OPTIONS ASSESSMENT REVIEW / REQUIREMENTS FORM

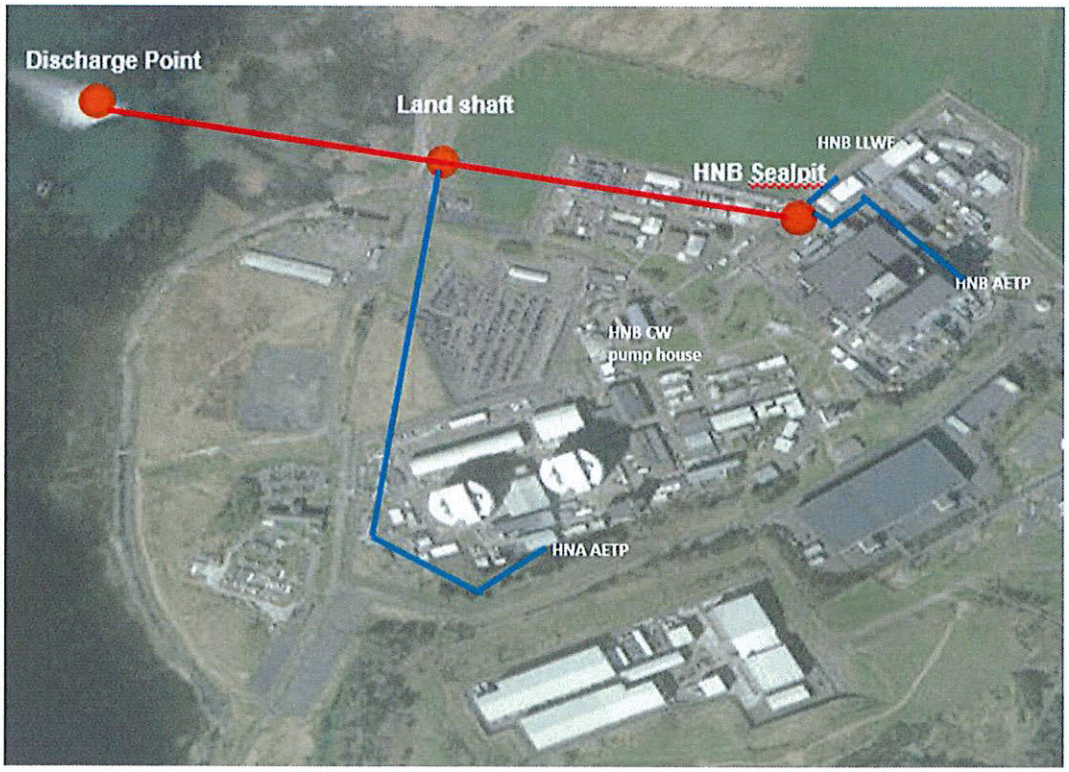
SUMMARY	
Title:	Options Assessment for the Disposal of Aqueous Radioactive Waste
Site(s):	Hunterston A Site
Document reference:	HNA/2860/TC/REP/1578 (Issue 2)
Issue date:	06th June 2024
What is the decision to be made?	What is the Best Practicable Means (BPM) for the disposal of aqueous radioactive waste.
Why is the decision required now?	The current Environmental Authorisations (Scotland) Regulations 2018 (EASR18) permit for Hunterston A Site, EAS/P/1173609 [Ref. 1], requires a minimum volumetric flow of Hunterston B Power Station cooling water of 7 m^3s^{-1} during the disposal of aqueous radioactive waste. Hunterston B Power Station has ceased electricity generation and is currently defueling. Once the station reaches Fuel Free Verification there is no longer a requirement for cooling water.
Is a new study required?	Yes ☐ Is the proposed new study of more than local significance? Yes ☐ No ☐
	No ☒ **What is the Preferred Option?** Installation of an extension to the existing Hunterston A Site discharge line utilising a small bore pipe (of the order of 6 inch diameter) inside the existing culvert from the land shaft to the existing discharge point.
BAT/BPM Summary	As detailed within report HPS/TSSD/SR878 'Best Practicable Means (BPM) Report for Aqueous Discharges to Sea Following Fuel Free Verification' [Ref. 3], when the three credible options identified are compared, the proposed (preferred) option has the (significantly) lowest lifetime cost, lowest lifetime conventional safety risk, second shortest implementation period, second least impact to wildlife and habitats (when compared with continuing discharges with cooling water, i.e. maintaining the status quo) and utilises a proven technology which has been implemented at several other nuclear decommissioning sites within the UK.
ALARP Summary	Operation and maintenance of the plant and equipment necessary to perform a discharge would not alter following implementation of the proposal therefore implementation of the proposal would not result in an increased exposure to ionising radiation when compared with current doses received. Dispersion modelling has determined that the dispersion of aqueous radioactive waste, and subsequent dose to the public, is unchanged when the proposed option is compared with the current discharge methodology, as detailed within report HPS/TSSD/SR878 [Ref. 3]. As can be seen from RIFE 28, 'Radioactivity in Food and the Environment 2022' [Ref. 7], the 'total dose' for the representative person from all pathways and sources of radiation from Hunterston A Site and Hunterston B Power Station combined was less than 0.005 milli Sieverts (mSv) in 2022 or less than 0.5% of the statutory dose limit.
Sustainability Statement	Utilising the existing infrastructure (culvert and discharge point) for the extension to the existing Hunterston A Site discharge line shall minimise the impact to wildlife and habitats. Not purging the discharge line following each discharge of aqueous radioactive waste shall minimise towns water (i.e. resource) use.

Further Work	As detailed within Part C of this assessment.
Review Requirements	Not Applicable. This options assessment is in relation to a short-term project.
Who has been consulted in completing this form?	[redacted] – Environmental Safety Group Head (Hunterston B Power Station)

SEND A COPY OF THE FULLY SIGNED FORM TO ANY OPTIONS ASSESSMENT OVERSIGHT MANAGER.

NEW STUDY NOT REQUIRED: SIGNATURES		
Form Prepared by: Signed: [redacted] Name: [redacted]	Date: 06/06/24	Role: *Head of Radiological Protection & Environment*
Form checked (as correctly and fully completed) by: Signed: [redacted] Name: [redacted]	Date: 06/06/24	Role: *Site Options Assessment Coordinator*[1]
Decision / option agreed as BAT / BPM by: Signed: [redacted] Name: [redacted]	Date: 06/06/24	Role: *Relevant Site Provider of RSL Advice*[1]
Decision / option agreed as ALARP by: Signed: [redacted] Name: [redacted]	Date: 06/06/24	Role: *Relevant Site Provider of Radiological Advice*[1]

[1] For matters of local significance only.

PART A: DETERMINING WHETHER THERE IS A NEED FOR A NEW STUDY		
1.	**Site(s):**	Hunterston A Site
2.	**a. What is the decision to be made?**	What is the Best Practicable Means (BPM) for the disposal of aqueous radioactive waste.
	b. Why is the decision required now?	The current Environmental Authorisations (Scotland) Regulations 2018 (EASR18) permit for Hunterston A Site, EAS/P/1173609 [Ref. 1], requires a minimum volumetric flow of Hunterston B Power Station cooling water of 7 m^3s^{-1} during the disposal of aqueous radioactive waste. Hunterston B Power Station has ceased electricity generation and is currently defueling. Once the station reaches Fuel Free Verification there is no longer a requirement for cooling water.
3.	**Scope:**	This assessment is limited to the disposal of aqueous radioactive waste only. Aqueous radioactive waste at Hunterston A Site originates from two 'streams': 'Active' - Work associated with the draining of the Cartridge Cooling Pond. Although the pond has now been fully drained, there are still a number of areas within the pond building and Active Effluent Treatment Plant (AETP) that require post operational clean out. 'Miscellaneous' - All other effluents that arise on the Hunterston A Site mainly comprising of aqueous waste from showers and sinks within the Radiological Controlled Area. The maximum estimated volume of aqueous radioactive waste discharged in a single year from future arisings is less than 280 m^3 as detailed in section 4.2 of report HNA/2860/PJ/PR/758, issue 2 [Ref. 2]. Information on the volume of aqueous radioactive waste discharged during the previous five years is available within Appendix C of this form for comparison. Aqueous radioactive waste is discharged (pumped) from one of three delay tanks, each with a capacity c. 35 m^3, adjacent to the AETP through a sub-surface pipe to a land shaft, where it drops into the Hunterston B Power Station cooling water culvert by gravity and is forced out to the discharge point by Hunterston B Power Station cooling water. 

		This assessment considers the following conditions specific to the Hunterston A Site permit [Ref. 1]: *2.1 You must ensure that aqueous radioactive waste is only discharged:* *a. When the volumetric flow of Hunterston B nuclear power station cooling water is no less than 7 m^3s^{-1}; and* *c. During the interval commencing one hour after high-tide and ending one hour before low-tide.* The treatment of aqueous radioactive waste in order to minimise the activity and volume of waste generated and also to minimise the total activity that is discharged to the environment is outwith the scope of this assessment.	
4.	**a. Is there an existing relevant options assessment addressing the decision in Box A2a**	Yes ☒	No ☐
	b. Title and reference for existing assessment:	Hunterston B Power Station Technical Safety Support Department Report HPS/TSSD/SR878 'Best Practicable Means (BPM) Report for Aqueous Discharges to Sea Following Fuel Free Verification' [Ref. 3]	
	c. Outcome of existing assessment: DOCUMENT THE REVIEW OF EXISTING ASSESSMENTS IN APPENDIX A.	Installation of an extension to the existing Hunterston A Site discharge line utilising a small bore pipe (of the order of 6 inch diameter) inside the existing culvert from the land shaft to the existing discharge point.	
	d. Is the existing assessment valid and sufficient now to address the decision and scope in Box A2a and Box A3?	Yes ☒ **New study NOT required. Go to Box A8.**	No ☐ **Go to Box A5.**
5.	**Are there existing Company or site procedures which:** • **apply to the decision and scope described in Box A2a and Box A3 above; and** • **ensure that BAT/BPM is applied; and** **ensure that doses and risks are ALARP?** IF YES PROVIDE THE JUSTIFICATION IN APPENDIX B.	Yes ☐ **Title(s) and reference(s) for the existing procedure(s):** **In brief, what are the requirements of existing procedure(s):** **New study NOT required. Go to Box A8.**	No ☐ **Go to Box A6.**

6.	**Is the issue fully covered by existing external best practice or compelling regulatory guidance?** **IF YES PROVIDE THE JUSTIFICATION IN APPENDIX B.**	Yes ☐ **Title(s) and reference(s) for best practice / compelling guidance:** **In brief, what are the requirements of existing best practice or guidance:**	No ☐ **Go to Box A7.**
7.	**Is there only a single option or is there one clearly preferable option?** **IF YES PROVIDE THE JUSTIFICATION IN APPENDIX B.**	Yes ☐ **New study NOT required. Go to Box A8**	No ☐ **New study required. Go to Box A9**
8.	**Tick here to confirm that a NEW STUDY IS NOT REQUIRED UNDER S-391** **COMPLETE PART C.** **COMPLETE FRONT PAGE SUMMARY THEN SIGN-OFF OF THIS FORM.**		☒
9.	**Tick here to confirm that a NEW STUDY IS REQUIRED UNDER S-391.** **COMPLETE PART B.**		☐

PART C – A NEW STUDY IS NOT REQUIRED, IMPLMENTATION OF PROPOSED OPTION			
C1.	**Further work (including further options assessments) required to support the outcome**	Detailed design of the extension to the existing Hunterston A Site discharge line is required. This work is being managed by Hunterston B Power Station personnel with the support of Suitably Qualified and Experienced Personnel (SQEP) from Hunterston A Site.	
C2.	**Implementation requirements**	**High Level Regulatory Requirements**	The current EASR18 permit for Hunterston A Site, reference EAS/P/1173609 [Ref. 1], requires to be varied to remove the requirement for a minimum volumetric flow of Hunterston B Power Station cooling water of 7 m^3s^{-1}. The permit also requires to be varied to remove the requirement to discharge during the interval commencing one hour after high-tide and ending one hour before low-tide.
		Performance Criteria	Not Applicable. Suitable and sufficient testing of the integrity of the extended discharge line is detailed under 'Maintenance Schedule Requirements'.
		Operating Rules / Operating Instructions	Changes are required to the following documents: HNA/SOI/2 'Site Environmental Operating Instruction' HNA/2910/SO/POI/078 'Discharge to Sea from Additional Delay Tank (ADT) 1 or ADT 2' HNA/2910/EO/POI/089 'Discharge to Sea from Replacement Delay Tank (RDT)'
		Sampling, Analysis, and Measurement	Review of the sites Environmental Monitoring Programme, as detailed within report HNA/1200/TC/SR/1180 'Hunterston A Site Environmental Monitoring Programme' [Ref. 4]. This review shall identify whether additional sampling and analysis is required to continue to demonstrate that radioactive discharges have been optimised and the radiological effects minimised.
		Maintenance Schedule Requirements	The relevant site Maintenance Schedule shall be changed to include the pressure testing of the extension to the existing Hunterston A Site discharge line.
		Other Requirements	Not Applicable.
C3.	**Review Requirement (When)**	Not Applicable. This options assessment is in relation to a short-term project.	
C4.	**Review Requirement (Triggers)**	Not Applicable.	

APPENDIX A: REVIEW OF EXISTING OPTIONS ASSESSMENT TO BE COMPLETED IF DIRECTED HERE FROM A4)

Document Title: HPS/TSSD/SR878
Issue No: 1
Issue Date: January 2024
Author(s): George Thomson & Rhonda Dubouchet (Hunterston B Power Station)

Options Assessment and Optimisation

The above document [Ref. 3] identifies three credible options:
Option A – Maintain cooling water discharges
Option B – Thread small bore pipes to existing discharge point without cooling water
Option C – Install new small bore pipes to new discharge point without cooling water

Through the optioneering process described within section 7 of the document, Option B demonstrated to represent Best Practicable Means (BPM). Optimisation of the preferred option, i.e. Option B, is demonstrated within Appendix B of this form.

Extending the Discharge Line

The option to extend the current discharge line was not considered to be a credible option as detailed within section 3.2 of Hunterston B Power Station Technical Safety Support Department Report HPS/TSSD/ES/ENV/DR2735 'Addendum to BPM Report (HPS/TSSD/SR878) for Aqueous Discharges to Sea Following Fuel Free Verification' [Ref.8].

Extending the current discharge line would result in the following detrimental impacts when compared with not extending the line:

- Conventional (i.e. non-radiological) risks to workers associated with construction and commissioning of the extension
- Potential for damage to the existing discharge line with resulting delays to planned decommissioning activities at Hunterston A Site
- Disturbance, and damage, to underwater wildlife and habitats during the installation of the extension
- Cost associated with the design, construction, commissioning, operation, decommissioning and waste management costs of the extension

As detailed within sections 5 and 7 of report ENE-0328A/R1 'Dispersion of Aqueous Effluent from Hunterston Power Stations' [Ref. 5], extending the discharge line would result in a lower radioactivity concentration local to the current discharge point however the radioactivity concentrations in other areas of the Firth of Clyde would remain similar to those present when the discharge line is not extended. As a result, it is unlikely that extending the current discharge line would result in a significant difference to what already is a low dose to members of the public as detailed within section 4.1.4 of RIFE 28 [Ref. 7]. It is also worth noting that the concentrations of radioactivity in the marine environment local to Hunterston A & B Sites, which contribute towards the radiological effects on the environment and members of the public, are predominantly due to aqueous radioactive discharges from Sellafield as also detailed within section 4.1.4 of RIFE 28 [Ref. 7] providing further evidence that it is unlikely that extending the current discharge line for discharges from Hunterston A site would result in a significant difference to what already is a low dose to members of the public.

In summary, the cost and additional risks of extending the current discharge line were demonstrated to be disproportionate to any reduction of the resulting radiological effects on the environment and members of the public hence why the option to extend the current discharge line was not considered to be a credible option.

Purging the Discharge Line

Report ENE-0328A/R1 [Ref. 5], section 2.2, specifies that the discharge line shall be purged with water after the delay tank has been emptied. Section 2 of report ENE-0328A/R2 [Ref. 9] 'Dispersion of Aqueous Effluent from Hunterston Power Stations Annex – Additional Scenarios' clarifies that reference to purging the discharge line was made in order to represent the full content of the delay tanks having been discharged to sea for the purpose of modelling the dilution and dispersion of the radioactivity and that modelling did not consider any dilution that may occur from purging the discharge line after the discharge.

Purging the discharge line from Hunterston A Site with towns-water, which may require the ability to fill the Delay Tanks with towns-water after each discharge, would require modification to the existing facilities and equipment. Purging the discharge line would result in the following detrimental impacts when compared with not purging the line:

- Radiation dose to workers associated with the modification of existing radioactive facilities and equipment
- Conventional (i.e. non-radiological) risks to workers associated with modification of existing facilities and equipment
- Increased volume of aqueous radioactive waste associated with each individual discharge as a result of towns-water passing through radioactive facilities and equipment
- Cost associated with the design, construction, commissioning, operation, decommissioning and waste management costs of the additional equipment
- Increased resource (towns-water) use which impacts sustainability

Should the discharge line not be purged, some of the residual aqueous radioactive waste would remain within the discharge line, when the discharge pumps are stopped, and would be dispersed into the sea due to natural displacement, including tidal ebb and flow. The remaining residual aqueous radioactive waste would be displaced during the start of the following discharge. This does not affect the total activity of the aqueous radioactive waste that is discharged to the environment, nor does it significantly alter the radiological effects of radioactive discharges on the environment and members of the public as report ENE-0328A/R1 [Ref. 5] demonstrates that similar results for the dispersion and dilution at the discharge point in the Firth of Clyde are obtained with or without a tidal window.

In summary, the cost and risks of modifying existing facilities and equipment, the increase in volume of aqueous radioactive waste discharged to the environment and increased resource use required to purge the discharge line are shown to be disproportionate to any potential impacts from residual aqueous radioactive waste remaining within the discharge line when the discharge pumps are stopped. It is therefore demonstrated that purging the discharge line does not demonstrate Best Practicable Means (BPM) and therefore there is no intention to purge the discharge line at Hunterston A Site after each discharge.

Discharge Flow Rate

A calculation sheet HNA/2812/ED/CS/1556 'Check of Discharge to Sea Line Flow with New Pipework Extension Direct to Sea' [Ref. 6] has been produced which demonstrates that a discharge flow rate of c. 15 m^3/h shall be achieved when the extension to the existing Hunterston A Site discharge line, which currently terminates at the land shaft, is constructed and operational. This is comparable to the current discharge flow rate of c. 17 m^3/h. Therefore, there is no requirement to replace the existing discharge pumps at Hunterston A Site. The present discharge pumps shall continue to be used to discharge aqueous radioactive waste through the extended discharge line to the existing discharge point within the Firth of Clyde. This small reduction in flow rate shall have minimal impact on the duration of each discharge, allowing the discharge of a delay tank to continue to take place within an approximate 3 hour period.

As can be seen from Table 1 within report ENE-0328A/R1 [Ref. 5], modelling within this report was based on discharge flow rates greater than those that shall be observed from Hunterston A Site. A new scenario, scenario 6, within report ENE-0328A/R2 [Ref. 9] was modelled to determine the impact of discharge flow rates relevant to Hunterston A Site, in this case 17 m^3/h, on concentration of radionuclides and therefore dose when compared to those in report ENE-0328A/R1 [Ref. 5]. As demonstrated within report ENE-0328A/R2 [Ref. 9] the reduction in flow rate has negligible impact on the 'discharge cycle moving averages' and therefore no dose consequences. The same negligible impact can therefore be determined where there is a reduction of discharge flow rate at Hunterston A Site from c. 17m^3/h to c. 15m^3/h.

Dose Assessment to Swimmer

If the Hunterston B Power Station cooling water system is shut down it may be possible for a member of the public to swim in the vicinity of the discharge point due to less turbulence on the water surface. Section 4.2 of report ENE-0328A/R2 [Ref. 9] models the scenario where a swimmer is in the immediate vicinity of the discharge point, for the period of one hour, when both Hunterston A Site and Hunterston B Power Station discharge aqueous radioactive waste simultaneously and the radioactivity content of both discharges are at the relevant annual discharge limits of both sites permits.

The resulting dose assessment, within the report [Ref. 9], calculated that the swimmer would receive a radiation dose of 198 micro Sieverts (μSv), i.e. 0.198 mSv and the radioactive discharge from Hunterston A Site would contribute 17% of the total dose, i.e. 0.034 mSv. This radiation dose is significantly below the annual public dose limit of 1 mSv stated in the Ionising Radiation Regulations 2017 (IRR17) and below the effective site and single source dose constraints for future discharges of 0.5mSv/year and 0.3mSv/year, respectively, as applied under EASR18.

The dose assessment is extremely pessimistic and the following should be taken into consideration for context:

- There are both engineering and administrative controls in place at Hunterston A Site to prevent the site discharging aqueous radioactive waste at, or approaching, the sites annual radioactivity discharge limits. These controls include the assessment of a representative proportional discharge sample during the pre-discharge decision making and approval process.
- At Hunterston A Site a discharge of aqueous radioactive waste is classed as a single continuous discharge from a single delay tank. On average, the site discharges on six occasions each year. It is not reasonably foreseeable that a situation would arise where only a single delay tank would be discharged in a calendar year as the volume of aqueous radioactive waste generated at Hunterston A Site during a calendar year is greater than the total capacity of all three delay tanks combined.
- As can be seen from Appendix C of this form, the radioactivity content of the Hunterston A Sites annual discharges during 2023 was less than or equal to 0.06% of any annual radioactivity discharge limit within the sites permit [Ref. 1]. Sources of aqueous radioactive waste on site are well known and understood, as detailed within report HNA/2860/PJ/PR/758 issue 2 [Ref. 2]. There is no reasonably foreseeable scenario where the radioactivity content of aqueous radioactive waste shall significantly increase compared to previous years and therefore it is not reasonably foreseeable that future discharges would approach the sites annual radioactivity discharge limits within the sites permit [Ref. 1].
  Based on the above dose assessment, a discharge where the radioactivity content was 0.06% of all of the relevant limits within the Hunterston A Sites permit would result in a dose to a swimmer, in the given scenario, of 0.00002 mSv (i.e. 0.06% of 0.034 mSv), or 0.00002% of the public dose limit stated in IRR17.

Recommendations

The document [Ref. 3] addresses the decision to be made in Box A2a of this form and, together with supporting documents referenced throughout, address the conditions specific to the Hunterston A Site permit [Ref. 1] as detailed in Box A3 of this form.

As summarised within section 5 of report ENE-0328A/R2 [Ref. 9], it has been demonstrated through modeling that the number of discharges, reduction in discharge flow rate, geometry of the Hunterston A Site discharge line, discharge frequency, discharge delay time and duration of the discharge have negligible impact on the 'discharge cycle moving averages' and therefore no dose consequence to members of the public.

The preferred option does not include Hunterston B Power Station cooling water during the discharge of aqueous radioactive waste. As such it is recommended that a permit variation application is submitted to SEPA requesting the removal of the site specific permit requirement 2.1a '*When the volumetric flow of Hunterston B nuclear power station cooling water is no less than 7 m^3s^{-1}*'.

It is also recommended that the same permit variation application requests the removal the site specific permit requirement 2.1c '*During the interval commencing one hour after high-tide and ending one hour before low-tide*'. Report ENE-0328A/R1 [Ref. 5] demonstrates that similar results for the dispersion and dilution at the discharge point in the Firth of Clyde are obtained with or without a tidal window.

There have been no additional options identified since the document [Ref. 3] was produced and all data used in the assessment remains valid.

Is the existing assessment valid and sufficient now to address the decision and scope in Box A2a and Box A3?	
Yes ☒ NEW STUDY IS NOT REQUIRED Complete Summary BAT/BPM Arguments below	No ☐ NEW STUDY MAY BE REQUIRED
Summary BAT/BPM argument	As detailed within report HPS/TSSD/SR878 'Best Practicable Means (BPM) Report for Aqueous Discharges to Sea Following Fuel Free Verification' [Ref. 3], when the three credible options identified are compared, the proposed (preferred) option has the (significantly) lowest lifetime cost, lowest lifetime conventional safety risk, second shortest implementation period, second least impact to wildlife and habitats (when compared with continuing discharges with cooling water, i.e. maintaining the status quo) and utilises a proven technology which has been implemented at several other nuclear decommissioning sites within the UK.
Summary ALARP argument	Operation and maintenance of the plant and equipment necessary to perform a discharge would not alter following implementation of the proposal therefore implementation of the proposal would not result in an increased exposure to ionising radiation when compared with current doses received. Dispersion modelling has determined that the dispersion of aqueous radioactive waste, and subsequent dose to the public, is unchanged when the proposed option is compared with the current discharge methodology, as detailed within report HPS/TSSD/SR878 [Ref. 3]. As can be seen from RIFE 28, 'Radioactivity in Food and the Environment 2022' [Ref. 7], the 'total dose' for the representative person from all pathways and sources of radiation from Hunterston A Site and Hunterston B Power Station combined was less than 0.005 milli Sieverts (mSv) in 2022 or less than 0.5% of the statutory dose limit.

Verified (including for clarity of argument) by:

NAME: [redacted]

POSITION / ROLE: Head of Radiological Protection & Environment

SIGNATURE: [redacted]

DATE: 06/06/24

APPENDIX B: OPTIMISATION SUMMARY FOR THE PREFERRED OPTION

Claim	Demonstration of compliance with EASR Standard Condition A.6.3: *You must ensure that all facilities and equipment necessary to ensure compliance with your authorisation are:* *a. maintained in good repair;* *b. regularly calibrated (where calibration is required);* *c. checked to ensure they are serviceable and effective; and* *d. being correctly used.*
Argument	The only new equipment that shall be introduced to support the variation to the existing Environmental Authorisations (Scotland) Regulations 2018 (EASR18) permit for Hunterston A Site, EAS/P/1173609 [Ref. 1], is an extension to the existing discharge pipework from the land shaft to the existing discharge point as specified within section 6.3 of report HPS/TSSD/SR878. The detailed design of the extension pipework is yet to be conducted as highlighted within Part C.1 of this form. Checks to ensure that the new discharge pipework is serviceable and effective shall be through regular pressure testing of the pipework as stated in Part C.2. of this form. Pressure testing of the pipework shall be included within the sites Environmental Maintenance Schedule during commissioning of the pipework. This shall be managed using the company's modification process as detailed within Management Control Procedure MCP-099 'Unified Arrangements for Regulatory Compliance in Projects'. As stated within Part A.3 of this form 'this assessment is limited to the disposal of aqueous radioactive waste only'. There is no requirement to alter the current arrangements for the inspection, maintenance, operation or calibration of equipment associated with the treatment, sampling and measurement of aqueous radioactive waste as specified within the following documents: Work instruction HNA/2910/SO/WI/3008 which details the testing of the Miscellaneous Cartridge Filtration Plant (MCFP) filters which are used to treat radioactive aqueous waste passing through the abatement plant in order to minimise the activity of the waste. Work instruction HNA/2910/EO/WI/3072 which details the testing of the New Effluent Treatment Plant (NEffTP) filters which are used to treat radioactive aqueous waste passing through the abatement plant in order to minimise the activity of the waste. Work instruction HNA/2911/EM/WI/1141 which details the calibration of the Replacement Delay Tank (RDT) Total Volume Indicator (TVI) which is used to measure the volume of radioactive aqueous waste discharged and to calculate the total radioactivity discharged. Work instruction HNA/2911/EO/WI/1148 which details the pressure testing of the discharge to sea line to confirm that the line is serviceable, effective and in good repair. Work instruction HNA/2912/SO/WI/1572 which details the calibration of the Additional Delay Tanks (ADTs) Total Volume Indicator (TVI) which is used to measure the volume of radioactive aqueous waste discharged and to calculate the total radioactivity discharged. Work instruction HNA/2912/SO/WI/1573 which details the maintenance of the ADTs proportional sampling system to confirm that the system is serviceable, effective and in good repair.

	Work instruction HNA/3810/EH/CWI/029, which includes references to other supporting work instructions, details the manner in which the laboratory measuring instruments are used when measuring the radioactivity content of aqueous discharges together with the associated calculations. Personnel using the measuring instruments are trained in the procedures to ensure that the measuring instruments are being correctly used. Work instruction HNA/3810/EH/CWI/035 which details the checks to confirm that the laboratory measuring instruments are serviceable and effective. The measuring instruments are maintained in good repair by an external contractor under a framework service contract. Work instruction HNA/5200/ED/WI/6224 which details the routine inspection of tanks, vessels, sumps, bunds and pipework to confirm that the equipment is in good repair.
Evidence	• HPS/TSSD/SR878 'Best Practicable Means (BPM) Report for Aqueous Discharges to Sea following Fuel Free Verification' • HNA/2860/TC/REP/1578 'Options Assessment for the Disposal of Aqueous Radioactive Waste' • HNA/2910/SO/WI/3008 'Miscellaneous Cartridge Filtration Plant (MCFP) Performance Analysis' • HNA/2910/EO/WI/3072 'Performance Check of NEffTP' • HNA/2911/EM/WI/1141 'RDT - Calibration Check of Total Volume Indicator (TVI)' • HNA/2911/EO/WI/1148 'Operational Pressure Testing of Effluent Discharge to Sea Pipe Work' • HNA/2912/SO/WI/1572 'ADT - Calibration Check of Total Volume Indicator (TVI)' • HNA/2912/SO/WI/1573 'Inspection and Maintenance of ADT Discharge to Sea Sampler' • HNA/3810/EH/CWI/029 'Final Delay Tank Post Discharge Sample Activity Analysis' • HNA/3810/EH/CWI/035 'Routine Function Checking of Laboratory Counting Equipment' • HNA/5200/ED/WI/6224 'Routine Inspection of Tanks, Vessels, Sumps, Bunds & Pipework'

Claim	Demonstration of compliance with EASR Standard Condition A.7.1: *You must take samples and conduct measurements, tests, surveys, analyses, and calculations as necessary in order to ensure compliance with your authorisation.*
Argument	As stated within Part A.3 of this form 'this assessment is limited to the disposal of aqueous radioactive waste only'. There is no requirement to alter the current arrangements for the sampling, measurement and calculations associated with the disposal of radioactive aqueous waste as specified within the following documents: Work instruction HNA/2910/SO/POI/078 which details the procedure for obtaining a representative, proportional, sample from Additional Delay Tank (ADT) 1 or ADT 2 using the automatic proportional sampling system. Work instruction HNA/2910/SO/POI/089 which details the procedure for obtaining a representative, proportional, sample from the Replacement Delay Tank (RDT) using the automatic proportional sampling system. Work instruction HNA/2910/SO/POI/1052 which details the procedure for obtaining a representative, proportional, sample from the Replacement Delay Tank (RDT) where the automatic proportional sampling system is unavailable.

	Work instruction HNA/3810/EH/CWI/029, which includes references to other supporting work instructions, details the manner in which the laboratory measuring instruments are used when measuring the radioactivity content of aqueous discharges together with the associated calculations.
Evidence	• HNA/2910/SO/POI/078 'Discharge to Sea from Additional Delay Tank (ADT) 1 or ADT 2' • HNA/2910/EO/POI/089 'Discharge to Sea from Replacement Delay Tank (RDT)' • HNA/2910/SO/POI/1052 'Manual Sampling Arrangements During Discharge to Sea from Replacement Delay Tank (RDT)' • HNA/3810/EH/CWI/029 'Final Delay Tank Post Discharge Sample Activity Analysis'

Claim	Demonstration of compliance with EASR Standard Condition A.7.2: *You must use the best practicable means when taking samples or conducting measurements, tests, surveys, and calculations.*
Argument	As stated within Part A.3 of this form 'this assessment is limited to the disposal of aqueous radioactive waste only'. There is no requirement to alter the current arrangements for the sampling, measurement and calculations associated with the disposal of radioactive aqueous waste as specified within the following documents: Company Standard S-037 details the best practicable means for carrying out this requirement. Site interface document HNA/SID S-037 identifies site supporting written procedures.
Evidence	• S-037 'The Assessment of Radioactive Liquid Discharges' • HNA/SID S-037 'Interface with Company Standard S-037: The Assessment of Radioactive Liquid Discharges'

Claim	Demonstration of compliance with EASR Standard Condition B.2.1: *You must use the best practicable means to ensure that no unnecessary radioactive waste is generated.*
Argument	The only new equipment that shall be introduced to support the variation to the sites existing Environmental Authorisations (Scotland) Regulations (EASR) permit is an extension to the existing discharge pipework from the land shaft to the existing discharge point as specified within section 6.3 of report HPS/TSSD/SR878. The detailed design of the extension pipework is yet to be conducted as highlighted within Part C.1 of this form. It is an assumption that the installation of the pipework shall not generate radioactive waste. With regards to the disposal of radioactive aqueous waste, there is no requirement to alter the current arrangements demonstrating the use of best practicable means to ensure that no unnecessary radioactive waste is generated as specified within the following documents: Report HNA/2914/PE/DR/388 for radioactive aqueous waste treated via the Modular Active Effluent Treatment Plant (MAETP) with a periodic review recorded in report HNA/2911/TC/REP/1441.

	Report HNA/1002/TC/SMF/172 for radioactive aqueous waste treated via the Miscellaneous Cartridge Filtration Plant (MCFP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/2900/PJ/PR/1105 for radioactive aqueous waste treated via the New Effluent Treatment Plant (NEffTP).
Evidence	• HNA/2914/PE/DR/388 'Modular Active Effluent Treatment Plant Project Best Practicable Means Statement' • HNA/1002/TC/SMF/172 'Treatment of Miscellaneous Liquid Effluent' • HNA/2911/TC/REP/1441 'BPM Review of Radioactive Liquid Effluent Treatment on Hunterston A Site' • HNA/2900/PJ/PR/1105 'NEffTP - Overall Justification of Best Practicable Means (BPM)'

Claim	Demonstration of compliance with EASR Standard Condition B.2.2: *You must optimise your approach to the management of radioactive waste taking account of all waste streams and disposals expected from current and future operations.*
Argument	As stated within section 7.2 of report HPS/TSSD/SR878 'The public dose from liquid effluent discharges from HNA and HNB is extremely low.' In addition, section 7.2 of the same report also states 'The Dispersion Modelling report was commissioned to assess the dispersion of effluent in the Clyde, which determined that the dispersion of effluent (and subsequent dose to the public) would be unchanged if the discharge line came out at the same point (i.e. the cooling water outfall) and that the tide restriction and flowrate of the effluent made no difference to the dispersion.' As the installation of an extension to the existing discharge pipework from the land shaft to the existing discharge point does not alter the radiological effects of radioactive discharges on the environment and members of the public it can be demonstrated that the installation of the extension to the existing discharge pipework represents best practicable means. Furthermore, as summarised within section 5 of report ENE-0328A/R2 [Ref. 9], it has been demonstrated through modeling that the number of discharges, reduction in discharge flow rate, geometry of the Hunterston A Site discharge line, discharge frequency, discharge delay time and duration of the discharge have negligible impact on the 'discharge cycle moving averages' and therefore no dose consequence to members of the public. With regards to the disposal of radioactive aqueous waste, there is no requirement to alter the current arrangements demonstrating the use of best practicable means to minimise the activity and volume of radioactive waste generated and to minimise the total activity of radioactive waste that is discharged to the environment as specified within the following documents: Report HNA/2914/PE/DR/388 for radioactive aqueous waste treated via the Modular Active Effluent Treatment Plant (MAETP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/1002/TC/SMF/172 for radioactive aqueous waste treated via the Miscellaneous Cartridge Filtration Plant (MCFP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/2900/PJ/PR/1105 for radioactive aqueous waste treated via the New Effluent Treatment Plant (NEffTP).

	The above information demonstrates that the management of radioactive aqueous waste has been optimised.
Evidence	• HPS/TSSD/SR878 'Best Practicable Means (BPM) Report for Aqueous Discharges to Sea following Fuel Free Verification' • ENE-0328A/R2 'Dispersion of Aqueous Effluent from Hunterston Power Stations Annex – Additional Scenarios' • HNA/2914/PE/DR/388 'Modular Active Effluent Treatment Plant Project Best Practicable Means Statement' • HNA/1002/TC/SMF/172 'Treatment of Miscellaneous Liquid Effluent' • HNA/2911/TC/REP/1441 'BPM Review of Radioactive Liquid Effluent Treatment on Hunterston A Site' • HNA/2900/PJ/PR/1105 'NEffTP - Overall Justification of Best Practicable Means (BPM)'

Claim	Demonstration of compliance with EASR Standard Condition B.6.1: *You must only treat radioactive waste where this represents the best practicable means for the management of the waste.*
Argument	As stated within Part A.3 of this form 'this assessment is limited to the disposal of aqueous radioactive waste only'. There is no requirement to alter the current arrangements for the treatment of radioactive aqueous waste as specified within the following documents: Report HNA/2914/PE/DR/388 for radioactive aqueous waste treated via the Modular Active Effluent Treatment Plant (MAETP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/1002/TC/SMF/172 for radioactive aqueous waste treated via the Miscellaneous Cartridge Filtration Plant (MCFP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/2900/PJ/PR/1105 for radioactive aqueous waste treated via the New Effluent Treatment Plant (NEffTP).
Evidence	• HNA/2914/PE/DR/388 'Modular Active Effluent Treatment Plant Project Best Practicable Means Statement' • HNA/1002/TC/SMF/172 'Treatment of Miscellaneous Liquid Effluent' • HNA/2911/TC/REP/1441 'BPM Review of Radioactive Liquid Effluent Treatment on Hunterston A Site' • HNA/2900/PJ/PR/1105 'NEffTP - Overall Justification of Best Practicable Means (BPM)'

Claim	Demonstration of compliance with EASR Standard Condition G.1.4: *You must use the best practicable means to minimise the quantity of radionuclides that are discharged.*
Argument	With regards to the disposal of radioactive aqueous waste, there is no requirement to alter the current arrangements demonstrating the use of best practicable means to minimise the activity and volume of radioactive waste generated and to minimise the total activity of radioactive waste that is discharged to the environment as specified within the following documents:

	Report HNA/2914/PE/DR/388 for radioactive aqueous waste treated via the Modular Active Effluent Treatment Plant (MAETP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/1002/TC/SMF/172 for radioactive aqueous waste treated via the Miscellaneous Cartridge Filtration Plant (MCFP) with a periodic review recorded in report HNA/2911/TC/REP/1441. Report HNA/2900/PJ/PR/1105 for radioactive aqueous waste treated via the New Effluent Treatment Plant (NEffTP).
Evidence	• HNA/2914/PE/DR/388 'Modular Active Effluent Treatment Plant Project Best Practicable Means Statement' • HNA/1002/TC/SMF/172 'Treatment of Miscellaneous Liquid Effluent' • HNA/2911/TC/REP/1441 'BPM Review of Radioactive Liquid Effluent Treatment on Hunterston A Site' • HNA/2900/PJ/PR/1105 'NEffTP - Overall Justification of Best Practicable Means (BPM)'

Claim	Demonstration of compliance with EASR Standard Condition G.1.5: *You must use the best practicable means to dispose of radioactive waste in a manner that minimises public exposure and impact on the environment.*
Argument	As stated within section 7.2 of report HPS/TSSD/SR878 'The public dose from liquid effluent discharges from HNA and HNB is extremely low.' In addition, section 7.2 of the same report also states 'The Dispersion Modelling report was commissioned to assess the dispersion of effluent in the Clyde, which determined that the dispersion of effluent (and subsequent dose to the public) would be unchanged if the discharge line came out at the same point (i.e. the cooling water outfall) and that the tide restriction and flowrate of the effluent made no difference to the dispersion.' As the installation of an extension to the existing discharge pipework from the land shaft to the existing discharge point does not alter the radiological effects of radioactive discharges on the environment and members of the public it can be demonstrated that the installation of the extension to the existing discharge pipework represents best practicable means. Furthermore, as summarised within section 5 of report ENE-0328A/R2 [Ref. 9], it has been demonstrated through modeling that the number of discharges, reduction in discharge flow rate, geometry of the Hunterston A Site discharge line, discharge frequency, discharge delay time and duration of the discharge have negligible impact on the 'discharge cycle moving averages' and therefore no dose consequence to members of the public.
Evidence	• HPS/TSSD/SR878 'Best Practicable Means (BPM) Report for Aqueous Discharges to Sea following Fuel Free Verification' • ENE-0328A/R2 'Dispersion of Aqueous Effluent from Hunterston Power Stations Annex – Additional Scenarios'

Claim	Demonstration of compliance with EASR Standard Condition G.2.1: *You must evaluate the quantity of radionuclides discharged into the environment.*
Argument	As stated within Part A.3 of this form 'this assessment is limited to the disposal of aqueous radioactive waste only'. There is no requirement to alter the current arrangements for the sampling, measurement and calculations associated with the disposal of radioactive aqueous waste as specified within the following documents: Work instruction HNA/2910/SO/POI/078 which details the procedure for obtaining a representative, proportional, sample from Additional Delay Tank (ADT) 1 or ADT 2 using the automatic proportional sampling system. Work instruction HNA/2910/SO/POI/089 which details the procedure for obtaining a representative, proportional, sample from the Replacement Delay Tank (RDT) using the automatic proportional sampling system. Work instruction HNA/2910/SO/POI/1052 which details the procedure for obtaining a representative, proportional, sample from the Replacement Delay Tank (RDT) where the automatic proportional sampling system is unavailable. Work instruction HNA/3810/EH/CWI/029, which includes references to other supporting work instructions, details the manner in which the laboratory measuring instruments are used when measuring the radioactivity content of aqueous discharges together with the associated calculations.
Evidence	• HNA/2910/SO/POI/078 'Discharge to Sea from Additional Delay Tank (ADT) 1 or ADT 2' • HNA/2910/EO/POI/089 'Discharge to Sea from Replacement Delay Tank (RDT)' • HNA/2910/SO/POI/1052 'Manual Sampling Arrangements During Discharge to Sea from Replacement Delay Tank (RDT)' • HNA/3810/EH/CWI/029 'Final Delay Tank Post Discharge Sample Activity Analysis'

Claim	Demonstration of compliance with EASR Standard Condition J.1.1: *You must develop, implement, maintain, and review an environmental monitoring programme to monitor the levels of radioactivity in the environment and food caused by your radioactive waste disposals.*
Argument	The site has developed, implemented and maintains an environmental monitoring programme which is detailed within report HNA/1200/TC/SR/1180. The programme is subject to regular review in accordance with company standard S-045. As stated within Part C.2 of this form a review of the environmental monitoring programme shall be conducted during implementation of the proposal (i.e. prior to / during installation of the pipework). This shall be managed using the company's modification process as detailed within Management Control Procedure MCP-099 'Unified Arrangements for Regulatory Compliance in Projects'.
Evidence	• HNA/1200/TC/SR/1180 'Hunterston A Site Environmental Monitoring Programme' • S-045 'Environmental Monitoring Programme'

APPENDIX C – ANNUAL AQUEOUS RADIOACTIVE WASTE DISCHARGES FROM HUNTERSTON A SITE

Radionuclide	2019 (GBq)	2020 (GBq)	2021 (GBq)	2022 (GBq)	2023 (GBq)	Limit (GBq)	% of Limit 2023
H-3	0.086	0.013	0.010	0.007	0.006	30	0.02
Cs-137	0.119	0.038	0.056	0.048	0.043	160	0.03
Pu-241	0.009	0.001	0.003	0.001	0.000	2	0.00
All Alpha	0.043	0.004	0.003	0.003	0.001	2	0.05
All Non-Alpha (Excluding H-3, Cs-137 & Pu-241)	0.142	0.036	0.054	0.039	0.038	60	0.06
Volume (m^3)	414.9	199.9	262.8	226.6	195.5	N/A	N/A