regulatory inspection of the Environment Case by the EA. This would require no additional information conditions to be added to the RSR permit.

### Impact on Discharges

The table below outlines the areas of the original RSR permit application and the Environment Agency's subsequent decision document where reference was made to discharges from the wet ISFS facility.

Permit Section Number	Contribution to Discharges from Wet ISFS	Impact of Technology Change	Potential impact on Permit
S3.1	The annual gaseous carbon-14 limit includes minor contributions from wet ISFS.	There will be no gaseous discharges from the dry ISFS facility. There will be some minor contributions to gaseous discharges during cask loading and drying which were not present for wet ISFS. Contributions to discharges from both technologies are considered minor and it would therefore not be appropriate or necessary to change the limits.	No change to the annual gaseous carbon -14 limit.
S3.1	The annual gaseous limit for beta emitters includes a 20 MBq allowance for wet storage.	There will be no gaseous discharges from the dry ISFS facility. There will be some minor contributions to gaseous discharges during cask loading and drying which were not present for wet ISFS. The 20 MBq allowance is considered appropriate to cover the potential discharges from the loading and drying	No change of the annual gaseous limit for beta emitters



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		activities noting that the design has been optimised to include local HEPA abatement of discharges from drying before routing to the main unit stack.	
S3.2	The annual aqueous Cs-137 limit includes a negligible contribution from wet ISFS.	There will be no aqueous discharges from the dry ISFS facility. There will be some minor contributions to aqueous discharges during cask loading and drying which were not present for wet ISFS. Contributions to discharges from both technologies are considered negligible and it would therefore not be appropriate or necessary to change the limits	No change to the annual aqueous Cs-137 limit.
S3.2	The annual aqueous discharge limit other fission and activation products included no contribution from wet ISFS.	There will be no aqueous discharges from the dry ISFS facility. There will be some minor contributions to aqueous discharges during cask loading and drying which were not present for wet ISFS. It is not considered appropriate or necessary to revise the 'other' radionuclides limit as a result of the change to dry ISFS.	No change to the annual aqueous 'other radionuclides' limit.

As outlined above, dry ISFS will include some effluent arisings associated with the loading and drying processes. Discharges from dry ISFS shall be subject to the application of BAT and will not exceed the original estimates of discharges arising from wet ISFS. Given the discharges will not increase and the allowances in the existing permit for wet ISFS are also appropriate for dry ISFS, no change to permitted limits are sought.

**Monitoring**

The dry ISFS facility will not have any discharges and therefore will not require a stack; equally, no discharge monitoring will be required. Radioactive waste arisings during the transfer of spent fuel into the dry storage casks in the fuel building will be managed through existing disposal routes with the existing planned monitoring equipment and arrangements.

During the cask drying process gas samples are taken to confirm the integrity of fuel being loaded into the dry storage casks. Once the casks are placed into interim storage their temperature is monitored which provides assurance that containment barrier integrity has been maintained, and also that the passive cooling system remains effective.

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### **Impact on Doses from Discharges**

As part of the permit determination in 2013, the Environment Agency assessed the dose to the theoretical representative person who would be most exposed to discharges and direct radiation from all activities undertaken on the site including interim spent fuel storage<sup>1</sup>. For discharges at the permitted limits and direct radiation, the annual dose calculated by the Environment Agency for HPC was 8.4  $\mu\text{Sv}$  per year. This puts the radiological impact to members of the public from all operations on the HPC site (of which interim spent fuel storage is a very small fraction of the total dose) below the internationally recognised threshold of regulatory exemption of 10  $\mu\text{Sv}$  per year<sup>2</sup>.

Based on the negligible contribution from interim wet storage of spent fuel taken into account of the permit limits granted in 2013 and that the change to dry storage technology will not increase discharge limits, the dose contribution from dry interim spent fuel storage technology can be estimated. The dose to the theoretical representative person who would be most exposed to discharges associated with interim dry fuel storage system, on the basis that it will not exceed that of the wet store, can be estimated as less than 0.001  $\mu\text{Sv}$  per year.

### **Impact on External Doses**

An assessment has been carried out which considers the external doses arising from dry ISFS. External dose rates from the dry ISFS facility will be below 0.5  $\mu\text{Sv/h}$  at one metre from the building, i.e., below the level at which radiation protection classification/zoning would be required. The estimated external dose rate at the northern perimeter fence is estimated 0.05  $\mu\text{Sv/h}$  (assuming the dry ISFS facility is full, and location of casks is optimised). Based on a member of the public spending 20 minutes a day at the closest accessible point (40m from the dry ISFS facility at the perimeter fence) this equates to dose of approximately 6  $\mu\text{Sv}$  per year.

The combined impact of doses from discharges and direct radiation from all activities on the HPC site based on the Environment Agency and HPC assessments, including but not limited to the dry ISFS facility, is less than 15  $\mu\text{Sv}$  per year. This is well below the Environment Agency's source dose constraint that considers both radiological impact from discharges and external radiation of 300  $\mu\text{Sv}$  per year and is broadly equivalent to the radiation received as a result of one chest x-ray or eating approximately 100g of Brazil nuts.

Therefore, the doses associated with discharges and direct radiation remain incredibly small and well below regulatory requirements and constraints, as such NNB GenCo (HPC) feels there is no justification for any change in the discharge limits currently in place at HPC.

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<sup>1</sup> Assessment of doses to the public from the expected operations of the proposed Hinkley Point C Power Station. A review of NNB GenCo's dose assessment by the Environment Agency. An independent dose assessment by the Environment Agency

<sup>2</sup> IAEA, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, GSR Part 3



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### Impact on Non-Human Biota Assessment

The EA published its Appropriate Assessment for related Environment Agency permissions for HPC in March 2013<sup>3</sup>. This concluded that:

*"The assessed dose rates to all reference organisms from discharges from all three power stations at Hinkley Point are below the levels that would trigger further consideration of total impact on the Severn Estuary habitats and species.*

- *The dose rates are over a 1000x below the ERICA screening level of 10µGy/h, which is intended as a trigger for further assessment rather than an indicator of significant impact on non-human biota.*
- *The dose rates are over 4000x below the level of 40µGy/h stated by Environment Agency Operational Instruction 388\_01 ± RSR permitting ± prospective radiological assessment for human health and wildlife as the level above which a more site-specific assessment is required.*

*We therefore conclude that the impact of radionuclide discharges from the proposed Hinkley Point C Power Station alone and cumulatively with similar discharges from the other power stations at Hinkley Point can be regarded as trivial and have no adverse effect on the site integrity of the Severn Estuary SAC/SPA/Ramsar or the Exmoor Quantock Oakwoods SAC.*

It is therefore considered that it is not necessary to revise the original non-human biota assessment to support any permit variation given no changes in discharge limits are proposed and the previous impacts have already been determined by the regulator "as trivial".

### The Transboundary Radioactive Contamination (England) Direction 2020 / Article 37

A positive opinion from the European Commission Group of Experts Article 37 for ISFS (and interim ILW storage) was published by the European Commission on 30 May 2012<sup>4</sup>.

*The opinion stated that 'the plan for the disposal of radioactive waste in whatever form from the interim storage facilities for intermediate level waste and spent fuel at the Hinkley Point C nuclear power station site .....is not liable to result in a radioactive contamination of the water, soil or airspace of another Member State that would be significant from the point of view of health.'*

Post Brexit, following the withdrawal of the UK from Euratom, parallel requirements are in place under The Transboundary Radioactive Contamination (England) Direction 2020. Section 3(2) which states: "Where the Environment Agency has received an environmental permit variation application, the Environment Agency must, before determining the application, consider whether the variation to the planned disposal of radioactive waste is liable to result in radioactive contamination, significant from the point of view of health, of water, soil, or airspace of any of the notifiable countries ("variation transboundary consideration")."

<sup>3</sup> Hinkley Point C Appropriate Assessment for related Environment Agency permissions Revised Final Version: March 2013

<sup>4</sup> COMMISSION OPINION of 30.5.2012 relating to the plan for the disposal of radioactive waste arising from the Interim Storage Facilities for Intermediate-Level Waste and Spent Fuel at the Hinkley Point C nuclear power station site, located in Somerset, United Kingdom, in accordance with Article 37 of the Euratom Treaty

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It then goes onto to say under section 3 (3): *"A variation transboundary consideration is not required where the proposed variation to the planned disposal of radioactive waste envisages unchanged or more restrictive authorised limits and associated requirements than in the existing permit."*

Therefore, any subsequent variation to the RSR permit to remove the wet ISFS requirements would not result in any application to increase limits and therefore will not trigger any requirement under The Transboundary Radioactive Contamination (England) Direction 2020.

### **Planning Permission Relevant to ISFS**

The original DCO for HPC was granted based on a wet ISFS. NNB GenCo (HPC) is in the process of applying to the Secretary of State via an application which will be made to the Planning Inspectorate to make a material change to the DCO including the proposed change to dry storage. This process has completed its initial scoping exercise<sup>5</sup> where the Planning Inspectorate concluded the following points relevant to ISFS.

- Spent fuel and radioactive waste management - "The Scoping Report states that there is no change to the volume of spent fuel held by the ISFS and notes the removal of the vent stack reduces the risk of any potential emissions. On this basis it is considered that additional [Likely Significant Effects] LSE are unlikely, and this matter can be scoped out of further assessment."
- Radiological - "The Inspectorate agrees to scope this aspect out of further assessment as the Proposed Changes are unlikely to increase emissions and would be regulated by the Radioactive Substances Regulation Permit. The Scoping Report also notes that the removal of the flue on the spent fuel storage facility further reduces the likelihood of any emissions."
- The Inspectorate on behalf of the SoS has considered the proposed Change and concludes that the Proposed Change is unlikely to have a significant effect either alone or cumulatively on the environment in a European Economic Area State. In reaching this conclusion the Inspectorate has identified and considered the Proposed Development's likely impacts including consideration of potential pathways and the extent, magnitude, probability, duration, frequency, and reversibility of the impacts. The Inspectorate considers that the likelihood of transboundary effects resulting from the Proposed Change is so low that it does not warrant the issue of a detailed transboundary screening. However, this position will remain under review and will have regard to any new or materially different information coming to light which may alter that decision.

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<sup>5</sup> [EN010102-000088-Scoping Opinion 2017 EIA Regs HPC MC1.pdf \(planninginspectorate.gov.uk\)](#)



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**Conclusion**

NNB GenCo (HPC) has assessed the impact of the change of ISFS technology on its RSR permit and as a result seeks the removal/amendment of specific conditions that are no longer relevant. No changes are sought to the current discharge limits which are considered to remain appropriate for a site using dry ISFS technology.

In its assessment of the change to dry ISFS technology (Appendix 1) the EA concluded "Given that the change from wet to dry ISFS does not lead to an increase in radioactive discharges, we find the change to be acceptable and the dry ISFS option being pursued by NNBHPC to represent BAT. We do not find that the change significantly impacts any of the decisions made in our original permit determination for EPR/ZP3690SY".

NNB GenCo (HPC) requests the Environment Agency make the following variation to the Environmental Permit EPR/ZP3690SY:

- Removal of major outlet A3 from Table S3.1 the permit.
- Removal of Pre-Operational Measure (POM) requesting installation of the HEPA filter in the stack from Table S1.3B of the permit.
- Amendment of IC14 in Table S1.2 to read: "The operator shall provide an assessment of the operational management of the dry ISFS facility to demonstrate the application of Best Available Techniques, to be completed six months before operation of relevant plant."

Yours sincerely,

DocuSigned by:  
[Redacted Signature]

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NNB GenCo Review	Name	Signature
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Independent Verification	N/A	62BC8F9A68714E3...
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Appendices

- Appendix 1: EA RSR Compliance Assessment Report into the change of ISFS technology
- Appendix 2: Application Form A
- Appendix 3: Application Form C3
- Appendix 4: Application Form F