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COMMUNICATIONS RECEIVED FROM MEMBERS REGARDING THE EXPORT OF NUCLEAR MATERIAL AND OF CERTAIN CATEGORIES OF EQUIPMENT AND OTHER MATERIAL

1. The Director General has received letters dated 1 July 1985 from the Resident Representatives to the Agency of the following Member States concerning the commitments of these Member States under Article III, paragraph 2, of the Treaty on the Non-Proliferation of Nuclear Weapons: Australia, Canada, Finland, the German Democratic Republic, the Federal Republic of Germany, Ireland, Japan, the Netherlands, Norway, Poland, Sweden, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

2. In the light of the wish expressed at the end of each of the letters, both the text of the letters and their annex are attached.

85-3316

LETTER

"I have the honour to refer to [relevant previous communication(s)] from the Resident Representative of [Member State] to the International Atomic Energy Agency.

"In the years since the procedures for export of nuclear materials and of certain categories of equipment and other material described in INFCIRC/209 were formulated, there have been considerable changes in nuclear technology which make it desirable, in the view of my Government, to clarify those parts of the Trigger List which refer to fuel reprocessing technology.

"In relation to the Annex entitled "Clarifications of Items on the Trigger List" attached to Memorandum B in INFCIRC/209, I therefore wish to inform you that the items relating to the Fuel Reprocessing Plants and specified in paragraph 7 of that annex also include the items listed in the annex to this letter. These items are introduced by an explanatory note.

"As hitherto, my Government reserves to itself discretion as to the interpretation and implementation of the procedures provided in the above-mentioned documents and the right to control, if it wishes, the export of items relevant to fuel reprocessing plants other than those specified in INFCIRC/209 and in the annex to this letter.

"I should be grateful if you would circulate the text of this letter and its annex to all Member Governments for their information."

ANNEX

INTRODUCTORY NOTE: SPENT NUCLEAR FUEL REPROCESSING

Reprocessing irradiated nuclear fuel separates plutonium and uranium from intensely radioactive fission products and other transuranic elements. Different technical processes can accomplish this separation. However, over the years Purex has become the most commonly used and accepted process. Purex involves the dissolution of irradiated nuclear fuel in nitric acid, followed by separation of the uranium, plutonium, and fission products by solvent extraction using a mixture of tributyl phosphate in an organic diluent.

Purex facilities have process functions similar to each other, including: irradiated fuel element chopping, fuel dissolution, solvent extraction, and process liquor storage. There may also be equipment for thermal denitration of uranium nitrate, conversion of plutonium nitrate to oxide or metal, and treatment of fission product waste liquor to a form suitable for long-term storage or disposal. However, the specific type and configuration of the equipment performing these functions may differ between Purex facilities for several reasons, including the type and quantity of irradiated nuclear fuel to be reprocessed and the intended disposition of the recovered materials, and the safety and maintenance philosophy incorporated into the design of the facility.

The equipment listed below performs key reprocessing functions. Each comes into direct contact with the irradiated fuel or process liquor and operates in an environment characterised by criticality, radiation, and toxicity hazards. These make remote control of the process essential.

(1) Fuel element chopping

This equipment breaches the cladding of the fuel to expose the irradiated nuclear material to dissolution. Especially designed metal cutting shears are the most commonly employed, although advanced equipment, such as lasers, may be used.

(2) Dissolvers

Dissolvers normally receive the chopped up spent fuel. In these critically safe vessels, the irradiated nuclear material is dissolved in nitric acid and the remaining hulls removed from the process stream.

(3) Solvent extractors

Solvent extractors both receive the solution of irradiated fuel from the dissolvers and the organic solution which separates the uranium, plutonium, and fission products. Solvent extraction equipment is normally designed to meet strict operating parameters, such as long operating lifetimes with no maintenance requirements or adaptability to easy replacement, simplicity of operation and control, and flexibility for variations in process conditions.

(4) Holding or storage vessels

Three main process liquor streams result from the solvent extraction step. Holding or storage vessels are used in the further processing of all three streams, as follows:

(a) The pure uranium nitrate solution is concentrated by evaporation and passed to a denitration process where it is converted to uranium oxide. This oxide is reused in the nuclear fuel cycle.

(b) The intensely radioactive fission products solution is normally concentrated by evaporation and stored as a liquor concentrate. This concentrate may be subsequently evaporated and converted to a form suitable for storage or disposal.

(c) The pure plutonium nitrate solution is concentrated and stored pending its transfer to further process steps. In particular, holding or storage vessels for plutonium solutions are designed to avoid criticality problems resulting from changes in concentration and form of this stream.

(5) Plutonium nitrate to oxide conversion system

In most reprocessing facilities, this final process involves the conversion of the plutonium nitrate solution to plutonium dioxide. The main functions involved in this process are: process feed storage and adjustment, precipitation and solid/liquor separation, calcination, product handling, ventilation, waste management, and process control.

(6) Plutonium oxide to metal conversion system

This, process, which could be related to a reprocessing facility, involves the fluorination of plutonium dioxide, normally with highly corrosive hydrogen fluoride, to produce plutonium fluoride which is subsequently reduced using high purity calcium metal to produce metallic plutonium and a calcium fluoride slag. The main functions involved in this process are: fluorination (eg involving equipment fabricated or lined with a precious metal), metal reduction (eg employing ceramic crucibles), slag recovery, product handling, ventilation, waste management and process control.

These processes, including the complete systems for plutonium conversion and plutonium metal production, may be identified by the measures taken to avoid criticality (eg by geometry), radiation exposure (eg by shielding), and toxicity hazards (eg by containment).

DEFINITIONS FOR REPROCESSING

A. Solvent extraction equipment - Especially designed or prepared solvent extractors such as packed or pulse columns, mixer settlers or centrifugal contactors for use in a plant for the reprocessing of irradiated fuel. Solvent extractors must be resistant to the corrosive effect of nitric acid. Solvent extractors are normally fabricated to extremely high standards (including special welding and inspection and quality assurance and quality control techniques) out of low carbon stainless steels, titanium, zirconium or other high quality materials.

B. Chemical holding or storage vessels - Especially designed or prepared holding or storage vessels for use in a plant for the reprocessing of irradiated fuel. The holding or storage vessels must be resistant to the corrosive effect of nitric acid. The holding or storage vessels are normally fabricated of materials such as low carbon stainless steels, titanium or zirconium, or other high quality materials. Holding or storage vessels may be designed for remote operation and maintenance and may have the following features for control of nuclear criticality:

(1) walls or internal structures with a boron equivalent of at least two per cent, or

(2) a maximum diameter of 7 inches (17.78 cm) for cylindrical vessels, or

(3) a maximum width of 3 inches (7.62 cm) for either a slab or annular vessel.

C. Plutonium nitrate to plutonium oxide conversion systems - Complete systems especially designed or prepared for the conversion of plutonium nitrate to plutonium oxide, in particular adapted so as to avoid criticality and radiation effects and to minimise toxicity hazards.

D. Plutonium metal production systems - Complete systems especially designed or prepared for the production of plutonium metal, in particular adapted so as to avoid criticality and radiation effects and to minimise toxicity hazards.