

# FASLANE & COULPORT ERICA ASSESSMENT

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## 1.0 Scope

The purpose of this assessment was to assess the potential impact of gaseous and liquid radioactive discharges arising from HMNB Clyde Coulport and Faslane respectively on Natura 2000 sites and Sites of Special Scientific Interest (SSSI). This was in support of proposed changes to the Letters of Agreement for the disposal of radioactive waste from HMNB Clyde. The proposed revised discharge limits for gaseous and liquid radioactive wastes are detailed in Table 1.

**Table 1: Proposed discharge limits**

Radionuclide	Proposed discharge limit (Bq/y)
<i>Gaseous (Coulport)</i>	
H-3	2.0E10
<i>Liquid (Faslane)</i>	
Co-60	1.25E8
H-3	5.0E11
Total alpha ( <i>Pu-239</i> ) <sup>1</sup>	5.0E7
Total beta ( <i>Cs-137</i> ) <sup>1</sup>	1.25E8

<sup>1</sup> In order to assess these discharge limits analogue radionuclides were used to represent these discharges as shown in brackets. These were chosen to ensure that the assessment was conservative.

## 2.0 Background

Natura 2000 sites are areas which are afforded special protection due to their ecological importance. These include Special Areas of Conservation (SAC), designated under the "Habitats Directive" (92/43/EEC), Special Protection Areas (SPA), designated under the "Birds Directive" (79/409/EEC) and Ramsar sites designated under the Ramsar Convention on Wetlands of International Importance.

In the UK, Natura 2000 sites are given legal protection through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and SSSI's are protected under the Nature Conservation (Scotland) Act 2004. SEPA must consider any potential impact on these sites when determining all applications for authorisations, permissions, permits, consents and environmental licences.

In order to comply with these obligations, SEPA undertakes assessments of the potential impact of authorised radioactive discharges on these sites. The ERICA Assessment Tool (Brown *et al*, 2008) is the method adopted by SEPA for conducting these assessments.

## 3.0 Method

The gaseous and liquid discharge limits were modelled using PC Cream (HPA, 2009) which provided estimations of the activity concentrations in air (Bq/m<sup>3</sup>) and water (Bq/l) as a result of the respective discharges. These data were then used as input into the ERICA Tool for assessing any impact on non-human species.

Using the activity concentrations the ERICA Tool predicts the dose rates to a set of reference organisms and compares these to the screening dose rate of 10µGyh<sup>-1</sup>. If the predicted dose rate is lower than the screening dose rate then the exposure may be considered to be of negligible radiological concern.

## 4.0 Results

### 4.1 Gaseous discharge assessment

This assessment considered the potential impact of the gaseous discharge on the nearest protected site which in this case is the Craighoyle Woodland SSSI, 4.2km from the Coulport gaseous discharge point which is at a height of 14.5m. The site comprises ancient native deciduous woodland and supports a number of nationally important lower plant communities, particularly bryophytes. The bryophytes flora includes a number of internationally threatened and nine nationally scarce species. The results of the assessment are presented in Table 2.

**Table 2: Gaseous discharge ERICA results**

ERICA RESULTS	
REFERENCE ORGANISM	PREDICTED DOSE RATE ( $\mu\text{Gy/hr}$ )
Amphibian	3.48E-07
Bird	3.48E-07
Bird egg	3.48E-07
Detritivorous invertebrate	3.48E-07
Flying insects	3.25E-07
Gastropod	3.48E-07
Grasses & Herbs	3.48E-07
Lichen & bryophytes	3.48E-07
Mammal (Deer)	3.48E-07
Mammal (Rat)	3.48E-07
Reptile	3.48E-07
Shrub	3.48E-07
Soil Invertebrate (worm)	3.48E-07
Tree	3.48E-07

In Table 2, with the exception of flying insects, the predicted dose rates for all reference organisms are the same. This is due to the H-3 concentration ratio and dose conversion coefficient being the same across all these reference organisms. This results in the predicted dose rate from H-3 being the same and, since H-3 is the only radionuclide in this dose in this assessment, results in the predicted dose rates being the same.

### 4.2 Liquid discharge assessment

This assessment considered the potential impact of the liquid discharge on the nearest protected site which in this case is the Inner Clyde SSSI/SPA/RAMSAR site, 10.5km from the Faslane liquid discharge point. This site is used by migrating birds and is of national importance for its populations of wintering wildfowl and waders and of European importance for its wintering population of redshank. The results of the assessment are presented in Table 3.

**Table 3: Liquid discharge ERICA results**

ERICA RESULTS	
REFERENCE ORGANISM	PREDICTED DOSE RATE ( $\mu\text{Gy/hr}$ )
(Wading) bird	2.38E-06
Benthic fish	2.24E-04
Benthic mollusc	2.03E-04
Crustacean	1.76E-04
Macroalgae	2.45E-04
Mammal	4.43E-06
Pelagic fish	5.05E-05
Phytoplankton	1.70E-03
Polychaete worm	3.95E-04
Reptile	2.68E-06
Sea anemones or true corals - colony	2.12E-04
Sea anemones or true corals - polyp	2.25E-04
Vascular plant	2.45E-04
Zooplankton	1.11E-04

## 5.0 Conclusion

The dose rates to non-human species as a result of exposure to the gaseous and liquid discharges are predicted to be less than the screening dose rate of  $10\mu\text{Gy h}^{-1}$ . Therefore exposure of non-human species to the discharges may be considered to be of negligible radiological concern.

## 6.0 References

Brown J., Alfonso B., Avila R., Beresford N.A., Copplestone D., Proehl G. and Ulanovsky A. (2008) The ERICA tool *Journal of Environmental Radioactivity* 99(9), 1371-1383

HPA (2009) *The methodology for assessing the radiological consequences of routine releases of radionuclides to the environment used in PC-Cream 08*, HPA-RPD-058