

For the future of our environment

Letter of Approval covering the disposal of Radioactive Waste from HMNB Clyde

Decision Document

November 2024



Contents

Summa	ary	5
1. Intr	roduction	6
1.1.	Purpose of document	6
1.2.	Radioactive Substances Regulation and MoD	6
1.3.	Background HMNB Clyde and application	7
1.4.	Application process	9
2. Mo	D's existing agreements and proposed changes	11
2.1.	HMNB Clyde - Faslane	11
2.2.	HMNB Clyde - Coulport	17
3. Co	nsideration of relevant policy and legislation	20
3.1.	The principles of radiological protection	20
3.2.	OSPAR and the UK Discharge Strategy	22
3.3.	Transboundary impacts	23
3.4.	Solid radioactive waste policy	23
3.5.	Conservation	24
3.6.	Human Rights	25
3.7.	Duties under the Environment Act 1995 (EA95), the UK withdrawal from the	
Europ	pean Union (Continuity) (Scotland) Act 2021, and sustainable development	26
3.8.	In Control and Fit and Proper Status	28
4. SE	PA's determination	29
4.1.	HMNB Clyde LOA	29
4.2.	HMNB Clyde aqueous liquid waste	29
4.3.	HMNB Clyde general effluent limits	33
4.4.	HMNB Clyde gaseous waste	35
4.5.	HMNB Clyde radioactive waste transfers	37
4.6.	Dose assessment	37
4.7.	Application of SEPA's Standard Conditions	39

4	.8.	HMNB Clyde specific conditions	43
5.	SE	PA's conclusions	45
6.	Fina	al consultations	46
7.	SE	PA's decision	46
Ref	eren	ces	47
Арр	pendi	ix 1 - Existing LOAs	50
F	asla	ne Letter of Agreement 18-06-1993 (RSA-N-1027837)	59
C	Coulp	ort Letter of Agreement 09-06-1994 (RSA-N-1027874)	61
F	asla	ne Letter of Agreement 17-08-1995 (RSA-N-1027543)	64
C	Coulp	ort Letter of Agreement 08-12-2000 (RSA-N-1027872)	66
F	asla	ne Addendum 25-06-2019 (RSA-N-1027543)	73
Арр	pendi	ix 2 – Application	76
F	IMNE	3 Clyde Waste Disposal Application Letter	77
Арр	bendi	ix 3 – Dose assessments	79
1	Sur	nmary	79
1 1	Sur .1.	nmary Dose assessment principles	79 79
1 1 1	Sur .1. .2.	nmary Dose assessment principles Radiological protection criteria (effective dose to humans)	79 79 81
1 1 1 1	Sur .1. .2. .3.	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment	79 79 81 81
1 1 1 1	Sur .1. .2. .3. .4.	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process	79 79 81 81 81
1 1 1 1 1	Sur .1. .2. .3. .4. .5.	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion	79 79 81 81 81 82
1 1 1 1 1 2.	Sur .1. .2. .3. .4. .5. Sur	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion	79 79 81 81 81 82 83
1 1 1 1 1 2. 3.	Sur .1. .2. .3. .4. .5. Sur HM	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion nmary of doses NB Clyde (Faslane) aqueous liquid disposals	 79 79 81 81 82 83 84
1 1 1 1 2. 3. 4.	Sur .1. .2. .3. .4. .5. Sur HM HM	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion nmary of doses NB Clyde (Faslane) aqueous liquid disposals NB Clyde (Faslane) gaseous disposals (NSH)	 79 79 81 81 82 83 84 87
1 1 1 1 2. 3. 4. 5.	Sur .1. .2. .3. .4. .5. Sur HM HM	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment process Nose assessment conclusion nmary of doses NB Clyde (Faslane) aqueous liquid disposals NB Clyde (Faslane) gaseous disposals (NSH) NB Clyde (Coulport) gaseous disposals	 79 79 81 81 82 83 84 87 87
1 1 1 1 1 2. 3. 4. 5. 6.	Sur .1. .2. .3. .4. .5. Sur HM HM HM	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion nmary of doses NB Clyde (Faslane) aqueous liquid disposals NB Clyde (Faslane) gaseous disposals (NSH) NB Clyde (Coulport) gaseous disposals NB Clyde general effluents	 79 79 81 81 82 83 84 87 87 89
1 1 1 1 2. 3. 4. 5. 6. 9.	Sur .1. .2. .3. .4. .5. Sur HM HM HM HM	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion nmary of doses NB Clyde (Faslane) aqueous liquid disposals NB Clyde (Faslane) gaseous disposals (NSH) NB Clyde (Coulport) gaseous disposals NB Clyde general effluents	 79 79 81 81 82 83 84 87 87 89 90
1 1 1 1 1 2. 3. 4. 5. 6. 9. 9.	Sur .1. .2. .3. .4. .5. Sur HM HM HM HM Imp .1.	nmary Dose assessment principles Radiological protection criteria (effective dose to humans) Radiological protection criteria for the environment Dose assessment process Dose assessment conclusion nmary of doses NB Clyde (Faslane) aqueous liquid disposals NB Clyde (Faslane) gaseous disposals (NSH) NB Clyde (Coulport) gaseous disposals NB Clyde general effluents pact on non-human species Background and drivers	 79 79 81 81 82 83 84 87 87 89 90 90

11.	Organically bound tritium93
12.	Appropriate dose coefficient of tritium94
13.	Appendix 3 References95
Appe	ndix 4 – consultation response
1.	Introduction
2.	Stage 1 consultation97
3.	Stage 2 consultation
Co	mmon themes140
4.	Stage 3 Consultation141
5.	Conclusion142
Appe	ndix 5 – proposed conditions143
Sc	hedule 1 – general limitations and conditions143
Sc	hedule 2: limitations and conditions relating to the management of radioactive waste . 146
Sc	hedule 3: further limitation and conditions relating to the transfer of radioactive waste 148
Sc	hedule 4: further conditions relating to the disposal of aqueous and gaseous waste to the
en	vironment
Sc	hedule 5: disposal of radioactive wastes153
Sc	hedule 6: further limitations and conditions relating to environmental monitoring
Inte	erpretation of Terms154

Summary

His Majesty's Naval Base (HMNB) Clyde consists of the Naval Base at Faslane, the Clyde Offsite Centre and the armaments depot at Coulport. Activities at Faslane and Coulport generate small quantities of solid, liquid, and gaseous radioactive waste. The Environmental Authorisations (Scotland) Regulations 2018 (EASR), which seeks to control management of radioactive substances in Scotland, does not apply to the Ministry of Defence (MOD). However, agreements between the Scottish Environment Protection Agency (SEPA) and MoD are in place so that similar processes and controls are applied to radioactive waste at these sites.

The MoD applied to SEPA for an approval to dispose of radioactive waste disposal from HMNB Clyde taking account of:

- 1. A new radioactive waste facility being built at Faslane that will have new dedicated liquid and gaseous release points.
- 2. A review of operational needs.
- 3. Changes to UK radioactive waste management policy.

SEPA accepted the application and have determined it in a manner similar to nuclear civilian sites that are subject to the EASR. The determination process included a public consultation.

In its application, the MoD requested substantial reductions to the existing limits and to adopt current standards that are applied to equivalent civil sites. SEPA determined that accepting the proposed changes would, subject to appropriate limitations and conditions, enhance the standard of protection of the public and the environment and therefore agreed to the changes. SEPA believe that moving to a single approval covering all the radioactive waste management activities across HMNB Clyde subject to the limitations and conditions of the approval will, if adhered to, effectively protect human health, the safety of the food chain and the environment generally.

1. Introduction

1.1. Purpose of document

This document records and explains SEPA's determination of an application received from the MoD for an approval to dispose of radioactive waste from HMNB Clyde. The application was received in May 2019.

This document provides background information relating to radioactive substances regulation as it applies to the MoD, the application process, explanation of the changes requested by the MoD and how SEPA dealt with these requests.

1.2. Radioactive Substances Regulation and MoD

Until 1 September 2018 activities involving the disposal of radioactive waste in Scotland were regulated under the Radioactive Substances Act 1993 (RSA93) (Reference 30). On 1 September 2018, RSA93 was largely replaced by the Environmental Authorisations (Scotland) Regulations 2018 (EASR) (Reference 26) in Scotland both RSA93 and EASR apply to the Crown but do not apply to radioactive substances activities carried at premises occupied on behalf of the Crown for naval, military, air force purposes or for the purposes of the department of the Secretary of State having responsibility for Defence¹.

However, MOD policy states that:

"where there are exemptions or derogations from either domestic or international law applicable to Defence, we introduce standards and management arrangements that produce outcomes that are, so far as reasonable practicable, at least as good as those required by legislation" (Reference 1).

To satisfy this policy with regard to radioactive substances regulation, administrative arrangements are in place between SEPA and the MOD. The framework of these arrangements is detailed in a MoD SEPA Memorandum of Understanding regarding matters Relating to Radioactive Substances (Reference 2). The particulars of the waste disposal arrangements at a site level are covered by Letters of Agreement or Approval (LOA). These LOAs are subject to limitations and conditions which are set to ensure that where the generation of radioactive waste cannot be avoided, it is disposed of in a safe and controlled manner, at appropriate times and in

¹ Section 42 of The Radioactive Substances Act 1993 and regulation 78 of The Environmental Authorisations (Scotland) Regulations 2018

accordance with Government policy. In setting the limitations and conditions of a LOA, SEPA makes the same considerations as are undertaken for applications from civil sites, ensuring that the conditions and limitations attached to the LOA are relevant and equivalent to permits issued under EASR or previously the authorisations issued under RSA93.

The LOAs currently in place at Faslane and Coulport were issued between 1993 and 2000.

The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (Reference 31) specifies that authorisations under EASR are "relevant authorisations" under CAR. This requires SEPA to ensure that EASR authorisations for the disposal of radioactive waste to the water environment are also compliant with the requirements of CAR for non-radioactive discharges to the water environment. As LOAs are an administrative arrangement they are not considered to be "relevant authorisations". Therefore, the CAR requirements are regulated separately and are not considered further in the determination of the application.

1.3. Background HMNB Clyde and application

1.3.1. Background HMNB Clyde

HMNB Clyde comprises of two sites: the Faslane Naval Base (Faslane) including the Clyde Off Site Centre and the Royal Naval Armaments Depot at Coulport (Coulport).

Faslane is located on the north-eastern shore of the Gare Loch. It is the Royal Navy's principal submarine base and exists to support the operation of submarines. It is the home port for the UK's nuclear deterrent and 'A Class' submarines. The Faslane site also includes the off-site centre, which is located at Rhu. Coulport is located on the eastern shore of Loch Long and is responsible for the storage and handling of weapons in support of the submarine programme.

The submarine fleet based at Clyde has undergone change since the extant LOAs were put in place over 25 years ago. At that time, the Vanguard Class submarines were just coming into service as their predecessors, the Resolution Class, were coming to the end of their service. Additionally, the Swiftsure attack submarines and Trafalgar Class submarines are being replaced with the new Astute Class. The current operational classes of submarine generate less radioactive waste than their predecessors because of design changes including the use of different materials.

HMNB Clyde is occupied on behalf of the Crown for naval purposes and therefore EASR regulation 78 applies.



There are long standing arrangements between SEPA and MoD for HMNB Clyde for the management of radioactive waste from both sites. These arrangements reflected the practice of issuing single authorisations for different physical types of waste at that time. The arrangements are detailed in four Letters of Agreement (LOAs) shown in Table 1 and are given in Appendix 1. The LOAs include both limitations and conditions on the disposal of solid, liquid, and gaseous waste.

Site	Scope of Letter	Date of Letter
Faslane	Solid Radioactive Waste	17 August 1995
Faslane ¹	Liquid and Gaseous Radioactive Waste	18 June 1993
Coulport	Solid Radioactive Waste	8 December 2000
Coulport	Gaseous Radioactive Waste	9 June 1995



¹An addendum to this LOA was made in May 2019 allowing the disposal of general effluents.

1.3.2. Disposals specific to Faslane

Operations at Faslane currently generate solid, liquid, and gaseous radioactive waste. Liquid and gaseous radioactive waste are discharged from a facility at the south end of the Base. This facility is being replaced with a new facility, known as the Nuclear Support Hub (NSH), towards the north end of the Base. The new facility has a new discharge point. SEPA considers the movement of a discharge point to be a significant change that required assessment.

Additionally, MoD has taken the opportunity to review its operational needs and has applied for new approvals which include a substantial reduction to the liquid discharge limits, management options for liquid waste not suitable for on-site disposal and the ability to use any appropriately approved route for solid waste disposal.

The Faslane LOAs were made with SEPA's predecessor body, Her Majesty's Industrial Pollution Inspectorate (HMIPI), and are over 25 years old. They have been subject to review and amendment in this time and, although they are still broadly in line with equivalent permits issued to civil nuclear sites, there is a need to update the conditions to reflect more modern standards. The MoD application for a new approval provides a suitable opportunity to make these changes.



The details of the application are further explained in section 2.1 of this document and a link to the application is available in Appendix 2.

1.3.3. Disposals specific to Coulport

Operations at Coulport currently generate solid, liquid, and gaseous waste. The disposal of gaseous and solid waste is currently covered by two LOAs. A small amount of liquid waste has historically been disposed off-site under an exemption. Unlike Faslane, there are no major changes to the arrangements on site for radioactive waste. However, like Faslane, the Coulport LOAs need updating to reflect current practice. The MoD has used this opportunity to review operations at Coulport and applied to update the existing LOAs. The main changes requested for Coulport include a reduction to the gaseous limits and the ability to transfer waste to Faslane for onward management. Due to a change in exemption conditions for liquid waste between RSA93 and the equivalent general binding rules of EASR there is also a need to incorporate a route for liquid waste.

The details of the application are further explained in section 2.2 of this document and a link to the application is available in Appendix 2.

1.4. Application process

The process for determining this application followed SEPA's standard procedure for determining an application made under EASR from the operator of a civilian nuclear site requesting a substantial change. The procedure includes various consultation stages and a determination stage where we consider relevant legislative, policy, guidance requirements and consultation responses before coming to a decision about whether to grant a permit and what conditions and limitations to include. Minor adjustments were made to the procedure to ensure that it was relevant to the application, for example MoD's internal nuclear regulator, Defence Nuclear Safety Regulator (DNSR), was included in the relevant consultation stages.

The process included three stages of consultation. Firstly, the Office for Nuclear Regulation (ONR), Food Standards Scotland (FSS), Scottish Ministers and DNSR were consulted on the application as it was received. This consultation took place in the fourth quarter of 2019. No significant concerns were raised during this consultation.

Stage two engaged with other relevant bodies, organisations, and the public. This stage took place in quarter one of 2020. An unusually high number of consultation responses were received.



SEPA then conducted its determination of the application. The determination considers the proposed changes in relation to relevant legislation, policy, guidance, and consultation responses. The considerations are discussed in detail in sections 3 and 4 of this document. The determination phase was delayed firstly due to an unexpected high number of consultation responses received in stage two, disruptions to work patterns caused by Covid 19 restrictions and then a cyber-attack on SEPA's systems which occurred in December 2020.

SEPA concluded the determination by deciding on the outcome of the application. SEPA's conclusions on the application are detailed in section 5 of this document. Following this there was a final consultation stage with ONR, FSS and DNSR on the draft approval in April 2024 and with Scottish Ministers in October 2024. No significant comments were made, and details are presented in section 6 of this document. SEPA's decision on the application is detailed in section 7 of this document.

The details of the responses received during the consultations are given in Appendix 4.



2. MoD's existing agreements and proposed changes

This section provides details of the current arrangements in place at Faslane and Coulport and the proposals that MoD has made for a new approval for HMNB Clyde.

2.1. HMNB Clyde - Faslane

2.1.1. Existing Letters of Agreement

There are two existing LOAs, both over 25 years old. They reflect the style and wording of authorisations issued to civilian nuclear licensed sites under the Radioactive Substances Act 1993 at the time. They were formally reviewed by SEPA, most recently in 2012, and it was concluded that the LOAs were broadly in line with the requirements placed on equivalent civil sites subject to full regulation but that updates could be made.

Copies of the existing LOAs are provided in Appendix 1 and the details are summarised in Table 2 below.



Date of Letter Scope		Limitations		
17 August 1995	Solid waste	40 m ³ of solid in 12 consecutive months and in any single consignment the concentration of alpha emitting radionuclides shall not exceed 4 giga becquerels per tonne and the concentration of all other radionuclides taken together shall not exceed 12 giga becquerels per tonne. The disposal routes are specified as either Sellafield or what is now the Low-Level Waste Repository.		
18 June 1993 ¹	Liquid and Gaseous Waste	Gaseous is unlimited. Liquid waste is limited to a specific discharge point and annual limits of: Cobalt 60 – 500 Mega Becquerels Tritium - 1 Tera Becquerel Gross Beta Activity - 500 Mega Becquerels Gross Alpha Activity – 200 Mega Becquerels		

Table 2: Details of Extant Letters of Agreement for HMNB Clyde - Faslane

¹An addendum was made in June 2019 to cover the disposal of general effluents.

2.1.2. Proposed changes to liquid discharges

Radioactive effluents arise from the operation of the submarine reactor, contamination or activation of cooling water circuits and associated plant. They are brought ashore and taken to a treatment facility, currently the radioactive effluent discharge facility (REDF), and in future to the NSH. At the REDF/NSH, the effluent is filtered and treated by ion exchange. This removes any particulate material and reduces the radioactivity before it is discharged to the Gare Loch at an identified point. The REDF and NSH are at separate locations in the Base and consequently have different discharge points. MoD has requested a new discharge point in its application for the new location of the NSH. Once the NSH is commissioned and in service, the REDF will be decommissioned.

As discussed in 1.3.1 and 2.1.1 of this document, the limits in the current LOA (dated June 1993) were set for a different fleet of submarines. During the 2012 review of the LOAs, SEPA



requested that MoD carry out a review of the sites limits taking into account operational need and the composition of the liquid effluent. This was completed and reductions to limits have been proposed. These reductions are detailed in Table 3.

Radionuclides	Existing Annual Limit (MBq)	Proposed New Annual Limit (MBq)
Cobalt-60	500	100
Carbon-14	N/A	100
Tritium	1,000,000	500,000
All non-alpha emitting radionuclides taken together excluding tritium, carbon-14 and cobalt-60 (previously as gross beta)	500	100
All alpha emitting radionuclides taken together	200	5

 Table 3: Change in Liquid Discharge Limits – HMNB Clyde Faslane

In proposing these limits, the MoD has considered the potential radionuclide content of the waste and reflected modern practice for the description of groups of radionuclides. This has resulted in the request for a new limit for carbon-14. It was previously considered under the "gross beta activity" limit however as it is present in the effluent in relatively significant quantities it is best practice to limit it separately. The existing LOA has limits for "gross beta activity" and "gross alpha activity" however this does not include radionuclides which decay by other means such as electron capture. For example, iron-55 decays by electron capture and is typically found in the effluent. Therefore, the MoD has proposed the limit for "all non-alpha emitting radionuclides…" to account for these radionuclides.

The MoD requested that any radioactive waste arising onboard UK operational submarines could be brought back to Faslane for processing at NSH to improve operational flexibility. The waste is the same regardless of where the submarine is located.

The existing LOA was amended in June 2019 to allow the disposal of general effluents off-site. General effluents contain relatively high quantities of non-radioactive pollutants and very low quantities of radioactive pollutants. The non-radioactive pollutants make the effluents unsuitable for treatment as radioactive effluents in the on-site facilities.



There are essentially two main sources of general effluents. Some arise from the submarine bilge systems and contain pollutants such as oils, detergents, antifreeze, and marine diesel. Others arise from the submarine slop and sewage systems and may contain detergents, salts, and organic matter. In addition to the more substantial quantities of non-radioactive pollutants, very low concentrations of tritium have been found in these effluents.

The proposed changes to general effluents are presented in Table 4.

Table 4: General Effluents Faslane

	Tritium concentration	Total activity disposed in 12 consecutive months as a sublimit of overall tritium limit	Disposal route
2019 Amendment	1 Bq/ml	10 GBq	Relevant sewer ¹ or the sea
Application	100 Bq/ml	10 GBq	Relevant sewer ¹ or the sea

¹ Where relevant sewer is defined as: (1) a public sewer; or (2) a private sewer which leads to a sewage treatment works that: (a) has the capacity to handle a minimum of 100m³ of sewage per day; and (b) discharges treated sewage only to the sea.

The 2019 amendment also covered the release of ballast and trim water (this is seawater taken in or discharged) from the submarine for the purposes of managing buoyancy and manoeuvrability. Under the current MOU (Reference 2), regulation of ballast and trim water will be carried out by DNSR. Therefore, ballast and trim water is no longer a matter for SEPA and is not included in this LOA.

The application requests a new route for liquid waste. This is particularly for the transfer of chemically contaminated radioactive effluent to a person who is legally entitled to manage the waste. The waste is not suitable for on-site treatment and subsequent discharge to the Gare Loch due to its chemical properties. It is currently stored on site pending a disposal route.

In summary the proposed changes to the liquid discharge arrangements are:

- 1. New discharge point for NSH.
- 2. New limits for carbon-14 and any other non-alpha emitting radionuclides.
- 3. Reduced limits for tritium, cobalt-60, and alpha emitting radionuclides.



- 4. Change in tritium concentration for general effluents.
- 5. Receipt and management of effluents generated by UK submarines whilst berthed at other UK or foreign berths.
- 6. The regulation of trim and ballast water transfer to DNSR
- 7. Offsite disposal route for chemically contaminated effluent.

2.1.3. Proposed changes to gaseous discharges

The LOA dated June 1993 covers both liquid and gaseous waste from Faslane. Gaseous waste is subject to several of the general conditions such as ensuring best practicable means (BPM) is used to reduce the quantities of the waste as well as keeping discharge systems in good repair. However gaseous waste was not subject to any limits or reporting requirements.

The processes at Faslane do not generate large quantities of gaseous waste. Three potential sources are identified in the application:

- The processing of liquids in the REDF/NSH as a result of evaporation whilst the effluent is stored in tanks.
- Activities relating to decontamination or size reduction of solid waste.
- Radiochemical analysis of radioactive effluent.

The first two processes have historically been monitored. No activity above the limits of detection have been found. The third process does actively release gaseous waste through boiling down and preparation of samples for radiochemical analysis. The discharges are made via laboratory fume cupboards. Sample sizes and numbers mean that this discharge is very small both in volume and activity.

The MoD has reviewed these practices and estimated how much gaseous waste could potentially be generated as a result. SEPA had previously informed the MoD that it is appropriate to limit gaseous releases and require routine reporting despite the very low levels. Consequently, MoD proposed the following limits, shown in Table 5.



Table 5: Proposed Annual Gaseous Limits from the NSH
--

Radionuclide	Annual Activity Limit (MBq)
Tritium	200
Carbon-14	1
Noble gases	100

Under the MoD SEPA Memorandum of Understanding (Reference 2) any gaseous waste released from an operational submarine directly is regulated by DNSR. This includes any gaseous releases at the point of transfer between the submarine and the tank used to transfer effluent from the submarine to the onsite treatment facility.

In summary the proposed changes to the gaseous discharge arrangements are:

1. Add limits to the discharges.

2.1.4. Proposed changes to solid waste transfers

Solid waste arises from maintenance and repair work on board the submarine and consists of metallic waste such as valves and pipework and softer waste such as PPE, cloths and rags used to minimise any contamination. This waste is transferred ashore where the activity is assessed. Some items are cleaned and are redeployed back to submarines, but waste is collected and sent off site for disposal. Additional solid waste is generated by onshore operations such as maintenance of the effluent treatment plant including the exchange of ion exchange resins and the replacement of redundant plant. There will be significant volumes of waste generated through the decommissioning of the REDF.

The existing LOA, dated August 1995, required solid waste to be removed to British Nuclear Fuel plc's facilities at Sellafield or Drigg for disposal in accordance with their authorisations. This was standard practice at the time as was the inclusion of volume and activity limits. An annual volume limit of 40 m³ and the standard low level waste activity limits are included in the existing LOA.

Since 1995 there have been many changes to the UK's waste management arrangements and since the late 2000's it has been standard practice for SEPA to issue authorisations to the



nuclear industry which do not require waste to be disposed of to a named facility or to set activity and volume limits on annual disposals. Instead, operators authorised under EASR are permitted to transfer waste to persons who are legally entitled to manage the waste. The MoD has applied to have this standard approach for the disposal of solid waste from HMNB Clyde, Faslane.

In summary the proposed change to the solid waste management arrangements is to:

1. Remove limits and specified disposal routes and replace with SEPA standard approach of allowing waste to be transferred to someone who is legally entitled to manage it.

2.2. HMNB Clyde - Coulport

2.2.1. Existing Letters of Agreement

There are two extant LOAs for Coulport; one covering the discharge of gaseous waste which was issued in 1995 and one for the disposal of solid waste which was issued in 2000. Like the LOAs for Faslane these letters have been identified as requiring change to align them with modern standards.

2.2.2. Proposals for liquid effluents

At present there are no agreements covering the discharge of radioactive liquids from Coulport. Historically liquids from this site have been under terms equivalent to an RSA93 exemption order. The liquid waste can be described as:

- 1. Liquid scintillant waste which was sent off site for incineration.
- General effluents such as those described in section 2.1.2 of this document which are sent off site for treatment in line with non-radiological properties before they are disposed of to sea or relevant sewer.

MoD has applied to allow liquid waste generated at Coulport as a result of submarine operations that would normally take place at Faslane to be collected at Coulport and transported by road to Faslane where they will be treated in the normal way at the NSH. This is to allow operational flexibility and does not represent additional radioactive waste. No limits have been suggested for this transfer as the waste will be transferred to Faslane where it will be discharged via the NSH and will therefore be subject to the limitations imposed for Faslane.

In summary, the proposed change for liquid waste is:



1. To allow liquid waste to be transferred to Faslane for treatment and disposal via the NSH.

2.2.3. Proposals for gaseous discharges

Tritium is discharged in gaseous form from Coulport. The discharges are directly related to the weapons programme and arise due to the highly mobile nature of tritium. Tritium diffuses out of sealed pressure vessels designed for the purposes of storing tritium. The activity discharged is estimated by a combination of direct measurement and calculation using emission factors. There are no significant changes to the operations at Coulport; however, discharges are significantly lower than the current limit. The MoD has reviewed the requirement and proposed a reduced limit.

In summary, the proposed change for gaseous waste is:

1. To reduce the current limit by half.

2.2.4. Proposals for solid waste transfers

The current letter of agreement for solid waste transfers allows for the transfer of desiccant contaminated with tritium to be transferred to Faslane prior to disposal at the UK's low level waste repository.

Desiccant is used to maintain the required levels of humidity in weapon storage and transport containers. Where these containers hold components containing tritium, the highly mobile nature of tritium means that it may encounter the desiccant causing it to become contaminated. The levels of tritium contamination in the desiccant are assessed and the majority are below 100 Bq/g, the level below which is designated as out of scope of EASR. Consequently, the majority of desiccant is appropriately disposed of according to the non-radiological properties of the desiccant rather than as radioactive waste. However, there is still a requirement for an agreed transfer route should the activity be assessed to be greater than 100 Bq/g.

In addition, the MoD also requested that a wider range of solid waste types could be transferred to Faslane to improve operational flexibility. There will be no additional waste generated; it will merely be generated at Coulport rather than Faslane. The intention is to transport the waste by road to Faslane where it will be appropriately assessed before it is ready for onward shipment.

In summary, the proposed change for solid waste is to:



1. Extend the scope of radioactive waste generated at Coulport that can be transferred to Faslane for characterising the activity of the waste and management.

3. Consideration of relevant policy and legislation

As indicated in previous sections (1.2 and 1.4), SEPA's approach to the determination of this application is similar to that for determining applications relating to civilian Nuclear Sites under EASR. SEPA regulates the management of radioactive substances under EASR to protect public health and the environment. This section of the decision document details how SEPA takes account of the legal and policy requirements in making our decision.

3.1. The principles of radiological protection

The regulation of radioactive substances is based on the principles of radiation protection recommended by the International Commission on Radiological Protection (ICRP), and required by the International Atomic Energy Agency (IAEA):

- Justification
- Optimisation
- Dose Limitation

3.1.1. Justification

The UK Government's position is that justification does not apply to defence activities so no further consideration is given.

3.1.2. Optimisation

Optimisation is the principle for ensuring radiation exposures are as low as reasonably achievable (ALARA), taking account of economic and social factors. Optimisation decisions balance exposures to ionising radiation with the other benefits and detriments associated with radioactive substances activities. Optimising radiological protection means exposures should be the lowest that can reasonably be achieved; it does not mean minimising radiation exposure regardless of the consequences of doing so.

The optimisation process, undertaken to identify options which represent BPM, should be proportionate to the magnitude of the risks of the options being compared. It should consider the current state of technical knowledge, social and economic factors, along with other relevant aspects, such as use of natural resources, climate changing emissions and adaptations.



Optimisation is an iterative process that continues throughout the lifetime of the radioactive substances activity. We expect all operators to keep their activities under review to ensure they are continuing to use BPM.

To restrict radiation exposure from the normal operation of a source of radioactivity, or a number of sources at a single location, SEPA must have regard to the dose constraints specified in EASR, Schedule 8, paragraph 27. The dose constraints set maximum doses for optimised exposures from individual authorised radioactive substances activities:

(a) 0.3 millisieverts per year from any source from which radioactive discharges are first made on, or after, 13th May 2000; or

(b) 0.5 millisieverts per year from the discharges from any single site.

In our regulation of radioactive substances activities, we have regard to the threshold of optimisation for radioactive waste disposals, which is a radiation dose of 0.02 mSv per year (Reference 3). Doses below this value are in general considered to be below the level for regulatory concern. For radioactive substances activities which result in radiation doses to members of the public below this value, we will not seek further reduction in dose, providing we are satisfied that BPM is being applied.

SEPA implements the optimisation principle by the application of Best Practicable Means (BPM), as set out in our policy document – "Satisfying the optimisation requirement and the role of best practicable means" (Reference 4). SEPA includes BPM requirements within EASR registrations and permits for radioactive substances activities. These require the use of BPM to minimise the:

- 1. activity and volume of radioactive waste generated.
- 2. total activity of radioactive waste that is discharged to the environment.
- 3. radiological effects of radioactive discharges on the environment and members of the public.

These requirements are captured in the requirements of SEPA's standard conditions (B.1.1, B.2.1, B.2.2, G.1.4 and G.1.5), see Reference 5, for radioactive substances activities. Compliance with these conditions forms an integral part of SEPA's routine regulatory activities

at EASR permitted sites. Including equivalent conditions in an LOA would ensure a similar level of control.

3.1.3. Dose limitation

The principles of justification and optimisation discussed above do not in themselves guarantee protection of all members of the public, and so dose limits are necessary to ensure that no individual is subjected to an unacceptable risk of harm from radiation exposures to all controlled sources.

EASR, Schedule 8, paragraph 26(2) requires SEPA to exercise its relevant functions in relation to radioactive substances activities to ensure that the sum of doses to an individual member of the public does not exceed –

- (a) an effective dose of 1 millisievert in a year;
- (b) an equivalent dose for the lens of the eye of 15 millisieverts in a year;
- (c) an equivalent dose for the skin of 50 millisieverts in a year, averaged over any 1 cm² of skin regardless of the area exposed.

3.2. OSPAR and the UK Discharge Strategy

At the 1998 Ministerial meeting of the Oslo and Paris (OSPAR) Commission, contracting parties to the 1992 Convention for the protection of the Marine Environment of the Northeast Atlantic agreed the OSPAR Strategy for radioactive substances. The objective of this strategy is to prevent the pollution of the maritime area from ionising radiation through progressive and substantial reductions of discharges, emissions, and losses of radioactive substances. Defence sector discharges are not included within the scope of the OSPAR strategy.

The UK's commitment to meet the OSPAR strategy was first published in "UK Strategy for radioactive discharges 2001-2020". In 2008 the Scottish Government published statutory guidance, requiring SEPA to have regard to what is set out in the UK Strategy for Radioactive Discharges (Reference 27) and to statutory guidance on sustainable development (now superseded - see section 3.7). The strategy was updated in 2009, UK Strategy for Radioactive Discharges 2009 (UKSRDS09) (Reference 6). In 2018 UK Government published a review of the 2009 strategy (Reference 7). Despite the exclusion of defence sector discharges from OSPAR the UK Government decided to include them in its 2018 review, which noted that those discharges are relatively low. The 2018 review also recognised there is a balance between the



national security benefits of maintaining defence operational capability and the radioactive discharges that arise from defence operations. The expected outcomes stated in the 2009 strategy and reviewed in 2018 relate to total alpha, total beta and tritium levels. Over the entire UK defence sector liquid discharges remain below forecasts. Forecasts of both liquid and aerial discharges up to 2030 are expected to remain at current levels.

The LOA application proposals are to substantially reduce discharge limits. As with the existing LOAs and any EASR permit issued to an equivalent civil site, conditions will be added to ensure that best practical means are employed to minimise discharges. Consequently, as the discharges are already noted as being low and conditions of a new LOA will further constrain discharges, SEPA considers that the proposed changes do not conflict with the UK discharge strategy.

3.3. Transboundary impacts

In March 2021, the Scottish Ministers issued a direction on SEPA to consider transboundary impacts of radioactive waste disposal, The Transboundary Radioactive Contamination (Scotland) Direction 2021 (Reference 8). The direction does not apply to applications in relation to letters of approval regarding radioactive substances activities carried out at premises occupied on behalf of the Crown for naval purposes. Therefore, transboundary considerations are not applicable.

3.4. Solid radioactive waste policy

As discussed previously solid radioactive waste is generated at HMNB Clyde and therefore it is appropriate to consider relevant Government policy on the management of this type of waste.

3.4.1. Low Level Waste Policy

The policies and practices for the management of low-level waste in the UK have changed since the current LOAs were granted. The UK Government policy "Policy for the Long-Term Management of Solid Low Level Radioactive Waste in the United Kingdom 2007" (Reference 9) recognised the need to move away from a prescriptive approach and it provided a framework allowing individual waste management decisions to be taken to ensure safe, environmentally acceptable, and cost-effective management solutions that appropriately reflected the nature of the waste. In 2010 a further Government Policy document "UK strategy for the Management of Solid Low Level Radioactive Waste from the Nuclear Industry" (Reference 10) reinforced the need for a more flexible approach. This has enabled new waste disposal routes to open and



encouraged the use of best practicable means in the management of Low Level Radioactive Waste (LLW). SEPA supported this move to provide greater flexibility for LLW solutions by allowing authorised persons to transfer their LLW to any persons who are legally entitled to manage it providing it is best practical means to do.

The 2007 policy has since been replaced by the UK policy framework for managing radioactive substances and nuclear decommissioning May 2024 (Reference 3). The 2024 policy retains the earlier policy's aim of ensuring safe, secure, environmentally acceptable, and cost-effective solutions for the management of radioactive waste. The 2024 policy aims to provide flexibility to allow appropriate waste management solutions to be developed on a case-by-case basis and emphasises the need for risk-informed decision-making by those creating and managing radioactive waste, throughout the full waste management lifecycle. Risks to people and the environment should be as low as is reasonably achievable/practicable taking account of social, environmental, and economic factors.

The current LOAs reflect past practice and limit the transfer of LLW to the British Nuclear Fuels Facility at Drigg, now known as the Low Level Waste Repository which is operated by National Waste Services. The application seeks to adopt current standards applied across civil nuclear sites which SEPA considers to be good practice and reflects standards applied across civil nuclear sites.

3.4.2. Higher Activity Waste Policy

Scotland's Higher Activity Radioactive Waste Policy (HAW Policy) was published in 2011, (Reference 11). The HAW Policy provides the framework within which regulators, facility operators, waste producers and owners, and the Nuclear Decommissioning Authority will take decisions on the long-term management of higher activity radioactive waste. The HAW Policy applies to operational and decommissioning waste generated at civil nuclear sites and from non-nuclear industry activities throughout Scotland. It does not apply to MoD waste and therefore is not considered further in the determination of this application.

The application does not request the disposal of higher activity radioactive waste.

3.5. Conservation

SEPA is required to have due regard to a wide range of legislation relating to the protection of habitats and other conservation objectives. Furthermore, the Nature Conservation (Scotland) Act 2004 (NCSA04) (Reference 12) sets out a series of measures which are designed to

conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland. In doing so, the NCSA04 provides the principal legislative components of an integrated system for nature conservation within Scotland.

As a public body under Section 1 of the NCSA04, SEPA is required to further the conservation of biodiversity when exercising its regulatory functions. NCSA04 also introduced tighter controls for the protection of Sites of Special Scientific Interest (SSSI's). These include stronger requirements for SEPA and other regulatory bodies to protect SSSIs through the implementation of regulatory regimes.

There are currently no statutory limits on concentrations of radionuclides in, or radiation doses to, organisms other than human beings. The International Atomic Energy Agency has published guideline dose rates (References 31 & 32), below which it is considered unlikely that there would be any significant effect on populations of other organisms.

These are:

- Terrestrial animal populations at chronic dose rates below 40 µGy/h;
- Terrestrial plant populations at chronic dose rates below 400 µGy/h;
- Populations of freshwater and coastal organisms at chronic dose rates below 400 µGy/h.

SEPA is bound by the Conservation (Natural Habitats, & c.) Regulations 1994 (the Habitats Regulations) and has adopted the ERICA assessment tool (Reference 13) to assess the potential impact of aqueous and gaseous waste disposals to air and water on protected areas.

There are a number of protected areas within the vicinity of HMNB Clyde, the nearest SSSI is the Inner Clyde. SEPA undertook an assessment, using the ERICA tool (Reference 13) on the proposed limits for each site. The assessment concluded that the summation of risk quotients was less than one, indicating high confidence that dose rates to non-human species would be less than the screening dose rate of 10 μ Gy/hr. Details of the assessment are given in Appendix 3. SEPA considered the exposure of non-human species to the discharges to be of negligible radiological concern and therefore had no impact on the decision to grant new LOAs.

3.6. Human Rights

The Scotland Act 1998 (Reference 14) and the Human Rights Act 1998 (HRA98) (Reference 15) incorporate the provisions of the European Convention of Human Rights ("the ECHR") into Scots law. Under the HRA98, SEPA must consider whether its decisions in respect of an



authorisation under EASR will result in any potential or actual breach of a Convention Right. If SEPA does identify such a breach it must then consider whether it has the discretion to act otherwise, as its primary obligation must be to fulfil its statutory duty. Where SEPA does have discretion and the Convention right at issue is not absolute, it must then consider whether its decision is justified. SEPA considers that its regulatory process is consistent with our duties under HRA98.

SEPA has not identified any issue regarding human rights in respect to the proposed updated LOAs.

3.7. Duties under the Environment Act 1995 (EA95), the UK withdrawal from the European Union (Continuity) (Scotland) Act 2021, and sustainable development

SEPA was established through the provisions of the Environment Act 1995 (EA95) (Reference 16) and it is through that Act that SEPA is given many of its powers and duties. EA95 has subsequently been amended by the Regulatory Reform (Scotland) Act 2014 (RRSA) (Reference 17). Section 51 of the RRSA amends the general purpose of SEPA by inserting section 20A into the EA95. Section 20A states:

(1) "SEPA is to carry out the functions conferred on it by, or under this Act or any other enactment for the purpose of protecting and improving the environment (including managing natural resources in a sustainable way).

(2) In carrying out its functions for that purpose SEPA must, except to the extent that it would be inconsistent with subsection (1) to do so, contribute to

- a. Improving the health and well-being of people in Scotland, and
- b. Achieving sustainable economic growth."

Section 31 of EA95 requires SEPA to have regard to any guidance the Secretary of State may give with regards to aims and objectives he considers it appropriate for SEPA to pursue in performing its function towards its general purpose and attaining the objective of achieving sustainable development. In accordance with Section 31, the Scottish Government published its Statutory Guidance in March 2015 (Reference 18). This guidance stresses that SEPA's primary role is to protect and improve the environment as Scotland's principal environmental regulator, while contributing to sustainable development, the goal of which is to enable all people



throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. One of SEPA's main contributions to sustainable development will be in working with others to help those in Scotland understand how economic and social benefits can be maximised without undermining natural capital and ecosystems services.

Furthermore, since January 2011, the Public Bodies Duties in Section 44 of the Climate Change (Scotland) Act 2009 (Reference 19) have required SEPA, when exercising its functions, to act in the way that it considers is most sustainable. The guidance to support public bodies in exercising their duties under this Act clarifies that acting sustainably requires public bodies to take account of sustainable development and routinely balance a number of economic, social and environmental impacts when making and implementing decisions.

The UK Withdrawal from the European Union (Continuity) (Scotland) Act 2021 ("the Continuity Act") (Reference 28) places a duty on Scottish Ministers and public authorities to have due regard to five guiding principles on the environment:

- the principle of integration,
- the precautionary principle,
- the preventative principle,
- the rectification at source principle and
- the polluter pays principle.

The Continuity Act aim is to ensure that consideration of protection and improvement of our environment is embedded in decision making across different policies and sectors, to keep Scotland aligned with the environmental principles that guide policy development in the EU, and to contribute to sustainable development. Under section 17 of the Continuity Act, statutory guidance "Scotland's Guiding Principles on the Environment": (Reference 29) was published, to promote a common understanding and interpretation of the guiding principles and how they should be considered and applied when developing future policy and legislation.

SEPA considers that its strategies and regulatory processes, including the process for determination of LOA applications, are consistent with the goal of sustainable development and SEPA's duties under EA95, and the Continuity Act.



3.8. In Control and Fit and Proper Status

EASR requires SEPA when determining an application to be satisfied that the authorised person: a) is the person who will have control over the regulated activities; b) is a fit and proper person to be in control of the regulated activities. SEPA has published the following EASR guidance: Guidance on who can hold an authorisation: 'In Control' and 'Fit and Proper Person tests', version 2 (Reference 20). This guidance provides the overarching framework for decision making on 'in control' and 'fit and proper person'.

As discussed in section 1.2 of this document, the radioactive substances activities at HMNB Clyde are carried on by the MOD. The MOD is a department of UK Government and SEPA is satisfied that the MoD remains in control of the management of radioactive waste activities. Additionally, as a fit and proper person we expect the MOD to appoint Radioactive Waste Advisers (RWAs), which they have done.

4. SEPA's determination

SEPA's determination of the application has considered all aspects of the application, relevant legislation, policy and guidance and the responses from the consultation exercise. The following sections document SEPA's rationale for determining the technical aspects of the application including the necessity of conditions and limitations to protect public health and the environment.

4.1. HMNB Clyde LOA

4.1.1. Single or multiple LOAs

There are currently four LOAs for HMNB Clyde. These were split on media (solid, liquid, gas) and site. Whilst this was a common approach at the time of issue, SEPA has since adopted a multimedia approach to civil nuclear permits. This recognises the commonality of many of conditions such as those relating to resources, record keeping, provision of information and BPM. Having combined media certificates ensures a more holistic approach and avoids any confusion caused by duplication of conditions. Consequently, it is intended to adopt a multimedia approach to the HMNB Clyde LOAs.

Additionally, as the two sites operate as a single base under the control of the Naval Base Commander, Clyde, SEPA considers that consistency and clarity can be further improved by agreeing a single LOA.

In developing a single LOA SEPA has considered the individual wastes streams at HMNB Clyde and these considerations are detailed in the following sections.

4.2. HMNB Clyde aqueous liquid waste

Aqueous liquid waste is generated by and removed from the submarines to the REDF facility at Faslane for processing and disposal to the Gareloch. The REDF facility will be replaced by the NSH. There may be a short period of dual operation for these facilities whilst the NSH becomes fully operational. This will not mean the generation or disposal of additional aqueous liquid waste.

4.2.1. The correct radionuclides are limited

To control radioactive disposal to the environment SEPA places limits on radionuclides or groups of radionuclides for a number of reasons including:



- a) They represent a major component of the discharge.
- b) They are a significant contributor to dose.
- c) They are an indicator of plant performance.

In its application the MoD provided analysis of the typical radioactive effluents (Table 4 of the application document follow link in Appendix 2). This showed that tritium and carbon-14 are the first and second most abundant radionuclides in the effluent and therefore it is appropriate for SEPA to place limits on these radionuclides. Cobalt-60 is the third most abundant radionuclide and has historically been limited as it can be a significant contributor to dose. The analysis highlighted the presence of radionuclides which do not fit into the existing radionuclide groupings: nickel-63 and iron-55. These radionuclides decay by electron capture and are the fourth and fifth most abundant in the effluent. These radionuclides will be accounted for under the new grouping "non-alpha emitting radionuclides". Section 5.6.5 of the application (follow link to application document in Appendix 2) discusses assessment of the non-alpha grouping such that iron-55 and nickel-63 are measured and reported against this limit. Alpha emitting radionuclides are expected to be minimal. Any alpha radionuclides that are present would be expected to be associated with particulate material and therefore would be filtered out in the treatment plant. SEPA has included an alpha limit despite expected levels being very low as it demonstrates that the plant is operating effectively.

SEPA is content that the radionuclides and groupings of radionuclides proposed are appropriate for this effluent.

4.2.2. Setting limits

Once the appropriate radionuclide groupings are established SEPA will set a limit on the amount of radioactivity that can be discharged. The limit must balance operational need with protection of the environment and the public.

Past discharges can be used as an indicator of operational need. SEPA reviewed discharges between 2010 and 2022 in comparison to the proposed limits considering both maximum discharges and average discharges. This is represented in Table 6 below. As can be seen from the table the proposed limits are significantly higher than discharges over this time.



Table 6: Aqueou	s Liquid Effluent	Limits
-----------------	-------------------	--------

Radionuclide(s)	Current Annual Limits (MBq)	MoD Proposed Annual Limits (MBq)	MoD estimated Max (MBq)	Max Annual Discharge 2010-2022 (MBq)	Average Annual Discharge 2010-2022 (MBq)
Tritium	1,000,000	500,000	175,000	61,800	15,934
Carbon-14	-	100	51.5	-	-
Cobalt-60	500	100	23.4	1.25	0.43
Gross Alpha ¹	200	5	0.3	0.14	0.07
Gross Beta ²	500	100	45.3	2.14	0.96

¹ It is proposed gross alpha will become all alpha emitting radionuclides.

² It is proposed gross beta will become all other non-alpha emitting radionuclides.

In addition to past discharges operators must also consider future needs. It is standard practice for operators to consider what the highest foreseeable limit might be. This means that all operations that could generate significant amounts of radioactive waste are considered even if the likelihood or frequency of such operations are very low. The MoD has adopted this approach and considered all operations and waste arisings in proposing limits. Additionally, the proposed limits take account of changes to the submarine fleet in coming years. As expected with this approach, the limits proposed by the MoD are higher than historical discharges. However, the proposed limits are substantially lower than the existing levels, see table 6 above.

Under Schedule 8, paragraph 21 of EASR, SEPA must set limits following consideration of:

- 1. The results of any optimisation of radiation protection.
- 2. Good practice in the operation of similar facilities; and
- Where appropriate the results of a generic screening assessment based on internationally recognised scientific guidance to demonstrate that environmental criteria for long term human health are met.



To be consistent with the standards applied to equivalent civil nuclear sites SEPA has considered these requirements in relation to limit setting for HMNB Clyde. In relation to the aqueous liquid discharges and points one and two above, SEPA has reviewed the new arrangements for the NSH and the application of BPM, these are discussed further in section 4.2.3 of this document.

As discussed in section 4.6 of this document SEPA has assessed the dose at the proposed discharge limits using internationally recognised standards and concluded that they are insignificant. Therefore, SEPA is content that the proposed discharge limits will not pose a realistic risk to human health and the environment.

Additionally, SEPA does not set limits as targets. There are further conditions within EASR permits, LOAs and previously RSA93 authorisations that require the application of BPM to minimise discharges. Therefore, the expectation is that discharges will be kept low and will routinely be substantially below the limits.

Concerns were raised during the second stage of consultation, see Appendix 4, regarding the proposed limits. Some consultees compared the proposed limits to actual discharges made in recent years and concluded that this meant there would be a rise in discharges. As explained above the method of setting limits took a standard approach of considering the worst case for potential discharges so although discharges could increase for operational reasons it is not expected to be the case.

In response to the number of responses obtained during consultation and recognising the level of concern raised and the difference between the proposed limits and actual discharges, SEPA has included a notification level for cobalt-60. A limit of 2 MBq was set which closer reflects actual discharges. Should the level be exceeded the MoD is required to review that the appropriate BPM arrangements are in place and being implemented. This is an additional control and is intended to provide reassurance to the public that discharges are low and continue to be subject to scrutiny by SEPA.

SEPA is satisfied that the MoD has reviewed the limits for aqueous liquid radioactive discharge at HMNB Clyde. The levels proposed represent substantial reductions to the existing limits and pose no realistic risk to the environment or the public. Therefore, SEPA is content with the limits proposed and will set these in the LOA granted.



4.2.3. Optimisation and discharge

The MoD is building a new effluent treatment facility, the NSH. The facility began an extensive commissioning programme in 2023 and is expected to become operational in 2025. The facility has been designed to modern standards and the MoD has carried out a BPM assessment to support the treatment options provided. Treatment will consist of filtration and ion exchange. Filtration will ensure that any alpha activity is removed as it is most likely to be associated with particulate material. Ion exchange will substantially reduce the presence of other radionuclides, notably cobalt-60 and carbon-14. Results of analysis carried out by the MoD on pre and post treatment effluent showed reductions for these radionuclides in the order of a factor of 10. Tritium cannot be efficiently removed from the effluent.

The discharge point is to the Gareloch from the NSH. The discharge pipe will be located 1m above the loch bed and below the lowest astronomical tide level. This reduces the risk of the end of the pipe being silted up and ensures optimal dispersion. The pipe is to be fitted with a "duck bill" style non return valve to prevent return flow when not in use and reduce the risk of fouling.

SEPA is satisfied that BPM has been considered and will continue to be considered with regards the discharge of aqueous liquid radioactive waste. SEPA's standard conditions include a number that require the implementation of BPM. These conditions will be replicated in the LOA granted.

4.3. HMNB Clyde general effluent limits

General effluents are generated on submarines. They are not directly associated with radioactive plant and contain significant quantities of oils, greases, detergents, and biological matter. They also contain very low levels of tritium. They are generated in large volumes and can be removed from submarines at both Coulport or Faslane. These effluents are disposed of to the water environment following treatment for the non-radioactive properties. It is not possible to remove or treat the tritium from the effluents therefore approval is required.

4.3.1. The correct radionuclides are limited

As discussed in 2.1.2, these effluents contain small amounts of tritium which is not unexpected given the highly mobile nature of tritium. Therefore, a tritium limit is applicable.



4.3.2. Setting limits

The current LOA for liquid waste at Faslane was amended to include a total activity limit on the discharge of general effluents of 10 GBq with an additional concentration limit of 1 Bq/ml. These limits replicated the values in the 2011 exemption order (Reference 21) associated with RSA93. This allowed the activity to be brought under the control of the agreement.

The concentrations seen at Faslane have all been lower than the 1 Bq/ml level. However, there have been a few occasions where higher concentrations have been found in similar effluents that have been generated at other defence sites, and the MoD has suggested an increase to the concentration with regard to this application. No increase has been requested to the overall total activity as higher concentrations are expected to be an exception to the rule.

General Effluents arising at Coulport have historically been disposed of under terms similar to those in RSA 93 exemption orders due to the much lower volumes at this site. To date, because there was no agreement in place at Coulport regarding liquid waste disposal, the waste has been disposed of in line with the 2011 Exemption Orders (Reference 21) and the previous MOD SEPA agreement (SEPA MoD Agreement on matters relating to radioactive substances, 2017) (Reference 22). This allowed for the disposal of high volumes with low concentrations of radionuclides. In 2018, RSA93 and its associated exemption orders were replaced in Scotland by EASR. Although many of the 2011 exemptions were carried forward into GBRs, the high-volume low concentration exemption was not and therefore it is appropriate to include this disposal in the new LOA.

Tables 7 and 8 summarise the disposals of general effluents between 2019-2022 from HMNB Clyde.

Year	Total Volume Discharge (m³)	Total Tritium Activity (MBq)
2019	7771	1400
2020	10277	1340
2021	10838	2170
2022	8754	2540

Table 7: General Effluents Discharged from Faslane



Year	Total Volume Discharge (m³)	Total Tritium Activity (MBq)
2019	727	131
2020	431	60
2021	166	33
2022	342	99

Table 8: General Effluents Discharged from Coulport

The average annual volume discharged across HMNB Clyde is approximately 9,000 m³, and the total activity discharged in this effluent is significantly lower than the upper limit of 10 GBq currently in the liquid LOA for Faslane. Past disposals may not fully reflect future disposals however SEPA considers that the current annual limit in the Faslane liquid LOA is adequate for the general effluent waste generated at HMNB Clyde.

By its nature this waste has a very low radioactive concentration. It is not SEPA standard practice to place concentration limits on effluent discharges. SEPA's assessment of the dose to the environment and the public is based on total activity, and it shows that the doses are insignificant even using conservative parameters, see section 4.6 and Appendix 3 in this document. Therefore, SEPA sees no reason to include a specific concentration limit in addition to an annual total limit.

4.3.3. Optimisation and discharge

There are several options for the discharge of these general effluents. The general effluent can be taken to a public sewer, dealt with by the on-site sewage treatment works or piped to the nearby oil fuel depot. These routes are appropriate for the treatment of the non-radioactive pollutants in the general effluents and allow them to be safely discharged to the water environment.

4.4. HMNB Clyde gaseous waste

Sources of gaseous waste at HMNB Clyde are from operations in the effluent processing facilities, radiochemistry labs, and from sealed pressure vessels that are designed for storing tritium.



4.4.1. Radionuclides and limits

The existing LOA for Faslane allows gaseous discharges, it requires that BPM be applied to the discharges, but it does not place any numerical limits on the discharges. SEPA previously asked MoD to review the gaseous discharges and propose limits. This work was done and is summarised in the application.

The most abundant radionuclide is tritium, and as discussed in section 4.2.1 of this document, it is appropriate to place a limit on this radionuclide. The application suggests other radionuclides in gaseous waste could be carbon-14 and potentially noble gases. Other radionuclides were identified as being present are very low in abundance. Therefore, SEPA has put a single limit for radionuclides other than tritium.

The amount of gaseous waste generated at the REDF and the NSH is minimal as there are few processes where gaseous waste is actively generated. Those that do generate gaseous waste are small scale laboratory practices. Consequently, the limits proposed for tritium and all other radionuclides are very low at 200MBq, 100 MBq respectively. It is expected that the decommissioning of the existing facilities (REDF and APF) can be accommodated under these proposed limits.

Tritium is the only radionuclide that is released in gaseous form as a result of operations at Coulport. Therefore, it is the only radionuclide which requires a numerical limit. The MoD reviewed the current annual limit of 50 GBq and proposed a new annual limit of 25 GBq. The actual annual discharges over the last 10 years are typically 3.5 GBq per year with a maximum of 7 GBq in this period. Examination of these figures alone suggests that there is scope for further reduction in the limit; however, the MOD has stated that it wishes to keep sufficient headroom to deal with any urgent operational requirements. There is no indication that the MOD plan to make significant changes to the operations at Coulport. Therefore, it is expected that discharges will remain at similar level to recent years. In addition to the numerical limit, BPM conditions will apply to ensure that discharges are optimised. SEPA is of the view that the proposed limit of 25 GBq for operations at Coulport represents a significant reduction to the existing limit and that the public and environment will be protected by imposing this limit.

SEPA is content that limits proposed for HMNB Clyde will not pose a realistic risk to human health or the environment.


4.4.2. Optimisation and discharge

The existing plant areas for these activities in the REDF and APF are vented, and emissions are directed through HEPA filtration. The NSH has ventilation and HEPA filtration systems, and all discharges will be routed to a dedicated stack. Such arrangements are typical for discharges of this nature in civilian nuclear sites.

4.5. HMNB Clyde radioactive waste transfers

In its application the MoD identified various types of radioactive wastes which would be suitable for transfer from HMNB Clyde for offsite management. This includes chemically contaminated liquid wastes not suitable for disposal to the water environment, solid wastes, liquid scintillation waste, and desiccant waste.

As discussed in 2.1.4 of this document, the MOD have requested to adopt SEPA's standard approach for transferring waste to another person who is legally entitled to manage. The background to this approach is discussed in section 3.4.1 of this document and SEPA is satisfied that adopting a similar approach will allow the appropriate management of this waste.

The application seeks to extend the scope of internal transfers from Coulport to Faslane for waste characterisation and onward transfer. SEPA considers that this represents best practice as it will allow the waste to be properly characterised. A number of second stage consultation respondents were concerned about the safe transport of radioactive waste. The regulation of transport is not within SEPA's regulatory control and therefore is not considered further. It is for the MoD to ensure compliance with the relevant transport regulations.

4.6. Dose assessment

Dose assessments are carried out in two ways: prospectively to estimate the radiation dose that will be received by those who are likely to receive the highest radiation dose and retrospectively to determine the actual dose that was received.

4.6.1. Prospective dose assessment

When SEPA determines an EASR permit application for disposals of liquid or gaseous radioactive waste from a site to the environment, SEPA sets limits on the disposals to ensure that the radiation doses to individual members of the public, who are representative of those most exposed, do not exceed the dose constraints. As part the permit determination process,



SEPA undertakes prospective dose assessments for disposals at the proposed limits to determine the impact on members of the public, during the period of authorisation.

SEPA assesses doses to members of the public who are representative of those most exposed to radiation in the vicinity of the discharging site. Some members of the public close to nuclear installations may receive higher doses than other members of the population. This can arise due to their higher-than-average consumption of certain local sourced foodstuffs, frequenting certain areas or living in close proximity to the site. SEPA establishes these habits by carrying out surveys (Reference 23). By ensuring that those who are likely to be most exposed do not receive unacceptable radiation doses as a result of disposals, the wider public is also protected.

SEPA carried out a prospective assessment of radiation dose to the public assuming discharges were made at the proposed limits. Assessments were carried out for liquid and gaseous disposals from both sites and therefore covered all routes to the local environment. The assessments used conservative parameters and therefore can be expected to give higher doses than actual doses. Details of the assessments are given in Appendix 3.

All doses calculated are very low and even using conservative parameters were significantly less than 1 microsievert per year and therefore orders of magnitude below the dose constraint of 300 microsieverts per year and the threshold for optimisation of 20 microsieverts per year.

An issue was raised during the consultation regarding the relative biological effectiveness (RBE) of tritium suggesting that it should be 20 times higher than that recommended by the International Atomic Energy Agency and the European Commission and used as standard. To explore this, SEPA did further testing of the models used to assess dose from tritium and concluded that effects of increasing the RBE by 20 times had little impact on the calculated dose, as detailed in Appendix 3. Similarly, issues were raised regarding organically bound tritium (OBT) and again further testing of the model showed that there was a negligible impact, and all doses remained less than 1 microsievert per year (Appendix 3).

4.6.2. Retrospective dose assessment

In conjunction with Food Standards Scotland, SEPA undertakes an annual environmental monitoring programme which involves collecting data on levels of radioactivity in food and the environment in Scotland. The results of the monitoring programme are used, along with information on public habits, to undertake dose assessments to demonstrate that the public's

exposure to radiation does not exceed the statutory does limit. This information is published annually in the Radioactivity in Food and the Environment" (RIFE) report (Reference 24).

The results from the analysis of local samples and information about local habits are combined to estimated radiation doses. The latest published results are those for 2022, (Reference 24). The total dose for all pathways and sources of radiation was estimated to be 0.007mSv which is less than 1% of the dose limit.

SEPA's findings are consistent with those demonstrated by the MoD in their application and with those of Food Standards Scotland whose response to the first stage of consultation included their own dose assessment which concluded:

"we do not believe that the applied for limits of radioactive discharges represent a significant risk to human health via the food chain".

4.6.3. Conclusions for dose assessments

SEPA has assessed the disposals to the environment at the annual limits. The calculated doses are significantly below the dose limits, dose constraints and the threshold for optimisation dose. These calculations are supported by the results from SEPA's environmental monitoring programme local to the HMNB Clyde and the subsequent assessment carried out using these results. Therefore, SEPA concludes that the radiation dose from the proposed discharges does not pose a realistic risk to human health or the environment.

4.7. Application of SEPA's Standard Conditions

Under EASR, SEPA has developed a series of Standard Conditions for radioactive substances activities, (Reference 5), in consultation with relevant stakeholders. Typically, SEPA refers out to these conditions in EASR permits and registrations rather than incorporating them directly into the authorisation itself. To ensure that the MoD is subject to similar standards, SEPA considers that it would be appropriate to use, as far as is reasonably applicable, the same suite of standard conditions. However, as an LOA is an administrative arrangement rather than an EASR authorisation, it is appropriate to incorporate these conditions directly into the LOA. This will allow for minor amendments necessary to reflect the MoD's position and activities. Similar to EASR permits, it is appropriate to include bespoke conditions that are particular to the HMNB Clyde.

The following minor amendments are applicable across all conditions:



- References to "Authorisation" are replaced with "Approval".
- Requirements contained in schedules are included as part of the condition where appropriate.
- Conditions that do not apply to the activities at HMNB Clyde are not included. For example, those that relate to radioactive material held on a site as this not within SEPA's remit for the site.

The proposed conditions for the approval are presented in Appendix 5.

4.7.1. Standard Conditions section A

SEPA's Standard Condition Section A applies to all radioactive substances activities, whether in permit or registration and covers general requirements such as management arrangements, written procedures, record keeping and training. SEPA is minded to include these conditions in an LOA with the following minor amendments:

- A requirement for adequate resources rather than more specifically financial and human resources. It was considered that the generality of resources would be appropriate as it includes all relevant resources.
- The requirement to notify SEPA prior to the cessation of radioactive waste management activities at HMNB Clyde is retained; however, a timescale has not been specified as it would be expected that this notification would be made as soon as was possible.
- The information and data returns are specified in the relevant conditions rather than separate schedules. Where necessary, additional time has been allowed to provide the information to SEPA. This has been agreed in conjunction with HMNB Clyde.

SEPA considers that these conditions, including the minor amendments, will ensure that the MoD meet the same standards as expected by authorised persons carrying out radioactive substances activities under EASR with regards general conditions.

In addition to the information supplied in the application, SEPA is familiar with the managerial arrangements, record keeping, training and facilities at HMNB Clyde through interactions under the existing LOAs. SEPA is confident that the MoD could comply with the conditions proposed.



4.7.2. Standard Condition section B

As discussed in section 3.1.2 of this document, it is internationally recognised that there is a need to optimise radioactive substances activities thus ensuring the optimal level of protection of the environment and public. For civil nuclear operators, SEPA achieves this through application of Standard Conditions in Section B, (Reference 5). Authorised persons are required to implement BPM to ensure no unnecessary waste is generated and to optimise the approach to waste management. Additionally, there are requirements to ensure the safe management of radioactive substances These conditions are relevant to the MoD activities at HMNB Clyde and SEPA would seek to include them in a LOA. A number of minor amendments are necessary, and these are summarised below.

- The application requests the receipt of waste from UK submarines that may be on operations away from HMNB Clyde and small amounts of radioactive waste may be generated by other MOD units based at HMNB Clyde. Therefore, the condition for the receipt of radioactive waste is the site-specific condition, 2.3.1, which allows waste to be returned from operational Royal Navy submarines. Waste generated by other MOD units is considered to be MOD waste and therefore it can be managed under the permit without the need for a bespoke condition.
- Conditions on the safe management have been adjusted to reflect the nature of the radioactive substances that may be covered by the LOA.
- Removed the requirement to contact the relevant police force for lost or stolen waste. It
 is adequate that SEPA is informed in this case. The MOD is responsible for reporting
 within MOD including the MOD police.

One of the main reasons for this application is the construction of a new radioactive waste handling facility. The application provides detail on the MoD's approach to BPM when designing this new facility and considers the approach to liquid, gaseous and solid waste individually. Additionally, there are details in support of the existing arrangements at Coulport explaining how they are demonstrably BPM. BPM is a requirement of the existing LOAs and SEPA is content that the MoD are capable of complying.

4.7.3. Standard Condition section C

The act of sending radioactive waste to a third party who is legally entitled to manage it, is referred to in SEPA's standard conditions as a transfer rather than a disposal. For the reasons

discussed in section 3.4.1, SEPA's approach to transfers has changed since the existing LOAs were made. For example, the receiving facility is no longer specified and there are no restrictions on the total volume. However, waste must be fully characterised and the facility receiving the waste must be legally entitled to accept the waste and manage it thereafter. The waste transferred need not only be solid waste. This is a more flexible approach in the implementation of BPM and Government policy. SEPA controls the transfer of radioactive substances from civil nuclear sites through Standard Condition Section C.

As discussed in sections 2.1.2 and 2.1.4, the MOD has requested to have this modern approach applied to the transfer of radioactive waste. The standard approach would cover both solid waste and liquid waste such as the chemically contaminated waste described in section 2.1.2. SEPA's standard conditions relating to the transfer of waste also allow for the transfer of intermediate level waste to persons in other parts of the UK, provided it is for treatment and any remaining intermediate level waste is returned in line with Government policy. As discussed in section 3.4.2, the HAW Policy does not include MoD waste. Therefore, the standard condition (C5) is not relevant. Intermediate level waste could be transferred following the other conditions in this section.

SEPA has included the standard condition relating to the transfer of samples as the MoD requires on occasion to transfer samples of waste for characterisation by specialist laboratories. SEPA considers that this is a necessary activity as it allows for improved understanding of the waste.

4.7.4. Standard Condition section G

Standard Condition Section G covers the disposal of waste including small quantities to the local environment. These conditions can include limits on specific radionuclides and those relating to the point of discharge were previously covered by exemption orders (Reference 21) and are now in relevant GBRs. These include the disposal of small amounts of solid radioactive waste to the dustbin, or liquid waste to the sewer or sea and fugitive gaseous releases.

The Standard Condition sub-sections G1 to G5 will be included, with minor amendments for to reflect MoD terminology.

4.7.5. Standard Condition sections H and J

For civil nuclear sites, SEPA requires that the authorised person carries out and maintains an assessment of the public exposure and the environmental impact of their discharges. The MoD

carries out such a programme for all its naval establishments where radioactive discharges are made. The programme around Clyde is conducted by Defence Science and Technology Limited and includes inter-tidal areas and underwater zones. The MoD has reviewed the monitoring locations in view of the change in the discharge point and in relation to SEPA guidance, Radiological Monitoring Technical Guidance Note 2 Environmental Radiological Monitoring 2019 (Reference 25).

The existing LOAs do not require environmental monitoring to be done; however, it is appropriate that it is, and continues to be, done. Therefore, SEPA propose to include conditions similar to those in Standard Conditions sub-Section H.1 and Section J. The only necessary change is to the reporting period for the environmental monitoring programme. The current programme is a national programme, and the reports are generated annually similar to SEPA's RIFE report rather than quarterly as set out in Schedule 2 of the Standard Conditions for radioactive substances activities.

Condition H2 refers to the discharge of gaseous waste from places other than the approved discharge stacks. Discharges of this nature can only be made where it can be demonstrated that it is not BPM to direct the discharge to the approved stack and that it will not exceed any limits. This condition may be applicable for any ongoing or decommissioning activities at the existing REDF and APF.

4.8. HMNB Clyde specific conditions

In addition to the standard conditions, civil nuclear EASR permits have a number of "bespoke" conditions which cover specific discharge limits as well as any additional conditions not directly covered by a standard condition.

As discussed in sections 4.2, 4.3 and 4.4 of this document, limits and radionuclides will be set for discharges of radioactive effluent, general effluents, and gaseous discharges. As proposed in 4.2.2, an additional notification level of 2 MBq for cobalt-60 has been included.

As discussed in 4.7.5, a different reporting period for the environmental monitoring results will be necessary.

The inactive commissioning of the NSH began in 2023 and is expected to be completed in 2025 with first nuclear use shortly thereafter. The initial intention was to have the new LOA in place at the same time as the NSH became operational. However, by including operations at the REDF



this would allow the new LOA to be issued at an earlier date and provide greater flexibility for the transfer between the old and new facilities. Consequently, the discharge points for both facilities have been included, see table 1 in Appendix 5. The site will not generate or discharge any additional effluents as a result of this approach and the limits on the discharge apply to both discharge points taken together.

5. SEPA's conclusions

SEPA has reviewed the application submitted by MoD in May 2019 for approval to dispose of radioactive waste disposal at HMNB Clyde. The application has been subject to wide consultation both with relevant organisations and the public. SEPA's consideration of the proposed changes has been carried out with reference to the application of relevant policy, legislation, guidance, technical aspects, and the responses to the consultation.

SEPA has concluded the following:

- The proposed reductions to annual limits of aqueous liquid waste discharged are appropriate and offer a greater level of control whilst accommodating the MOD's request for operational flexibility. The level of control is further enhanced by the inclusion of a lower notification limit for cobalt-60.
- The proposed inclusion of gaseous waste limits for the REDF and NSH represent an improvement as this waste was previously unlimited.
- The changes regarding the transfer of waste to offsite waste facilities brings the arrangements in line with Government policy and civil nuclear operators. It will also allow the prompt transfer of waste off site which do not currently have an agreed disposal route.
- The proposed reduction in the gaseous limit for Coulport is appropriate and offers a greater level of control whilst maintaining the requirement for operational flexibility.
- The arrangements for dealing with general effluents have been clarified and routine reporting will be implemented.
- SEPA has carried out in-depth assessments of the radiological dose at the new disposal limits which demonstrated that disposal at these limits do not pose a realistic risk to human health or the environment.
- The inclusion of conditions similar to SEPA's standard conditions allows the application of modern standards and a consistency across all the relevant activities at HNMB Clyde.

• HMNB Clyde is a single naval base under the control of Naval Base Commander Clyde and as the majority of conditions are the same activities at HMNB Clyde would be best controlled under a single letter of approval.

6. Final consultations

Following SEPA's determination of the application and proposal for a new LOAs, SEPA consulted with the MOD as the applicant on the proposed LOA. The MoD was content with the proposed LOA. Following MOD and SEPA agreement on the proposed LOA, a final stage of consultation was undertaken with those organisations who were consulted in the first stage of consultation - FSS, ONR, DNSR and Scottish Ministers.

FSS, ONR and DNSR were provided a copy of the draft LOA documents on 02 April 2024. The final versions of the documents not being available until after this final stage of consultation could be completed. No objections or concerns were raised by this consultation and DNSR welcomed the intent to combine the four existing approvals into a single approval. Further details of these responses are provided in Appendix 4.

Scottish Ministers were provided a copy of the draft LOA document on 2 October 2024 for final comment.

7. SEPA's decision

SEPA's decision is to agree to a new LOA which covers all the activities of HMNB Clyde. The LOA will contain the limitations which are specific to each facility and conditions which are applicable across the site. The limitations and conditions are described in detail in the sections above and the details provided in Appendix 5. SEPA is of the opinion that this approach will result in improved protection of the public and the environment.

References

- 1. Policy Statement by the Secretary of state of Defence Health, Safety and Environmental Protection in Defence
- 2. <u>Memorandum of Understanding between Ministry of Defence and Scottish Environment</u> <u>Protection Agency on matters relating to radioactive substances, Oct 22</u>
- 3. <u>UK policy framework for managing radioactive substances and nuclear</u> <u>decommissioning</u>
- 4. <u>Satisfying the optimisation requirement and the role of best practicable means</u>
- 5. <u>Environmental Authorisations (Scotland) Regulations 2018 Standard Conditions for</u> radioactive substances activities v2.1
- 6. UK Strategy for radioactive discharges 2009
- 7. <u>Review UK Strategy for radioactive discharges 2009</u>
- 8. <u>The Transboundary Radioactive Contamination (Scotland) Direction 2021</u>
- 9. Policy for the Long-Term Management of Solid Low Level Radioactive Waste in the United Kingdom 2007
- 10. UK strategy for the Management of Solid Low Level Radioactive Waste from the Nuclear Industry 2010
- 11. <u>Scotland's Higher Activity Radioactive Waste Policy</u>
- 12. Nature Conservation (Scotland) Act 2004
- 13. ERICA tool
- 14. The Scotland Act 1998
- 15. Human Rights Act 1998
- 16. <u>The Environment Act 1995</u>
- 17. Regulatory Reform (Scotland) Act 2014



- 18. <u>Statutory Guidance on the General Purpose of the Scottish Environment Protection</u> <u>Agency and its Contribution Towards Sustainable Development</u>
- 19. <u>Climate Change (Scotland) Act 2009</u>
- 20. <u>Guidance on who can hold an authorisation: 'in control and 'fit and proper person tests</u>
- 21. <u>The Radioactive Substances Exemption (Scotland) Order 2011.</u>
- 22. SEPA MoD Agreement on matters relating to radioactive substances, 2017
- 23. Radiological Habits Survey: HMNB Clyde (Faslane & Coulport) 2016 Public Report
- 24. Radioactivity in Food and the Environment
- 25. <u>Radiological Monitoring Technical Guidance Note 2 Environmental Radiological</u> <u>Monitoring 2019</u>
- 26. <u>Environmental Authorisation (Scotland) Regulations 2018</u>
- 27. Environment Act 1995 The UK Strategy for Radioactive Discharges SG/2008/13
- 28. <u>The UK Withdrawal from the European Union (Continuity) (Scotland) Act 2021 ("the</u> <u>Continuity Act")</u>
- 29. <u>Scotland's Guiding Principles on the Environment: Statutory Guidance August 2023</u>
- 30. <u>The Radioactive Substances Act (Scotland) 1993</u>
- 31. The Water Environment (Controlled Activities) (Scotland) Regulations 2011

Appendices

- Appendix 1 Existing LOAs
- Appendix 2 Application
- Appendix 3 Dose assessments
- Appendix 4 Consultation Responses
- Appendix 5 Proposed Conditions

Appendix 1 - Existing LOAs

The following screenshots of the existing LOAs are not compatible with screen readers,

therefore accessible versions are available at the end of this appendix.

Coulport – June 1995



Coulport – December 2000





- 7.1.1 Any non-fixed contamination on any container in which the waste is packed when averaged over an area of 300 square centimetres shall not exceed 4 becquerels per square centimetre for all beta and gamma emitting radionuclides taken together, and shall not exceed 0.4 becquerels per square centimetre for all alpha emitting radionuclides taken together.
- 7.1.2 Any packaging or containers used to contain the waste shall be appropriately labelled to show their contents.

8. SAMPLING AND ANALYSIS

- 8.1 The Director shall take samples of the waste and determine the activity of the radionuclides contained in the waste in accordance with a sampling and analysis plan agreed with SEPA.
- 8.2 When required by SEPA the Director shall obtain samples of the waste, including packaged waste, as specified by SEPA, and deliver them for examination to a laboratory specified by SEPA and after examination, and on written notification from SEPA, collect and return them to the premises, all within such time scales as may be specified in writing by SEPA.
- 9. RECORDS AND PROVISION OF INFORMATION
- 9.1 The Director shall make and shall retain on the premises, for such a period as is agreed in writing with SEPA, for inspection, by a designated officer of SEPA, a true and accurate record of all waste disposed of on or from the premises; and the said record shall comprise -
 - 9.1.1 a description of all the waste disposed of and the source of all such waste;
 - 9.1.2 the activity of tritium and any other radionuclide which may be present in all the waste disposed of;
 - 9.1.3 the volume of all the waste disposed of; and
 - 9.1.4 the means and date of disposal of all the waste disposed of.
- 9.2 The Director shall provide to SEPA a summary of solid waste disposed in each preceding calendar year within 30 days of the end of the calendar year. The report shall include a summary of the record kept in accordance with conditions 9.1.1, 9.1.2 and 9.1.3 of this certificate and shall be made in a format specified by SEPA.
- 9.3 The Director shall provide the results of any sampling and analysis carried out in accordance with condition 8 in any calendar month to SEPA within 30 days of that calendar month of the completion of the sampling or at any other time as agreed in writing by SEPA.

Annexe to a letter of agreement for the disposal of solid waste from RNAD Coulport to BNFL Drigg, Cumbria via HMNB Clyde, Faslane.

Dated: 8 December 2000

Page 2 of 6

9.4 The Director shall provide reports in accordance with condition 9.2 and 9.3 in writing to the Director, West Region at the address specified in condition 11.%5

10. PROCEDURES

- 10.1 The Director shall prepare, record, and implement suitable procedures designed to meet the conditions of this authorisation, and :-
 - 10.1.1. The procedures shall be subject to a documented revision and modification system;
 - 10.1.2 The procedures shall be subject to a review by the company every twelve months, or at such other interval as may be agreed by SEPA, and details of that review shall be forwarded to SEPA within one month of the review taking place;
 - 10.1.3 The company shall prepare and maintain an index of these procedures in such a manner as SEPA may specify;
 - 10.1.4 The procedures shall be made available for examination by the designated officer of SEPA ; and
 - 10.1.5 The company shall furnish copies of any of the procedures mentioned above to SEPA, at SEPA's request.
- 10.2 The procedures referred to in condition 10.1 shall set out amongst other things:
 - 10.2.1 The maintenance and inspection procedures of equipment used for the handling, treatment and disposal of radioactive waste;
 - 10.2.2 The means by which waste minimisation is achieved;
 - 10.2.3 The arrangements for record keeping;
 - 10.2.4 The arrangements for sampling and monitoring; and
 - 10.2.5 The necessary training and experience of persons responsible for the disposal of waste.
 - 10.2.6 The Director may appoint an appropriate person to have overall responsibility for ensuring compliance with the limits and conditions to which this agreement is subject and shall so advise the Director, West Region at the address specified in Condition 11.5.

11. INCIDENTS

11.1 In the event of any breach of any condition or limitation to which this agreement is subject the Director shall:

Annexe to a letter of agreement for the disposal of solid waste from RNAD Coulport to BNFL Drigg, Cumbria via HMNB Clyde, Fastane.

Page 3 of 6

SEPA

- 11.1.1 take prompt action to prevent the continuation or recurrence of that breach and where practicable to remedy the consequences of that breach;
- 11.1.2 carry out an immediate investigation into the causes and circumstances of the breach;
- 11.1.3 make a record of the cause and action taken under condition 11.1.1.
- 11.2 The Director shall notify SEPA when:
 - 11.2.1 any release of any waste is detected that has exceeded, or is likely to exceed, or has caused, or is likely to cause an exceedance of any disposal limit specified in this agreement;
 - 11.2.2 any radioactive waste named in any relevant condition of this authorisation is detected in a disposal where the pathway of this disposal is not authorised by any condition of this agreement.
 - 11.2.3 any disposal of any radioactive waste not agreed to be released by virtue of any condition of the agreement is detected.
- 11.3 The Director shall notify any incident to SEPA at the address specified under Condition 11.5 by telephone without delay and in writing by first class post on the next working day after the identification of the incident.
 - 11.3.1 Any such notification made as a result of Condition 11.3 shall contain details relating to the following:
 - 11.3.1.1 date, time and duration of incident;
 - 11.3.1.2 the receiving medium or media;
 - 11.3.1.3 an initial estimate of the quantity of waste disposed;
 - 11.3.1.4 the nature of the waste involved;
 - 11.3.1.5 measures taken to minimise harm; and
 - 11.3.1.6 where possible, a preliminary assessment of the cause of the incident.
- 11.4 The Director shall carry out an investigation on any incident that has been notified as a consequence of Condition 11.3 and this report shall be submitted to SEPA within 14 days of the incident or such other period as agreed in writing with SEPA. Any such report shall detail, as a minimum, the circumstances of the incident and the steps taken by the Director to bring the incident to an end. It shall also set out proposals for preventing a repetition of the incident in question.
- 11.5
 In the event of an incident occurring between 1730 hours and 0830 hours on any week day, or between 1730 hours on a Friday and 0830 hours the Annave to a letter of agreement for the disposal of solid wase from RNAD Coupon to BNFL Drigg, Cumbria via HMNB Clyde, Feslane.
 Page 4 of 6 Drigg, Cumbria via HMNB Clyde, Feslane.

Dated: 8 December 2000



following Monday, or during any bank holiday, initial notification of the incident shall be by telephone to SEPA's standby telephone number 01355 574200, and should be confirmed by first class post to Director, SEPA West, 5 Redwood Crescent, Peel Park, East Kilbride, G74 5PP on the first following working day.

- 12 DISPLAY OF DOCUMENTS
- 12.1 A copy of this agreement and annexe shall be kept posted on the premises to which it relates in such a way as to be conveniently read by persons whose duties on the premises may be affected by the requirements of the agreement.

13 INTERPRETATION

In this Annexe to the Agreement -

"the Act" means the Radioactive Substances Act 1993;

"activity" expressed in becquerels means the number of spontaneous nuclear transformations occurring in a quantity of radioactive substance in a period of one second; and any reference to activity is a reference to activity ascertained or estimated by a method acceptable to the Scottish Environment Protection Agency;

"annexe" means an annexe forming part of the agreement

"authorisation" means an authorisation granted, or having effect as if granted, under section 13 of the Act;

"Authorised Person" means a person who is authorised in writing under Section 108 of the Environment Act to carry out duties on behalf of SEPA;

any reference to the contamination of a substance or article is a reference to its being affected in the manner described in section 47(5) of the Act;

"best practicable means" within a particular waste management option, means that level of management and engineering control that minimises, as far as practicable, the release of radioactivity to the environment whilst taking account of a wider range of factors, including cost - effectiveness, technological status, operational safety, and social and environmental factors. In determining whether a particular aspect of a proposal represents the best practicable means SEPA will not require the Director to incur expenditure, whether in money, time or trouble, which is disproportionate to the benefits likely to be derived.

"designated officer" means the authorised person identified in writing by SEPA as the person responsible for checking Director's compliance with this agreement;

Annexe to a letter of agreement for the disposal of solid waste from RNAD Coulport to BNFL Drigg, Cumbria via HMNB Clyde, Faslane, Dated: 8 December 2000

Page 5 of 6



1

sepa 🛊

Faslane – June 1993



SCHEDULE - LIQUID WASTE

3.

Column 2 500 MBq 1 TBq 500 MBq 200 MBq

MOD (Navy) CSB, Faslane

Operative	1 July 1993
	Column 1
	Cobalt 60
	Tritium
	Gross Beta Activity
	Gross Alpha Activity

sepa

Faslane – August 1995





Faslane – Addendum June 2019



Accessible versions of the above LOAs

Faslane Letter of Agreement 18-06-1993 (RSA-N-1027837)

Issued by The Scottish Office

Dear Sir

Radioactive Substances Act 1960

Disposal of Liquid and Gaseous Radioactive Wastes from the Clyde Submarine Base, Faslane

 I refer to the discussions. between. our respective departments on the_disposal of liquid and gaseous radioactive wastes produced by MOD (Navy) at the Clyde Submarine Base,
 Faslane. This letter sets out the limitations and conditions agreed with the Chief Inspector of



Her Majesty's Industrial Pollution Inspectorate, hereinafter called the Chief Inspector, in respect of the disposal of these wastes and shall be operative from 1 July 1993.

2. MOD (Navy) shall use the best practicable means for reducing the quantity of liquid and gaseous radioactive wastes subject to disposal having regard both to the provision and efficient maintenance of apparatus for reducing the quantifies of the liquid and gaseous radioactive wastes prior to disposal and also to the supervision by MOD (Navy) of the processes whereby the wastes are produced. In determining whether any particular means are to be required in relation to this duty, MOD (Navy) shall not be required to incur expenditure, whether of money, time or trouble which is, or is likely to be, grossly disproportionate either to the benefit to be derived from, or likely to be derived from, or to the efficacy of, or likely efficacy of, employing them, the benefits or results produce being, or likely to be, insignificant in relation to the expenditure.

 In all liquid radioactive waste discharged from the Clyde Submarine Base, Faslane during any period of 12 consecutive calendar months the activity of the radionuclides listed in Column 1 of the Schedule to this letter shall not exceed the value specified in Column 2 of the Schedule.

4. Liquid radioactive waste shall be discharged by pipeline to The Gareloch within national grid square NS 2488.

5. MOD (Navy) shall ensure that the systems by which all radioactive wastes are discharged are kept in good repair.

6. For the purposes of determining the activity of any radionuclides contained in the radioactive wastes and of ascertaining the effects on the environment of radioactive wastes discharged, MOD (Navy) shall provide and maintain such equipment and shall take such samples, both as shall be agreed with the Chief Inspector.

7. MOD (Navy) shall examine or cause to be examined by methods that shall be agreed with the Chief Inspector any samples taken in pursuance of the preceding paragraph and shall retain for such period as the Chief Inspector may specify any such samples for examination by or on behalf of any persons authorised by the Chief Inspector in that behalf.

8. MOD (Navy) shall keep records in respect of all radioactive wastes.

These records shall comprise:-



- a. a description of the outlets by which the radioactive wastes were discharged;
- b. a description of the radioactive wastes discharged;
- c. the date and period over which the radioactive wastes are discharged;
- d. for liquid radioactive waste, the activity, expressed in becquerels or multiples thereof, of each of those radionuclides listed in the Schedule and present in the waste at the time it was discharged; and
- e. such part of the information obtained by MOD (Navy) in pursuance of paragraph 7 as shall be agreed with the Chief Inspector.

9. These records shall be kept at the Clyde Submarine Base, Faslane, and shall be open to examination by any persons authorised for that purpose by the Secretary of State for Scotland. Any alteration of these records shall be so made that the original entries remain legible.

10. The records maintained in pursuance of the preceding paragraph shall be preserved by MOD (Navy) for 30 years or for such other period as may be agreed with the Chief Inspector, and a copy of the records, or any part thereof as he shall specify shall be supplied to the Chief Inspector at such intervals as shall be agreed.

11. For the purposes of this agreement, activity expressed in becquerels or multiples thereof means the number of spontaneous nuclear transformations occurring in a radioactive substance in. a period of one second, and any reference to activity is a reference to activity ascertained by a method acceptable to the Chief Inspector.

Yours faithfully [redacted]

Coulport Letter of Agreement 09-06-1994 (RSA-N-1027874)

Issued by The Scottish Office

Dear Sir

Radioactive Substances Act 1960

Disposal of Gaseous Radioactive Waste from the Royal Naval Armament Depot, Coulport



1. I refer to the discussions between our respective departments on the disposal of gaseous radioactive waste produced by The Ministry of Defence (MOD) at the Royal Naval Armament Depot, Coulport hereinafter called the premises. This letter sets out the limitations and conditions agreed with the Chief Inspector of Her Majesty's Industrial Pollution Inspectorate, hereinafter called the Chief Inspector, in respect of the disposal of these wastes and shall be operative from 9 June 1995.

2. MOD shall use the best practicable means for reducing the quantity of gaseous radioactive wastes subject to disposal having regard both to the provision and efficient maintenance of apparatus for reducing the quantities of the gaseous radioactive wastes prior to disposal and also to 'the supervision by MOD of the processes whereby the wastes are produced. In determining whether any particular means are to be required in relation to. this duty, MOD shall not be required to incur expenditure, whether of money, time or trouble which is, or is likely to be, grossly disproportionate either to the benefit to be derived from, or likely to be derived from, or to the efficacy of, or likely efficacy of, employing them, the benefits or results produced being, or likely to be, insignificant in relation to the expenditure.

3. In all gaseous radioactive waste discharged from the premises during any period of 12 consecutive calendar months the activity of tritium shall not exceed 50 gigabecquerels.

4. Gaseous radioactive waste shall be discharged to atmosphere from the premises.

5. MOD shall ensure that the systems by which all radioactive wastes are discharged are kept in good repair.

6. For the purposes of determining the activity of any radionuclides contained in the radioactive wastes and of ascertaining the effects on the environment of radioactive wastes discharged, MOD shall provide and maintain such equipment and shall take samples, both as shall be agreed with the Chief Inspector.

7. MOD shall examine or cause to be examined by methods that shall be agreed with the Chief Inspector any samples taken in pursuance of the preceding paragraph and shall retain for such period as the Chief Inspector may specify any such samples for examination by or on behalf of any persons authorised by the Chief Inspector in that behalf.

8. MOD shall keep records in respect of gaseous radioactive wastes. These records shall comprise:-



- a. a description of the outlets by which the radioactive wastes were discharged;
- b. a description of the radioactive wastes discharged;
- c. the date and period over which the radioactive wastes are discharged;
- d. the activity, expressed in becquerels or multiples thereof, of tritium present in the waste at the time it was discharged; and
- e. such part of the information obtained by MOD in pursuance of paragraph 7 as shall be agreed with the Chief Inspector.

9. These records shall be kept at the premises and shall be open to examination by any persons authorised for that purpose by the Secretary of State for Scotland. Any alteration of these records shall be so made that the original entries remain legible.

10. The records maintained in pursuance of the preceding paragraph shall be preserved by MOD for 30 years or for such other period as may be agreed with the Chief Inspector, and a copy of the records, or any part thereof as he shall specify shall be supplied to the Chief Inspector at such intervals as shall be agreed.

11. For the purposes of this agreement, activity expressed in becquerels or multiples thereof means the number of spontaneous nuclear transformations occurring in a radioactive substance in a period of one second, and any reference to activity is a reference to activity ascertained by a method acceptable to the Chief Inspector.

Yours faithfully

[redacted]

Schedule – Liquid wasteMOD (Navy) CSB Faslane Operative 1 July 1993Column 1Column 2Cobalt 60500 MBqTritium1 TINGross Beta Activity500 MBqGross Alpha Activity200



Faslane Letter of Agreement 17-08-1995 (RSA-N-1027543)

Issued by The Scottish Office

Dear Sir

Radioactive Substances Act 1993

Disposal of Solid Radioactive Waste from Clyde Submarine Base, Faslane, To DRIGG

I refer to the discussions between the Ministry of Defence (Navy) and Her Majesty's Industrial Pollution Inspectorate on the disposal of solid radioactive waste (hereinafter called "the waste") produced by MOD (Navy) at the Clyde Submarine Base, Faslane. This letter sets out the limitations and conditions agreed with the Chief Inspector in respect of the disposal of the waste.

1. The waste shall be disposed of by removing it or causing or permitting its removal to British Nuclear Fuels plc's facilities at either Sellafield, Cumbria, or Drigg, Cumbria, for subsequent disposal therefrom in accordance with an authorisation under Section 13 of the 1993 Act or Section 6 of the Radioactive Substances Act 1960 granted in that behalf.

2. MOD (Navy) shall use the best practicable means for reducing the activity and volume of the waste subject to disposal under the terms of this agreement having regard both to the provision and efficient maintenance of apparatus for reducing the quantities of the waste prior to disposal and also to the supervision by MOD (Navy) of the processes whereby the waste is produced. In determining whether any particular means are, or may be, required in relation to this duty MOD (Navy) shall_not be required to incur expenditure, whether of money, time or trouble which is, or is likely to be, grossly disproportionate either to the benefit to be derived from, or likely to be derived from, or to the efficacy of, or the likely efficacy of, employing them, the benefits or results produced being, or likely to be, insignificant in relation to the expenditure.

3. Without prejudice to the general requirement of the preceding paragraph, the volume of the waste, including its immediate packaging, disposed of during any period of 12 consecutive calendar months shall not exceed 40 m³. In all the waste disposed from the premises during any period of 12 consecutive calendar months the activity of each of the radionuclides or groups of radionuclides listed in column 1 of the schedule



shall not exceed the value specified for that radionuclide or group of radionuclides in column 2 of the schedule.

4. Notwithstanding the limitations of the previous paragraph, in any single consignment of waste the concentration of radionuclides which emit alpha particles shall not exceed 4 gigabecquerels per tonne and the concentration of all other radionuclides taken together shall not exceed 12 gigabecquerels per tonne.

5. All consignments of the waste shall be subject to quality assurance and documentation to the satisfaction of BNFL.

6. The waste shall be packed in containers appropriately labelled to show their contents and shall be made available for collection by or delivered to BNFL all in accordance with its directions.

7. The dose rate at the surface of the waste when substantially unshielded shall not exceed 2 milligrays per hour in air.

8. MOD (Navy) shall keep records in respect of each consignment of the waste showing:

- a. the date of its removal from the Clyde Submarine Base;
- b. the weight and volume of the waste removed;
- c. the maximum surface dose rate at the surface of the waste; and
- d. the activity of each of the radionuclides -or groups of radionuclides listed in column 1 of the schedule.

The records maintained in pursuance of the preceding paragraph shall be kept at the Clyde Submarine Base and shall be open to examination by any person authorised for that purpose by the Secretary of State for Scotland. Any alteration of the said reports shall be so made that the original entries remain legible.

9 The records shall be preserved by MOD(N) for 30 years or for such other period as may be specified by the Chief Inspector and a copy of the records, or of any part thereof as he shall specify, shall be supplied to the Chief Inspector at such intervals as shall be agreed. 10.For the purposes of this agreement, activity expressed in becquerels or multiples thereof means the numbers of spontaneous nuclear transformations occurring in a radioactive substance in a period of one second, and any reference to activity is a reference ascertained or estimated by a method acceptable to the Chief Inspector. These conditions and limitations shall come into force on 18 August 1995.

Yours faithfully [redacted]

Coulport Letter of Agreement 08-12-2000 (RSA-N-1027872)

Issued by SEPA

Dear Sir

Disposal of Solid Radioactive Waste from RNAD Coulport To BNFL Drigg, via HMNB Clyde Faslane.

Letter Of Agreement

I refer to the application, dated 31 July 1998 made by the Ministry of Defence for SEPA's agreement to the disposal of solid radioactive waste in the form of desiccant and associated items which have been contaminated with tritium. After consideration of your application and responses received as a consequence of a public consultation exercise SEPA agrees to the Director, Naval Base Clyde, Faslane, for the Ministry of Defence, disposing of the waste by causing or permitting its removal from the premises of RNAD Coulport to British Nuclear Fuels plc at Sellafield or Drigg, Cumbria, for final disposal at the British Nuclear Fuels plc facility at Drigg, Cumbria in accordance with an authorisation granted to the said British Nuclear Fuels plc. Any such disposal shall be made in the first instance to the Active Processing Facility, HM Naval Base Clyde, Faslane for onward shipment to British Nuclear Fuels plc as soon as is reasonably practicable after its receipt.

The agreement specified above is subject to limitations and conditions which are prescribed in the Annexe to this letter.

The agreement is also subject to the Director, Naval Base Clyde, Faslane providing appropriate facilities and reasonable access to RNAD Coulport for designated officers of



SEPA in order that the necessary checking of compliance with the limitations and conditions of this agreement can be undertaken.

Yours faithfully [redacted]

Annexe to a letter of agreement for the disposal of solid radioactive waste from RNAD Coulport to BNFL Drigg, Cumbria via HMNB Clyde, Faslane.

 This Annexe provides the limitations and conditions to the letter of agreement reference RS/Nuc/Coulport and dated 8 December 2000 (hereinafter called "the agreement") and issued by SEPA to the Director, Naval Base Clyde, for the Ministry of Defence (hereinafter called "the Director").

Limitations and conditions

- 2. The radioactive waste to which the agreement refers (hereinafter called "the waste") shall comprise waste in solid form which has arisen as a result of the operations of the Ministry of Defence (hereinafter called "the MOD") on the premises of RNAD Coulport (hereinafter called "the premises").
- 3. The best practicable means shall be used to minimise the activity and volume of waste subject to disposal under the terms of the agreement.
- 4. Without prejudice to the general requirements of the preceding condition:
 - 4.1 in all of the waste disposed of in any 12 consecutive calendar months the number of megabecquerels of tritium shall not exceed 20; and
 - 4.2 the volume of all the waste disposed of, including its immediate packaging during any such period shall not exceed 2 m³.
- 5. In any consignment of waste removed from the premises:
 - 5.1 the waste shall not contain any radionuclide other than tritium, in a concentration which exceeds that which would be reasonably expected from the natural environment; and
 - 5.2 the average concentration of tritium shall not exceed 12 gigabecquerels per tonne.

- 6. The waste shall be disposed of by causing or permitting its removal from the premises to British Nuclear Fuels plc (hereinafter BNFL) at Sellafield or Drigg, Cumbria, for final disposal at the BNFL facility at Drigg (hereinafter "Drigg"), in accordance with an authorisation granted to the said British Nuclear Fuels plc for disposal at Drigg. Any such disposal shall be made in the first instance to the Active Processing Facility, HM Naval Base Clyde, Faslane for onward shipment to BNFL as soon as is reasonably practicable after its receipt.
- 7. Packaging
- 7.1 The waste shall be packed in such a manner to prevent as far as reasonably practicable the contamination of other articles during transport to the premises specified in condition 6.
 - 7.1.1 Any non-fixed contamination on any container in which the waste is packed when averaged over an area of 300 square centimetres shall not exceed 4 becquerels per square centimetre for all beta and gamma emitting radionuclides taken together, and shall not exceed 0.4 becquerels per square centimetre for all alpha emitting radionuclides taken together.
 - 7.1.2 Any packaging or containers used to contain the waste shall be appropriately labelled to show their contents.
- 8. Sampling and analysis
 - 8.1 The Director shall take samples of the waste and determine the activity of the radionuclides contained in the waste in accordance with a sampling and analysis plan agreed with SEPA.
 - 8.2 When required by SEPA the Director shall' obtain samples of the waste, including packaged waste, as specified by SEPA, and deliver them for examination to a laboratory specified by SEPA and after examination, and on written notification from SEPA, collect and return them to the premises, all within such time scales as may be specified in writing by SEPA.
- 9. Records and provision of information
- 9.1 The Director shall make and shall retain on the premises, for such a period as is agreed in writing with SEPA, for inspection, by a designated officer of SEPA, a true and accurate



record of all waste disposed of on or from the premises; and the said record shall comprise -

- 9.1.1 a description of all the waste disposed of and the source of all such waste;
- 9.1.2 the activity of tritium and any other radionuclide which may be present in all the waste disposed of;
- 9.1.3 the volume of all the waste disposed of; and
- 9.1.4 the means and date of disposal of all the waste disposed of.
- 9.2 The Director shall provide to SEPA a summary of solid waste disposed in each preceding calendar year within 30 days of the end of the calendar year. The report shall include a summary of the record kept in accordance with conditions 9.1.1, 9.1.2 and 9.1.3 of this certificate and shall be made in a format specified by SEPA.
- 9.3 The Director shall provide the results of any sampling and analysis carried out in accordance with condition 8 in any calendar month to SEPA within 30 days of that calendar month of the completion of the sampling or at any other time as agreed in writing by SEPA.
- 9.4 The Director shall provide reports in accordance with condition 9.2 and 9.3 in writing to the Director, West Region at the address specified in condition 11.5.
- 10. Procedures
- 10.1 The Director shall prepare, record, and implement suitable procedures designed to meet the conditions of this authorisation, and: -
 - 10.1.1. The procedures shall be subject to a documented revision and modification system;
 - 10.1.2 The procedures shall be subject to a review by the company every twelve months, or at such other interval as may be agreed by SEPA, and details of that review shall be forwarded to SEPA within one month of the review taking place;
 - 10.1.3 The company shall prepare and maintain an index of these procedures in such a manner as SEPA may specify;

- 10.1.4 The procedures shall be made available for examination by the designated officer of SEPA; and
- 10.1.5 The company shall furnish copies of any of the procedures mentioned above to SEPA, at SEPA's request.
- 10.2 The procedures referred to in condition 10.1 shall set out amongst other things:
 - 10.2.1 The maintenance and inspection procedures of equipment used for the handling, treatment and disposal of radioactive waste;
 - 10.2.2 The means by which waste minimisation is achieved;
 - 10.2.3 The arrangements for record keeping;
 - 10.2.4 The arrangements for sampling and monitoring; and
 - 10.2.5 The necessary training and experience of persons responsible for the disposal of waste.
 - 10.2.6 The Director may appoint an appropriate person to have overall responsibility for ensuring compliance with the limits and conditions to which this agreement is subject and shall so advise the Director, West Region at the address specified in Condition 11.5.
- 11. Incidents
- 11.1 In the event of any breach of any condition or limitation to which this agreement is subject the Director shall:
 - 11.1.1 take prompt action to prevent the continuation or recurrence of that breach and where practicable to remedy the consequences of that breach;
 - 11.1.2 carry out an immediate investigation into the causes and circumstances of the breach;
 - 11.1.3 make a record of the cause and action taken under condition 11.1.1.
- 11.2 The Director shall notify SEPA when:



- 11.2.1 any release of any waste is detected that has exceeded, or is likely to exceed, or has caused, or is likely to cause an exceedance of any disposal limit specified in this agreement;
- 11.2.2 any radioactive waste named in any relevant condition of this authorisation is detected in a disposal where the pathway of this disposal is not authorised by any condition of this agreement.
- 11.2.3 any disposal of any radioactive waste not agreed to be released by virtue of any condition of the agreement is detected.
- 11.3 The Director shall notify any incident to SEPA at the address specified under Condition 11.5 by telephone without delay and in writing by first class post on the next working day after the identification of the incident.
 - 11.3.1 Any such notification made as a result of Condition 11.3 shall contain details relating to the following:
 - 11.3.1.1 date, time and duration of incident;
 - 11.3.1.2 the receiving medium or media;
 - 11.3.1.3 an initial estimate of the quantity of waste disposed;
 - 11.3.1.4 the nature of the waste involved;
 - 11.3.1.5 measures taken to minimise harm; and
 - 11.3.1.6 where possible, a preliminary assessment of the cause of the incident.
- 11.4 The Director shall carry out an investigation on any incident that has been notified as a consequence of Condition 11.3 and this report shall be submitted to SEPA within 14 days of the incident or such other period as agreed in writing with SEPA. Any such report shall detail, as a minimum, the circumstances of the incident and the steps taken by the Director to bring the incident to an end. It shall also set out proposals for preventing a repetition of the incident in question.
- 11.5 In the event of an incident occurring between 1730 hours and 0830 hours on any week day, or between 1730 hours on a Friday and 0830 hours the following Monday, or during



any bank holiday, initial notification of the incident shall be by telephone to SEPA's standby telephone number 01355 574200, and should be confirmed by first class post to Director, SEPA West, 5 Redwood Crescent, Peel Park, East Kilbride, G74 5PP on the first following working day.

- 12 Display of documents
- 12.1 A copy of this agreement and annexe shall be kept posted on the premises to which it relates in such a way as to be conveniently read by persons whose duties on the premises may be affected by the requirements of the agreement.
- 13 Interpretation

In this Annexe to the Agreement -

"the Act" means the Radioactive Substances Act 1993;

"activity" expressed in becquerels means the number of spontaneous nuclear transformations occurring in a quantity of radioactive substance in a period of one second; and any reference to activity is a reference to activity ascertained or estimated by a method acceptable to the Scottish Environment Protection Agency;

"annexe" means an annexe forming part of the agreement

"authorisation" means an authorisation granted, or having effect as if granted, under section 13 of the Act;

"Authorised Person" means a person who is authorised in writing under Section 108 of the Environment Act to carry out duties on behalf of SEPA;

any reference to the contamination of a substance or article is a reference to its being affected in the manner described in section 47(5) of the Act;

"best practicable means" within a particular waste management option, means that level of management and engineering control that minimises, as far as practicable, the release of radioactivity to the environment whilst taking account of a wider range of factors, including cost - effectiveness, technological status, operational safety, and social and environmental factors. In determining whether a particular aspect of a proposal represents the best practicable means SEPA will not require the Director to incur expenditure,


whether in money, time or trouble, which is disproportionate to the benefits likely to be derived.

"designated officer" means the authorised person identified in writing by SEPA as the person responsible for checking Director's compliance with this agreement;

"premises", "radioactive waste" and "waste" have the same meaning as in the Act;

"radionuclide" means a species of atom characterised by its mass number and atomic number and subject to radioactive decay;

"solid radioactive waste" is radioactive waste that has been treated or packaged in such a way as to render it as far as reasonably practicable insoluble in water and not readily flammable;

Faslane Addendum 25-06-2019 (RSA-N-1027543)

Issued by SEPA

Dear [redacted]

Radioactive Substances Act 1993 Letter of Agreement Addendum for General Effluent Disposal at HMNB Clyde

- 1. In reference to our discussions (letters between the Ministry of Defence (MoD) and SEPA dated 10 and 30 October 2017, 19 April 2018 and 17 July 2018) on the disposal of general effluents from HMNB Clyde, this letter sets out the limitations and conditions agreed between MoD and SEPA in respect of the disposal of general effluents and ballast and trim water from HMNB Clyde, Faslane. This letter is an addendum to the existing letter of agreement covering the disposal of liquid and gaseous wastes from Faslane, dated 18 June 1993 (LOA93) and shall have effect from 1st of July 2019.
- 2. For the purposes of this agreement "General Effluents" means liquid wastes which are produced on board a submarine as part of normal operations that are not directly associated with submarine reactor plant containing tritium with a concentration not greater than 1 Bq/ml.
- For the purposes of this agreement "Ballast and Trim Water" means seawater containing tritium pumped from compensating and trim tanks to sea to manage buoyancy and manoeuvrability.



- 4. For the purposes of this agreement "relevant sewer" means
 - a) a public sewer; or
 - b) a private sewer which leads to a sewage treatment works that
 - i) has the capacity to handle a minimum of 100m³ of sewage per day; and
 - ii) discharges treated sewage only to the sea;
 - and "sewer", "public sewer", "private sewer", "sewage treatment works" and "sewage" have the same meanings as in the Sewerage (Scotland) Act 1968.
- 5. In addition to the disposal route specified in paragraph 4 of LOA93, MoD shall ensure that General Effluents are disposed of to a relevant sewer or the sea and only in accordance with legislation that relates to the non-radioactive properties of these effluents.
- The MoD shall not dispose of General Effluents in which the total activity of tritium exceeds 10 Gigabecquerels in any 12 consecutive months.
- 7. Paragraph 3 of the LOA93 is replaced with "3. In all liquid radioactive waste disposed from HMNB Clyde, Faslane during any period of 12 consecutive months the activity of the radionuclides listed in Column 1 of the Schedule to this letter shall not exceed the value specified in Column 2 of the Schedule".
- 8. In addition to Paragraph 8 of the LOA93, MoD shall keep records in respect of General Effluents. These records shall comprise for each of the General Effluents:
 - a. The volume disposed;
 - b. The activity disposed; and
 - c. The disposal route
- 9. MoD may release Ballast and Trim Water directly from submarines berthed at HMNB Clyde, Faslane.
- 10. MoD shall inform SEPA without delay if they have reason to believe that disposal of radioactive waste is occurring, has occurred or might occur which does not comply with the



limitations and conditions of the LOA93 and this addendum, and shall report the circumstances in writing to SEPA as soon as practicable thereafter.

11. MoD shall provide SEPA with any other information that SEPA may reasonably require to determine compliance with, or review of, the LOA93.

Yours sincerely

[redacted]

Appendix 2 – Application

ROYAL NAVY	Naval Base Commander Clyde Room 401 Lomond Building HM Naval Base Clyde HELENSBURGH Argyll & Bute G84 8HL				
	Telephone: 01436 674321 ext 6762 Email:				
SEPA Ayr Office 31 Miller Road Ayr	NBC/02/04/02				
KA7 2AX	22 May 2019				
Application for Approval to Dispose of Badioactive	e Waste from HMNR Clude				
HMNB Clyde's updated application to dispose of solid submitted at the Enclosure for SEPA determination. O understanding of waste generation from across the De inform the submission and to ensure that it includes al could be generated at Faslane or Coulport.	, liquid and gaseous radioactive waste is Dperational experience and better sfence Nuclear Enterprise has been used to Il potential radioactive waste streams that				
In assessing future requirements, HMNB Clyde has ca Practical Means (BPM) to activities at Faslane and Co to reflect the following:	arefully considered the application of Best sulport and arrangements for waste disposals				
a. Replacement of the current solid and liquid new combined treatment and disposal facility, the	d radioactive waste facilities at Faslane by a le Nuclear Support Hub (NSH).				
 Transfer of solid low-level waste and liquid NSH for processing and ultimate disposal. 	d waste arisings directly from Coulport to the				
c. Treated liquid radioactive waste will be dis approximately 1km north of the current discharg waste disposals to the Gare Loch have, where p best practice with Carbon-14 reported separatel	c. Treated liquid radioactive waste will be discharged from the NSH at a point approximately 1km north of the current discharge point. Proposed annual limits for liquid waste disposals to the Gare Loch have, where practical, been reduced and updated to reflect best practice with Carbon-14 reported separately.				
 Proposed annual limits for gaseous radioactive waste disposals from Coulport have been reduced and specific numerical limits applied to the NSH. 					
The predicted doses to the representative individual for threshold for optimisation of 20µSv per year. Environ undertaken to demonstrate that there is no radiologica the discharges of radioactive waste from HMNB Clyde	or all discharges is significantly below the mental monitoring will continue to be al hazard to any member of the public from 9.				
If you have any additional questions or require further my Radioactive Waste Advisor.	clarification do not hesitate to contact				
1					
Enclosure: 1. Application to SEPA for an Approval to Dispose of Radioacti Issue 1.1, Feb 2019. Copy to:	ve Waste from HMNB Clyde,				

Full application is available on the Consultation Hub

Full consultation



Accessible version of the above letter

HMNB Clyde Waste Disposal Application Letter

22 May 2019

Dear [redacted]

Application for Approval to Dispose of Radioactive Waste from HMNB Clyde

HMNB Clyde's updated application to dispose of solid, liquid and gaseous radioactive waste is submitted at the Enclosure for SEPA determination. Operational experience and better understanding of waste generation from across the Defence Nuclear Enterprise has been used to inform the submission and to ensure that it includes all potential radioactive waste streams that could be generated at Faslane or Coulport.

In assessing future requirements, HMNB Clyde has carefully considered the application of Best Practical Means (BPM) to activities at Faslane and Coulport and arrangements for waste disposals to reflect the following:

a. Replacement of the current solid and liquid radioactive waste facilities at Faslane by a new combined treatment and disposal facility, the Nuclear Support Hub (NSH).

b. Transfer of solid low-level waste and liquid waste arisings directly from Coulport to the NSH for processing and ultimate disposal.

c. Treated liquid radioactive waste will be discharged from the NSH at a point approximately 1 km north of the current discharge point. Proposed annual limits for liquid waste disposals to the Gare Loch have, where practical, been reduced and updated to reflect best practice with Carbon-14 reported separately.

d. Proposed annual limits for gaseous radioactive waste disposals from Coulport have been reduced and specific numerical limits applied to the NSH.

The predicted doses to the representative individual for all discharges is significantly below the threshold for optimisation of 20μ Sv per year. Environmental monitoring will continue to be undertaken to demonstrate that there is no radiological hazard to any member of the public from the discharges of radioactive waste from HMNB Clyde. If you have any additional questions or require further clarification do not hesitate to contact [redacted], my Radioactive Waste Advisor.

[redacted]

Commodore Royal Navy

Enclosure:

1.Application to SEPA for an Approval to Dispose of Radioactive Waste from HMNB Clyde, Issue 1.1, Feb 2019.

Copy to:

[redacted]



Appendix 3 – Dose assessments

1 Summary

Prospective radiological dose assessments were carried out to determine the impact of the proposed discharges in the application from HMNB Clyde in 2019. This appendix presents the results of these assessments for all relevant pathways resulting from discharges of liquid and gaseous radioactive wastes from HMNB Clyde in Argyll & Bute. It should be read as part of this decision document.

All modelled prospective dose assessments followed a conservative approach and demonstrate that the calculated doses are extremely low.

In summary:

- The annual dose constraints and limit will not be exceeded based on this assessment.
- Conservatively assessed prospective doses to the most exposed group are extremely low in all cases.
- The dose rate guidance for exposure to non-human species are will not be exceeded based on this assessment.
- Issues relating to modified dose coefficients and the hazard posed by tritium or organically bound tritium do not result in any significant change in the calculated doses and they remain extremely low.

1.1. Dose assessment principles

Prospective radiological dose assessments must follow applicable International and UK legislation, policy and guidance. The requirements are presented in 'Principles for the assessment of prospective public doses arising from authorised discharges of radioactive waste to the environment' (RS-JG-016, October 2019) and the principles are summarised below. (Reference A3-1)

Principles for the assessment of prospective public dose

1 Prospective dose assessment methods, data and results should be transparent and made publicly available.



- 2 Workers, who are exposed to discharges of radioactive waste, but who do not work directly with ionising radiation and are therefore not normally exposed to ionising radiation, should be treated as if they are members of the public for the purpose of determining discharge permits or authorisations.
- 3 When determining discharge permits or authorisations, the dose to the representative person should be assessed.
- Doses to the most affected age group should be assessed for the purpose of determining discharge permits or authorisations. Assessment of doses to 1-year old, 10-year-old and adults (and foetus when appropriate) is adequate age group coverage.
- 5 The dose to the representative person which is assessed for comparison with the source constraint and, if appropriate, the site constraint, should include all reasonably foreseeable and relevant future exposure pathways.
- 6 Significant additional doses to the representative person from historical discharges from the source being considered and doses from historical and future discharges and direct radiation from other relevant sources subject to control should be assessed and the total dose compared with the dose limit of 1 mSv/y.
- 7 Where a cautious estimate of the dose to the representative person exceeds 0.02 mSv/y, the assessments should be refined and, where appropriate, more realistic assumptions made. However, sufficient caution should be retained in assessments to provide confidence that actual doses received by the representative person will be below the dose limit.
- 8 The assessment of dose to the representative person should take account of accumulation of radionuclides in the environment from future discharges.
- 9 The realistic habits adopted for the representative person should be those which have actually been observed at the site, within a period of about 5 years. Changes to habits which are reasonably likely to occur should be taken into account.
- 10 Land use and infrastructure should have sufficient capacity to support the habits of the representative person. Any changes to land use and infrastructure should be



reasonably likely to occur over a period of about 5 years and be sustainable year on year for them to be considered.

1.2. Radiological protection criteria (effective dose to humans)

The following points outline the dose criteria that are relevant to this series of assessments. (References A3-2 & A3-3)

•	Dose Limit	1 millisievert (1,000 ² microsieverts) per year
•	Site Dose Constraint	0.5 millisievert (500 microsieverts) per year
•	Source Dose Constraint	0.3 millisievert (300 microsieverts) per year
•	Threshold for Optimisation	0.02 millisievert (20 microsieverts) per year

1.3. Radiological protection criteria for the environment

There are currently no statutory limits on concentrations of radionuclides in, or radiation doses to, organisms other than human beings. The International Atomic Energy Agency (References A3-4 & A3-5) has published guideline dose rates, below which it is considered unlikely that there would be any significant effect on populations of other organisms.

These dose rates are:

- Terrestrial animal populations at chronic dose rates below 40 µGy/h;
- Terrestrial plant populations at chronic dose rates below 400 µGy/h;
- Populations of freshwater and coastal organisms at chronic dose rates below 400 µGy/h

This is further considered in section 3.5 of the decision document.

1.4. Dose assessment process

Dose assessments follow a staged approach, following the assessment principles, to produce a cautious assessment of dose to the representative person. If the dose is less than 0.02 mSv/y

² <u>The Environmental Authorisations (Scotland) Regulations 2018</u> Schedule 8, Part 3 26 (2) denotes legal dose limit of 1 millisievert per year to a member of the public. One millisievert is equal to 1,000 microsieverts, however microsieverts are used in this report as the calculated values are small and this aides comparisons.

(20 microsieverts) then under principle 7, regulators should not seek any further reduction in dose providing that the operator can demonstrate that they are applying Best Practicable Means to limit the impact of their discharge. Care would be required to ensure that the exposure pathways were suitably conservative.

SEPA utilises both commercially and freely available dose assessment software and bespoke software developed for SEPA's purpose. These programmes are as follows:

- PC-Cream 08 which allows modelling of dose impacts and environmental concentrations to defined human receptors for liquid discharges and gaseous emissions. (Reference A3-6)
- SEPA uses a spreadsheet tool to determine the impact of minor liquid discharges to the Scottish sewer network. This is a bespoke tool that was developed by SEPA, available on our website. (References A3-7 & A3-8)
- (iii) ERICA tool is used to determine the potential impact of liquid discharges, gaseous emissions or environmental concentrations on non-human species. This can use authorised discharge limits and a basic dispersion model or environmental concentration data from other modelling tools. (Reference A3-9)

1.5. Dose assessment conclusion

The results produced from modelling the discharges from HMNB Clyde, outlined in section 2 of the decision document, demonstrate that the impact of radioactive discharges to members of the public will not exceed legal public dose limits of 1,000 microsieverts per year; nor the lower site dose constraint of 500 or source dose constraint of 300 microsieverts per year. The calculated doses have also been compared to the threshold of optimisation of 20 microsieverts per year, below which regulators should not seek further reductions in discharges provided that the regulator is satisfied that the operator is employing Best Practicable Means (BPM) to protect the public. Additionally, the potential radiological impact on the environment and wildlife has been conservatively assessed and the impact will not produce a dose rate exceeding recommended rates.

The assessments undertaken also addresses concerns raised by some parties namely:

(i) Relative Biological Effectiveness (RBE) of Tritium



(ii) The impact of Elemental and Organically Bound Tritium

In summary, SEPA is confident that:

- The annual dose constraints and limits are will not be exceeded based on this assessment
- The dose rate guidance for exposure to non-human species are will not be exceeded based on this assessment.
- Issues raised regarding RBE of Tritium and organically bound Tritium are not of concern.

2. Summary of doses

Dose assessments have been undertaken for the disposal of aqueous liquids, general effluents and gas from HMNB Clyde to the local environment to support the regulatory decision-making process. In each case the calculations were done using conservative assumptions, for example high rates of local food consumption. This ensures that the calculated doses are extremely conservative, for example it is unlikely that so much local food is available all year at the quantities consumed or that occupancy of local areas is as high as the values used in the assessment. The details for each assessment pathway are presented in sections 3, 4, 5 and 6 of this appendix.

Doses to humans from all pathways were assessed as being less than 1 microsieverts /year and therefore below the value of 20 microsieverts per year which is the threshold for optimisation and provided that Best Practical Means (BPM) is being used SEPA would not normally require further reductions in the discharges or refinement of the modelling based on a graded approach. This is supported by Principle 7 from section 1.1 which states "*Where a cautious estimate of the dose to the representative person exceeds 0.02 mSv/y, the assessments should be refined and, where appropriate, more realistic assumptions made. However, sufficient caution should be retained in assessments to provide confidence that actual doses received by the representative person will be below the dose limit. ".*

In order to assess the potential impact on non-human species SEPA assessed the proposed releases using the SEPA Sewage Model or the Non-Human species dose assessment tool (known as the ERICA tool). The results show that the values are far below the threshold values recommended by IAEA (References A3-4 and A3-5)



3. HMNB Clyde (Faslane) aqueous liquid disposals

Aqueous liquid disposals from Faslane are discussed in sections 2.1.2 and 4.2.1 of the decision document. The assessment of the dose resulting from these disposals was carried out using PC-Cream modelling software taking a conservative approach ensuring that the input parameters resulted in the calculation of the maximum dose.

The proposed annual limit of discharges, shown in Table , were used to calculate the resultant doses from the aqueous liquid disposals. Where there are limits for groups of radionuclides, such as "all non-alpha emitting radionuclides..." SEPA adopted the approach of taking the most restrictive radionuclide. For example, both nickel-63 and caesium-137 were modelled for the non-alpha emitting grouping and the results for caesium-137 were included in the final assessment as they were higher. Additionally, to achieve the maximum calculated doses extremely conservative input parameters, such as high consumption of food from the local compartment have been used in the assessment. Relevant data on occupancy rates, consumption and inhalation of sea spray are displayed in Table to 4 (Reference A3-10).

The resultant doses to the most exposed groups of each age category assuming the parameters above including discharge at the limits are, shown below and all significantly less than 1 microsievert/year:

Adult 1.55E-02 microsieverts/year

Child 2.53-02 microsieverts/year

Infant 7.14E-03 microsieverts/year

Table 1: Annual discharge limits for radioactive liquid effluent discharged from the REDF or NSH (Faslane)

Radionuclide	Proposed annual limit (MBq)
Tritium	500,000
Carbon-14	100
Cobalt-60	100
All alpha	5
All non-alpha	100

Table 2: HMNB Clyde (Faslane) liquid - external habits

Pathway	Age group	Local occupancy (h/y) ³
External beta from beaches	Adult	2.00E+03
External gamma from beaches	Adult	2.00E+03
External beta from fishing equipment	Adult	2.00E+03
External gamma from fishing equipment	Adult	2.00E+03
External beta from beaches	Child	2.00E+03
External gamma from beaches	Child	2.00E+03
External beta from fishing equipment	Child	0.00E+00
External gamma from fishing equipment	Child	0.00E+00
External beta from beaches	Infant	2.00E+03
External gamma from beaches	Infant	2.00E+03
External beta from fishing equipment	Infant	0.00E+00
External gamma from fishing equipment	Infant	0.00E+00

³ Regional occupancy was zero hours for all pathways. Therefore, as all time was considered to be spent in the local area this ensure a conservative assessment.

Food	Age group	Ingestion rate (kg/y)
fish	Adult	2.01E+02
crustaceans	Adult	2.00E+01
molluscs	Adult	2.00E+01
seaweed	Adult	4.00E+00
fish	Child	2.01E+02
crustaceans	Child	2.00E+01
molluscs	Child	2.00E+01
seaweed	Child	4.00E+00
fish	Infant	5.00E+00
crustaceans	Infant	0.00E+00
molluscs	Infant	0.00E+00
seaweed	Infant	0.00E+00

Table 4: HMNB Clyde (Faslane) liquid - inhalation of sea spray

Age Group	Inhalation rate (m3/y)	Distance from the sea (m)	Time spent near the sea (h/y)	Source compartment
Adult	8.10E+03	1.00E+02	2.00E+03	Faslane (local compartment)
Child	5.60E+03	1.00E+02	2.00E+03	Faslane (local compartment)
Infant	1.90E+03	1.00E+02	2.00E+03	Faslane (local compartment)

⁴ It was assumed that 100% of the food groups was caught in the local area. This ensures the most conservative approach to assessment.

4. HMNB Clyde (Faslane) gaseous disposals (NSH)

Gaseous disposals from Faslane are discussed in sections 2.1.3 and 4.4.1 of the decision document. The PC Cream model was used for a disposals of gaseous wastes using conservative parameters and at the proposed annual limits from the Nuclear Support Hub (NSH) (Table). A stack height of 10 m was used, alongside average weather that was uniformly distributed. Receptors were set at straight-line distances of 100, 200, 500 and 1000 m. Occupancy outdoors was set to the default 10%. Consumption rates of various food groups was set to critical to further enhance the level of conservatism. Input parameters are detailed in tables 6, 7 and 8. Doses to the most exposed group within each age category, shown below, were calculated to be at 100m from the stack and were all significantly less than 1 microsievert per year.

Adult 2.92E-04 microsieverts/year Child 2.89E-04 microsieverts/year Infant 4.34E-04 microsieverts/year

Radionuclide	Proposed annual limit (MBq)
Tritium	200
Carbon-14	1
Noble gases	100

Table 5: NSH gaseous (Faslane) proposed discharge limit

5. HMNB Clyde (Coulport) gaseous disposals

Gaseous disposals from Coulport consist only of tritium and are discussed in sections 2.2.3 & 4.4.1 of the decision document. An assessment using the PC Cream model was undertaken for a disposal of gaseous wastes using conservative parameters at the proposed annual limit, 25 Giga-becquerels. A stack height of 3 m was used, alongside average weather that was uniformly distributed. Receptors were set at straight-line distances of 100, 200, 500 and 1000 m. Consumption rates of various food groups was set to critical to further enhance the level of conservatism. Input parameters are also detailed in tables 6, 7 and 8.



The assessment showed that the highest calculated gaseous dose at Coulport was at a distance of 100m to the three age categories shown below and were all significantly less than 1 microsievert per year:

Adult - 5.85E-02 microsieverts/year

Child - 5.72E-02 microsieverts/year

Infant - 1.03E-01 microsieverts/year

Table 6: Occupancy (all age groups at all locations)

Time at location (h/y)	Fraction of time spent indoors	Cloud gamma location factor	Deposited gamma location factor	Cloud beta location factor	Deposited beta location factor	Inhalation location factor
8.76E+03	9.00E-01	2.00E-01	1.00E-01	1.00E+00	1.00E+00	1.00E+00

Table 7: Inhalation rate (adult, child, infant at all locations)

	Adult	Child	Infant
Inhalation rates (m ³ /y)	8.10E+03	5.60E+03	1.90E+03

Food	Adult ingestion rate (kg/y)	Child ingestion rate (kg/y)	Infant ingestion rate (kg/y)
Cow meat	4.50E+01	3.00E+01	1.00E+01
Cow milk	2.40E+02	2.40E+02	3.20E+02
Cow milk products	6.00E+01	4.50E+01	4.50E+01
Cow liver	1.00E+01	5.00E+00	2.75E+00
Sheep meat	2.50E+01	1.00E+01	3.00E+00
Sheep liver	1.00E+01	5.00E+00	2.75E+00
Green vegetables	8.00E+01	3.50E+01	1.50E+01
Root vegetables	1.30E+02	9.50E+01	4.50E+01
Grain	1.00E+02	7.50E+01	3.00E+01
Fruit	7.50E+01	5.00E+01	3.50E+01

Table 8: Ingestion rates (adult, child, infant at all locations)

6. HMNB Clyde general effluents

General effluents are discussed in 2.1.2, 2.2.2 & 4.3 of the decision document. Dose assessments were carried out to assess the potential impact if general effluents were transferred to local sewage treatment works (STW): Faslane STW, Laigh Park STW (Paisley), Dalmuir STW and Daldowie STW (both Glasgow) for disposal. Additionally oily wastes may be directed to the nearby Oil Fuel Depot where the oily contaminants are separated, and the aqueous fraction is disposed to the Gareloch. As this fraction potentially contains very low levels of tritium this is a potential public exposure pathway covering workers inside the facility and members of the public this route was included in the assessment.

The assessment was performed using the SEPA Multiple Release Tool (References A3-7 & A3-8) assuming a worst-case where the entirety of the proposed limit is discharged to a single site. Not all the receptors are applicable for each disposal route.

The resultant doses are presented in Table 9. The maximum dose was to any receptor via any route was 0.02 microsieverts and therefore significantly less than 1 microsievert per year.

Table 9: Sewer disposal doses (sewer disposal)

Receptor	Paisley	Daldowie	Dalmuir	Faslane STW	Faslane Oil
STW worker dose at STW	1.9E-07	1.4E-07	7.0E-08	1.75E-05	4.16E-03
Farming family dose (sewage sludge to land)	2.6E-04	1.9E-04	9.4E-05	2.35E-02	N/A
Child playing in burn	4.6E-06	4.6E-06	4.6E-06	N/A	N/A
Angler dose (river)	1.0E-04	1.0E-04	1.0E-04	1.0E-04	N/A
Irrigated food consumer dose (river water)	7.6E-06	7.6E-06	7.6E-06	7.61E-06	N/A
Fisherman dose (estuary/coastal)	2.5E-05	2.5E-05	2.5E-05	2.52E-05	2.52E-05

NB: all doses are in microsieverts/year

All the exposure pathways are hypothetical and may not be present at the sites assessed, however they represent the worst-case assessment.

9. Impact on non-human species

9.1. Background and drivers

The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) transpose into UK legislation the European Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna ("the Habitats Directive"). They also effectively confer equal legal protection to Special Areas of Conservation (SACs) protected under the Habitats Directive and areas designated under the older Directive 79/409/EEC on the Conservation of Wild Birds ("the Birds Directive"), known as Special Protection Areas (SPAs). (Reference A3-11)

In addition to sites designated or undergoing designation, under the above Directives, Government has decided to afford the same level of protection to sites designated under the Ramsar Convention on Wetlands of International Importance (Ramsar sites).

Collectively, these sites are referred to as European Sites, or Natura 2000 Sites.

SEPA is required by its obligations as a competent and relevant authority, to apply the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) ("the Regulations") when considering all applications for authorisations, permissions, permits, consents and environmental licences.



There are currently no statutory limits on concentrations of radionuclides in, or radiation doses to, organisms other than human beings. The International Atomic Energy Agency (References A3 4, A3 5) has published guideline dose rates, below which it is considered unlikely that there would be any significant effect on populations of other organisms.

These are:

- Terrestrial animal populations at chronic dose rates below 40 µGy/hr
- Terrestrial plant populations at chronic dose rates below 400 µGy/hr
- Populations of freshwater and coastal organisms at chronic dose rates below 400 µGy/hr.

To fulfil the requirements of the Directive, SEPA has adopted the ERICA assessment tool. The key outputs of the ERICA model are dose rates and risk quotients. The risk quotient is the ratio of the predicted environmental dose rate, and the benchmark dose rate assumed to be environmentally 'safe'. The default benchmark in ERICA is the screening dose rate for incremental exposure of 10 μ Gy hr⁻¹. This value can be modified by the user but is considered sufficiently cautious that if it is not exceeded SEPA would not affect the Natura 2000 site to be deleteriously affected by the discharge.

The impact on non-human species of the proposed liquid and gaseous discharges from HMNB Clyde and those via the sewer network was assessed.

Figure 1 shows designated conservation areas (Special Areas of Conservation, Special Protection Areas, RAMSAR sites and Special Sites of Scientific Interest) near HMNB Clyde. HMNB Clyde is located approximately within the red circle of this image, which covers around 5 miles in diameter. The Inner Clyde Site of Special Scientific Interest is approximately 10 miles from the center of the red circle covering the main liquid discharge point. Additionally, Craighoyle Woodland and Lock Eck (both designated SSSI sites) are within 7 miles to the west of the HMNB Clyde site. (Reference A3-12)





Figure 1: SSSI, SAC, SPA and RAMSAR sites near HMNB Clyde (Ref 13)

Whilst it is important to understand where these sites are located it does not have an impact on the initial modelling assessment as it is assumed that all discharges are made directly to a designated site (within 100 m to allow for mixing) at the highest concentration (i.e. highly conservative). Should the assessment indicate higher risk quotients that give risk to potential concern then more detailed modelling would be undertaken.

PC-Cream 08 was used to determine the environmental concentrations in unfiltered seawater and air. These values were used as an input to the Environmental Risk from Ionising Contaminants: Assessment and Management (ERICA) programme. The output of the ERICA programme is given as a 'Risk Quotient' (RQ). If the RQ is less than less than one this gives high confidence that the screening dose rate will not be exceeded, and no further assessment is needed. The RQ for HMNB Clyde to non-human species was calculated as < 1 for all liquid and gaseous disposal pathways. Consequently, there is no need to undertake additional or more detailed modelling determining the impact on non-human species.

The modelling was undertaken against a target dose rate of 10 microgray/hr, which is lower (and therefore more restrictive) than the IAEA suggested thresholds for dose rate applicable to



non-human species. The calculated dose rates from liquid and gaseous discharges from either Faslane or Coulport, and those made via the sewer network were less than 10 microgray/hour as shown in table 10.

Site	Wildlife & environmental dose
Faslane Non-Human Species Assessment – Sewer*	Dose rate < 10 microgray/hr
Faslane Non-Human Species Assessment – Liquid	RQ 1.76E-08, Dose rate < 10 microgray/hr
Faslane Non-Human Species Assessment – Gaseous	RQ 5.74E-03, Dose rate < 10 microgray/hr
Coulport Non-Human Species Assessment – Gaseous	RQ 4.9E-03, Dose rate < 10 microgray/hr

Table 10: Dose to non-human species

* This assessment is undertaken using the SEPA Sewer Tool, which provides a combined human and wildlife dose assessment. Other results in the table were performed using the ERICA assessment tool and outputs from PC-Cream, which provides the answer in the form of a Risk Quotient (RQ). Providing the RQ is less than 1, the assessment is confident that the dose rate will not be exceeded. The IAEA recommendation is that dose rate for terrestrial plants and animals does not exceed 40 microgray/hr.

10. Relative biological effectiveness value of tritium

There is scientific debate regarding the appropriate Relative Biological Effectiveness (RBE) for tritium. In order to ensure conservatism in assessment, consideration of the implication of changing the RBE of tritium from a value of one to 20 was undertaken for assessments calculated in PC Cream. The impact of this on doses was negligible and all doses remained less than 1.0 microsievert per year on a conservative basis.

11. Organically bound tritium

Elemental tritium will over time translocate into organically bound tritium (OBT), with a resultant increase in dose coefficient from 1 to 2.33. In order to ensure conservatism in assessments, it was assumed that all of the tritium was in OBT form. The impact of this on doses was negligible

and all doses remained less than 1 microsievert per year on a conservative basis. (Reference A3-13)

12. Appropriate dose coefficient of tritium

During the consultation the Nuclear Free Local Authorities challenged the coefficients used for Tritium in dose assessments, see appendix 4 table 2.

SEPA has considered this concern and provides the following response:

Dose coefficients are set by the International Commission on Radiological Protection (ICRP) and adopted for use by the International Atomic Energy Agency and European Commission. (Reference A3-13) in the United Kingdom, the UK Health Security Agency is responsible for providing advice to government, regulators and the public on risks associated with radiation. A predecessor body to the UKHSA has published advice on the uncertainty related to specific dose coefficients (assessing the reliability of Dose Coefficients for Ingestion and Inhalation of Radionuclides by Members of the Public, HPA-CRCE-048 (publishing.service.gov.uk) (Reference A3-14). This report has shown that there is a potential uncertainty of 2 for tritium (both as Organically Bound Tritium and Tritiated Water). SEPA cannot deviate from published data without good reason, however we have considered the potential impact of the tritium dose coefficient changing in future publications of the ICRP dose coefficients (as a measure of the ability of a radionuclide to cause harm) for tritium, SEPA has assessed the impact of varying the discharge to increase the concentration of tritium as a proxy for changing the dose coefficient.

SEPA assessed the impact of a potential change by modifying input parameters to the dose equation.

Equivalent Dose = (i) Activity Concentration x (ii) Dose Coefficient x (iii) Intake

Where:

(i) is the activity concentration in selected media (e.g. water, fish, etc) measured in Becquerels per litre or Becquerels per kilogram (from modelled data);

(ii) the Dose Coefficient is measured in Sieverts per Becquerel (from published data);



(iii) Intake is the amount of the particular media consumed per year measured in litres per year or kilograms per year (from model or published data).

The industry standard modelling tool, PC-Cream, does not allow for modifications to the dose coefficient values so the only method that SEPA could use to mimic the potential change is to modify the other parts of the dose assessment equation by (i) increasing the activity concentration or by (iii) increasing the intake of food/water. SEPA modelled this change by increasing the amount of tritium discharged to increase the activity concentration in various environmental media.

The results demonstrated that changing the amount of tritium discharged in the model by a factor of twenty (and thus replicating changing the dose coefficient by the same amount) resulted in only a minor change in the actual results of the impacting dose to the public. SEPA continued modelling changes to identify at what point the site dose limit of 0.5 mSv/y and the public dose limit of 1 mSv/y would occur. The modelling identified that the discharge could be in the region of 25E18 Bq/y of tritium before the public dose limit was exceeded. This represents an increase of some 50 million times the proposed discharge limit of 5E11 Bq/y, which is many times higher than the proposed tritium dose coefficient value of 20 x times higher.

This modelling, although extreme, demonstrates that the impact of the tritium dose coefficient changing by a factor of 20, does not pose a realistic risk to human health.

13. Appendix 3 References

- A3-1 <u>Principles for the assessment of prospective public doses arising from authorised</u> <u>discharges of radioactive waste to the environment. Reviewed Oct 2019 RS-JG-016</u>
- A3-2 The Environmental Authorisations (Scotland) Regulations 2018
- A3-3 UK policy framework for managing radioactive substances and nuclear decommissioning
- A3-4 IAEA Technical Report Series No 288 (1988) Assessing the impact of deep-sea disposal of low level radioactive waste on living resources.
- A3-5 <u>IAEA Technical Report Series No 322 (1992) Effects of ionising radiation on plants and</u> <u>animals at levels implied by current radiation protection standards.</u>
- A3-6 PC-CREAM Radiological Impact Assessment Software



- A3-7 SEPA Radiological Dose Assessment Tool
- A3-8 SEPA Radiological Dose Assessment Tool Guidance
- A3-9 ERICA tool
- A3-10 Radiological Habits Survey: HMNB Clyde (Faslane & Coulport) 2016
- A3-11 <u>Scottish Office Circular No. 6/1995, Nature Conservation: Implementation in Scotland of</u> <u>EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and</u> <u>the Conservation of Wild Birds ('The Habitats and Birds Directives')</u>
- A3-12 Designated Conservation Sites
- A3-13 ICRP, Publication 119, Compendium of Dose Coefficients based on ICRP Publication 60
- A3-14 Assessing the reliability of Dose Coefficients for Ingestion and Inhalation of Radionuclides by Members of the Public

Appendix 4 – consultation response

1. Introduction

This appendix details the comments received during the consultation stages for the application from MoD to SEPA for an approval to dispose of radioactive waste from HMNB Clyde. SEPA's determination process included three stages of consultation in accordance with SEPA's standard procedure for applications from nuclear licensed sites. The following sections provide more detail on the consultation responses received during each of the three consultation stages.

2. Stage 1 consultation

Consultation process

Stage 1 consultation involved the Scottish Ministers, the Office for Nuclear Regulation (ONR) and Food Standards Scotland (FSS). The Defence Nuclear Safety Regulator (DNSR) was also consulted at this stage as it is an MoD application. These consultees were invited to comment directly on the submitted application. Stage 1 consultation for the HNMB Clyde application occurred in the Autumn of 2019.

Consultation response

The responses are summarised in below. No objections to the applications were raised and some responders noted positive outcomes from the proposed updates.

Scottish Government:

No specific comments on the technical aspects of the proposal and consider SEPA are best placed to assess these. In response to a particular question about the application of Article 37 of the Euratom Treaty, the Scottish Government confirmed that it did not apply to military activities.

Food Standards Scotland (FSS):

Assessed the effective dose to the public via the food chain as a consequence of the limits proposed for radioactive discharges from HMNB Clyde. FSS concluded that it does not believe that the applied-for limits for radioactive discharges represent a significant risk to human health via the food chain.



Office for Nuclear Regulation (ONR):

No objections to updating all the existing arrangements for the disposal of radioactive wastes from HMNB Clyde. ONR noted that introduction of a modern facility for the treatment of radioactive waste on the site will reduce risks associated with radioactive waste on the site and that expanding the scope of waste disposal routes to those that are legally entitled to receive it will facilitate timely disposals of radioactive waste and reduce hazards on the site.

Defence Nuclear Safety Regulator (DNSR):

No objections raised. DNSR stated that it is content with the description of the work and planned work and welcomed the prospect of combining the exiting approvals.

3. Stage 2 consultation

Consultation process

Stage 2 consultation engaged with other relevant bodies, organisations, and the general public. In advance of the stage 2 consultation, SEPA identified and subsequently contacted organisations and public bodies which were considered to have an interest in the application. These parties included local health boards, Public Health England (now UK Health Security Agency), Committee of Medical Aspects of Radiation Effects (COMARE) and Scottish National Heritage (now Nature Scot). Additionally, the consultation was advertised publicly in local and national newspapers and on SEPA's website. This process encouraged the public and other interested organisations to respond to the consultation.

Stage 2 consultees, including the online consultation, were provided with a pack comprising of the application (appendix 2), the responses from first stage consultees and a consultation document prepared by SEPA giving further explanation for the application. This stage took place in quarter one of 2020.

The consultation document asked six questions:

- Do you have any comments on the proposed changes to the Letter of Agreement for liquid and gaseous wastes from Faslane and in particular the annual limits proposed by MoD?
- 2. Do you have any comments on the proposed changes to the Letter of Agreement for solid wastes from Faslane?



- 3. Do you have any comments on the proposed changes to the Letter of Agreement for gaseous wastes from Coulport?
- 4. Do you have any comment on the proposed change to the Letter of Agreement for solid wastes from Coulport?
- 5. Do you have any comments on the proposed change of adding the disposal of liquid waste form Coulport to Faslane to an updated Letter of Agreement?
- 6. Do you have any comments on the proposed changes to SEPA updates to the Letters of Agreement?

Consultation response

Over 7,000 responses were received to the Stage 2 consultation. For comparison, previous consultations on EASR applications for nuclear sites receive typically receive less than 12 responses. The style of responses varied, with some responders answering the consultation questions, others providing a single response to all questions, and some responding without reference to the questions.

SEPA normally addresses each response individually within the application decision document. However, the number of responses and the nature of the responses to this consultation made this approach impractical. Therefore, to address the responses SEPA reviewed all the responses and those received on behalf of a recognised organisation were identified for a detailed consultation response whilst the remaining responses were grouped and addressed as common themes.

Detailed consultation responses

Where a detailed response was received from an organisation SEPA have addressed the points raised. These detailed responses are provided in Table 2 of this appendix. This approach includes a response to over 5,000 responses that were received from individuals using a template developed by the Scottish Green Party.



Table 2: Detailed responses from Stage 2 Consultation

Green Petition (circa 5,700 responses)

Dear SEPA

I am emailing in response to the HMNB Clyde application consultation, to register my opposition. I wish to register my opposition on the following grounds:

The Ministry of Defense's stated intention to build a new Nuclear Service Hub and host an increased number of nuclear submarines will lead to increases in both radioactive waste and other pollutants into the natural environment.

The MoD application identifies significant anticipated increases in discharges of cobalt-60 (up to 52 times based on previous years) and tritium (up to 30 times based on previous years). I consider it to be an unacceptable risk to the local environment and communities around the Gare Loch to increase these discharges so significantly, particularly when this is an entirely avoidable outcome.

I understand that SEPA has highlighted the proposal to reduce the maximum discharge limits.

However, it is clear that for the last several years discharges have been significantly below those permitted levels and so lowering that limit will still permit actual discharge levels to increase significantly, as outlined above. The direction of travel should be towards reducing and ending the discharging of radioactive waste, not increasing it.

The existence of these submarines and their criminal arsenals is a democratic outrage. I accept that this is not criteria relevant to SEPA's consideration of this application but would urge you to consider that a risk already exists due to the existence of this nuclear arsenal and that any increase in that risk is both unnecessary and unacceptable.

SEPA Response

The number of submarines based as HMNB Clyde is a matter for UK Government and not SEPA. Further details on SEPA's remit are provided in the introductory sections of the decision document, see sections 1 and 2.

Given the ongoing presence of submarines, SEPA is supportive of the MoD's plans to build a new facility and to implement best practical means for the treatment of any radioactive waste produced. This approach is in keeping with wider industry standards and should reduce the already low environmental impact further.

The limits currently agreed for HMNB Clyde discharges to the Gare Loch are significantly higher than the actual discharges. The proposed new limits are substantially lower than the existing

limits. Further details on limit setting and dose assessment are given in section 4 of the decision document.

Nuclear Free Local Authorities /KIMO

Re: NFLA / KIMO International SEPA consultation on the MOD application for radioactive waste disposal at HMNB Clyde

Dear SEPA Registry Department,

I attach with this letter the submission of the Nuclear Free Local Authorities (NFLA) Scotland Forum to the SEPA consultation on the Ministry of Defence (MoD) application for radioactive waste disposal at HNMB Clyde. This submission is also fully supported by KIMO International, an international group of local authorities concerned with the issue of protecting the marine environment.

For your information, the NFLA Scotland Forum is part of a local authority group which is made up of Councils from Scotland and is headquartered in Glasgow. There are also National NFLA Forums in Wales, Northern Ireland and the Republic of Ireland; and a UK and Ireland Steering Committee and Secretariat based in Manchester. NFLA raises legitimate concerns and issues over all aspects of nuclear policy and energy policy in order to assist local government in meeting its commitment to sustainable development, energy policy development, environmental protection and public safety. Further details on its remit can be found at its website <u>http://www.nuclearpolicy.info</u> or by contacting the NFLA Secretariat using the details at the top of this letter. NFLA is content for its submission to be made public on the Common Weal website, and a modified copy of this response will go on the NFLA website. I also send with this submission our response to your additional form.

The NFLA Scotland response gives our overview and comments on all the core aspects of the MOD application.

1. Background to the NFLA submission

NFLA notes that this application by the MoD covers proposed discharges from a new effluent treatment facility at Faslane and seeks to update existing arrangements. The MoD is building a Nuclear Support Hub (NSH) at Faslane which will centralise the existing radioactive waste handling facilities and radiochemistry laboratories.

The NSH is situated in a new location within the Faslane site, with a new effluent discharge point into the middle of the Gare Loch. This is one of the reasons it is argued that a new site



agreement is needed. NFLA notes that Faslane's function is to support the operation of nuclear submarines including routine maintenance and the provision of associated services. The number of nuclear submarines which operate from Faslane is also scheduled to increase. This will be the main reason why, despite the application being for lower absolute limits for liquid radioactive discharges into the Gare Loch, actual discharges are expected to increase, some by very large amounts. *NFLA strongly objects to these increased radioactive discharges which, if permitted by SEPA, would result in increased radioactive contamination of the entire Gare Loch, including its flora and fauna, and would result in increased radiation doses to people living in the vicinity of the Loch.*

The MoD is exempt from the provisions of the Environmental Authorisations (Scotland) Regulations 2018(EASR). However, MoD policy states that:

"Where Defence has exemptions, derogations or dis-applications from HS&EP legislation, we maintain Departmental arrangements that produce outcomes that are, so far as reasonably practicable, at least as good as those required by UK legislation."

In NFLA's view, there is no good reason for these exemptions, derogations and disapplications from HS&EP legislation. These should apply to the MOD as they do to all employers. This is particularly the case for all civilian contractors.

Page 10 of document 1 says:

"It should be noted that although there are plans to increase the numbers of submarines at Faslane this does not represent any change to the nature of the radioactive waste arising although it may have an impact on the quantity of waste produced."

In other words, the amount of radioactive wastes will be substantially increased.

2. Radioactive Waste at Faslane

NFLA note that, at present, liquid wastes generated from operations at Faslane can be conveniently split into 3 distinct groups:

- Effluent discharged directly to Primary Effluent Tanks (PETs) for routine processing at the Radioactive Effluent Disposal Facility (REDF);
- 2. Liquid waste collected in carboys (a rigid container like a demijohn) from controlled contamination areas which may also include hazardous chemicals; and
- 3. Large volumes of conventional effluents from submarine that are not directly associated with submarine nuclear reactor plant.



NFLA understand the sources of liquid waste arising at Faslane include:

- a. The bulk of activity discharged originates from the operation of submarine reactor circuits and associated plant.
- b. Small volumes arise from maintenance work and on shore laboratories.
- c. Liquid waste also arises from conventional operations within the submarine that are not associated with the reactor and are often referred to as general effluents. These effluents contain pollutants such oils, greases and sewage. Tritium has been detected at levels below 1 Bq/ml: this means 1,000 Bq per litre which is a relatively high concentration. Due to the non-radioactive contaminants these effluents are not suitable for treatment as radioactive effluents. Furthermore, the MOD application claims that there is no practical way of removing the tritium. The application seeks to increase the permitted concentration level from 1000 to 100,000 Bq/l but allegedly with no increase to the overall total activity disposed. It remains to be seen whether this will be so in practice, as higher concentrations have been found in similar effluents produced at other UK naval bases.
- d. Trim and ballast water is used to adjust submarine buoyancy and manoeuvrability. This water sometimes contains allegedly "trace" amounts of tritium.
- e. Chemically contaminated wastes containing low levels of radioactivity occasionally arise from submarine operations. This contains tritium but the MOD states it does not know where this tritium comes from: this does not inspire confidence in the MOD application. The chemical content means that they are unsuitable for ion exchange and are therefore unsuitable for onsite treatment. Currently there is no agreed disposal route for these wastes.

Radionuclide	Current rolling 12 monthly total limit (MBq)	Previous annual discharges (MBq)			MoD proposed annual limits (MBq)		
		2014	2015	2016	2017	2018	
Cobalt 60	500	0.12	0.63	0.33	0.68	0.49	100
Tritium	1,000,000	3810	19500	11000	330000	5816	500,000
Gross beta	500	0.25	1.47	0.66	1.36	0.99	100
Gross alpha	200	0.02	0.12	0.07	0.14	0.10	50
Carbon 14	n/a						100

Table 2: Liquid Discharges from Faslane



3. Tritium

It is noticeable that these discharges are dominated by tritium, the radioactive isotope of hydrogen. In NFLA's view, the MOD needs to develop its awareness of the multiple hazards of tritium and its expertise in handling tritiated wastes. Contrary to the MOD's apparent view that tritium's is not very hazardous, the reality is that it is a very hazardous internal emitter indeed. (1)

In recent years liquid discharges from Faslane have been considerably lower than agreed limits. As can been seen from table 2 above MoD have proposed substantial reductions in annual limits. *In the interests of transparency, NFLA considers that an explanation for the massive increase in tritium discharge in 2017 should be explained.*

Of course, what the public will be concerned about is the actual level of discharges, rather than the proposed limit. In recent years we have seen several applications by nuclear operators where the proposed limits are being decreased, but the expected actual level of discharges is increasing.

The new proposed limits include, for the first time, a specific limit for Carbon-14. It has taken the MOD a long time to recognise that C-14 is a significant radionuclide in nuclear submarines.

4. Gaseous waste discharged at Faslane

NFLA note that the sources of gaseous wastes are limited to discharges from the Radiochemical Laboratory, evaporation from effluent tanks and ventilation of the solid waste handling facility; (see section 3.8 of paper 4b). MoD reviewed current practices and the arrangements for the NSH to characterise and quantify the likely gaseous wastes. This work is reported in sections and 5.8-5.10 of paper 4b and suggests the following annual numerical limits for the NSH:

Tritium - 200MBq

Carbon 14 – 1MBq

Noble Gases - 100MBq

The MOD application states: "Any gaseous releases direct from the submarine are regulated by the Defence Nuclear Safety Regulator (DNSR) in accordance with the SEPA MoD agreement relating to matters involving radioactive substances."



In NFLA's view, this "sweeping under the carpet" treatment for such gaseous emissions is regrettable.

5. Solid Waste at Faslane

Solid waste arises from a number of submarine support activities including routine maintenance and the decommissioning of obsolete equipment and facilities. Previously solid waste has been disposed of to Drigg or Sellafield. It is now standard practice for SEPA allow the transfer of waste to any site that is lawfully entitled to receive it without specifying the site, subject to the application of best practical means.

In summary the proposed changes to the liquid, gaseous and solid arrangements for Faslane are:

- 1. Continue disposal of liquid wastes to the Gare Loch but with reduced limits.
- 2. To increase the concentration of tritium but not the total activity in general effluents discharged.
- 3. Allow for the receipt, treatment and disposal of radioactive effluents associated with supporting submarines at foreign ports or Coulport.
- 4. To add limits for the discharge of gaseous wastes at Faslane.
- 5. Disposal of low-level radioactive waste (LLW) will be brought in line with SEPA standard practice for all civil sites such that it will no longer be restricted to named facilities within the UK and will not be restricted in terms of volume or additional activity constraints. Regrettably SEPA does not explain why no restrictions are to be imposed.

6. Radioactive waste at Coulport

Weapon support activities at Coulport result in the generation of small quantities of solid and gaseous waste. Gaseous waste disposal may occur during weapon container storage or when the containers are opened in the Weapon Processing Area (WPA). In addition, material used to control the environmental conditions within weapon containers may become contaminated with tritium during use and, following analysis, may require disposal as radioactive waste.

In 2011 the level at which tritium contaminated waste is considered 'out of scope' of RSA93 was raised from 0.4 Bq/g to 100 Bq/g. *The NFLA was not consulted about this large relaxation in standards and fails to see why such a massive increase was permitted.*



This increase has meant that 95% of desiccant – used to control humidity in weapons stores and transport containers is now assessed as <100 Bq/g and disposed of as non-radioactive waste. Only a few kg of desiccant has been disposed of as radioactive waste since 2011.

Limited submarine maintenance currently takes place at the Explosive Handling Jetty (EHJ) at Coulport. Currently any radioactive waste generated (presumably not including gases?) must be stored on-board until the submarine berths at Faslane.

All solid radioactive waste generated is transferred to Faslane for storage and eventual disposal.

Gaseous releases from Coulport are solely of tritium. It is proposed to reduce the annual rolling limit from 50 GBq to 25 GBq. However, 25 GBq/a remains a very large amount.

The MoD has asked to be allowed to transfer of low-level solid wastes from Coulport to Faslane. It also wants to agree with SEPA suitable routes for liquid waste disposals from Coulport for treatment at Faslane or disposal as a general effluent.

7. Increases in liquid radioactive waste discharges

For the NFLA, the area of most concern with regard to this application is the proposed large increase in liquid radioactive discharges from the Effluent Treatment Plant when compared to discharges in 2018.

	ETP Receipt			ЕТР	
Radionuclide	DETe	Active	S///HD	Total all	discharge
		Effluent Lab	30005	sources	uischarge
H-3	1.75E+11	3.00E+06	3.58E+07	1.75E+11	1.75E+11
C-14	1.92E+08	6.00E+06	8.00E+06	2.06E+08	5.15E+07
Mn-54	1.20E+07	7.80E+04	6.30E+05	1.27E+07	1.61E+06
Fe-55	1.92E+07	2.40E+06	3.00E+06	2.46E+07	6.15E+06
Co-58	1.80E+06	7.35E+04	2.66E+05	2.14E+06	3.05E+05
Co-60	1.68E+08	9.21E+05	1.13E+07	1.81E+08	2.34E+07
Ni-63	1.31E+08	3.90E+06	5.40E+06	1.40E+08	3.50E+07
Ag-110m	9.52E+06	1.08E+05	3.10E+06	1.27E+07	8.89E+05
Sn-113	0.00E+00	0.00E+00	2.62E+05	2.62E+05	4.11E+03
Sb-124	3.52E+06	0.00E+00	4.00E+04	3.56E+06	6.18E+05
Sb-125	8.11E+06	0.00E+00	5.70E+-5	8.68E+06	1.54E+06
Cs-137	2.12E+07	2.63E+05	4.18E+05	2.19E+07	5.18E+06
Ce-144	2.14E+06	3.06E+05	6.72E+05	3.11E+06	4.89E+04
Total alpha	7.20E+05	9.00E+04	1.20E+05	9.30E+05	2.33E+05

The table below, from the SEPA document outlines the discharges of liquid radioactive waste.

 Table 4. NSH Radionuclide Concentrations (Bq/y) – Receipt and Discharge



Proposed increases in liquid discharges: 2018 Liquid Discharges compared to those expected from the ETP and the percentage increase.

	Liquid discharges in 2018	Expected ETP Discharge	Factor Increase
Cobalt-60	0.49 MBq	23.4 MBq	47. 76 fold
Tritium	5,816MBq	175,000 MBq	30. 09 fold

The tables above show that proposed tritium discharges could increase by 30 fold and discharges of cobalt-60 by about 50 fold.

If the MoD wishes to "produce outcomes that are, so far as reasonably practicable, at least as good as those required by UK legislation" then it is safe to assume that it would also wish to comply with international treaty obligations. At the very least SEPA should insist on such obligations being observed. *The NFLA is concerned that this application indicates a lack of compliance with the UK's obligations under the OSPAR Convention on the Protection of the Marine Environment of the North East Atlantic.* Under the treaty the UK Government is committed to:

"...progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of [achieving] concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances." [by 2020].

The application of "best available techniques and best environmental practice, including, where appropriate, clean technology" is one of the Guiding Principles of the OSPAR Strategy with regard to radioactive substances.

"Clean Technology" should not, in the view of many environmental commentators, involve endof -pipe filters to remove pollution from discharges to the environment – *for the NFLA it should include techniques which produce no pollution to begin with.* The requirement for 'Best Available Techniques' (and clean technology) should also *rule out the use of nuclearpowered submarines* which produce highly dangerous wastes when alternative methods of propulsion exist which are safer, less dangerous, and do not involve hazardous radioactive wastes.

8. Application of BPM to Liquid Radioactive Waste Handling Arrangements



As a result of MoD's agreement with SEPA, the Site Operator, the Naval Base Commander (NBC), is expected to use best practicable means (BPM) for reducing both the volume and the activity of waste generated for disposal.

SEPA says "the use of BPM is of increasing importance as it is a key mechanism to achieve the Government policy aim of progressive reductions in radioactive discharges into the marine environment." (2)

BPM is defined as "...that level of management and engineering control that minimises, as far as practicable, the release of radioactivity to the environment whilst taking account of a wider range of factors, including cost-effectiveness, technological status, operational safety, and social and environmental factors".

It will be noted that this definition hinges on "practicability" and is not qualified by "reasonableness". This means that treatment technology must be closely considered. A review of treatment technology for the abatement of tritium was undertaken in 2015. The high additional cost, operator training, and maintenance of an unfamiliar system was deemed by the MOD to be "grossly disproportionate" to the "relatively low environmental benefit" of abating tritium releases.

However. NFLA begs to differ on this matter as tritium is by far the most important nuclide under consideration, and to sweep it away in such an arbitrary manner is unacceptable. At the very least, the MOD should indicate its findings from its review of the scientific literature on this matter. In addition, NFLA begs to differ from the MOD's statement that the environmental benefits would be "relatively low". Has the MOD considered the issue of organically bound tritium in the flora and fauna of the Gare Loch?

Effluent treatment in the new Effluent Treatment Plant would be a two-stage process that utilises both staged cartridge filtration and Ion Exchange (IX) resin. The process is designed to achieve optimal reduction in the radioactivity content of the treated effluent. The IX process is designed to specifically remove Co-60.

In the NFLA's view a sustainable radioactive waste management policy must be based on a clearly stated set of environmental principles, in particular:

- the polluter pays principle,
- the concentration and containment principle
- the precautionary principle and
- the proximity principle.


Management should also use the Best Practicable Environmental Option. (BPEO) which, according to the Twelfth Report of the Royal Commission on Environmental Pollution (RCEP) (1988) should be "the outcome of a systematic consultative and decision-making procedure which emphasises the protection and conservation of the environment across land, air and water."

The MOD's application signally fails to consider these principles.

In the NFLA's view, national defence should not be used as an excuse for increasing discharges into the environment when there are ways of achieving the same ends which don't require the discharge of radioactive waste into the environment. *In other words, we should be asking ourselves whether we can achieve the defence outcome that we need without using a system which generates large amounts of radioactive wastes.*

According to Kyle Mizokami, nuclear power is not necessary for a submarine to function, and run silently if an air-independent propulsion (AIP) system is used. (3) Non-nuclear air-independent propulsion (AIP) submarines offer several important advantages over nuclear submarines, as seen in submarine development in countries such as Germany and Sweden. Conventional diesel-electric engines are a popular means of propulsion for non-nuclear boats, and there are several AIP options, but hydrogen-powered fuel cells offer more than any other option. (4) Japan's new Soryu class of submarines is one of the best non-nuclear submarines on the planet. (5) NFLA recommend the MoD pursue these alternative non-nuclear options.

9. Dose Assessments

The MoD says it has carried out comprehensive dose assessments using worst-case discharge information, and these have concluded that doses are trivial and are "well below the threshold for optimisation of 20 μ Sv per year". (Document 4b p5)

The predicted individual dose to the adult population (identified as the representative individual for Faslane) from all sources is $3.14 \times 10-6 \text{ mSv} = 0.00314 \mu \text{Sv}$ (document 4b page 43) (6)

The predicted collective dose to the World population over a period of 500 years from all sources is 6.15 x 10-4 manSv.

The Food Standards Agency appears to agree saying liquid waste represents the vast majority of the applied for discharge limits (approximately 99.5%) and is primarily composed of tritium (500 GBq), with much smaller contributions from Co-60, C-14, and other radionuclides. Having considered the aqueous and aerial routes for emission of radionuclide discharges to the environment under the new proposed limits, the FSA estimates an effective dose, to the



representative person of 0.2 μ Sv/year, significantly below the exposure level that would require model refinement, of 20 μ Sv/year, associated with a one-in-one million risk of death. Therefore, the FSA does not believe that the applied for limits of radioactive discharges represent a significant risk to human health via the food chain.

If we assume that the computer models used by the MoD and the FSA are correct then the impact of these discharges on human health might be quite small. However, the Environment Agency (of England) points out that:

"Government policy on radioactive discharges states that unnecessarily introducing radioactivity into the environment is undesirable, even at levels where doses to humans and other species are low and, on the basis of current knowledge, are unlikely to cause harm." (7)

And it is worth noting that an important report by the UK's influential Advisory Group on Ionising Radiation (AGIR) (November 2007) (8) suggested that current dose estimates for tritiated water are too low. This is in line with similar findings by the UK Government's CERRIE report. (9)

A number of factors combine to make tritium of particular concern. Firstly, it is almost ubiquitous in the environment and biological systems, and it is very mobile due to its occurrence as water. While many radionuclides only occur as one or two common forms, tritium can become incorporated with many different organic compounds with different behaviour in the environment and human body. Tritium emits a beta particle with high energy over a short track length. Tritium is often described as a "weak" emitter, but is actually 2-3 times more hazardous than most gamma/beta emitters. (10)

Extensive studies show that different radiation types produce different biological effects per unit of absorbed dose. This is expressed as Relative Biological Effectiveness (RBE), or radiation weighting factor. Based on the available scientific evidence, AGIR strongly recommended that tritium's RBE (and radiation weighting factor) should both be doubled from 1 to 2. (The US EPA has recommended 2.5)

Dr Ian Fairlie, a former advisor to the UK Government's Committee Examining Radiation Risks of Internal Emitters (CERRIE), says current dose models for tritium are poor, as there is no recognition of tritium levels building up in tissue to high levels from chronic exposures; no consideration of the heterogeneous distribution of tritium in the body, especially Organically Bound Tritium (OBT) and OBT is badly modelled with experimental animal and human data being ignored. (11) Fairlie argues that, all factors included, we should increase tritium doses figures by a factor of at least 20.



9. Spent Submarine Reactor Fuel

The Ministry of Defence has yet to provide a credible scientific case for nuclear waste 'disposal'. A deep geological disposal facility (GDF) is not expected to be ready to receive waste until around 2040 at the earliest. It will take around 90 years for all of the UK's existing legacy waste (civil and military) to be emplaced, so spent fuel from new submarines now being constructed cannot begin to be emplaced until at least 2130. As well as being a radiation hazard, this means spent fuel containing weapons-useable highly enriched uranium will have to be safely stored and managed for over another 100 years. *NFLA believes the MoD should not be producing more submarine reactor spent fuel when there is still no agreed long-term form of management.*

10. Conclusions

The NFLA has 5 core conclusions from the MoD's application which it wishes to bring to the attention of SEPA:

- 1. The MoD's application involves expected *increases in discharges of tritium by as much as 30-fold and discharges of cobalt-60 by almost 50-fold.*
- 2. Whilst the individual and collective doses estimated by the MoD and FSA are relatively small, there are *considerable uncertainties* involved with the modelling especially with regard to tritium.
- 3. Doses attributed to tritium *should be multiplied by around 20* in order to use a precautionary approach.
- 4. UK Government policy is that *unnecessarily introducing radioactivity into the environment is undesirable,* even at levels where doses to humans and other species are purportedly low and, on the basis of current knowledge, are unlikely to cause harm.
- 5. The Clean Technology choice for powering submarines would not involve using a nuclear reactor. *Non-nuclear air-independent propulsion (AIP) submarines offer particular advantages over nuclear submarines. NFLA recommend MoD pursue such an option.*

SEPA Response

1. Background to NLFA Submission

The limits currently agreed for HMNB Clyde discharges to the Gare Loch are significantly higher than the actual discharges. The proposed new limits are substantially lower than the existing

limits. Further details on limit setting and dose assessment are given in section 4 of the decision document.

Application of radioactive substances legislation to MoD is not a matter for SEPA or related to the determination of this application.

2. Radioactive Waste at Faslane

Comments noted. Details of all discharges are provided section 4 of the decision document.

3. Tritium

The H-3 discharged in 2017 was 33,000 MBq as per Table 2 in the application and not 330,000 MBq as per SEPA's consultation document. There was a typographical error in SEPA's consultation document.

SEPA asked MoD to characterise its liquid effluent. The results showed that C-14 was one of the more significant components in terms of activity. Typically, SEPA places specific limits on the main components of a discharge. See section 4 for details on limit setting.

4. Gaseous Waste Discharged at Faslane

Comment noted. MoD is exempt from EASR. Further information is given in section 1 and in the SEPA MoD memorandum of understanding (Reference 2)

5. Solid Waste at Faslane

Current practice for all civilian nuclear licensed sites is to have alternative controls on disposal routes through permit conditions and notification requirements. This approach allows prompt transfer of waste via the most appropriate route and avoids issues if a specific named route becomes unavailable. This is further discussed in section 3 of the decision document.

6. Radioactive Waste at Coulport

Comments noted. Details on limit setting are given in section 4 of the decision document.

The change in 2011 to the RSA93 exemption order that increased the 'in scope' threshold for tritium is beyond the scope of this application. However, it should be noted that Government consulted widely before making this change and a summary of the stakeholder responses received is publicly available.

7. Increases in Liquid Radioactive Waste Discharges

The limits currently agreed for HMNB Clyde discharges to the Gare Loch are significantly higher than the actual discharges. The proposed new limits are substantially lower than the existing

limits. Further details on limit setting and dose assessment are given in section 4 of the decision document.

Defence discharges are not within the scope of the OSPAR Strategy. However, they are included in the UK strategy for Discharges 2009 where they are noted to be very low and below expectation. Further details are available in section 3 of the decision document.

The design and use of nuclear-powered submarines is a matter for UK Government and not a matter for SEPA. Therefore, it is not considered pertinent to this application.

8. Application of BPM to Liquid Radioactive Waste Handling Arrangements

SEPA has reviewed BPM and optimisation as part of our determination of the application, see sections 3 and 4 of the decision document.

SEPA has carried out a dose assessment details in section 4 of the decision document and appendix 3.

9. Dose Assessments

SEPA has carried out a dose assessment details in section 4 and appendix 3. This has considered dose coefficients and organically bound tritium.

Relevant Government policy is set out in section 3 of the decision document and the conditions of the LOA accord with this policy.

9. Spent Submarine Reactor Fuel

Comment noted however the application does not relate to the management of spent submarine reactor fuel at HMNB Clyde. It should be noted that the means of propulsion for submarines or the number of submarines is not a matter for SEPA.

10. Conclusions

SEPA has noted these comments and is satisfied they have been addressed above and in the decision document.

Greater Glasgow and Clyde Health Board

Thank you for the invitation. I have tried to respond online but unfortunately your consultation hub and GG&C's IT security arrangements appear to be incompatible. I reply on behalf of GG&C Health Board and in my capacity as Head of Health Physics, an organisation that supports eight Health Boards in the West of Scotland and Borders.



My responses are as follows:

2.2.2 The Gaseous Waste Arrangements, Faslane:

Q1 – Do you have any comments on the proposed changes to the letter of agreement for liquid and gaseous waste from Faslane and in particular the annual limits proposed by MoD?

I support the reduction in annual limits proposed by MoD but on the basis of the figures supplied, they still appear arbitrarily high and could be reduced further. A limit is only a meaningful limit if you have to work to achieve it.

I wish to comment on the proposed change No. 3 "Allow for the receipt, treatment and disposal of radioactive effluence associated with supporting submarines at foreign ports or Coulport".

I believe that this statement should be amended to read "UK submarines only".

- 2.2.3 Solid Waste Arrangements, Faslane:
- Q2 Do you have any comments on the proposed changes to the letter of agreement for solid and wastes from Faslane?

No comment.

2.3.1 Gaseous Agreements (Coulport):

Q3 – Do you have any comments on the proposed change to the letter of agreement for gaseous waste from Coulport (to reduce the annual rolling limits from 50 GBq to 25 GBq).?

Only comment is on the basis of the proffered figures for the discharges from 2014-2018, why are they asking for 25 GBq per annum and not 10 GBq per annum? Once again the limit is only a limit if you have to work to it.

2.3.2 Solid Waste Agreement:

The summary of the proposed changes appear to be badly worded and confuse disposal with transfer for processing and onward disposal.

Q4 – Do you have any comments on the proposed change to the letter of agreement for solid waste for Coulport?

No, other than the poor wording of the summary. To my simplistic reading, the question is wrong and does not reflect what is requested in 6.1 of document 4(b).



2.3.3 Liquid Waste from Coulport:

Q5 – Do you have any comments on the proposed change of adding the disposal of liquid waste from Coulport to Faslane to an updated letter of agreement?

No, other than As Q4 above the poor wording of the summary , the question appears to be badly worded.

2.4 SEPA Changes:

Q6 – Do you have any comments on the proposed changes to SEPA Updates to the letter of agreement?

I believe that the letter of agreement should closely mirror conditions and format of the EASR permits for transparency and for ease of updates.

SEPA Response

2.2.2 Gaseous discharges at Faslane are unlimited in the current LOA and therefore imposing limits will be more restrictive. Further details are provided in section 4 of the decision document.

Only waste from UK submarines is approved for treatment at Faslane.

2.2.3 Noted

2.3.1 The gaseous limit for Coulport has been halved from 50 GBq to 25 GB and is further discussed in section 4 of the decision document.

2.3.2 & 2.3.3 Comments are noted.

2.4 The standard EASR conditions are mirrored in the new LOA. See section 4 of the decision document and appendix 5.

Inverclyde Community Council

I write in response to the application which proposes to increase discharges by up to 50 times current levels.

Firstly, as co-chair of the Scottish Councils Committee on Radioactive Substances (SCCORS), it is both disappointing and concerning that our group were not deemed worthy of being on the list of stakeholders to be formally consulted. It was by accident that I stumbled across it on social media.

Secondly, as an elected member of Inverclyde Council, being only 8 miles away from HMNB Clyde, our local authority should also have been a consultee.



Nuclear powered submarines pass by close to our shores on a regular basis.

As a former employee at HMNB Clyde, I have an in-depth knowledge of some of the processes undertaken at HMNB Clyde. Indeed, the Defence Nuclear Safety Regulator used to insist that safety standards would be the same if not better than the civil nuclear sector.

I therefore cannot understand why this application is at odds with that statement as they are looking to increase radioactive discharges.

As an environment body, what assessments have SEPA carried out on the impact these increased radioactive discharges will have on fish, wildlife, the environment and people? Has there been an assessment on the hazard of transporting radioactive waste from Coulport to Faslane?

Throughout my 40 years working for the MOD, we took pride in the fact that dose limits were set much lower than the civil nuclear sector. This much lauded position is now discredited and in tatters with this proposal.

I also experienced the transition from the Polaris to Trident submarine fleet.

The former currently lie rotting and decaying at Rosyth. A nuclear dumping graveyard. Is this the real reason for the increase in discharges?

As previously stated, SCCORS haven't been consulted, therefore this response is not in their name, but as an individual.

I ask that this email be included as a formal response to the consultation and that I strongly object to this application.

SEPA Response

SEPA notes the points raised about the consultation process.

The limits currently agreed for HMNB Clyde discharges to the Gare Loch are significantly higher than the actual discharges. The proposed new limits are substantially lower than the existing limits. Further details on limit setting and dose assessment are given in section 4 of the decision document.

SEPA have conducted a dose assessment to consider the effects of radioactivity on the public, the environment and wildlife. See section 4 and appendix 3 of the decision document.

The transport of radioactive substances is not within SEPA's legal vires.

There is no connection between this application and the submarines currently stored at Rosyth.



Scottish CND

I am responding on behalf of the Scottish Campaign for Nuclear Disarmament (SCND) to the consultation on the Ministry of Defence's (MoD's) application regarding the proposed disposal of radioactive waste from Her Majesty's Naval Base (HMNB) Clyde, Coulport and Faslane including discharges from a new effluent treatment facility at Faslane.

We refrain from using the web form for your consultation as it prevents us from raising all of our concerns. We trust you are genuinely interested in consultation and will forgive of us for responding in this letter format.

Although SCND is actively campaigning against nuclear weapons and for the removal rather than the renewal of the Trident nuclear submarine system, in this document we confine ourselves to concerns about the proposed changes in waste disposal at HMNB Clyde and the risks of adding radioactivity to the environment.

We note that the Nuclear Support Hub (NSH) which the MoD is building at Faslane is intended to centralise the existing radioactive waste handling facilities and radiochemistry laboratories. It is situated in a new location within the Faslane site, with a new effluent discharge point into the middle of the Gare Loch. We also note that the number of nuclear submarines which operate from Faslane is scheduled to increase. This means that, despite the application being for lower absolute limits for liquid radioactive discharges into the Gare Loch, radioactive discharges are, in fact, expected to increase some by very large amounts. SCND strongly objects to these proposed increased radioactive discharges which, if permitted by SEPA, would result in increased radioactive contamination of the entire Gare Loch, including its flora and fauna, and would result in increased radiation doses to people living in the vicinity of the Loch.

SCND can see no good reason why the MoD or visiting navies should be exempt from the provisions of the Environmental Authorisations (Scotland) Regulations 2018(EASR). These should apply to the MOD as they do to all UK employers. This is particularly the case for all civilian contractors.

Para 3.7 of HMNB's Paper 4b (page 19) is titled "Submarine Conventional Discharges". This title is misleading as it suggests non-radiological discharges, but this is not the case. Tritium- the radioactive isotope of hydrogen- is not a "conventional" chemical.

Para 3.71 states that,<u>at present</u>, the annual volume of "conventional" liquids is approximately $5,000 \text{ m}^3$ with tritium concentrations below 1,000 Bq/litre. Since a cubic metre contains 1,000 litres, this means that HMNB Clyde is at present discharging up to 5,000,000 litres x 1,000 Bq =



5 billion Bq of tritium annually into the Gare Loch. And since the number of submarines is expected to double in future, the discharge of tritium is also expected to double to 10 billion Bq each year.

For this reason, para 3.71 adds that HMNB Clyde has requested SEPA's approval to dispose "up to" 10 GBq of tritium per annum into the Gare Loch. HMNB Clyde states that it expects SEPA to approve this request within the next few months. SCND objects to this application to discharge 10,000,000,000 (or 10 billion) becquerels of radioactive tritium each year into the Gare Loch.

Faslane

Radionuclide	Current rolling 12 monthly total limit (MBq)	Previous annual discharges (MBq)					MoD proposed annual limits (MBq)
		2014	2015	2016	2017	2018	
Cobalt 60	500	0.12	0.63	0.33	0.68	0.49	100
Tritium	1,000,000	3810	19500	11000	330000	5816	500,000
Gross beta	500	0.25	1.47	0.66	1.36	0.99	100
Gross alpha	200	0.02	0.12	0.07	0.14	0.10	50
Carbon 14	n/a						100

Table 2: Liquid Discharges from Faslane

The discharges from Faslane are dominated by tritium, the radioactive isotope of hydrogen. Tritium poses multiple hazards and the MoD needs to develop its awareness of these hazards and its expertise in handling tritiated wastes. Contrary to the MOD's apparent view that tritium's is not very hazardous, the reality is that it is a very hazardous internal emitter indeed.⁵In the interests of transparency, the MoD should explain why there was a massive increase in tritium discharge in 2017. Why should the public have any confidence that this will not be regularly repeated?

In recent years, liquid discharges from Faslane have been lower than agreed limits and the MoD has proposed substantial reductions in annual limits. But we are concerned with the *actual* level of discharges, which is more significant for public safety than the new proposed limit. In recent

⁵ See <u>Report of Committee Examining Radiation Risks of Internal Emitters (CERRIE), 2004</u>

years we have seen several applications by nuclear operators where the proposed limits are being decreased, but *the expected actual level of discharges is increasing*. We note that any increase in radiation in the environment may have harmful consequences for those who are particularly susceptible to radiation, particularly pregnant women and their developing child, children and women. *Lower limits will not stop the actual harm of increases in actual radiation* and we believe this is a matter of great public concern. We consider the MOD's proposed discharges an unacceptable risk and believe they should be disallowed.

The new proposed limits include, for the first time, a specific limit for Carbon-14. It has taken the MOD a long time to recognise that C-14 is a significant radionuclide in nuclear submarines.

Liquid waste arising from conventional operations within the submarine that are not associated with the reactor - referred to as general effluents - contain pollutants such oils, greases and sewage. Tritium has been detected in these effluents, but because of the non-radioactive contaminants, these effluents are deemed not suitable for treatment as radioactive effluents.

The consultation documents state that tritium has been detected in these effluents at levels below 1 Bq/ml. But this is still a relatively high concentration of 1,000 Bq per litre. Yet, the application seeks to increase the permitted concentration level from 1000 to 100,000 Bq/l but allegedly with no increase to the overall total radioactivity disposed. This seems implausible and it remains to be seen whether this will be so in practice - higher concentrations have been found in similar effluents produced at other UK naval bases. The MOD application claims that there is no practical way of removing this tritium. We return to this issue under the heading of 'Coulport' below.

Proposed increases in liquid discharges: 2018 Liquid Discharges compared to those expected from the ETP and the percentage increase.

	Liquid discharges in 2018	Expected ETP Discharge	Factor Increase
Cobalt-60	0.49 MBq	23.4 MBq	47.76-fold
Tritium	5,816MBq	175,000 MBq	30.09-fold

The table above shows that proposed tritium discharges could increase by 30-fold and discharges of cobalt-60 by about 50-fold. These proposed increases are among the most concerning aspects of this application.

Application of BPM to Liquid Radioactive Waste Handling Arrangements

As a result of MoD's agreement with SEPA, the Site Operator, the Naval Base Commander (NBC), is expected to use best practicable means (BPM) for reducing both the volume and the activity of waste generated for disposal.

SEPA says "the use of BPM is of increasing importance as it is a key mechanism to achieve the Government policy aim of progressive reductions in radioactive discharges into the marine environment."⁶

BPM is defined as "...that level of management and engineering control that minimises, as far as practicable, the release of radioactivity to the environment whilst taking account of a wider range of factors, including cost-effectiveness, technological status, operational safety, and social and environmental factors".

It will be noted that this definition hinges on "practicability" and is not qualified by "reasonableness". This means that treatment technology must be closely considered. A review of treatment technology for the abatement of tritium was undertaken in 2015. The high additional cost, operator training, and maintenance of an unfamiliar system was deemed by the MOD to be "grossly disproportionate" to the "relatively low environmental benefit" of abating tritium releases.

However, SCND begs to differ on this matter as tritium is by far the most important nuclide under consideration, and to dismiss it in such an arbitrary manner is unacceptable. At the very least, the MOD should indicate its findings from its review of the scientific literature on this matter. In addition, SCND begs to differ from the MOD's statement that the environmental benefits would be "relatively low". Has the MOD given detailed consideration to the issue of organically bound tritium in the flora and fauna of the Gare Loch? Where is this detail?

Clean Technology

In SCND's view a sustainable radioactive waste management policy must be based on a clearly stated set of environmental principles, in particular:

- the polluter pays principle,
- the concentration and containment principle
- the precautionary principle and
- the proximity principle.

⁶ <u>A Review of the Application of 'Best Practicable Means' within a Regulatory Framework for Managing Radioactive</u> Wastes, SNIFFER, March 2005



• The MOD's application fails to even to mention these principles far less consider them. This is regrettable. In our view, SEPA should send the application back to the MOD with the request to consider them.

If the MoD wishes to "produce outcomes that are, so far as reasonably practicable, at least as good as those required by UK legislation" then it is safe to assume that it would also wish to comply with international treaty obligations. At the very least SEPA should insist on such obligations being observed. SCND is concerned that this application indicates a lack of compliance with the UK's obligations under the OSPAR Convention on the Protection of the Marine Environment of the North East Atlantic. Under the treaty the UK Government is committed to:

"...progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of [achieving] concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances." [by 2020].

The application of "best available techniques and best environmental practice, including, where appropriate, clean technology" is one of the Guiding Principles of the OSPAR Strategy with regard to radioactive substances.

"Clean Technology" should mean using techniques which produce no pollution to begin with. The requirement for 'Best Available Techniques' (and clean technology) should rule out the use of nuclear-powered submarines which produce highly dangerous wastes when alternative methods of propulsion exist which are safer, less dangerous, and do not involve hazardous radioactive wastes.

Management should alsouse the Best Practicable Environmental Option. (BPEO) which, according to the Twelfth Report of the Royal Commission on Environmental Pollution (RCEP) (1988) should be "the outcome of a systematic consultative and decision-making procedure which emphasises the protection and conservation of the environment across land, air and water."

The MOD's application fails to even to mention these treaties far less consider them.

SCND notes a failure to seriously consider obligations to reduce actual radioactive emissions and to consider alternative submarine propulsion systems to nuclear power; national defence should not be an excuse to add further radioactivity to the environment. In other words, the MOD should be asking whether they can achieve the submarine propulsion that they consider



they need without using a system which generates large amounts of radioactive wastes. We suggest that continuing with nuclear propulsion should only be in a context of being able to reduce and not increase radioactivity released to the environment.

According to Kyle Mizokamiat the US Center for the National Interest, nuclear power is not necessary for a submarine to function, and run silently if an air-independent propulsion (AIP) system is used.⁷Non-nuclear AIP submarines offer several important advantages over nuclear submarines, as seen in submarine development in countries such as Germany and Sweden. Conventional diesel-electric engines are a popular means of propulsion for non-nuclear boats, and there are several AIP options, but hydrogen-powered fuel cells offer more than any other option.⁸Japan's new Soryu class of submarines is one of the best non-nuclear submarines on the planet.⁹

Dose Estimates

The MoD says it has carried out dose assessments using worst-case discharge information, and these have concluded that doses are trivial and are "*well below the threshold for optimisation of 20* μ Sv per year". (Document 4b p5)

If we were to assume that the serial computer models used by the MoD were correct then the impact of these discharges on human health might appear to be small. Independent experts question the credibility of such estimates. In our view, such estimates are riddled with uncertainties, which the MOD application fails to consider. As pointed out in the 2004 CERRIE report (which the MOD would do well to peruse) these dose estimates are arrived at by using at least 5 computer models where the result from model 1 is plugged into model 2 and so on until a result comes out of model 5. Each model is replete with untested assumptions, errors and uncertainties. The uncertainties from each model have to be multiplied together, with the result that the overall uncertainty could be very large indeed. And this is what the CERRIE report in fact concluded.

Also, the Environment Agency (of England) points out that:

⁹ National Interest 12th March 2019



⁷ National Interest 15th Sept 2019,

⁸ US Naval Institute June 2019

"Government policy on radioactive discharges states that unnecessarily introducing radioactivity into the environment is undesirable, even at levels where doses to humans and other species are low and, on the basis of current knowledge, are unlikely to cause harm." ¹⁰

And it is worth noting that an important report by the UK's influential Advisory Groupon Ionising Radiation (AGIR) (November 2007)¹¹ suggested that current dose estimates for tritiated water are too low. This is in line with similar findings by the UK Government's CERRIE report.¹²

A number of factors combine to make tritium of particular concern. Firstly, it can become part of almost any environment and biological systems, and it is very mobile due to its occurrence mostly as water. While many radionuclides only occur as one or two common forms, tritium can become incorporated into many different organic compounds with different behaviours in the environment and in the human body. Tritium emits a beta particle with a relatively low energy but this energy is deposited over a very short track length of only 0.6 microns –i.e. about the width of a human chromosome. Therefore, tritium's radiotoxicity depends on which cellular substructures it is located close to, and if located close to DNA then it will be very dangerous indeed. The nub of the problem is that we do not have a good handle on tritium's distribution after it is inhaled, ingested or absorbed by the skin. However, this lack of information should not be used by the MOD as a carpet under which to sweep all concerns about tritium.

In the past, tritium was often described erroneously as a "weak" emitter, but is actually 2-3 times more hazardous than most gamma/beta emitters.¹³

Extensive studies show that different radiation types produce different biological effects per unit of absorbed dose. This is expressed as Relative Biological Effectiveness (RBE), or radiation weighting factor. Based on the available scientific evidence, AGIR strongly recommended that tritium's RBE (and radiation weighting factor) should both be doubled from 1 to 2. (The US EPA has recommended 2.5)

Dr Ian Fairlie, a former advisor to the UK Government, says current dose models for tritium are poor, as there is no recognition of tritium levels building up in tissue to high levels from chronic exposures; no consideration of the heterogeneous distribution of tritium in the body, especially Organically Bound Tritium (OBT);and OBT is badly modelled with experimental animal and

¹⁰ <u>Draft decision document: Sellafield Ltd and Sellafield site Environmental permitting: radioactive substances</u> activities October 2019 para 117

¹¹ <u>Review of Risks from Tritium, Report of the Independent Advisory Group on Ionising Radiation, Health Protection</u> <u>Agency, November 2017</u>,

¹² Report of Committee Examining Radiation Risks of Internal Emitters (CERRIE), 2004

¹³ See <u>Tritium Risks Not Properly Assessed</u>

human data being ignored.¹⁴Fairlie argues that, all factors included, we should increase tritium dose estimates by a factor of at least 20.

Gaseous waste discharged at Faslane

We note that sources of gaseous wastes are limited to discharges from the Radiochemical Laboratory, evaporation from effluent tanks and ventilation of the solid waste handling facility; (see section 3.8 of paper 4b) and do not include the submarines. MoD reviewed current practices and the arrangements for the Nuclear Support Hub (NSH) to characterise and quantify the likely gaseous wastes. This work is reported in sections and 5.8-5.10 of paper 4b and suggests the following annual numerical limits for the NSH:

Tritium – 200MBq

Carbon 14 – 1MBq

Noble Gases – 100MBq

The MOD application states "Any gaseous releases direct from the submarine are regulated by the Defence Nuclear Safety Regulator (DNSR) in accordance with the SEPA MoD agreement relating to matters involving radioactive substances."

In SCND's view, this statement amounts to an inexcusable "sweeping under the carpet" of such gaseous emissions from submarines.

Spent Submarine Reactor Fuel

The Ministry of Defence has yet to provide a credible scientific case for nuclear waste 'disposal.' A deep geological disposal facility (GDF) is not expected to be ready to receive waste until around 2040 at the earliest. It will take around 90 years for all of the UK's existing legacy waste (civil and military) to be emplaced, so spent fuel from new submarines now being constructed cannot begin to be emplaced until at least 2130. As well as being a radiation hazard, this means spent fuel containing weapons-useable highly enriched uranium will have to be safely stored and managed for over another 100 years. We should not be producing more submarine reactor spent fuel when there is still no agreed long-term method of managing it.

Coulport

Material used to control the environmental conditions within weapon containers may become contaminated with tritium during use and, following analysis, may require disposal as radioactive

¹⁴Fairlie I (2007) RBE and wR values of Auger emitters and low-range beta emitters with particular reference to tritium. Journal of Radiological Protection. Vol 27 pp 157-168

waste. In 2011 the level at which tritium contaminated waste is considered 'out of scope' of RSA93 was raised from 0.4 Bq/g to 100 Bq/g.SCND was not consulted about this large relaxation in standards and fails to see why such a massive increase was permitted.

This increase has meant that 95% of desiccant – used to control humidity in weapons stores and transport containers is now assessed as <100 Bq/g ie100,000 Bq per kg, and disposed of as non-radioactive waste.

Conclusions

- **1.** The MoD's application involves expected increases in discharges of tritium by as much as 30-fold and discharges of cobalt-60 by almost 50-fold.
- 2. Whilst the individual and collective doses estimated by the MoD and FSA are relatively small, there are considerable uncertainties involved with the modelling especially with regard to tritium.
- **3.** Doses attributed to tritium should be multiplied by around 20 in order to use a precautionary approach.
- **4.** UK Government policy is that unnecessarily introducing radioactivity into the environment is undesirable, even at levels where doses to humans and other species are purportedly low and, on the basis of current knowledge, are unlikely to cause harm.
- The Clean Technology choice for powering submarines would not involve using a nuclear reactor. Non-nuclear air-independent propulsion (AIP) submarines offer particular advantages over nuclear submarines.

Furthermore, in the view of Scottish CND, there is something perverse and absurd about the MOD's proposed new effluent treatment facility because it goes along with a lack of treatment. While the new facility may reduce the amounts of some radioactive metals, especially Co-60, it would still allow >99.99% of the radioactivity, i.e. tritium, to be dumped into the Gare Loch. Has the MOD really looked hard into the possibility of reducing tritium levels its effluents? For example, how do the French and the Canadians manage to do this?

It does not give great confidence in the MOD's application when it admits that it does not know why relatively high tritium levels (>1000 Bq/l) occur in some of its waste discharges. This is likely due to tritium's extreme ability to diffuse through almost all materials. This in turn is because hydrogen is the smallest element in the periodic table.



Finally, in SCND's view nuclear weapons are not 'defence' or security but a source of horrendous risk but these arguments are set aside in our response to the proposed increased in radioactive discharges. We have kept our arguments about the unacceptable burdens of risk created by the nuclear weapons scrupulously out of this response.

Lynn Jamieson, Chair, Scottish CND, convener Risks of Radiation Working Group.

Document prepared by Risks of Radiation Working Group.

SEPA Response

SEPA notes the points raised about the consultation process.

The limits currently agreed for HMNB Clyde discharges to the Gare Loch are significantly higher than the actual discharges. The proposed new limits are substantially lower than the existing limits. Further details on limit setting and dose assessment are given in section 4 of the decision document.

Application of radioactive substances legislation to MoD is not a matter for SEPA or related to the determination of this application.

Comment noted about the descriptor Submarine Conventional Discharges. The term describes the main pollutants in this type of waste as oils and greases and rather than radioactivity which is only present in very small quantities. section 4 of the decision document provides more detail. Note that this waste is defined as a general effluent.

Comment noted on the variation which was carried out in 2019.

The H-3 discharged in 2017 was 33,000 MBq as per Table 2 in the application and not 330,000 MBq as per SEPA's consultation document. There was a typographical error in SEPA's consultation document.

SEPA has carried out a dose assessment details in section 4 and appendix 3 of the decision document. This has considered dose coefficients and the effects of organically bound tritium.

SEPA notes that comments on BPM and has addressed BPM in section 4 of the decision document.

Defence discharges are not within the scope of the OSPAR Strategy. However, they are included in the UK strategy for Discharges 2009 where they are noted to be very low and below expectation. Further details are available in section 3 of the decision document.



The design and use of nuclear-powered submarines is a matter for UK Government and not a matter for SEPA. Therefore, it is not considered pertinent to this application.

Comment regarding gaseous discharges from the submarine are noted. MoD is exempt from EASR. Further explanation is given in section 1 and in the SEPA MoD memorandum of understanding (Reference 2).

Comment regarding spent fuel is noted. However, the application does not relate to the management of spent submarine reactor fuel at HMNB Clyde. It should be noted that the means of propulsion for submarines or the number of submarines is not a matter for SEPA.

The change in 2011 to the RSA93 exemption order that increased the 'in scope' threshold for tritium is beyond the scope of this application. However, it should be noted that Government consulted widely before making this change and a summary of the stakeholder responses received is publicly available.

Relevant Government policy is set out in section 3 of the decision document and the conditions of the LOA accord with this policy.

SEPA has noted concluding remarks and is satisfied they have been addressed above and in the decision document.

Scottish Natural Heritage

We are content to leave chemical and radioactive pollution (including into surface or groundwater or air) issues to SEPA, including the potential for such pollution to impact on local biodiversity interests. We therefore have no further comments to make in relation to the proposed changes to the Letter of Agreement covering any aspect of the disposal of radioactive waste from HMNB Clyde, Coulport and Faslane.

SEPA Response

Noted

COMARE and PHE

1.Do you have any comments on the proposed changes to the Letter of Agreement for liquid and gaseous wastes from Faslane and in particular the annual limits proposed by MoD? - Faslane wastes and annual limits

No particular comments on the liquid waste aspect of application. However, it is noted that Table 2 of the consultation document suggests that MoD are seeking a limit of 50 MBq alpha radionuclides per annum, whilst Table 5 of the application (page 35) appears to request a limit of 5 MBq per annum. Is this an error in the consultation document?

With regards to the gaseous disposal, it is noted that the rationale behind the limits proposed in Table 7 of the application for both Tritium and Carbon 14 is given. There is no apparent rationale for the noble gas (Xe-133 and Kr-85) limits.

Is there any evidence (e.g. dye experiments) that the move of the discharge line will not affect the spread of the effluent?

2.Do you have any comments on the proposed changes to the Letter of Agreement for solid wastes from Faslane? - Faslane solid wastes

No. This is an appropriate enhancement, bringing LLW disposals into line with all other civil sites within the UK.

3.Do you have any comments on the proposed change to the Letter of Agreement for gaseous wastes from Coulport? - Coulport gaseous wastes

It is not possible to comment on the proposed change from 50MBq to 25MBq annually for Tritium. The revised figure seems considerably higher than current annual disposals, but reference is made to future knowledge of the weapon programme, which would not be part of this document. Is the level stated a consequence of the modelling undertaken?

4.Do you have any comments on the proposed change to the Letter of Agreement for solid wastes from Coulport? - Coulport solid wastes

No

5.Do you have any comments on the proposed change of adding the disposal of liquid waste from Coulport to Faslane to an updated Letter of Agreement? - Coulport liquid wastes

No

6.Do you have any comments on the proposed changes to SEPA updates to the Letters of Agreement? - Proposed SEPA updates

No.

SEPA Response

1. The alpha limit applied for is 5 MBq and the 50 MBq is an error in the consultation document.

The application indicates that noble gases may arise from samples taken from the submarine operating with a non-routine reactor configuration. The samples will be taken for analysis to support continued operation of the submarine.

No experimental work has been done to verify the likely spread of the effluent. Given that calculated doses at the annual discharge limits are so low SEPA did not require further information as part of the determination further information. See section 4 and appendix 3 of the decision document.

2. Noted

3. The level requested is a consequence on MoD's detailed understanding of the weapon programme for the next 25 years and a review of current discharges.

4-6. Noted

Clyde Fisherman's Association

1.Do you have any comments on the proposed changes to the Letter of Agreement for liquid and gaseous wastes from Faslane and in particular the annual limits proposed by MoD? - Faslane wastes and annual limits

We seek to work with the Navy whenever possible as a local fishing Association to the Clyde. Our preference of course would be for no wastes to be deposited in the Clyde due to the impacts they could potentially have on fish stocks and the wider eco-system. However we understand that on the whole deposits have traditionally been much less than the upper limit proposals. We note the proposed changes and would raise concern over the concentration of deposits. It will be for SEPA to analyse such proposals but we are of a mind that even less but more concentrated deposits could cause negative impacts for stocks.

2.Do you have any comments on the proposed changes to the Letter of Agreement for solid wastes from Faslane? - Faslane solid wastes



As already outlined our preference would be for no deposits, but practically speaking a reduction would be preferable, and even with a reduction we would still urge caution over less but more concentrated deposits as this could have a significant impact on stocks.

We would of course prefer transparency of waste issues and transfer to be clear, and for no area to suffer more deposits than is necessary, intense transferal to particular sites may cause issues.

3.Do you have any comments on the proposed change to the Letter of Agreement for gaseous wastes from Coulport? - Coulport gaseous wastes

As already outlined our preference would be for no deposits, but practically speaking a reduction would be preferable. However with a reduction we would still urge caution over less but more concentrated deposits as this could have a significant impact on stocks.

4.Do you have any comments on the proposed change to the Letter of Agreement for solid wastes from Coulport? - Coulport solid wastes

We would not like to see the types of waste deposited around the various Clyde sites increase in composition of waste types or be more intensively deposited.

We would of course prefer transparency of waste issues and transfer to be clear, and for no area to suffer more deposits than is necessary. We are of a mind that a variety of waste at any one site have the ability to potentially impact a wider base of stocks.

5.Do you have any comments on the proposed change of adding the disposal of liquid waste from Coulport to Faslane to an updated Letter of Agreement? - Coulport liquid wastes

We would not like to see the types of waste deposited around the various Clyde sites increase in composition of waste types or be more intensively deposited.

We would of course prefer transparency of waste issues and transfer to be clear, and for no area to suffer more deposits than is necessary through weighted disposal at other sites etc. We are of a mind that a variety of waste at any one site have the ability to potentially impact a wider base of stocks.

6.Do you have any comments on the proposed changes to SEPA updates to the Letters of Agreement? - Proposed SEPA updates

We would hope that SEPA would advise sensibly on the best workable process. We would suggest that any changes to the Letters of Agreement demonstrate clarity on the various



deposits proposed. We also caution that limits to negative impacts on stock and marine environment are employed.

SEPA Response

1.SEPA has conducted a dose assessment to consider the effects of radioactivity on the public, the environment and wildlife. See section 4 and appendix 3 of the decision document.

2.Solid waste is not deposited in the local environment but transferred to other sites which are legally entitled to receive them. The receiving sites have been assessed by the relevant authorities as being suitable to receive and manage such waste. See sections 3 and 4 of the decision document.

3.Comment noted, see section 4 of the decision document.

4&5. Current practice for all civilian nuclear licensed sites is to have alternative controls on disposal routes through permit conditions and notification requirements. This approach allows prompt transfer of waste via the most appropriate route and avoids issues if a specific named route becomes unavailable. This is further discussed in section 3 of the decision document.

6.Comments noted, refer to section 4 and appendix 3 of the decision document.

Loch Lomond Angling Improvement Association

1.Do you have any comments on the proposed changes to the Letter of Agreement for liquid and gaseous wastes from Faslane and in particular the annual limits proposed by MoD? - Faslane wastes and annual limits

Yes, We would wish that the limits for pollutants are not increased, and remain as originally applied for and approved and would state that the following should be considered: We are of the view that this development is likely to have a significant impact on migratory salmonids and therefore a full Environmental Impact Assessment, and Habitats Regulations Appraisal, is required. We believe that the EIA should cover the following points:

1. The likely migratory pathways of salmon and sea trout smolts from Loch Long, Gareloch in Argyll and Bute, and the River Clyde, Loch Lomond (including the Endrick Water SAC) and rivers in North Ayrshire. Must be considered in a fully detailed and specific environmental impact assessment. That the discharge of pollutants especially radioactive particles which can then enter the food chain via wild fish in the vicinity of known migratory routes for wild salmon and Sea Trout must be avoided.



2. The application should be accompanied by a draft Environmental Management Plan, developed in partnership with the relevant DSFBs ourselves at the L.L.A.I.A as the Lomond system fishery Managers and all Fisheries Trusts including the Loch Lomond fishery Trust. The EMP should cover appropriate monitoring of impacts on wild fish, with a feedback to effluent both solid and liquid discharge. These impacts should include ingestion/contamination of wild fish from the planned discharges.

3. The conservation status of all rivers in which Atlantic salmon populations are present, and the scope for any of these rivers to withstand any additional pressure arising from discharges/pollutants arising from the proposed developments.

Finally, we would emphasise the very sensitive nature of the proposed sites currently being considered. All sites lie on an important migration route for Atlantic salmon which all fish arising from the Clyde and Lomond systems will utilise. It is also high likely that Atlantic salmon and sea trout arising from rivers in North Ayrshire and Argyll and Loch Lomond will utilise this area. We note that both Atlantic salmon and sea trout are Priority Marine Features - the habitats and species of greatest conservation importance in inshore waters. We in particular as the L.L.A.I.A is the main fishery Riparian owner of the Salmon fishings on the Endrick Water emphasise in the strongest terms that the Endrick Water is a Special Area of Conservation with Atlantic salmon as a qualifying interest. The Habitats Directive (article 6) requires that Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive. It also states: In the light of the conclusions of the [appropriate] assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

If this is not the case and there are no alternative solutions, the proposal can only be allowed to proceed if there are imperative reasons of overriding public interest. We certainly do not consider that this is the case with regard to the current proposed development.

2.Do you have any comments on the proposed changes to the Letter of Agreement for solid wastes from Faslane? - Faslane solid wastes

"We would not wish any changes to solid wastes and that original detail is retained as originally approved with no increase and would ask that the following is considered given the Endrick

Water SAC protection of migrating Atlantic Salmon adults and migrating smolts from the Endrick Water SAC.

We are of the view that this development is likely to have a significant impact on migratory salmonids and therefore a full Environmental Impact Assessment, and Habitats Regulations Appraisal, is required. We believe that the EIA should cover the following points:

1. The likely migratory pathways of salmon and sea trout smolts from Loch Long, Gareloch in Argyll and Bute, and the River Clyde, Loch Lomond (including the Endrick Water SAC) and rivers in North Ayrshire. Must be considered in a fully detailed and specific environmental impact assessment. That the discharge of pollutants especially radioactive particles which can then enter the food chain via wild fish in the vicinity of known migratory routes for wild salmon and Sea Trout must be avoided.

2. The application should be accompanied by a draft Environmental Management Plan, developed in partnership with the relevant DSFBs ourselves at the L.L.A.I.A as the Lomond system fishery Managers and all Fisheries Trusts including the Loch Lomond fishery Trust. The EMP should cover appropriate monitoring of impacts on wild fish, with a feedback to effluent both solid and liquid discharge. These impacts should include ingestion/contamination of wild fish from the planned discharges.

3. The conservation status of all rivers in which Atlantic salmon populations are present, and the scope for any of these rivers to withstand any additional pressure arising from discharges/pollutants arising from the proposed developments.

Finally, we would emphasise the very sensitive nature of the proposed sites currently being considered. All sites lie on an important migration route for Atlantic salmon which all fish arising from the Clyde and Lomond systems will utilise. It is also high likely that Atlantic salmon and sea trout arising from rivers in North Ayrshire and Argyll and Loch Lomond will utilise this area. We note that both Atlantic salmon and sea trout are Priority Marine Features – the habitats and species of greatest conservation importance in inshore waters. We in particular as the L.L.A.I.A is the main fishery Riparian owner of the Salmon fishings on the Endrick Water emphasise in the strongest terms that the Endrick Water is a Special Area of Conservation with Atlantic salmon as a qualifying interest. The Habitats Directive (article 6) requires that Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive. It also states: In the light of the conclusions of the [appropriate]



assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

If this is not the case and there are no alternative solutions, the proposal can only be allowed to proceed if there are imperative reasons of overriding public interest. We certainly do not consider that this is the case with regard to the current proposed development".

3.Do you have any comments on the proposed change to the Letter of Agreement for gaseous wastes from Coulport? - Coulport gaseous wastes

We do not have any comments, agreed.

4.Do you have any comments on the proposed change to the Letter of Agreement for solid wastes from Coulport? - Coulport solid wastes

Waste transfer should remain as at present, the proposal to change would indicate a loading and then unloading action plus transport on the public road network. Thus the "Risk" of spillages/contamination increases without doubt given the activity never occurred before. If this will be an addition and increased level of solid particle discharge we would wish a full environmental impact program carried out before permission is granted.

We are of the view that this development is likely to have a significant impact on migratory salmonids and therefore a full Environmental Impact Assessment, and Habitats Regulations Appraisal, is required. We believe that the EIA should cover the following points:

1. The likely migratory pathways of salmon and sea trout smolts from Loch Long, Gareloch in Argyll and Bute, and the River Clyde, Loch Lomond (including the Endrick Water SAC) and rivers in North Ayrshire. Must be considered in a fully detailed and specific environmental impact assessment. That the discharge of pollutants especially radioactive particles which can then enter the food chain via wild fish in the vicinity of known migratory routes for wild salmon and Sea Trout must be avoided.

2. The application should be accompanied by a draft Environmental Management Plan, developed in partnership with the relevant DSFBs ourselves at the L.L.A.I.A as the Lomond system fishery Managers and all Fisheries Trusts including the Loch Lomond fishery Trust. The EMP should cover appropriate monitoring of impacts on wild fish, with a feedback to effluent both solid and liquid discharge. These impacts should include ingestion/contamination of wild fish from the planned discharges.

3. The conservation status of all rivers in which Atlantic salmon populations are present, and the



scope for any of these rivers to withstand any additional pressure arising from discharges/pollutants arising from the proposed developments.

Finally, we would emphasise the very sensitive nature of the proposed sites currently being considered. All sites lie on an important migration route for Atlantic salmon which all fish arising from the Clyde and Lomond systems will utilise. It is also high likely that Atlantic salmon and sea trout arising from rivers in North Ayrshire and Argyll and Loch Lomond will utilise this area. We note that both Atlantic salmon and sea trout are Priority Marine Features – the habitats and species of greatest conservation importance in inshore waters. We in particular as the L.L.A.I.A is the main fishery Riparian owner of the Salmon fishings on the Endrick Water emphasise in the strongest terms that the Endrick Water is a Special Area of Conservation with Atlantic salmon as a qualifying interest. The Habitats Directive (article 6) requires that Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive. It also states: In the light of the conclusions of the [appropriate] assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

If this is not the case and there are no alternative solutions, the proposal can only be allowed to proceed if there are imperative reasons of overriding public interest. We certainly do not consider that this is the case with regard to the current proposed development.

5.Do you have any comments on the proposed change of adding the disposal of liquid waste from Coulport to Faslane to an updated Letter of Agreement? - Coulport liquid wastes

Any waste should be treated at the most appropriate treatment facility. If this requires liquid waste to be transferred to Faslane then suitable systems of transfer and containment of waste during transport should be made. Any general effluents should not increase in volume or particle/solid/contamination percentages than at current levels.

Again a full environmental impact assessmnet must be carried out as we have already indicated.

We are of the view that this development is likely to have a significant impact on migratory salmonids and therefore a full Environmental Impact Assessment, and Habitats Regulations



Appraisal, is required. We believe that the EIA should cover the following points:

1. The likely migratory pathways of salmon and sea trout smolts from Loch Long, Gareloch in Argyll and Bute, and the River Clyde, Loch Lomond (including the Endrick Water SAC) and rivers in North Ayrshire. Must be considered in a fully detailed and specific environmental impact assessment. That the discharge of pollutants especially radioactive particles which can then enter the food chain via wild fish in the vicinity of known migratory routes for wild salmon and Sea Trout must be avoided.

2. The application should be accompanied by a draft Environmental Management Plan, developed in partnership with the relevant DSFBs ourselves at the L.L.A.I.A as the Lomond system fishery Managers and all Fisheries Trusts including the Loch Lomond fishery Trust. The EMP should cover appropriate monitoring of impacts on wild fish, with a feedback to effluent both solid and liquid discharge. These impacts should include ingestion/contamination of wild fish from the planned discharges.

3. The conservation status of all rivers in which Atlantic salmon populations are present, and the scope for any of these rivers to withstand any additional pressure arising from discharges/pollutants arising from the proposed developments.

Finally, we would emphasise the very sensitive nature of the proposed sites currently being considered. All sites lie on an important migration route for Atlantic salmon which all fish arising from the Clyde and Lomond systems will utilise. It is also high likely that Atlantic salmon and sea trout arising from rivers in North Ayrshire and Argyll and Loch Lomond will utilise this area. We note that both Atlantic salmon and sea trout are Priority Marine Features – the habitats and species of greatest conservation importance in inshore waters. We in particular as the L.L.A.I.A is the main fishery Riparian owner of the Salmon fishings on the Endrick Water emphasise in the strongest terms that the Endrick Water is a Special Area of Conservation with Atlantic salmon as a qualifying interest. The Habitats Directive (article 6) requires that Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive. It also states: In the light of the conclusions of the [appropriate] assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

If this is not the case and there are no alternative solutions, the proposal can only be allowed to



proceed if there are imperative reasons of overriding public interest. We certainly do not consider that this is the case with regard to the current proposed development.

6.Do you have any comments on the proposed changes to SEPA updates to the Letters of Agreement? - Proposed SEPA updates

No

SEPA Response

1.SEPA has considered the relevant conservation legislation, see section 3, and has conducted a dose assessment to consider the effects of radioactivity on the public, the environment and wildlife. See section 4 and appendix 3 of the decision document.

The proposed changes reduce the quantities of pollutants that can be discharged from the site. Furthermore, the move to more modern conditions places further limitations on radioactive waste management conditions for HMNB Clyde.

Additionally, SEPA has a long-standing programme which includes monitoring of the marine environment the results of which are published annually in Radioactivity in Food and the Environment (Reference 24).

2. Current practice for all civilian nuclear licensed sites is to have alternative controls on disposal routes through permit conditions and notification requirements. This approach allows prompt transfer of waste via the most appropriate route and avoids issues if a specific named route becomes unavailable. This is further discussed in section 3 of the decision document.

- 3. Noted
- 4. Transport of radioactive waste is not within SEPA's legal vires.
- 5. Comments noted.
- 6. Noted

Evolution Environment

1. Do you have any comments on the proposed changes to the Letter of Agreement for liquid and gaseous wastes from Faslane and in particular the annual limits proposed by MoD? - Faslane wastes and annual limits

While it may be reasonable to allow for the discharge of effluent from the facilities at Faslane, and notwithstanding the indicated control of previous discharges to below the licensed levels, it remains that the accumulation of potential contaminated materials in the area are not discussed as part of this submission.

Given that historic releases of untreated effluent have been recorded in Faslane (for example HMS Trafalgar in 2009), what baseline studies have been completed of the sediment in Gare Loch to demonstrate that normal or abnormal releases have not increased risk to the marine environment and that the proposed changes to the discharge limits remain tolerable? Further, given the planned redevelopment of the area, what re-assurances will be given by the contractor that no accidental releases of potentially contaminated materials will occur? What environmental risk assessments have been presented to SEPA in support of this application. Paper 4b, section 7.4.6. "Detailed assessments of the environmental impacts on biota from NSH disposals have not been conducted."

While commitments to environmental monitoring are indicated in the paper, has SEPA been provided with detailed investigation findings and detailed quantitative risk assessments demonstrating that the projected releases, excluding potential accidentals releases, has been allowed for?

In the absence of detailed investigation reports and supporting risk assessments, this application is considered to be lacking in substance for public consultation and should not be allowed in the absence of that information.

However, it may be that the proposer has completed investigations, this should be provided as part of the information for evaluation.

2.Do you have any comments on the proposed changes to the Letter of Agreement for solid wastes from Faslane? - Faslane solid wastes

All operational areas have the potential to be closed in the future. Given the requirements of the Contaminated Land (Scotland) Regulations, has sufficient arrangements been made to ensure that adequate clean-up of impacted ground across the base?

While not strictly associated with solid waste, any change in circumstances at the base must make allowances for the clean-up of the site, to avoid any remediation being with the Scottish Government agencies or Local Authority. Is there a bond or equivalent in place for this facility? While as an MOD facility a bond may not be required, with respect it is not considered prudent



to allow significant changes to the facility working arrangements without adequate protections in place.

No additional comments made for question 3,4,5 &6

SEPA Response

1.SEPA carries out a routine environmental monitoring programme where samples collected from the local marine and terrestrial environment are analysed for radioactivity. The environmental monitoring results are reported annually in RIFE (Reference 24). See section 4 of the decision document for further details.

2.Conditions in the LOA require remediation of contamination. The proposed changes to solid waste transfer routes does not impact the future remediation of the site and does not reduce the level of protection of the environment. Further details are available in section 4 of the decision document.

Mary Davies Trust

With unprecedented numbers of our population now suffering and dying from cancer, any dumping of nuclear materials close to people is unacceptable.

Any dumping of radioactive materials close to populated areas is unacceptable. Prevalence of cancer in these locations, such as on the Isle of Arran demonstrates this is a serious misjudgement.

SEPA Response

SEPA have conducted a dose assessment to consider the effects of radioactivity on the public, the environment and wildlife. See section 4 and appendix 3 of the decision document.

Common themes

For the remaining responses, SEPA identified common themes and addressed the issues raised within these themes. These themes are identified and discussed below.

Impact on the Environment including the impacts of radioactive discharges on fish, the local area, food, and contamination

These comments are addressed by the ERICA assessment carried out by SEPA which show that there is no significant impact on the environment. SEPA's environmental monitoring programme and annual dose assessment published annually in RIFE provides quantitative data to support this conclusion. Further information is provided in section 4 and appendix 3 of the decision document.

Impact on Human Health the impact on human health both in the local area and that of larger population centres (Glasgow) as a result of discharges

These points are addressed by the dose assessments that have been carried out by SEPA which show that the maximum predicted doses are very low. There is further discussion with regards the assessed doses in relation to dose limits and dose constraints in section 4 of the decision document.

Limits perceived increases in disposals, justification of new limits, zero discharges, whether MoD could do more to reduce disposals further

The proposed new limits are substantially more restrictive (lower) than the current limits. The limits set in radioactive substances authorisations or approvals are not set as targets and in addition to the limits there is a requirement for MoD to use best practical means (BPM) to minimise discharges. Additionally, SEPA has set a notification level on the liquid discharge which if exceeded will require MoD to review the approach to BPM. This matter is dealt with in detail in the section 4 of the decision document.

Waste Transfer – named sites removal of specified sites for waste disposal (transfer) from the LOA

Current practice for all civilian nuclear licensed sites is to have alternative controls on disposal routes through permit conditions and notification requirements. This approach allows prompt transfer of waste via the most appropriate route and avoids issues if a specific named route becomes unavailable. This is further discussed in section 3 of the decision document.

Other UK Ports / Foreign Ports transfer of waste from submarines berthed at other ports for management at Faslane

Waste generated aboard UK submarines is considered to be UK waste regardless of where in the world the submarine is. This is covered in section 2 of the decision document.

MoD Regulation concerns that MoD are not held to the same standard, or should be held to a higher standard, as civil nuclear facilities

MoD remain exempt from EASR, and legislative change is not within the remit of this application. Under the terms of an MoU, SEPA and MoD agree to apply similar standards that applied in the civil nuclear industry.

Specific radionuclides (mostly tritium but also C-14, Co-60) concerns about modelling methods used for tritium impact on health and environment; concerns about changes in historic tritium disposals (inclusion of other radionuclides.

No 'new' radionuclides will be disposed of as a result of the LOA review. SEPA may choose to limit disposals by radionuclide group (e.g., 'all beta and gamma emitters') or by specific radionuclide, to ensure that the limits both protect the environment and compliance can be demonstrated.

SEPA's modelling is based on peer-reviewed internationally accepted principles and follows the precautionary principle. SEPA participates in national and international committees on radiation in the environment and modelling is kept continuously under review'. See section 4 of the decision document and appendix 3.

Not in scope SEPA noted a large number of comments made in relation to factors such as transport including transport between the sites, UK Defence strategy and tourism

Such matters are beyond the scope of SEPA's interests and legal vires. They are noted and considered not relevant to the application.

4. Stage 3 Consultation

Consultation process

Stage 3 consultation begins after SEPA have completed determination of the application. SEPA sends the LOA SEPA is minded to issue to the Stage 1 consultees. The consultees are asked to comment on SEPA's decision.

This consultation took place in April 2024. The responses received are given below.



Food Standards Scotland (FSS):

FSS stated they were content and had no further comments.

Office for Nuclear Regulation (ONR):

ONR had no further comments regarding the letter of approval.

Defence Nuclear Safety Regulator (DNSR):

DNSR reviewed the Letter of Approval and offered no objection. They welcomed the intent to combine four existing approvals into a single approval that meets the future programme requirements. The LOA sets clear requirements that do not conflict with DNSR's regulations.

Scottish Ministers were consulted in October 2024 and had no further comments.

The responses received are supportive of SEPA's decision to grant the approval and of the conditions and limitation attached to this approval.

5. Conclusion

SEPA carried out three stages of consultation on an application submitted by MoD in 2019 to renew its approvals (LOA) to dispose of radioactive waste from HMNB Clyde. The Stage 2 consultation attracted a substantial response. This appendix outlines how SEPA has addressed these responses and where appropriate how they have been considered in the determination of the application.

Appendix 5 – proposed conditions

Schedule 1 – general limitations and conditions

1.1 Resources

1.1.1 You must have adequate resources to ensure compliance with your Approval.

1.2 Management arrangements

- 1.2.1 You must have and maintain a management system to ensure compliance with your Approval.
- 1.2.2 You must regularly carry out a review of your management system and its effectiveness in terms of achieving compliance with your Approval.

1.3 Written procedure

1.3.1 You must have, implement, and maintain written procedures to ensure compliance with your Approval.

1.4 Record keeping

- 1.4.1 You must make, as soon as reasonably practicable, true, accurate and legible records that ensure and demonstrate compliance with the requirements of your Approval.
- 1.4.2 You must keep sufficient records for as long as necessary to ensure and demonstrate compliance with your Approval.

1.5 Provision of training and information to staff

- 1.5.1 You must ensure that anyone carrying out duties that may affect compliance with your Approval is suitably trained and experienced.
- 1.5.2 You must ensure that anyone carrying out duties that may affect compliance with your Approval has access to a copy of your Approval and all relevant procedures and records that are necessary to ensure compliance with your Approval.

1.6 Facilities and equipment

1.6.1 You must provide suitable facilities and equipment that are necessary to ensure compliance with your Approval.



- 1.6.2 You must have and comply with appropriate arrangements for the acceptance into service of all facilities and equipment that are necessary to ensure compliance with your Approval.
- 1.6.3 You must ensure that all facilities and equipment necessary to ensure compliance with your Approval 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.

1.7 Sampling, measurements, tests, surveys, and calculations

- 1.7.1 You must take samples and conduct measurements, tests, surveys, analyses, and calculations as necessary in order to ensure compliance with your Approval.
- 1.7.2 You must use the best practicable means when taking samples or conducting measurements, tests, surveys, and calculations.

1.8 Provision of information and data returns

- 1.8.1 You must submit to SEPA, a written summary of the radioactive waste that you have disposed for each month. The submission shall be made no later than 28 days after the end of each month and shall include:
 - a. for each disposal limit in your permit, the total radioactivity of the radionuclides or group of radionuclides disposed;
 - b. the total radioactivity of the radionuclides or group of radionuclides disposed during the rolling year compared to the relevant annual limit; and
 - c. the volume of aqueous liquid waste disposed and the specific disposal route.
- 1.8.2 You must report disposals in accordance with the document "Radiological Monitoring Technical Guidance Note 1 Standardised Reporting of Radioactive Discharges from Nuclear Sites in Scotland, revised October 2019" and any subsequent version.


- 1.8.3 You must submit to SEPA for each month, a written summary of the radioactive waste that you have transferred. The submission shall be made no later than 28 days after the end of each month and shall include:
 - a. a description of the waste;
 - b. the purpose of the transfer;
 - c. its volume;
 - d. the total radioactivity; and
 - e. the name and address of the person receiving the waste.
- 1.8.4 You must submit to SEPA a written summary of the volumes, activities, and disposal routes for general effluents no later than 90 days after the end of each 3-month period.

1.9 Contraventions of your Approval

- 1.9.1 If you believe that a requirement of your Approval is being, has been, or might be contravened, you must inform SEPA by telephone without delay.
- 1.9.2 Where you have informed SEPA that your Approval has been contravened, you must:
 - a. confirm the information given in the telephone notification in writing by the next working day after the verbal notification;
 - b. carry out an investigation into the circumstances to identify any necessary corrective measures to avoid such events in the future;
 - c. record the results of your investigation;
 - d. ensure that any corrective measures are carried out as soon as reasonably practicable; and
 - e. send a summary of your investigation to SEPA as soon as reasonably practicable.

1.10 Ceasing your approved activity

1.10.1 You must inform SEPA if you intend to cease radioactive waste management activities at HMNB Clyde.



Schedule 2: limitations and conditions relating to the management of radioactive waste

2.1 Overarching requirement

2.1.1 You must carry out the approved radioactive waste management activities in a manner that achieves and maintains an optimal level of protection of the environment and the public.

2.2 Radioactive waste optimisation

- 2.2.1 You must use the best practicable means to ensure that no unnecessary radioactive waste is generated.
- 2.2.2 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.

2.3 Receipt of Radioactive waste

2.3.1 You may only receive radioactive waste generated from operational Royal Navy submarines.

2.4 Safe Management of Radioactive Waste

- 2.4.1 You must manage radioactive waste in a manner which prevents the unapproved or reckless dispersal of radionuclides.
- 2.4.2 You must manage radioactive waste safely and securely to prevent unapproved access, loss, and theft.
- 2.4.3 You must regularly verify that radioactive waste and, where relevant, the equipment or containers holding radioactive waste are still present and in good repair.
- 2.4.4 Where reasonably practicable, you must ensure that radioactive waste or its immediate containers are adequately and legibly marked or labelled to indicate their radioactive content.

2.5 Contamination control and remediation

2.5.1 If you believe that a leak, spill, or unapproved dispersal of radioactive waste has occurred, you must immediately take all reasonably practicable measures to prevent or restrict any further dispersal.



- 2.5.2 If there is a leak, spill, or unapproved dispersal of radioactive waste, you must:
 - a. use best practicable means to remediate any radioactive contamination arising either on or off HMNB Clyde; and
 - b. carry out remediation as soon as reasonably practicable.

2.6 Treatment of radioactive waste

- 2.6.1 You must only treat radioactive waste where this represents the best practicable means for the management of the waste.
- 2.6.2 You must not deliberately dilute radioactive waste in order to release it from regulatory control unless the dilution takes place in normal operations where radioactivity is not a consideration.

2.7 Waste management plan

- 2.7.1 You must prepare, maintain, and implement a management plan for radioactive waste arising from your activities and the decommissioning of associated facilities and equipment.
- 2.7.2 You must transfer or dispose of radioactive waste as soon as reasonably practicable.

2.8 Lost and stolen radioactive waste

- 2.8.1 If you believe that any radioactive waste has been lost or stolen, you must:
 - a. immediately verify if this is the case;
 - b. take all reasonably practicable measures to recover them; and
 - c. inform SEPA by telephone without delay.

2.9 Radioactive waste advisers

- 2.9.1 You must appoint, retain, and consult with suitable radioactive waste advisers to advise on compliance with your Approval, including but not limited to:
 - a. achieving and maintaining an optimal level of protection of the environment and the public;



- b. accepting into service adequate equipment and procedures for measuring or assessing public exposure and radioactive contamination of the environment;
- c. checking the effectiveness and maintenance of equipment for measuring or assessing public exposure and radioactive contamination of the environment; and
- d. ensuring the regular calibration of measuring instruments.
- 2.9.2 You must appoint the radioactive waste adviser in writing and include the scope of advice they are required to give.

Schedule 3: further limitation and conditions relating to the transfer of radioactive waste

3.1 Duty of Care

3.1.1 You must only transfer radioactive waste to a person who is legally entitled to manage it.

3.2 Transfer procedure

- 3.2.1 Before transferring any radioactive waste to another person, you must:
 - a. give to that person a true and accurate description of that waste; and
 - b. confirm that that person agrees to receive it.
- 3.2.2 You must ensure that you receive a receipt from the person removing the radioactive waste from HMNB Clyde.
- 3.2.3 As soon as reasonably practicable following transfer, you must obtain written confirmation from the person that the radioactive waste has been received.
- 3.2.4 Following transfer, you must ensure that the radioactive waste will be returned without delay to HMNB Clyde if:
 - a. it is not in accordance with the description that you have provided; or
 - b. cannot be delivered for any reason.



3.3 Transfer of radioactive waste

- 3.3.1 You must not transfer radioactive waste to any person unless the transfer represents the best practicable means for the management of that type of waste.
- 3.3.2 You must inform SEPA 28 days in advance if you intend to transfer radioactive waste to a person to whom you have not previously transferred radioactive waste. The information provided must include:
 - a. the name and address of the person that will be receiving the waste; and
 - b. the type of waste to be transferred.
 - c. evidence that the person is willing in principle to accept the waste
 - d. evidence that the person is legally entitled to accept the waste

3.4 Transfer of radioactive waste outside of the United Kingdom

- 3.4.1 Except for sealed sources, you must not transfer radioactive waste to a person outside of the United Kingdom unless:
 - a. the purpose of the transfer is treatment of the radioactive waste; and
 - b. any waste following treatment is returned in accordance with Government Policy.

3.5 Return of radioactive waste

- 3.5.1 You must ensure that any waste that is required to be returned by your Approval is:
 - a. returned to HMNB Clyde; or
 - b. in the case of low-level radioactive waste, taken to another person in the United Kingdom who is legally entitled to receive and manage that waste.
- 3.5.2 You must ensure that before any radioactive waste is returned, the radionuclide content and activities have been determined.
- 3.5.3 You must ensure that any radioactive waste returned:
 - a. only contains the radionuclides that were present at the time of transfer from HMNB Clyde (except for those present as a result of radioactive decay); and



b. has an activity no greater than that at the time of transfer from HMNB Clyde.

3.6 Transfer of Samples

- 3.6.1 You must not transfer samples of radioactive waste unless the quantity sent is the minimum practicable necessary to carry out the planned tests.
- 3.6.2 On completion of testing, any remaining samples and waste arisings may be returned to HMNB Clyde.

Schedule 4: further conditions relating to the disposal of aqueous and gaseous waste to the environment

4.1 Generic Disposal requirements

- 4.1.1 You must not dispose of any radioactive waste that is not described in this Approval.
- 4.1.2 You must ensure that any radioactive waste you dispose of is only disposed of in the manner described in this Approval.
- 4.1.3 You must ensure that the quantity of radioactive waste you dispose of does not exceed the limits set out in this Approval.
- 4.1.3 You must use the best practicable means to minimise the quantity of radionuclides that are disposed.
- 4.1.5 You must use the best practicable means to dispose of radioactive waste in a manner that minimises public exposure and impact on the environment.
- 4.1.6 You must evaluate the quantity of radionuclides disposed into the environment.

4.2 Radioactive aqueous liquid disposals

- 4.2.1 You are approved to dispose radioactive waste as described in Table 1.
- 4.2.2 If, in any month, the activity of Cobalt-60 in liquid waste exceeds 2 MBq, you shall provide SEPA with a written submission, within 14 days of the exceedance, which includes:
 - a. details of the occurrence.



- b. a description of the means used to minimise the activity of liquid waste disposed; and
- c. a review of those means having regard to paragraphs 2.1.1 and 4.1.4.

Table	1 – Ap	proved	Dist	posals	of	Aa	ueous	Lia	uid
TUDIC	i Ab	proved		J05015		лч	ucous		Jaia

Description of approved radioactive waste	Specified disposal routes	Approved radionuclide or groups of radionuclides	Approved annual activity disposal limit (MBq)	
	The collection system and disposal pipelines provided by you for disposal at National Grid References NS2489 or NS2488 taken together.	Tritium	500,000	
		Carbon-14	100	
		Cobalt-60	100	
Aqueous liquid		All non-alpha emitting radionuclides taken together and excluding those individually listed in this table	100	
		All alpha emitting radionuclides taken together	5	

4.3 General Effluents

4.3.1 You are approved to dispose radioactive waste as described in Table 2.

Table 2 - Approved Disposals for General Effluents

Description of approved radioactive waste	Specified disposal routes	Approved radionuclide or groups of radionuclides	Approved annual activity disposal limit (MBq)
General Effluents	To a relevant sewer To the Gareloch or a relevant sewer via the Garelochhead Oil Fuel Depot	Tritium	10,000

4.4 Radioactive Gaseous Disposals

- 4.4.1 You are approved to dispose radioactive waste only as described in Table 3 unless you can:
 - a. demonstrate that directing the dispose to an approved gaseous outlet is not the best practicable means; and
 - b. ensure that you will not exceed any relevant gaseous disposal limit.

Table 3 – Approved Gaseous Disposals

Description of approved radioactive waste	Specified disposal routes	Approved radionuclide or groups of radionuclides	Approved annual activity disposal limit (MBq)
	Gaseous outlet for the Nuclear Support Hub at National Grid Reference NS2489 and	Tritium	200
Gaseous	Gaseous outlet for the Radioactive Effluent Discharge Facility at National Grid Reference NS2488 taken together	Any other radionuclides taken together and excluding those individually listed in this table	100
Gaseous	Gaseous outlets at the Royal Naval Armaments Depot at Coulport	Tritium	25,000



Schedule 5: disposal of radioactive wastes

5.1 Disposal in normal refuse

- 5.1.1 You are approved to dispose of solid radioactive waste in normal refuse provided that:
 - a. No single item has an activity exceeding 400kBq for tritium and C-14 or 40 kBq for all other radionuclides.
 - The total activity in 0.1m³ of normal refuse does not exceed 4 MBq for tritium and C-14 or 400kBq for all other radionuclides.
 - c. The total activity disposed of in one year does not exceed 2 GBq for tritium and C-14 and 200 MBq for all other radionuclides; and
 - d. Where practicable, any marking or labelling that indicates the waste is radioactive is removed prior to disposal.

5.2 Radioactive aqueous liquid disposals – small quantities

- 5.2.1 You are approved to dispose of radioactive aqueous waste to a relevant sewer, relevant river, or the sea provided that:
 - a. the radionuclide concentration does not exceed 100Bq/ml
 - b. the total activity disposed of in a year does not exceed:
 - (i) 100MBq for the sum of the following radionuclides: H-3, C-11, C-14, F-18, P-32, P-33, S-35, Ca-45, Cr-51, Fe-55, Ga-67, Sr-89, Y-90, Tc-99m, In-111, I-123, I-125, Sm-153, TI-201; or
 - (ii) 1 MBq for the sum of all other radionuclides.

5.3 Radioactive gaseous releases – small quantities

- 5.3.1 You are approved to dispose of radioactive gaseous waste provided that:
 - a. it consists of only fugitive releases from a container; and
 - b. it is dispersed from a building in such a way that it does not enter or re-enter a building.



Schedule 6: further limitations and conditions relating to environmental monitoring

6.1 Assessment of public exposure and the environment

6.1.1 You must carry out and maintain an assessment of public exposure and the impact on the environment resulting from your disposals.

6.2 Environmental Monitoring Programme

- 6.2.1 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.
- 6.2.2 You must take appropriate samples and conduct appropriate measurements, tests, surveys, analyses, and calculations to periodically assess the effectiveness of the measures you have taken to minimise the radiological effects of your radioactive waste disposals.
- 6.2.3 You must inform SEPA at least 28 days before any intended change in the environmental monitoring programme is implemented. The information provided must detail the proposed changes and a reason for the proposed change.
- 6.2.4 You must submit to SEPA an annual summary of the results of the environmental monitoring programme and a written report of the results in respect of the radiation exposures of the public and trends in radioactivity concentration in the environment highlighting:
 - a. any reported value which exceeds the mean plus 3 standard deviations of the previous 12 reported values; and
 - b. as far as reasonably practicable, provide an explanation for any such elevated value.

Interpretation of Terms

 "activity" expressed in becquerels, means the number of spontaneous nuclear transformations occurring in a period of one second;

"Clyde Off Site Centre" having postal address Gareloch Road, Rhu, Helensburgh, G84 8LA



"decommissioning" means the process whereby a facility, at the end of its economic life, is taken permanently out of service and its site made available for other purposes and includes any remediation carried out by you in the locality of the approved place;

"disposal" has the same meaning as in schedule 8 of EASR;

"EASR" means the Environmental Authorisations (Scotland) Regulations 2018;

"gaseous waste" means radioactive waste in the form of gases and associated mists and particulate matter;

"general effluents" means liquid wastes which are produced on board a submarine as part of normal operations that are not directly associated with submarine reactor plant and that contain only tritium;

"HMNB Clyde" means His Majesty's Naval Base, Clyde and consisting of the naval base at Faslane (including the Clyde off Site Centre), and the Royal Naval Armaments Depot at Coulport;

"low level radioactive waste" means radioactive waste having a radioactive content not exceeding four gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity;

"month" means calendar month (i.e., 1-31 January, 1-28/29 February, 1-31 March, etc.);

"public exposure" has the same meaning as in Schedule 8 of EASR;

"radioactive waste" has the same meaning as in Schedule 8 of EASR;

"radioactive waste adviser" means a person having a current valid certificate recognising the capacity to act as a radioactive waste adviser issued by an Assessing Body approved by SEPA or a corporate radioactive waste adviser working in accordance with Corporate Arrangements approved by SEPA;

"sea" has the same meaning as in Schedule 9 of the EASR;

"relevant river" means a river which at the time of any disposal into it of aqueous radioactive waste has a flow rate which is not less than 1 m³s⁻¹;

"relevant sewer" has the same meaning as in Schedule 9 of EASR;



"sealed source" has the same meaning as in Schedule 8 of EASR;

"Tier 4 Approval" has the same meaning as in the Memorandum of Understanding Between Ministry of Defence and Scottish Environment Protection Agency on Matters Relating to Radioactive Substances, 2022.

"treatment" includes the recovery of reusable materials or to make the subsequent storage or disposal of the waste more manageable;

"year" means any period of 12 consecutive months;

"you" means the approved person;

"your Approval" means the Approval issued to you in relation to the radioactive waste management activity you are carrying on and constituted by this document.

- 2)(a) In determining whether particular means are the "best practicable" for the purposes of your Approval, you are not required to incur expenditure whether in money, time or trouble which is, or is likely to be, grossly disproportionate to the benefits to be derived from, or likely to be derived from, or the efficacy of, or likely efficacy of, employing them, the benefits or results produced being, or likely to be, insignificant in relation to the expenditure.
 - (b) Where reference is made to the use of "best practicable means" in your Approval, the terms "best", "practicable" and "means" have the following meaning:

"best" – means the most effective techniques for achieving a particular objective, having due regard to technological advances (state of the art) and changes in scientific knowledge; and understanding.

"practicable" – indicates that the "means" under consideration should only be selected following an optimisation process that includes consideration of the technical viability including comparable processes, facilities or methods of operation which have recently been successfully tried out and takes into account social and economic costs and benefits.

"means" – includes technology, disposal options, the design, build, maintenance, operation and decommissioning of facilities, and wider management arrangements.

(c) The social and economic costs and benefits that should be taken into account in the optimisation process used to decide what is practicable includes (where relevant):

- economic costs
- social benefits
- radiological exposures to the public
- occupational radiological exposures
- radiological impact on the environment
- conventional safety
- consistency with the waste hierarchy
- impact of the non-radioactive properties of radioactive waste
- the generation and associated impact of non-radioactive wastes, including climate change emissions
- the proximity principle
- applicable government policy.
- 3) Terms not defined in your Approval are to be read and understood in accordance with the definitions in the Memorandum of Understanding Between Ministry of Defence and Scottish Environment Protection Agency on Matters Relating to Radioactive Substances, 2022.

For information on accessing this document in an alternative format or language, please contact SEPA by emailing <u>equalities@sepa.org.uk</u>

If you are a user of British Sign Language (BSL), the Contact Scotland BSL service gives you access to an online interpreter, enabling you to communicate with us using sign language. <u>contactscotland-bsl.org</u>

