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UNITED STATES

May 15, 1978 NUCLEAR REGULATORY COMMISSION SECY-78-257

INFORMATION REPORT

For: The Commissioners

From: Raymond J. Brady, Director
Division of Security, ADM

Thru: Executive Director for Operations

Subject: UNITED KINGDOM "INTERNATIONAL NUCLEAR FUEL CYCLE EVALUATION (INFCE) CLASSIFICATION AND DISCLOSURE GUIDANCE"

Purpose: To inform the Commission of a recent United Kingdom Classification and Disclosure Guide.

Discussion: The Department of Energy (DOE) has informally requested comments on the enclosed "International Nuclear Fuel Cycle Evaluation Classification and Disclosure Guidance." This paper, which is being circulated for comments within DOE, has also been transmitted to other government agencies.

If the Commission has any comments on this draft guide, it is requested that we be advised.

Raymond J. Brady, Director
Division of Security
Office of Administration

Enclosure: As stated

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INTERNATIONAL NUCLEAR FUEL CYCLE EVALUATION (INFCE)

CLASSIFICATION AND DISCLOSURE GUIDANCE

04/01/4.

PART 1

INTRODUCTION

This guidance has been prepared to assist all U.K. participants in INFCE Working Groups and Committees, and also those preparing briefs and papers for INFCE purposes.

2. The existance and the contents of this paper are not to be made known to or discussed with INFCE participants from other nations or from international organisations, with nationals from other countries, with representatives of the media or with anyone not officially associated with the U.K. INFCE team or their supporting groups.

3. INFCE involves the exchange on a large scale of technical information about civil nuclear processes but the major movement of such information will be between countries, including Nuclear Weapon States (NWS), with highly developed nuclear technology, and Non Nuclear Weapon States (NNWS) with only moderately or poorly developed technology. The technology transfer will be accompanied by discussions of and papers on various aspects of nuclear policy.

4. The transfer and discussion of information provided from the U.K. for INFCE purposes carries with it a significant risk that information could be disclosed which is classified for defence policy or other reasons, which could reveal sensitive information of assistance to any NNWS wishing to set up a nuclear weapon capability or which could assist terrorists, subversives or criminals in gaining access to nuclear facilities or materials or in obtaining nuclear facilities for illegal purposes.

5. Discussions in INFCE and papers prepared for INFCE could all result in inadvertent disclosure of the types described above. In particular the discussions in Working Groups and Committees are times when disclosures could most readily occur and in addition to classified information such discussion periods could lead to dissemination of items of policy information which whilst individually not classifie or sensitive can, taken together, amount to very sensitive information about U.K. national technology or policy.

DISCLOSURE PRINCIPLES

6. Attached is a note (Annex 1) giving the Non-Proliferation background and settin out principles for protecting sensitive information in the context of INFCE. In complying with these principles the rules in the following paragraphs should be applied.

CLASSIFICATION AND CLEARANCE PROCEDURES

7. Expert advice should be sought and obtained on the classification aspects of proposed papers, presentational material and briefings during the drafting stages and before the drafts are circulated for internal comment. Authors should first consult the existing classification guides (listed at Annex 2) and notices. Guides on defence topics are held centrally by UKAEA and MOD and it will usually be necessary to consult MOD (Head of D Sc3).

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8. Expert advice is available at each establishment and the local experts have ready and timely access to the Classification Working Party secretariat in UKAEA London Office who, in turn, can consult MOD as necessary.

9. When papers, presentations and briefs have been circulated for internal comment, and when final drafts have been prepared, authors should submit them for clearance in the same way as normal scientific and other papers are cleared for open publication. It is stressed again that all papers and presentations for INFCE Committees and Working Groups must contain no classified information.

AIDS TO AUTHORS

10. The following points should be taken into account by all concerned:

(a) Accumulations of unclassified information may lead overall to undesirable disclosures. It should be assumed that all successive papers and statements by U.K. participants will be sifted for intelligence gathering purposes.

(b) "Review" papers which apply expert judgment to the ranking of alternative technologies and techniques are especially sensitive. They may provide valuable guidance to those aiming at clandestine production, clandestine diversion, overt acts of terrorism or criminal activities. Such papers should be avoided.

(c) New ideas, e.g. alternative anti-terrorist measures or fuel cycles may themselves be inherently classified or otherwise become immediately classifiable, e.g. for physical security reasons. It may also be undesirable on policy grounds to put forward possible technical remedies that would require lengthy development and large expenditure. Such remedies fall outside the scope of the INFCE which has a relative short time span. Such ideas and remedies should not be brought forward until their classification and disclosure implications have been thoroughly examined.

(d) Alleged explosive and dispersal nuclear devices have been described in the media and in unclassified papers. Staff associated with INFCE should not comment upon any such discussions or the claims or assertions made about them. It should be noted that a statement that a particular technique is of no use may be just as valuable to a clandestine operator as would a positive confirmatory statement since the denial will usually reduce the number of uncertainties he has to deal with.

(e) Access to sensitive nuclear materials is the objective of a NNWS undertaking or contemplating the future production of nuclear weapons and of potential to terrorists. Because much information, particularly on civil nuclear reactors, plutonium separation and tritium extraction has been published, it is particularly important to protect all remaining and new or modern technology associated with sensitive nuclear materials and also all classified data about those materials.

(f) A potential new process, e.g. for the production of nuclear materials needed in weapons, for isotope separation, etc. should not be described or discussed or commented on in any further detail than may already have been published officially (even if its feasibility has not hitherto been established) until it has been positively decided and made known officially to U.K. INFCE participants that the use of the process in NNWS would not prejudice U.K. interests or INFCE's own objectives.

PART 2

DETAILED CLASSIFICATION GUIDANCE

1. Isotope Separation by Gaseous Diffusion, Gas Centrifuge, Lasers and Other Methods (INFCE Working Group 2)
2. Reprocessing and Plutonium Handling (INFCE Working Group 4)
3. The Fast Breeder Fuel Cycle (INFCE Working Group 5)
4. Advanced Fuel Cycle and Reactor Concepts (INFCE Working Group 8)

Isotope Separation by Gaseous Diffusion, Gas Centrifuge, Lasers and Other Methods (INFCE Working Group 2)

Introduction

These notes are intended for general guidance only and are not intended to provide more than an indication of the areas of the above subjects which are Classified. For amplification and further information the Classification Guides CWP/G2 and CWP/G5 issued by the Classification Working Party, UKAEA should be consulted.

A. Gaseous Diffusion

1. General All theoretical work not referring in detail to an actual production cascade is unclassified. Specifications of plant equipment such as pumps, valves, motors, instruments etc. are only classified if plant operating technology or parameters or other information critical to the performance of the plant is revealed.

2. Summary of Unclassified Topics

2.1 Physics Assessments and considerations of plant safety, operation methods of controlling hazards, criticality, etc.

2.2 Chemistry Studies of inorganic chemistry of uranium and its compounds without specific references to diffusion plant technology. Studies of corrosion of materials of construction without specific reference to diffusion plant technology.

2.3 Plant Technology Basic theoretical work on plant design, flow sheets and operational control methods not relating to actual or proposed cascades. Feed and waste rates of cascade for low enrichment production. Power consumption of such a cascade.

3. Summary of Classified Topics (see also E below)

3.1 Chemical effects of UF_6 on diffusion plant, details of conditioning, stabilising and deplugging treatments.

3.2 Nature, composition and manufacturing details of the diffusion plant barrier other than the fact that some barrier contains sintered nickel; no other details must be given.

3.3 Specification and performance details of specific items of plant; details of pipework arrangements in the cascade, control valves and control systems used in the cascade.

3.4 Features of bearings used in plant which are essential to their performance in a diffusion plant.

3.5 Specification and performance of compressor units.

3.6 Separation efficiency of any stage in the cascade. Pressure level or temperature in any stage.

3.7 Any information concerning the production of enriched uranium for defence purposes which enables the capacity or throughput to be derived.

11. Part 2 of this Note gives more detailed classification guidance on the main sensitive areas in which INFCE participants will operate. This guidance is not precise. Whenever possible participants should also take expert advice. If such advice is not available, the most restrictive interpretation must be placed on any doubtful cases.

12. It will be noted that Part 2 refers throughout to the CWP Guide on Special Nuclear Materials (G8). That Guide is reproduced as Part 3 of this Note.

B. Gas Centrifuge

1. General All theoretical work relating to centrifuges which was developed and published in open literature before 1st August 1960 is unclassified. Areas of technology which represent no more than good engineering practice commonly found in other industries are also unclassified.

2. Summary of Unclassified Topics

2.1 Models of centrifuge machines with incorrect scale revealing only principles applicable to the technology before 1st August 1960.

2.2 Economics of plant performance, costs and plant capacities if centrifuge technology is not disclosed.

3. Summary of Classified Topics (see also E below)

3.1 Design details and specifications for all components of a centrifuge and manufacturing processes of the same.

3.2 Arrangement of units in a cascade.

3.3 All performance, endurance records and test results.

3.4 Specification or descriptions of centrifuge plants and information on performance or operating characteristics.

3.5 Theory relating to centrifuges and components if developed after 1st August 1960.

3.6 Theory of the internal circulation system of a centrifuge.

3.7 Plant sub-systems including full descriptions of instrumentation, cooling, protection and electrical drive systems.

C. Laser Isotope Separation

1. Summary of Classified Topics for Uranium Isotopes

1.1 Ideas

1.1.1 Ideas or concepts for techniques or routes for laser isotope separation which are new and are fundamental or significant advances over those in the published literature; and which show promise for efficient separation of practical quantities of uranium isotopes.

1.2 Research & Development Programmes

1.2.1 Experimental results and theoretical calculations, until it is shown that they will not form part of a process which has a reasonable potential for the separation of useful quantities of uranium isotopes, including details of newly determined properties of uranium isotopes and/or compounds which are important to a classified process for isotope separation.

1.2.2 Experimental or theoretical information specific to any process which has a reasonable potential for the separation of useful quantities of uranium isotopes, including experimental procedures and laser schemes for such separation, together with associated applied technology.

2. Separation of Isotopes of other Elements

2.1 Items 1.1.1, 1.2.1 and 1.2.2 refer specifically to isotopes of uranium. However, other isotopes (such as those of hydrogen, lithium, plutonium, etc.) may have military applications. Therefore, information on laser isotope separation of these elements or compounds should be treated in the same way as if they were covered by items 1.1.1, 1.2.1 and 1.2.2.

2.2 The application of laser methods to the separation of isotopes of elements other than those at the light and heavy ends of the periodic table is currently unclassified (but see Note 1 to Annex 1).

D. Other Methods of Isotope Separation

1. With respect to other methods of isotope separation, it is the intention to withhold information concerning R & D on development of processes until it is shown that they do not have a reasonable potential for the separation of "practical" quantities of materials of military interest.

E. Nuclear Suppliers Group Guidelines

1. The classified topics in A-D above are supplemented by the agreement of the Nuclear Suppliers Group on 'Guidelines for Nuclear Transfers' that there should be no technology* transfer (without safeguards) on the following items:

(i) gaseous diffusion barriers;
(ii) gaseous diffusion housings;
(iii) gas centrifuge assemblies, corrosion-resistant to UF_6;
(iv) jet nozzle separation units;
(v) vortex separation units;
(vi) large UF_6 corrosion-resistant axial or centrifugal compressors;
(vii) special compressor seals for such compressors.

*"Technology" means technical data in physical form designated by the supplying country as important to the design, construction, operation, or maintenance of enrichment, reprocessing, or heavy water production facilities or major critical components thereof, but excluding data available to the public, for example, in publishing books and periodical or that which has been made available internationally without restrictic upon its further dissemination.

Reprocessing and Plutonium Handling (INFCE Working Group 4)

Introduction

This note is intended for general guidance only and is not intended to provide more than a broad indication of the areas of the above subjects which are classified or are particularly sensitive from commercial considerations. For further information and amplification of classified aspects the Classification Guides CWP/G4 and CWP/G8 issued by the Classification Working Party should be consulted.

A. Reprocessing

1. General

Information on the technological aspects of reprocessing has been widely disseminated in the technical literature over many years, including detailed descriptions of chemical separation processes. The more sensitive aspects in this field may be considered under 3 headings.

1.1 Production of Plutonium for Defence Purposes

Quantities of plutonium allocated for military purposes, including historic records, and isotopic composition of this material are classified. Therefore any information which may allow classified information to be deduced must not be disclosed either directly or by confirmation or denial of leading questions. Care must be exercised when discussing, especially in the provision of safeguards information, the following topics:

(i) Plant throughputs, outputs and waste arisings.

(ii) Irradiation values of fuel undergoing processing.

(iii) Holdings of materials in store or in the reprocessing cycle.

(iv) Costs and programme dates.

1.2 Existing Processes

Discussion of process efficiences and economic advantages may not only compromise commercially sensitive information but may be of use in the construction of clandestine plant.

1.3 New Processes and Technology

Details of technological innovation leading to substantial improvements in existing processes or new processes especially those suitable for operation on a small scale may be of substantial assistance to illicit separation of plutonium and should not be discussed. Reviews of new or existing technology listing comparative advantages of various separation processes should also be avoided for the same reason.

B. Plutonium Handling

1. General

Basic principles for the storage, handling and transport of Plutonium have been laid down by the IAEA. Specific physical security measures applied in

the U.K. for the protection of plutonium and other Special Nuclear Materials (SNM) are classified and only general statements are permissible. The following areas of information are sensitive:

1.1 Site plans identifying the location of SNM. Plans or descriptions of buildings identifying their purpose in connection with use or storage of SNM.

1.2 Details of physical security measures taken at a site to protect SNM.

1.3 Statements of quantities of SNM in a particular store or plant other than general statements for a complete site.

1.4 Details of physical security measures taken to protect SNM in transit.

2. Alternative Methods of Handling

Alternative methods of handling such as spiking or pre-irradiation of fuel and the supply of fuel in mixed oxide forms are under active discussion and public debate. It is important to ensure that advocacy of any of these methods does not pre-empt the U.K. position before firm policy decisions have been made.

In particular care must be taken not to provide information about implications of alternative methods which could assist terrorists, for example where the accuracy of materials accountancy would be impaired at identifiable stages in the cycle; where proposed spiking agents would have short half-lives; or where remote handling must replace direct-handling techniques to diminish the additional radiological hazard.

The Fast Breeder Fuel Cycle (INFCE Working Group 5)

The Fast Breeder fuel cycle comprises any sodium cooled, Uranium/Plutonium fuelled, plutonium or uranium breeding Fast Reactor system proposed for commercial use; any closely related gas-cooled system; or any alternative concept using different coolants, fuel fabrication techniques, driver fuels or breeder materials.

2. Except where it is positively known that the information has been published officially certain topics should not be disclosed. These are set out below, firstly as broad issues and secondly as particular points of detail.

Broad Issues

3. Specific information of actual or potential value to terrorists/saboteurs; for example that concerning the production, recovery from irradiated fuel or wastes or disposition of any grade of nuclear material, even though not necessarily of recognised weapon specification, which might be of value in the creations of a nuclear weapon threat.

4. Information containing details of the physical security arrangements (and their associated power supplies) which protect sites, processes and nuclear materia (whether in process, storage or transit), including air photos, maps, site plans or building constructional drawings, which might reveal nuclear material storage and protection details. This includes any information concerning a major deficiency, a knowledge of which would assist an intruder to by-pass security systems.

5. Information in safety policy statements, safety assessments, or probability or reliability analyses which indentify or might disclose sensitive or vulnerable aspects of design or operation or which might assist terrorists to damage plants or to gain access to nuclear materials.

Specific Topics

6. Information concerning precise holdings and movement details of unirradiated fuel; irradiated fuel; spent fuel, breeder elements, bred fissile material; and derived wastes; including:

6.1 The precise location and capacity of stores (including ponds, etc., for "Extending cooling"); their manning arrangements; means of physical security protection; rate of turnover; procedures for issue and control of stock.

6.2 Details of routes and timings for off-site movements, inter-site transfer etc.

6.3 Materials Balancing Areas and Key Measurement Points:

6.3.1 Description and location.

6.3.2 Physical and chemical form of material measured.

6.3.3 "Material Unaccounted For" (MUF) figures relating thereto.

6.4 Information about ownership which reveals any connection with defence matters (other than the mere fact that there is "defence material" at Capenhurst, Springfields, or Windscale).

7. Actual figures relating to throughput or gross output (net of internal recycle) product and residues.

(The nominal capacity of a plant - the existence of which has been or can be, admitted - may be divulged).

8. Details of international safeguards inspections, and of related statements (e.g. Euratom returns), which reveal physical holdings, inventory changes and "MUF" figures.

9. Any cost information relative to civil reactor plutonium which might, by derivation, reveal the costs of military plutonium.

NOTES: 1. Reference should also be made to the other Sections of this overall INFCE guidance document wherever appropriate to the Fast Breeder cycle, in particular to that concerned with Reprocessing and Plutonium handling

2. Paragraphs 6 to 9 above must be supplemented by reference to Classification Guide C/P/G8, which is annexed to this document.

Advanced Fuel Cycle and Reactor Concepts (INFCE Working Group 8)

This Group is divided into two sections:

A. Once through fuel utilisation for present thermal reactors.

2. Information on present thermal reactors has been widely disseminated in unclassifed literature and there is little to be gained by withholding information in this section, except where this is classified elsewhere: see in particular Part 3 of this guidance.

B. Other reactors and fuel cycle concepts.

3. Specific problems relate to information on thorium-U233 technology, including the light water breeder reactor concept, high temperature gas cooled reactors, heavy water reactors, other thorium-U233 breeder concepts and the associated thorium-U233 fuel cycle. Information on thorium-U233 technology must be protected because:

(i) the proliferation risks of U233 are comparable to those of Pu-239;

(ii) the technology of the thorium-U233 fuel cycle is not yet as advanced as that of the U238/Pu 239 cycle and has not yet been demonstrated on a commercial or large scale; the possibility exists therefore, at this time, of preventing the dissemination of the technology.

4. Advanced reactor concepts included in Section B are the fusion and spallation breeder (accelerator breeder) reactors. No information relating to inertial confinement fusion systems should be released in view of its possible relevance to the design of explosive nuclear devices. Much information on the subject of Accelerat Breeder Reactors (Spallation Reactors) is contained in the unclassified literature but information not already compromised should not be offered.

Thorium/U233 Technology: Topics requiring Classification

Unpublished information on:

Fabrication
- Flowsheets and specifications
- Plant capacities and throughputs
- Plant designs
- Details of Shielding requirements
- Methods of operation
- Handling limits and any necessary special precautions
- Wastes; compositions and quantities

Storage (including reactor site)
- Details of Stores; location, capacity, contents, etc.
- Details of Shielding required because of build-up of gamma active isotopes in fresh fuel

Reprocessing
- Flowsheets and specifications
- Plant capacities and throughputs
- Plant designs
- Methods of operation
- Materials of construction (i.e. dissolvers)
- Any necessary special plant precautions
- Wastes; compositions and quantities

Physics	Nuclear physics of fuels destined for thorium/uranium fuel cycles
Costs	Operating costs in all cases.

Accelerator Breeder-Reactors

1. The production of plutonium by accelerating hydrogen nuclei on a heavy metal target was demonstrated on a laboratory scale in the 1950's. A recent study by the Brookhaven National Laboratory of the characteristics of a large-scale accelerator breeder concluded that such a breeder could be designed and constructed using current technology.

2. INFCE participants must not release or comment upon any information relating to:

(i) Target-blanket design optimisation.

(ii) High-power beam accelerator design features whether or not under the control of participating governments.

(iii) Problems of AC/R-F conversion.

(iv) Measures to deal with primary beam effects.

3. Similar constraints apply to the possibility of production by similar means of U233 and tritium.

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LL·45.00 PART 3 ~~RESTRICTED~~ CWP/G8

Warning - The information given in this document is not to be communicated, either directly or indirectly, to the Press or to any person not authorised to receive it.

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

CLASSIFICATION GUIDE: CERTAIN NUCLEAR MATERIALS

Issued by the Classification Working Party

UKAEA
11, Charles II Street
London SW1Y 4QP

March 1978

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~~DRAFT~~ CLASSIFICATION GUIDE FOR INFORMATION ABOUT CERTAIN NUCLEAR MATERIALS

General Principles

This guide deals with the classification of information, including documents, relating to holdings and movements of certain nuclear materials. In addition to the basic aim of all classification - the protection of national security - a special objective of this guide is to prevent the disclosure of information which could assist a person planning theft, blackmail, sabotage or other illegal acts. The information falls into two categories:

a) information about the physical security arrangements to protect the material.

b) information about holdings and movements, e.g. storage capacity, location, stocks, inventories, throughput, output and accounting.

One purpose of this guide is to define the extent to which information concerning the concept of materials unaccounted for (MUF), actual values of MUF for certain specified nuclear materials (Items I - V of Appendix I) for particular sites, and information on related topics should be protected.

The guide does not deal with technical information about the production or processing of nuclear materials, for which there are appropriate technical classification guides.

Nor does the guide apply to defence material or to sites engaged wholly or primarily on defence nuclear work. It is applicable only to UKAEA and ENFL sites and plants etc., engaged primarily in civil nuclear programme activities.

Physical Security standards for SNM in use, in storage or in transit are laid down in "Minimum standards for the physical protection of special nuclear and other radioactive materials" issued by UKAEA Security Branch.

Throughout the guide S = Secret, C = Confidential, R = Restricted, NC = Not Classified by this guide but may be classified by other guides..

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CONTENTS OF GUIDE -

CLASSIFICATION OF INFORMATION ON:

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SECTION 1: PHYSICAL SECURITY PROTECTION OF NUCLEAR MATERIALS IN USE AND STORAGE

1.1	The physical security plan for a site	C
1.2	The general layout of a site showing buildings, outside storage areas, perimeter fences and other features visually obtainable from outside the site. Includes outline plans and aspects of building visible to the public: the purpose of the buildings must not be disclosed unless already well known (e.g. the principal UKAEA reactors)	N/C
1.3	Specific drawings, diagrams, maps, aerial photographs of sites which includes descriptions or indexes so as to identify buildings or locations holding SNM, or reveal other features of special physical security interest in assisting theft or sabotage	C
1.4	Constructional drawings of buildings, stores, fences, electrical and other services layout specifically related to the storage or use of SNM and which include features of physical security interest.	see App.1
1.5	Security survey reports, inspection reports, threat assessment reports and other documented reports on physical security measures and intruder detection alarm systems at a site (but see 1.6)	C
1.6	Report showing a major deficiency, the knowledge of which would significantly assist an intruder to by-pass the physical security barriers to Cat.1 SNM.	S
1.7	Installed details of intruder detection alarms and C.C.T.V. systems. Drawings or plans which identify the electrical or other power supplies to the alarm and C.C.T.V. systems and control rooms.	C
1.8	Combination lock or other mechanical lock codes, and key design of special locks, protecting SNM	C

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SECTION 2: PHYSICAL SECURITY PROTECTION OF NUCLEAR MATERIALS IN TRANSIT

HIGH SECURITY VEHICLES (ESV)

2.1	General description of purpose and function	N/C
2.2	Visual access to cab, and cargo compartment	R
2.3	Physical security features of vehicle design and construction; design and function of alarms and immobilisation devices; combination lock codes and key design of special locks	C
2.4	Frequencies of radio sets installed in ESV and escort vehicles	C

Note 1 The details of classification to be applied to movements and communication information are stated in the operating instructions of the Radioactive Transport Monitoring System.

Note 2 Movement documents retain their classification after completion, unless declassification is authorised on the document by the originator.

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SECTION 3: NUCLEAR MATERIALS IN STORAGE

3.1	Fact that storage capability exists on a particular site for any class of nuclear material specified in Appendix I.	N.C
3.2	Precise location of stores on site;	see App.[illegible]
3.3	Number of stores on site	
	a. If Pu or HEU holding is revealed	C
	b. Otherwise	R
3.4	Capacity of stores,	
	a. general statements about total storage capacity for sites and materials listed in Appendix 2	N.C
	b. other information about capacity of stores	see App.I
3.5	Quantity of certain nuclear materials on or stored at a particular site,	
	a. general statements covered by App. 2	N.C
	b. other information about quantities	see App.I
3.6	Forms in which materials are or can be stored at a particular site,	
	a. general statements covered by Appendix 2	N.C
	b. other relevant information	see tech. guides
3.7	Data related to material issued, material received and rate of turnover of materials in store	see App.I
3.8	Waste intended for disposal	
	a. Waste in store, despatched from site to ultimate disposal, disposed of on site or to environment	N.C
	b. Annual summaries of waste in store, dumped discharge or otherwise disposed of	N.C
	c. Other waste figures including inter-site transfers and any breakdown to show derivation	R
3.9	Method of operation of store,	
	a. General principles not revealing operational details	N.C
	b. Detailed procedures for issue, receipt and control of stock	see App.I
	c. Manning arrangements	R

SECTION 4: NUCLEAR MATERIALS IN USE

4.1	Holdings and material received, quality, form and source	
	a. General information relating solely to material from civil nuclear power programme	N.C
	b. All other information on holdings and material received (but see section 5.1 for movement documents).	see App.I

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4.2	Throughput	
	a. Nominal capacity of a plant, the existence of which has been or can be admitted.	N.C.
	b. Actual throughput, except for Isotopic separation plants	See Appendix I
	c. Throughput of Isotopic separation plants - see appropriate site guides	
4.3	Output (net of internal recycle)	
	a. Gross output, product and residues, except for enrichment plant	See Appendix I
	b. Isotopic separation plants - see appropriate site guides	

SECTION 5: NUCLEAR MATERIALS IN TRANSIT

5.	Movement of nuclear materials off site and within sites	
5.1	Documents which state both (a) quantity and nature and (b) movement routes and timings of Category 1 SNM as defined in 'Minimum Standards'	C
5.2	Where (a) and (b) in 5.1 are communicated separately (which is the desirable method).	
	Category I SNM	C
	Category II SNM	R
	Categories I - IV are defined in "Minimum Standards for Protection of Special Nuclear Materials - Annex A"	
5.3	Documents related to Categories II, III and IV	R
5.4	Route cards and schedules of recommended road routes for off-site movements	R
5.5	The folder containing sets of route cards prepared by AEAC	C

SECTION 6. NUCLEAR MATERIALS ACCOUNTING

6.1	Statements of general materials accounting principles	N.C
6.2	Description and location of Materials Balance Areas and of key measurement points not already in the public domain	R
6.3	Physical and chemical form of material measured at those key points	R
6.4	Accuracy of measurements, instrumentation and techniques	N.C
6.5	Inventories:	
	a. Inventory information in computer stores* or other records if names and locations are referred to only by code numbers, and the key to the code is classified Confidential	N.C
	b. All other inventory information	See Appendix I

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6.6 Notices

a. Laboratory and plant notices e.g. boards showing glove box holdings must be classified according to the information they disclose.

6.7 Ownership of material.

a. Information about ownership which reveals any connection with defence matters other than the mere fact that the material is "defence material" at one of the plants or sites listed at App.4, or that one of those plants or sites is engaged on "defence work". (In relation to stores at any other site or plant the statement that it is or is not associated with nuclear weapons or MOD reactors must be neither confirmed nor denied) C

b. Other ownership information N.C.

* Appropriate protection must be given to all equipment and terminals through which classified information in computer stores can be accessed

SECTION 7. MUF INFORMATION

MUF (material unaccounted for) is a term of nuclear material accountancy. It is defined as the difference between the quantity of material found at a physical inventory within a "Materials Balance Area" (for which transfers in and out and into holdings, production and destruction of nuclear materials are measured or estimated) and that in the materials accounts.

The Authority and BNFL publish annually, for each site, an overall MUF figure for plutonium, uranium enriched to 20% or more, uranium enriched to less than 20% and natural and depleted uranium. Provided that classified or commercial information is not disclosed, questions arising from publication of the MUF figures can be answered. It is not intended to withhold MUF information solely on the grounds that it would cause embarrassment to the Authority or to BNFL.

7.1 MUF in reporting or other materials balance areas - R.
but may be C for materials balance areas holding Category I SNM quantities

7.2 MUF in Plants - classified in accordance with 4.1

7.3 MUF in Sites - MUF totals by quantity for site (not broken down to reveal defence "ownership") and where not revealing either directly or by implication any classified information may be released for publication after formal approval N.C.

7.4 Details of investigations into particular MUFs unless formally approved for release R or hi

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Appendix 1

CLASSES OF NUCLEAR MATERIALS

Classes		CONFIDENTIAL	RESTRICTED	N/C (NOTE 1)
Ia	Plutonium in store and use (NOTE 2)	above 2kg	1g - 2kg	below 1g
Ib	Plutonium in transit	above 100g	1g - 100g	below 1g
IIa	U233 (NOTE 3)	above 2kg	2g - 2kg	below 2g
IIb	U enriched to 20% or more of U235 (HEU) (NOTE 3)	above 5kg	10g - 5kg	below 10g
IIIa	Uranium enriched 10% - 20% U235 (NOTE 3)		above 100g	below 100g
IIIb	Uranium enriched less than 10% (NOTE 3)		above 10kg	below 10kg
IV	Natural Uranium			Any amount
V	Depleted uranium			Any amount
VI	Thorium			Any amount
VII	Irradiated materials (NOTE 4)		Any amount	
VIII	Tritium (NOTE 5)	above 3g		below 3g

NOTES 1 - 5 see overleaf

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Appendix 1

CLASSES OF NUCLEAR MATERIALS

NOTES

1. Information not classified under the provisions of this table should be graded OFFICIAL USE ONLY. A management decision is required before it can be published.

2. Local conditions may require classifications relating to plutonium in use to be based on the amounts given in line Ib.

3. In lines II and III the weights given relate to the actual contents of U233 or U235.

4. Irradiated materials in this context refers to materials which if unirradiated would fall within the provisions of the Restricted or Confidential columns of lines Ia - IIIb of this Table and which have a total radiation output giving a doserate not less than 1 gray/h ($1Gyh^{-1}$), i.e. 100 rad/h at one metre from the unshielded surface of the material.

5. The application of the guidance for Tritium is under review.

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Appendix ?
(under revision by BNFL)

~~Interim Classification Guide~~

and website

List of sites for which storage capacity may be disclosed

Dounreay (DNPDE):	:	depleted uranium.
Springfields (Nuclear Power Development Laboratory)	:	LEU in miscellaneous compounds.
Windscale (BNFL)	:	irradiated natural uranium fuel*
	:	irradiated LEU fuel*
Chapelcross	:	UO_3

*storage pond capacities may be disclosed in broad terms

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Appendix 1

~~Interim Classification Guide for MOX Fuel Fabrication Plant~~

List, by sites, of forms of materials for which fact of use or existence of storage can be disclosed

Capenhurst (BNFL)	:	depleted U as UF_6
Chapelcross (BNFL)	:	depleted U as UO_3
Dounreay (DNPDE)	:	mixed PuO_2 and natural U as UO_2 in fresh and irradiated fuel
	:	HEU in irradiated fuel
Harwell (AERE)	:	Pu) HEU) LEU) in alloys and compounds natural U) for research purposes depleted U) HEU fuel elements for Dido & Pluto Booster for Linac
Springfields (BNFL)	:	LEU in fresh fuel
	:	natural U in fresh fuel
	:	natural U as UF_6
	:	natural U as U_3O_8 concentrate
	:	depleted U as UO_3
Springfields (Nuclear Power Development Laboratory)	:	LEU in miscellaneous compounds
Windscale (BNFL)	:	Pu as PuO_2 Pu in irradiated fuel HEU in irradiated fuel LEU in irradiated fuel natural U in irradiated fuel depleted U as UO_3 natural and depleted U as UO_2
Winfrith (AEE)	:	Pu as metal Pu as PuO_2 HEU as metal HEU as UO_2 LEU as metal LEU as UO_2

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~~RESTRICTED~~

Appendix 4

~~Interim Classification Guide for MOD Establishments~~

List of sites or plants at which it may be disclosed that there are stores containing defence material and that the related site or plant is engaged on defence work

Capenhurst (BNFL)	:	depleted uranium
Springfields (BNFL)	:	natural uranium
Windscale (BNFL)	:	Pu
	:	HEU in irradiated fuel
	:	depleted uranium

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ANNEX 1

INFCE: NUCLEAR PROLIFERATION - PROTECTION OF INFORMATION

Introduction

This note has been prepared to indicate how best to avoid the danger of disseminating information of relevance to nuclear weapons through INFCE activities. While it is not possible to produce a detailed tabulation of the facts that should and should not be released, this paper explores the sensitive areas and indicates those which must be protected throughout the INFCE exercise.

Technical Background

2. An explosive nuclear device can be constructed from any type of fissile material. Plutonium is not the only suitable material; indeed uranium-235 and uranium-233 are equally, if not more, important. There are, however, differences between the various fissile materials used in nuclear weapons.

3. The route for obtaining uranium-235 is through an isotope separation process operating on natural uranium ore. The technologies for isotope separation, eg gaseous diffusion, gas centrifuge, jet vortex, laser irradiation, etc, have not been generally published. The other important nuclear materials for weapons usage ie plutonium, uranium-233 and tritium, are all obtained by irradiating inert materials with neutrons. Thus any major source of neutrons, eg thermal and fast fission reactor systems, fusion reactors (whether magnetically or inertially confined) and some accelerator systems, have proliferation potential and need to be controlled. Details of most of these reactor technologies are already in the public domain but those which are not, and the necessary separation and processing technologies when not already published or compromised, should remain classified.

4. Inertial confinement fusion (ICF), including laser fusion, systems are based on a technology which has many similarities with that applicable to modern nuclear weapons and hence work on ICF systems can contribute significantly towards gaining an understanding of the principles underlying the design of efficient weapons and of thermonuclear warheads.

5. Sufficient information has already been published to make it relatively easy for a nation state with the necessary equipment and financial resources to produce a modest military nuclear capability providing it has free access to the necessary nuclear materials but access to a relatively small quantity of fissile material only is needed to demonstrate that a nuclear device can be made - perhaps one tenth or one hundredth of the amount needed for a military capability. On the other hand, the production of an explosive nuclear device by a terrorist group with

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access to fossile material would be much more difficult and much more hazardous than has popularly been supposed. Consequently it is of the utmost importance that nothing should be said or published to make easier the task of terrorists; in particular nothing official should be said about the capability of terrorists to design and make nuclear devices and no comment should ever be offered on nuclear device designs which are put forward in publications or discussion: it is particularly important neither to confirm nor to deny the validity or otherwise of such designs.

6. There is no substantial difference between the nuclear technology required to produce a nuclear weapon and that required to produce an explosive nuclear device for peaceful purposes. Therefore non-proliferation policies must seek to control the latter just as stringently as they must seek to inhibit the spread of nuclear weapons.

7. Much classified Defence information is associated with certain UKAEA and BNFLtd activities. Such information must not be disclosed in open discussions or publications.

The INFCE Exercise

8. There is a very real danger that the INFCE exercise itself will prove to be a vehicle for the proliferation of information of substantial help to any non-nuclear weapon state with an ambition to acquire a military nuclear capability. The discussion of nuclear fuel cycles could show the best way to obtaining access to those nuclear materials which are produced through neutron irradiation: the discussion of isotope separation technologies could point the best direction for the development of a clandestine process for manufacturing enriched uranium; the discussion of critical quantities of materials needed for a weapons programme could allow the scale of a military programme to be estimated and give away information of value to terrorists; the discussion of the technology of ICF could reveal information of value to the design of nuclear weapons. Discussions could touch on matters associated with Defence programmes.

9. The objective of INFCE is to devise additional measures to minimise the danger of the proliferation of nuclear weapons without jeopardising nuclear energy supplies or the development of such supplies for peaceful purposes. This objective is directed at the non-proliferation of nuclear weapons by nation states rather than by terrorist groups, although the latter would constitute a particularly nasty form of proliferation. Many of the measures designed to inhibit "terrorist proliferation" are not relevant to "nation state proliferation". However, in some cases, it might be advantageous in the INFCE discussions to avoid too clear a definition of these two types of proliferation because a lack of clarity could improve the acceptability of some controls and constraints, ie a measure aimed primarily at NNWS might be accepted because it was also seen to have advantages in the anti-terrorist context. However, in national discussion, we should be careful to distinguish between nation state and terrorist proliferation as far as possible as as not to be uncertain about our own objectives.

The Terrorist Problem

10. As has already been stated, INFCE is not directly concerned with "terrorist proliferation". However INFCE must not give any assistance to terrorists. On the contrary, INFCE must be taken as a chance to emphasise the need to maintain the

highest possible standards of security to prevent nuclear materials falling into unauthorised hands. The ownership and control of nuclear materials should be centred in Government hands and not in private industry. The precautions which are taken to protect nuclear materials must not be disclosed in detail.

Conclusions

11. To sum up, INFCE must not be allowed to become a vehicle for the dissemination of information which would assist a NNWS to achieve a nuclear weapons capability or of classified Defence information. To achieve this:

(a) no information relevant to the design of explosive nuclear devices must be revealed in open publications or INFCE discussions; this means, inter alia that the technology of ICF must be withheld;

(b) information on the technologies for producing uranium-235 and 233 must not be released; nor must information on isotope separation (1) and, where not already published or compromised, on new or advanced technologies for producing or processing nuclear materials (2) or on advanced reactor concepts and accelerator-breeder systems suitable for the production of nuclear materials;

(c) a general statement needs preparing of the quantities of the various types of nuclear material (2) which are insignificant from a nation state proliferation viewpoint: this statement should indicate the degree of control which should be exercised by the international safeguards system over these materials (this may be the same as that already exercised by the IAEA): until such a list is produced the insignificant quantities should be those given for the Restricted category in Part 3, Table 1.

(d) no detailed information should be released on anti-terrorist security precautions;

(e) all concerned should refrain from attempting to list (3) or quantify the proliferation risks associated with the various phases of the nuclear fuel cycle;

(f) all classified Defence information must be withheld.

Notes: (1) Isotope separation technology developments are classified (see Part 1, paragraph 10(f)) and remain so except when a deliberate decision has been made that a specific topic is unclassified. All isotope separation technologies, unless already openly published or compromised are included and particular attention must be paid to those dealing with elements of $Z \leq 6$ or of $Z > 80$.

(2) The important nuclear materials in this NPT context are plutonium, 233 uranium, 235 uranium and tritium.

(3) Such a sensitive listing could be made, directly or by implication, if tablulations are made of the ease or difficulty of producing, processing or separating nuclear materials or of the relative suitability or otherwise of various techniques involved. Any such listings or tabulations must be avoided.

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ANNEX 2

EXISTING CLASSIFICATION GUIDES

CWP/G.0	Classifications and Markings used in the UKAEA
CWP/G.1	UK Classification Policy Guide (based on US CG-C-2)
CWP/G.2	Classification Guide - Capenhurst Works
CWP/G.3	Classification Guide - Springfields Works
CWP/G.4	Classification Guide - Windscale, Calder and Chapelcross
CWP/G.5	Classification Guide - The Gas Centrifuge
CWP/G.6	Classification Guide - Project No.0200/20
CWP/G.7	Classification Guide - Costs of Fissile Material
CWP/G.8	Classification Guide - Special Nuclear Materials
CWP/G.9	Classification Guide - Materials
CWP/G.10	Unallocated
CWP/G.11	Classification Guide for Barter Materials transmitted between the US and the UK under the 1958 Defence Agreement
CWP/G.12	Laser Isotope Separation Guide