RSA Application (09)INFO

Dounreay Site Restoration Ltd

DSG(2009)C102

Information in Support of an Application for Authorisation for the Disposal of Liquid, Gaseous and Solid Radioactive Wastes from Dounreay

2009

Dounreay Site Restoration Ltd

DSRL	NOT PROTECTIVELY MARKED	DOCUMENT REF: RSA AUTH(09)INFO
Title: **Information in Support of an Application for Authorisation for the Disposal of Liquid, Gaseous and Solid Radioactive Wastes from Dounreay, 2009**		**Issue: 2** **Date: September 2009** **Page 2 of 108**
Purpose: Application		**File No:**

	Print Name	Signature	Date
Author	John Disbury		
Checked	D Graham		
Approved Managing Director	S Middlemas		
Approved Assurance Director	A J Wratten		
Approved Site Project Manager	B Smith		

Revision Record

Issue		Amendment	Date
Draft	First submission draft for consideration		July 2009
1	First submission to Dounreay Environment Committee (DEC)	Multiple changes after external and internal peer review	August 2009
2	Submission to DEC following DEC comments	Multiple changes, mainly typographical, from comments by the DEC Members and numerical data check	September 2009

SUMMARY

The Radioactive Substances Act 1993 requires operators to have authorisations to dispose of radioactive wastes from their sites. Authorisations are reviewed at regular intervals. This application is made by Dounreay Site Restoration Limited (DSRL) to renew the solid, liquid and gaseous authorisations for the Dounreay site.

The current authorisations were originally issued to the United Kingdom Atomic Energy Authority (UKAEA) on 16 July 1999 by the Scottish Environment Protection Agency (SEPA) and transferred to DSRL on 1 April 2008. Each of the authorisations has been varied:

- Solid Radioactive Wastes
  - March 2003 to allow the transfer of contaminated sodium from AEA Technology plc to UKAEA for destruction;
  - 5 July 2005, to update the authorisation to the multimedia format of certificate, following an application to dispose of low level solid radioactive waste to the Low Level waste Repository at Drigg; and
  - 23 June 2008 to include improvement requirements;
- Gaseous Radioactive Wastes
  - July 2003 in response to a variation requested by UKAEA to account for tritium disposal during the low level liquid effluent treatment plant operations;
  - 28 May 2007 to update the authorisation to the multimedia format of certificate; and
  - 23 June 2008 to include improvement requirements;
- Liquid Radioactive wastes
  - October 2004 following a review of the authorisation for UKAEA Dounreay initiated by SEPA following the switch in role of the site from operational to one of mainly decommissioning;
  - 28 May 2007 to update the authorisation to the multimedia format of certificate; and
  - 23 June 2008 to include improvement requirements.

It is recognised by DSRL that the authorisation in place for the disposal of radioactive wastes from Dounreay is based on the application submitted in 1993 and determined by SEPA in 1999.

This application is submitted in support of proposals for revised authorisations to dispose solid, liquid and gaseous radioactive wastes from the Dounreay site to progress the Dounreay Lifetime Plan (LTP).

Past discharges of gaseous and liquid radioactive waste into the environment from Dounreay have had very small impact on members of the public or on the environment more generally. Radiation doses to local people are well below the dose limit of 1 mSv/yr recommended in the EC Directive 96/29/Euratom Basic Safety Standards. Over the last ten years there have been substantial improvements in the management of radioactive materials on the Dounreay site, which have led to a steady reduction in liquid and gaseous wastes discharges. DSRL has an effective system for monitoring the levels of radioactivity discharged from the Dounreay site and complements this by

carrying out environmental monitoring measurements in the vicinity that demonstrate the minimal impact of its operations.

During the LTP, there will be modest discharges of radioactive material to the environment as facilities are brought to a condition of passive safety and ultimately dismantled. This document provides information to demonstrate that the overall trend in reducing discharges can be continued whilst undertaking the beneficial decommissioning and restoration of the Dounreay site.

Wastes arising from the processing of foreign contract nuclear material will be packaged and returned to the country of origin in accordance with the terms of the contract and in compliance with the transboundary movement of radioactive materials regulations.

The new limits proposed are based on a review of past disposals and an assessment of future requirements over the period of the LTP through to completion of decommissioning at the Interim End Point[1] [2]. Best Practicable Means (BPM) is considered and applied to all operations to minimise the creation and disposal of radioactive waste. The limits proposed take into consideration ongoing waste minimisation measures. It is necessary to maintain a reasonable margin between expected disposals and regulatory limits in order to avoid unreasonable constraints on the essential flexibility required to progress the decommissioning and waste retrieval work associated with the LTP.

The proposed discharge limits (as summarised in the tables below) will in general have little effect on the exposure of the public to radiation across all pathways, whilst still allowing decommissioning of the site to be progressed. Potential radiation doses (as summarised in the tables below) to the most exposed members of the public have been calculated for discharge at 100% of the proposed limits; doses are 5.9µSv/year for adult exposure to atmospheric discharges and 0.015µSv/year for adult exposure to marine discharges. These doses are much lower, less than 5%, of the Health Protection Agency Radiation Protection Division recommended dose constraint for nuclear sites of 300µSv/year. They are also significantly below the proposed threshold of 20 µSv/year for discharges of radioactive wastes to the environment, as set out by the Government in the 1995 Review of Radioactive Waste Management Policy: Final Conclusions (Cmnd 2919 as amended), below which the regulators should not require further reduction in exposure providing they are satisfied that BPM is being applied to limit discharges. In practice discharges are expected to be lower than the proposed limits and radiation doses will therefore also be lower.

Gaseous Discharge

The following tables summarise the maximum extant authorised gaseous limits and the proposed estimated 12 month discharges from the authorised discharge points, and the calculated estimates of dose to the critical group and the UK and European populations.

[1] The Interim End Point is the point in time when all hazards have been made passively safe, decommissioning is complete and only conditioned wastes and any remaining packaged nuclear material await final disposal or transfer from Dounreay.

[2] The Final End Point is the point in time, depending on Scottish Government policy on the governance of radioactive wastes, when the entirety of the Dounreay estate can be de-licensed and released, with or without preconditions, for use.

Summarised Current radionuclide Authorised Limits (Bq/yr)

EXTANT ATMOSPHERIC DISCHARGE LIMITS						
Extant Groupings						
Radionuclide	Table 4.4	Table 4.2 & 4.7	Table 4.3	Table 4.6	Table 4.5	Extant Total Bq/yr
alpha	9.80E+08	6.06E+06	1.00E+07	1.37E+07	3.00E+05	1.01E+09
beta	4.50E+10	5.15E+07	1.50E+09	3.71E+08	7.50E+07	4.7E+10
H-3	2.00E+12	1.07E+13	4.50E+12	N/A	1.00E+10	1.72E+13
Kr-85	3.00E+15	4.00E+12	4.00E+08	1.00E+12	N/A	3.01E+15
I-129	1.10E+09	N/A	N/A	N/A	N/A	1.10E+09

Summarised Proposed Authorised Limits (Bq/yr)

PROPOSED ATMOSPHERIC DISCHARGE LIMITS						
Extant Groupings						
Radionuclide	Table 4.4	Table 4.2 & 4.7	Table 4.3	Table 4.6	Table 4.5	Proposed Limits Bq/yr
alpha	6.48E+06	1.28E+05	3.00E+05	3.70E+05	1.10E+04	**7.28E+06**
beta	1.46E+09	7.80E+08	7.00E+08	1.70E+06	4.00E+04	**2.94E+09**
H-3	5.13E+11	7.50E+13	2.70E+12	2.00E+10	1.01E+10	**7.82E+13**
Kr-85	0.00E+00	5.69E+14	3.00E+12	4.00E+12	0.00E+00	**5.76E+14**
I-129	1.00E+09	-	-	-	-	**1.00E+09**

Summarised individual doses (µSv) for atmospheric discharges (excluding component for goat's milk and assuming cow's milk consumption)

Discharge limit		**Proposed Authorised Limit**		**Current Authorised Limit**
Critical Group definition		**Average**	**Extreme**	**Average**
Upper Dose	Infant	6.1	14.0	5.3
	Child	7.1	14.0	7.4
	Adult	5.9	11.0	10
% of dose constraint	Infant	2.0	4.67	1.8
	Child	2.4	4.67	2.5
	Adult	2.0	3.67	3.3

For a description of the full meaning of 'average' and 'extreme' critical groups the reader is referred to An Assessment Of The Radiological Impacts Of Proposed Atmospheric And Liquid Radioactive Waste Disposals From Dounreay, DSRL, 2009

Summarised collective doses (man Sv) for modelled atmospheric cases

Discharge limit	Proposed Authorised Limit	Current Authorised Limit
UK collective dose	0.023	0.06
EU collective dose	0.12	0.26

Liquid Discharge

The following tables summarise the maximum extant authorised liquid limits and the proposed estimated 12 month discharges from the authorised discharge point, and the calculated estimates of dose to the critical groups and the UK and European populations.

Proposed and Current Authorised Limits for Liquid Discharges (Bq/yr)

Radionuclide	Proposed Limits	Extant Limits
Total alpha	3.67E+09	1.10E+11
Total beta (Excl. tritium)	2.73E+12	4.37E+12
Total Sr-90	2.74E+11	7.70E+11
Total Cs-137	1.27E+12	1.07E+12
Total Na-22	1.30E+10	1.80E+12
Total H-3	1.02E+14	6.9E+12
Total Am-241	1.50E+07	N/A

Summarised individual doses (μSv) for ingestion of marine food products

		Proposed Authorised Limit		Current Authorised Limit
Critical Group definition		Average	Extreme	Average
Upper Dose	Adult	0.015	0.026	0.61
	Child	0.010	0.01	0.51
	Infant	0	0	0
% of dose constraint	Adult	0.005	0.009	0.20
	Child	0.003	0.003	0.17
	Infant	0	0	0

Summarised collective doses (man Sv) for the modelled marine cases

Discharge limit	Proposed Authorised Limit	Current Authorised Limit
UK collective dose (manSv)	0.012	0.03
EU collective dose (manSv)	0.041	0.12

The facilities at Dounreay are such that no direct radiation dose to the local population is expected. As part of the environmental monitoring programme carried out around the site the dose rates at 15 locations around the site perimeter are measured with Thermoluminescent Dosimeters (TLDs). These show that the upper limit to the dose at the nearest habitation is within the variability of natural background and of the order of 7µGy/y.

DSRL's view is that the environmental impacts of discharges at the proposed limits are greatly outweighed by the substantial benefits to both society and the local community of the decommissioning and environmental restoration of the site being proposed. With respect to sustainable development, it is important that the decommissioning and restoration is allowed to progress rather than leaving the task (and associated environmental burdens) for future generations. On-going decommissioning operations at the Dounreay site also provide valuable development of national expertise in this field and have been shown to contribute to the local community and economy.