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**COMMUNICATIONS OF 17 OCTOBER 1996 RECEIVED FROM  
MEMBER STATES REGARDING THE EXPORT OF NUCLEAR  
MATERIAL AND OF CERTAIN CATEGORIES OF EQUIPMENT AND  
OTHER MATERIAL**

1. The attached correction to the document of 26 April 1999, issued as INFCIRC/209/Rev. 1/Mod. 4, is hereby re-issued as INFCIRC/209/Rev. 1/Mod. 4/Corr.1.
2. This correction brings the document in line with the usual format for modifications to INFCIRC/209. Additionally, the revised document includes details of communications from three Member States which were not mentioned in INFCIRC/209/Rev. 1/Mod. 4.

**COMMUNICATIONS OF 17 OCTOBER 1996 RECEIVED FROM MEMBER STATES  
REGARDING THE EXPORT OF NUCLEAR MATERIAL AND OF CERTAIN  
CATEGORIES OF EQUIPMENT AND OTHER MATERIAL**

1. The Director General of the International Atomic Energy Agency has received letters of 17 October 1996 from the Resident Representatives of Argentina, Australia, Austria, Belgium, Bulgaria, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Republic of Korea, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, the Slovak Republic, South Africa, Spain, Sweden, Switzerland, the United Kingdom, and the United States of America, concerning the export of nuclear material and of certain categories of equipment and other material.
2. In light of the wish expressed at the end of each letter, the text of the letter is attached hereto.

LETTER

Vienna, 17 October 1996

Sir,

I have the honour to refer to relevant previous communications from the Resident Representative of [Member State] to the International Atomic Energy Agency.

In the years since the procedures described in INFCIRC/209 were formulated for the export of certain categories of equipment and material especially designed or prepared for the processing, use or production of special fissionable material, developments in nuclear technology have brought about the need to clarify parts of the Trigger List originally incorporated in Memorandum B of INFCIRC/209. Such clarifications have been covered in INFCIRC/209/Mods. 1, 2, 3, and 4 (consolidated in INFCIRC/209/Rev. 1) and in INFCIRC/209/Rev. 1/Mod. 1, Mod. 2 and Mod. 3.

My Government now thinks it desirable to further clarify those parts of the Trigger List which refer to reactors, non-nuclear materials and fuel fabrication. I therefore wish to inform you that the existing sections 1, 2 and 4 and the title of section 6 of the Annex to INFCIRC/209/Rev. 1 (Clarification of Items on the Trigger List as amended by subsequent modifications), should be replaced by the text set out in the attachment to this letter; and a new sub-section 6.8 should be added, including the explanatory note, also set out in the attachment.

As hitherto, my Government reserves to itself the right to exercise discretion with regard to the interpretation and implementation of the procedures and the right to control, if it wishes, the export of relevant items other than those specified in the aforementioned attachment to this letter.

[The Government of (Member State) so far as trade within the European Union is concerned, will implement these procedures in the light of its commitments as a Member State of that Union.]<sup>1</sup>

I should be grateful if you would circulate the text of this letter and its attachment to Member States for their information.

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<sup>1</sup> This paragraph is included only in the letters sent by the Governments of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom of Great Britain and Northern Ireland.

## **1. Nuclear reactors and especially designed or prepared equipment and components therefor**

### **1.1. Complete nuclear reactors**

Nuclear reactors capable of operation so as to maintain a controlled self-sustaining fission chain reaction, excluding zero energy reactors, the latter being defined as reactors with a designed maximum rate of production of plutonium not exceeding 100 grams per year.

#### EXPLANATORY NOTE

A "nuclear reactor" basically includes the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain or come in direct contact with or control the primary coolant of the reactor core.

It is not intended to exclude reactors which could reasonably be capable of modification to produce significantly more than 100 grams of plutonium per year. Reactors designed for sustained operation at significant power levels, regardless of their capacity for plutonium production, are not considered as "zero energy reactors".

#### EXPORTS

The export of the whole set of major items within this boundary will take place only in accordance with procedures of the Memorandum. Those individual items within this functionally defined boundary which will be exported only in accordance with the procedures of the Memorandum are listed in paragraphs 1.2. to 1.10. Pursuant to paragraph 6 of the Memorandum, the Government reserves the right to apply the procedures of the Memorandum to other items within the functionally defined boundary.

### **1.2. Nuclear reactor vessels**

Metal vessels, or as major shop-fabricated parts therefor, especially designed or prepared to contain the core of a nuclear reactor as defined in paragraph 1.1. above, as well as relevant reactor internals as defined in paragraph 1.8. below.

#### EXPLANATORY NOTE

The reactor vessel head is covered by item 1.2. as a major shop-fabricated part of a reactor vessel.

### **1.3. Nuclear reactor fuel charging and discharging machines**

Manipulative equipment especially designed or prepared for inserting or removing fuel in a nuclear reactor as defined in paragraph 1.1. above.

#### **EXPLANATORY NOTE**

The items noted above are capable of on-load operation or of employing technically sophisticated positioning or alignment features to allow complex off-load fuelling operations such as those in which direct viewing of or access to the fuel is not normally available.

### **1.4. Nuclear reactor control rods**

Especially designed or prepared rods, support or suspension structures therefor, rod drive mechanisms or rod guide tubes to control the fission process in a nuclear reactor as defined in paragraph 1.1. above.

### **1.5. Nuclear reactor pressure tubes**

Tubes which are especially designed or prepared to contain fuel elements and the primary coolant in a reactor as defined in paragraph 1.1. above at an operating pressure in excess of 50 atmospheres.

### **1.6. Zirconium tubes**

Zirconium metal and alloys in the form of tubes or assemblies of tubes, and in quantities exceeding 500 kg for any one recipient country in any period of 12 months, especially designed or prepared for use in a reactor as defined in paragraph 1.1. above, and in which the relation of hafnium to zirconium is less than 1:500 parts by weight.

### **1.7. Primary coolant pumps**

Pumps especially designed or prepared for circulating the primary coolant for nuclear reactors as defined in paragraph 1.1. above.

#### **EXPLANATORY NOTE**

Especially designed or prepared pumps may include elaborate sealed or multi-sealed systems to prevent leakage of primary coolant, canned-driven pumps, and pumps with inertial mass systems. This definition encompasses pumps certified to NC-1 equivalent standards.

## **1.8 Nuclear reactor internals**

"Nuclear reactor internals" especially designed or prepared for use in a nuclear reactor as defined in paragraph 1.1. above, including support columns for the core, fuel channels, thermal shields, baffles, core grid plates, and diffuser plates.

### EXPLANATORY NOTE

"Nuclear reactor internals" are major structures within a reactor vessel which have one or more functions such as supporting the core, maintaining fuel alignment, directing primary coolant flow, providing radiation shields for the reactor vessel, and guiding in-core instrumentation.

## **1.9 Heat exchangers**

Heat exchangers (steam generators) especially designed or prepared for use in the primary coolant circuit of a nuclear reactor as defined in paragraph 1.1. above.

### EXPLANATORY NOTE

Steam generators are especially designed or prepared to transfer the heat generated in the reactor (primary side) to the feed water (secondary side) for steam generation. In the case of a liquid metal fast breeder reactor for which an intermediate liquid metal coolant loop is also present, the heat exchangers for transferring heat from the primary side to the intermediate coolant circuit are understood to be within the scope of control in addition to the steam generator. The scope of control for this entry does not include heat exchangers for the emergency cooling system or the decay heat cooling system.

## **1.10 Neutron detection and measuring instrumentation**

Especially designed or prepared neutron detection and measuring instruments for determining neutron flux levels within the core of a reactor as defined in paragraph 1.1. above.

### EXPLANATORY NOTE

The scope of this entry encompasses in-core and ex-core instrumentation which measure flux levels in a large range, typically from  $10^4$  neutrons per  $\text{cm}^2$  per second to  $10^{10}$  neutrons per  $\text{cm}^2$  per second or more. Ex-core refers to those instruments outside the core of a reactor as defined in paragraph 1.1. above, but located within the biological shielding.

## **2. Non-nuclear materials for reactors**

### **2.1. Deuterium and heavy water**

Deuterium, heavy water (deuterium oxide) and any other deuterium compound in which the ratio of deuterium to hydrogen atoms exceeds 1:5000 for use in a nuclear reactor as defined in paragraph 1.1. above, in quantities exceeding 200 kg of deuterium atoms for any one recipient country in any period of 12 months.

### **2.2 Nuclear grade graphite**

Graphite having a purity level better than 5 parts per million boron equivalent and with a density greater than 1.50 g/cm<sup>3</sup> for use in a reactor as defined in paragraph 1.1. above, in quantities exceeding 30 metric tons for any one recipient country in any period of 12 months.

#### EXPLANATORY NOTE

For the purpose of export control, the Government will determine whether or not the exports of graphite meeting the above specifications are for nuclear reactor use.

Boron equivalent (BE) may be determined experimentally or is calculated as the sum of BE<sub>Z</sub> for impurities (excluding BE<sub>carbon</sub> since carbon is not considered an impurity) including boron, where:

$BE_Z$  (ppm) = CF x concentration of element z (in ppm); CF is the conversion factor: ( $\sigma_Z \times A_B$ ) divided by ( $\sigma_B \times A_Z$ );  $\sigma_B$  and  $\sigma_Z$  are the thermal neutron capture cross sections (in barns) for naturally occurring boron and element Z respectively; and  $A_B$  and  $A_Z$  are the atomic masses of naturally occurring boron and element Z respectively.

#### **4. Plants for the fabrication of nuclear reactor fuel elements, and equipment especially designed or prepared therefor**

##### INTRODUCTORY NOTE

Nuclear fuel elements are manufactured from one or more of the source or special fissionable materials mentioned in Part A of this annex. For oxide fuels, the most common type of fuel, equipment for pressing pellets, sintering, grinding and grading will be present. Mixed oxide fuels are handled in glove boxes (or equivalent containment) until they are sealed in the cladding. In all cases, the fuel is hermetically sealed inside a suitable cladding which is designed to be the primary envelope encasing the fuel so as to provide suitable performance and safety during reactor operation. Also, in all cases, precise control of processes, procedures and equipment to extremely high standards is necessary in order to ensure predictable and safe fuel performance.

##### EXPLANATORY NOTE

Items of equipment that are considered to fall within the meaning of the phrase "and equipment especially designed or prepared" for the fabrication of fuel elements include equipment which:

- a) normally comes in direct contact with, or directly processes, or controls, the production flow of nuclear material;
- b) seals the nuclear material within the cladding;
- c) checks the integrity of the cladding or the seal; or
- d) checks the finish treatment of the sealed fuel.

Such equipment or systems of equipment may include, for example:

- 1) fully automatic pellet inspection stations especially designed or prepared for checking final dimensions and surface defects of fuel pellets;
- 2) automatic welding machines especially designed or prepared for welding end caps onto the fuel pins (or rods);
- 3) automatic test and inspection stations especially designed or prepared for checking the integrity of complete fuel pins (or rods).

Item 3 typically includes equipment for: a) x-ray examination of pin (or rod) end cap welds, b) helium leak detection from pressurized pins (or rods), and c) gamma-ray scanning of the pins (or rods) to check for correct loading of the fuel pellets inside.



**6. Plants for the production or concentration of heavy water, deuterium and deuterium compounds and equipment especially designed or prepared therefor**

**6.8. Complete heavy water upgrade systems or columns therefore**

Complete heavy water upgrade systems, or columns therefore, especially designed or prepared for the upgrade of heavy water to reactor-grade deuterium concentration.

EXPLANATORY NOTE

These systems, which usually employ water distillation to separate heavy water from light water, are especially designed or prepared to produce reactor-grade heavy water (i.e. typically 99.75% deuterium oxide) from heavy water feedstock of lesser concentration.