WITHDRAWALS FROM SAFEGUARDS PURSUANT TO THE UK SAFEGUARDS AGREEMENT WITH THE INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA) AND EURATOM

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1. The UK is a nuclear-weapon State as recognised in the Treaty on the Non-Proliferation of Nuclear Weapons (the NPT). As such, the UK's voluntary offer safeguards agreement with the International Atomic Energy Agency (the IAEA) and the European Atomic Energy Community (Euratom) allows for nuclear material to be excluded from safeguards for national security reasons. Article 14 of the agreement (the text of which is published as IAEA document INFCIRC/263) requires that the UK provides both the IAEA and Euratom with notice in advance of the withdrawal of nuclear material from the scope of the agreement. Such notifications require approval, on the basis of a national security requirement for withdrawal of the material concerned, by the DTI.

2. Civil nuclear material in the UK became subject to the safeguards requirements of the Euratom Treaty when the UK joined the European Community in 1973. Although the Treaty provides for the exclusion from safeguards of material for defence requirements, the definition and full implementation of the detailed arrangements to be adopted in situations where UK nuclear installations handled both civil (safeguarded) and military (unsafeguarded) material took some time. In addition, prior to entry-into-force of the INFCIRC/263 agreement in August 1978, there was no requirement to seek approval from or notify DTI in the event that nuclear material was withdrawn from Euratom Treaty safeguards. For these reasons, reliable records for withdrawals during the period 1973-1978 are not available.

3. The segregation of civil and military material has been steadily improved (both during processing and for material in storage). As was announced to Parliament at the time, the simultaneous processing of material from civil reactors with that from military reactors ('co-processing') was ended in 1986. Prior to that, safeguards reports on the flows and inventories of civil material subject to co-processing arrangements were provided to the competent authorities, and the information available to DTI is that there was no net flow of material between civil and military activities under the co-processing regime. More recently, in August 1996, the reactors at Calder Hall were brought under safeguards and the announcement of the outcome of the Strategic Defence Review (SDR) in July 1998 included a commitment that all future planned reprocessing in the UK would take place under safeguards. In fact, all reprocessing in the UK since March 1996 has been performed under Euratom safeguards and been subject to the terms of the INFCIRC/263 safeguards agreement.

4. The attached table contains information on the withdrawal of nuclear material from safeguards pursuant to the INFCIRC/263 agreement, i.e. on advance notifications for withdrawal approved since the agreement entered force in August 1978. As is evident from the tabulated information, application of the INFCIRC/263 advance notification procedures has developed since 1978. Some of the early advance notifications provided to DTI covered more than one type of nuclear material (e.g. both plutonium and uranium) and/or a number of instances of withdrawals over a period of time. In addition, although the requirements of INFCIRC/263 apply only to civil nuclear material at UK nuclear facilities (the term 'facility' being defined in standard safeguards terms in the agreement itself), DTI practice since the late 1980s has been to require all UK operators reporting holdings of civil nuclear material (i.e. whether or not the location concerned satisfies the safeguards definition of facility) to notify and seek DTI approval before withdrawing material from safeguards.

5. The tabulated information shows that:

a) since the INFCIRC/263 agreement entered force in August 1978, more than two thirds of all withdrawal notifications have related to temporary transfers of material[a];

b) since August 1978 there have been only 11 withdrawal notifications for plutonium in more than gram quantities. In each of these cases the withdrawal was part of a transaction which did not involve the net transfer of plutonium from safeguards[b];

c) over the same period there have been only 8 withdrawal notifications for high enriched uranium (HEU) other than for those involving either gram quantities or the temporary transfer of material[c];

d) excluding the return of military-origin material from safeguarded facilities and activities, notifications since August 1978 for the permanent withdrawal from safeguards of plutonium and HEU have involved a total of less than 10 grams plutonium and about one kilogram of HEU; and

e) numbers of withdrawal notifications have declined significantly from a peak in the mid-1980s, and those withdrawals that have taken place in recent years comprised small quantities of material for use in instrument calibration or radiation detectors, or as analytical tracers or radiological shielding (i.e. withdrawals of the kind described in announcement of the SDR).

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[a] for example, for use as fuel in reactors operated outside safeguards, for R&D at reactors operated outside safeguards or for other processing at plants operated outside safeguards or, where depleted uranium was concerned, after its temporary processing at safeguarded facilities.

[b] examples include, the temporary transfer of plutonium for processing in a plant operated outside safeguards, the return of plutonium temporarily brought into safeguards (e.g. for use in civil R&D activities), and inadvertent feed to an unsafeguarded plant - subsequently balanced by bringing an equivalent amount of plutonium into safeguards.

[c] temporary transfers of HEU have involved material for use as fuel or for experimental purposes at reactors operated outside safeguards. The 8 exceptions have concerned either the withdrawal of HEU (approximately 1kg in total) for use in development work outside safeguards or the return of material temporarily brought into safeguards.

Table: Summary of Notifications of Withdrawals from Safeguards (1978-1999)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
1999	5 notifications involving plutonium (Pu), mg quantities	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (2 from NPL Teddington, 2 from Nycomed-Amersham and 1 from UKAEA Harwell)
	5 notifications involving high enriched uranium (HEU)[3], total ~11g	material contained in radiation detectors[2] (from Centronics Ltd)
	3 notifications involving depleted natural and low enriched uranium (DNLEU), total ~10kg	1 for material for use as radiological shielding, 1 for material contained in a radiation detector[2] and 1 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (1 from Centronics Ltd, 1 from NPL Teddington and 1 from UKAEA Harwell)
	3 notifications involving Th, sub-gram quantities	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from NPL Teddington)
1998	1 notification involving Pu, µg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from Nycomed-Amersham)
	1 notification involving Th, µg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from Nycomed-Amersham)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
1997	2 notifications involving DNLEU, total ~50kg	material for use as radiological shielding (1 from Amersham and 1 from RSL Equipment Ltd)
	1 notification involving U-233, µg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	1 notification involving Th, ~1g	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from NPL Teddington)
1996	2 notifications involving Pu, mg quantities	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	1 notification involving DNLEU, sub-gram quantity	material contained in a radiation detector[2] (from Centronics Ltd)
	1 notification involving Th, ~35g total	material to be used in development work outside safeguards[4] (from UKAEA Harwell)
1995	1 notification involving DNLEU, total ~20kg	material for use as radiological shielding (from Amersham)
1994	1 notification involving Pu, mg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
	3 notifications involving DNLEU, total ~34kg	1 for material for use as radiological shielding and 2 for material for use in development work outside safeguards[4] (1 from Amersham, 1 from UKAEA Harwell and 1 from the Berkeley Technology Centre)
	1 notification involving Th, ~4g	material to be used in development work outside safeguards[4] (from UKAEA Harwell)
1993	2 notifications involving DNLEU, total ~16g	material for use in instrument calibration[2] (from Amersham)
1992	2 notifications involving Pu, µg quantities	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	6 notifications involving DNLEU, total ~6t	4 for material for use in instrument calibration[2], 1 for material for the fabrication of fuel for the Calder Hall and Chapelcross reactors[5] and 1 for material for use as radiological shielding (5 from Amersham, 1 from BNFL Springfields)
1991	1 notification involving Pu, mg quantity	Material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	14 notifications involving DNLEU, total ~64t	9 for the return of material following its processing at a safeguarded facility[6], 2 for material for use in instrument calibration[2], 1 for material for use as radiological shielding and 2 for material to

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
		be used in other activities (e.g. development work) outside safeguards[4] (9 from CSW Engineering, 3 from Amersham, 1 from BNFL Springfields and 1 from BNFL Capenhurst)
1990	2 notifications involving Pu, ~3g total	Material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	2 notifications involving HEU, total ~1.6kg	Temporary withdrawal of fuel for the DIDO reactor[7] (from UKAEA Harwell)
	16 notifications involving DNLEU, total ~300t	8 for the return of material following its processing at a safeguarded facility[6], 4 for material for use as radiological shielding, 2 for material for use in instrument calibration[2], 1 for material for the fabrication of fuel for the Calder Hall and Chapelcross reactors[5] and 1 for material to be used in other activities (e.g. development work) outside safeguards[4] (8 from CSW Engineering, 6 from Amersham, 1 from BNFL Springfields and 1 from BNFL Capenhurst)
	1 notification involving Th, µg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
1989	2 notifications involving Pu, mg quantities	Material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	11 notifications involving HEU, total ~15kg	Temporary withdrawal of fuel for the DIDO reactor[7] (from UKAEA Harwell)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
	20 notifications involving DNLEU, total ~36t	18 for the return of material following its processing at a safeguarded facility[6], 1 for temporary handling/processing of material at a plant operated outside safeguards[8] and 1 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (18 from CSW Engineering, 1 from BNFL Capenhurst and 1 from UKAEA Harwell)
	1 notification involving U-233, µg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	1 notification involving Th, µg quantity	material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
1988	4 notifications involving Pu, mg quantities	Material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	12 notifications involving HEU, total ~18kg	Temporary withdrawal of fuel for the DIDO reactor[7] (from UKAEA Harwell)
	16 notifications involving DNLEU, total ~730kg	14 for the return of material following its processing at a safeguarded facility[6] and 2 for material to be used in other activities (e.g. development work) outside safeguards[4] (12 from CSW Engineering, 2 from UKAEA Winfrith, 1 from UKAEA Springfields and 1 from UKAEA Harwell)
1987	5 notifications involving Pu, total ~1.5kg	3 for temporary handling/ processing of material at a plant operated outside safeguards[8] and 2 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument

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		calibration)[2] (3 from BNFL Sellafield and 2 from UKAEA Harwel)
	16 notifications involving HEU, total ~17kg	temporary withdrawal of fuel for the DIDO reactor[7] (from UKAEA Harwell)
	29 notifications involving DNLEU, total ~2t	27 for the return of material following its processing at a safeguarded facility[6], 1 for temporary withdrawal of material for handling/processing at a plant operated outside safeguards[8] and 1 for material to be used in other activities (e.g. development work) outside safeguards[4] (27 from CSW Engineering, 1 from UKAEA Springfields and 1 from BNFL Sellafield)
1986	3 notifications involving Pu, total ~28kg	1 for the return of material following its use for civil R&D at a safeguarded facility[9], 1 for material inadvertently fed to a plant operated outside safeguards (an equivalent amount of plutonium was brought into safeguards to compensate) and 1 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (2 from BNFL Sellafield and 1 from UKAEA Harwell)
	15 notifications involving HEU, total ~22kg	for temporary withdrawal of fuel for the DIDO, HORACE and HERALD reactors[7] (13 from UKAEA Harwell and 2 from UKAEA Dounreay)
	24 notifications involving DNLEU, total ~490kg	the return of material following its processing at a safeguarded facility[6] (from CSW Engineering)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
1985	4 notifications involving Pu, total ~1g	2 for temporary withdrawal of material for irradiation at the VIPER reactor[10] and 2 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (from UKAEA Harwell)
	17 notifications involving HEU, total ~22kg	15 for temporary withdrawal of fuel for the DIDO, HORACE and HERALD reactors[7] and 2 for temporary withdrawal of material for irradiation at the VIPER reactor[10] (15 from UKAEA Harwell and 2 from UKAEA Dounreay)
	31 notifications involving DNLEU, total ~720kg	24 for the return of material following its processing at a safeguarded facility[6], 5 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] and 2 for material to be used in other activities (e.g. development work) outside safeguards[4] (22 from CSW Engineering, 5 from BNFL Capenhurst, 2 from UKAEA Harwell, 1 from BNFL Springfields and 1 from UKAEA Springfields)
1984	8 notifications involving Pu, total ~4g	for temporary withdrawal of material for irradiation at the VIPER reactor[10] (from UKAEA Harwell)
	22 notifications involving HEU, total ~20kg	14 for temporary withdrawal of fuel for the DIDO reactor[7] and 8 for temporary withdrawal of material for irradiation at the VIPER reactor[10] (from UKAEA Harwell)
	48 notifications involving DNLEU, total ~34t	33 for the return of material following its processing at a safeguarded facility[6], 2 for temporary handling/processing of material at a plant operated outside safeguards[8], 2 for material for the fabrication of fuel for the Calder Hall and Chapelcross reactors[5], 2 for material for civil R&D at establishments operated outside safeguards, 2 for material to be used for analytical purposes (e.g.

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
		samples, standards/tracers and/or in instrument calibration)[2] and 7 for material to be used in other activities (e.g. development work) outside safeguards[4] (31 from CSW Engineering, 5 from BNFL Springfields, 5 from BNFL Capenhurst, 3 from UKAEA Harwell, 3 from UKAEA Springfields and 1 from UKAEA Winfrith)
	1 notification involving Th, mg quantities	material for R&D at a defence establishment (from UKAEA Harwell)
1983	8 notifications involving Pu, total ~6g	temporary withdrawal of material for irradiation at the VIPER reactor[10] (from UKAEA Harwell)
	26 notifications involving HEU, total ~27kg	18 for temporary withdrawal of fuel for the DIDO, HORACE and HERALD reactors[7] and 8 for temporary withdrawal of material for irradiation at the VIPER reactor[10] (23 from UKAEA Harwell and 3 from UKAEA Dounreay)
	43 notifications involving DNLEU, total ~107t	17 for the return of material following its processing at a safeguarded facility[6], 11 for material for the fabrication of fuel for the Calder Hall and Chapelcross reactors[5], 6 for temporary handling/processing of material in a plant operated outside safeguards[8], 1 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] and 8 for material to be used in other activities (e.g. development work) outside safeguards[4] (21 from BNFL Springfields, 15 from CSW Engineering, 4 from UKAEA Winfrith, 2 from BNFL Capenhurst and 1 from UKAEA Harwell)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
1982	6 notifications involving Pu, total ~6g	for temporary withdrawal of material for irradiation at the VIPER reactor[10] (from UKAEA Harwell)
	23 notifications involving HEU, total ~23kg	16 for temporary withdrawal of fuel for the DIDO reactor[7], 6 for temporary withdrawal of material for irradiation at the DIDO and VIPER reactors[10] and 1 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2] (22 from UKAEA Harwell and 1 from BNFL Capenhurst)
	19 notifications involving DNLEU, total ~1460t	8 for the return of material following its processing or handling at a safeguarded facility[6], 4 for material to be used for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2], 3 for depleted uranium (DU) feedstock for the Capenhurst gas diffusion plant[11], 1 for temporary handling/processing of material at a plant operated outside safeguards[8] and 3 for material to be used in other activities (e.g. development work) outside safeguards[4] (16 from BNFL Springfields and 3 from BNFL Capenhurst)
1981	10 notifications involving Pu, total ~24g	temporary withdrawal of material for irradiation at the DIDO and VIPER reactors[10] (from UKAEA Harwell)
	25 notifications involving HEU, total ~39kg	16 for temporary withdrawal of fuel for the DIDO, HERALD and HORACE reactors[7], 8 for temporary withdrawal of material for irradiation at the DIDO and VIPER reactors[10] and 1 for material to be used in other activities (e.g. development work) outside safeguards[4] (23 from UKAEA Harwell, 1 from UKAEA Dounreay and 1 from UKAEA Springfields)
	42 notifications involving DNLEU, total ~1460t	24 for the return of material following its handling or processing at a safeguarded facility[6], 7 for temporary withdrawal of material for irradiation at the DIDO reactor[10], 4 for material to be used

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
		for analytical purposes (e.g. samples, standards/tracers and/or in instrument calibration)[2], 2 for DU feedstock for the Capenhurst gas diffusion plant[11], 1 for temporary handling/processing of material at a plant operated outside safeguards[8] and 4 for material to be used in other activities (e.g. development work) outside safeguards[4] (30 from BNFL Springfields, 9 from UKAEA Harwell, 2 from BNFL Capenhurst and 1 from UKAEA Springfields)
	1 notification involving thorium (Th), ~1g	temporary withdrawal of material for irradiation at the DIDO reactor[10] (from UKAEA Harwell)
1980	12 notifications involving Pu, total ~17kg	9 for temporary withdrawal of material for irradiation at the DIDO and VIPER reactors[10] and 3 for the return of material following its use in the course of civil R&D at a safeguarded facility[9] (9 from UKAEA Harwell, 2 from BNFL Sellafield and 1 from UKAEA Winfrith)
	16 notifications involving HEU, total ~26kg	14 for temporary withdrawal of fuel for the DIDO reactor[7] and 2 for temporary withdrawal of material for irradiation at the DIDO and VIPER reactors[10] (from UKAEA Harwell)
	11 notifications involving DNLEU, total ~1230t	8 for temporary withdrawal of material for irradiation at the DIDO reactor[10], 1 for DU feedstock for the Capenhurst gas diffusion plant[11], 1 for temporary handling/processing of material at a plant operated outside safeguards[8] and 1 for the return of material temporarily brought into safeguards (9 from UKAEA Harwell, 1 from BNFL Springfields and 1 from BNFL Capenhurst)
1979	3 notifications involving Pu, total ~90g	2 for the return of material temporarily brought into safeguards, 1 for temporary withdrawal of material for irradiation at the DIDO reactor[10] (each from the UKAEA Harwell facility)

Year	Number of withdrawal notifications (by type of nuclear material involved)[1]	Reason for withdrawal
	12 notifications involving HEU, total ~12kg	4 for temporary withdrawal of fuel for the DIDO reactor[7], 4 for material to be used in other activities (e.g. development work) outside safeguards[4], 3 for the return of material temporarily brought into safeguards and 1 for temporary withdrawal of material for irradiation at the DIDO reactor[10] (8 from UKAEA Harwell and 4 from UKAEA Springfields)
	14 notifications involving DNLEU, total ~1700t	7 for material to be used in activities such as development work performed outside safeguards[4], 4 for the return of material temporarily brought into safeguards, 1 for DU feedstock for the Capenhurst gas diffusion plant[11], 1 for temporary handling/processing of material in a plant operated outside safeguards[8] and 1 for temporary withdrawal of material for irradiation at the DIDO reactor[10] (10 from BNFL Springfields, 3 from UKAEA Harwell and 1 from BNFL Capenhurst)
1978	4 notifications involving DU, total ~60t	material transferred to a defence establishment following processing to convert it from uranium hexafluoride to uranium metal at the BNFL Springfields facility

[1] the tabulated information covers advance notifications of withdrawal approved by DTI and which resulted in the eventual withdrawal of nuclear material from safeguards - notifications to DTI which were subsequently cancelled (i.e. did not result in the withdrawal of material) have not been included. It should also be noted that procedures during the early years of INFCIRC/263 implementation were such that a single advance notification was sometimes used to cover more than one type of nuclear material (e.g. both plutonium and uranium) and/or a number of instances of withdrawal over a period of time.

[2] there are no facilities outside safeguards which manufacture material in such quantities and forms, and defence establishment requirements for these commercially available specialist materials have therefore been met by purchase from civil operators.

[3] high enriched uranium (HEU) is uranium enriched to 20% uranium-235 or more.

[4] small amounts of material from civil research facilities for use in a variety of other R&D military-related projects at defence establishments (e.g. from UKAEA Springfields for development work on behalf of MOD - some of which material was subsequently returned to safeguards, from BNFL Springfields for laser-related R&D, and for work in respect of conventional munitions/armour and other non-nuclear applications).

[5] the Calder Hall and Chapelcross reactors were operated outside safeguards so that they were available to produce materials for defence purposes. The Calder Hall reactors were however were brought into safeguards in 1996.

[6] for example, DU residues returned from BNFL Springfields to the Capenhurst gas diffusion plant, DU metal returned to defence establishments following its machining at civil facilities such as CSW Engineering Ltd

[7] the DIDO, HERALD and HORACE reactors were operated outside safeguards. Fuel for the reactors was fabricated under safeguards, withdrawn for use in the reactors and then brought back into safeguards following its removal from the reactors.

[8] for example, in the course of refurbishment of uranium hexafluoride containers at a plant operated outside of safeguards, or for calcination of Pu in a furnace operated outside safeguards.

[9] (part) return of Calder Hall/Chapelcross origin material which had been brought into safeguards for use in civil R&D programmes (e.g. at the Winfrith ZEBRA facility).

[10] samples of material from civil R&D projects concerned with the UK fast reactor programme were temporarily withdrawn from safeguards whilst being irradiated in the DIDO, HERALD and VIPER research reactors.

[11] the Capenhurst diffusion plant was operated outside safeguards to produce enriched uranium for defence purposes but was also used for the production of LEU for the fabrication of fuel for civil AGR reactors. Such production involved the withdrawal of DU feedstock from safeguards, although LEU product and DU tails from it were subsequently brought back into safeguards.