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**GOVERNMENT NOTICE**

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**DEPARTMENT OF MINERALS AND ENERGY****No. 207****27 February 2009****NUCLEAR ENERGY ACT, 1999 (ACT NO. 46 OF 1999)**

THE MINISTER OF MINERALS AND ENERGY HAS, IN TERMS OF SECTION 2 (a) (b) (c) (f) OF THE NUCLEAR ENERGY ACT, 1999 (ACT NO. 46 OF 1999), DECLARED CERTAIN SUBSTANCES, MATERIALS AND EQUIPMENT AS RESTRICTED MATERIAL, SOURCE MATERIAL, SPECIAL NUCLEAR MATERIAL AND NUCLEAR RELATED EQUIPMENT AND MATERIAL AS INDICATED IN THE GOVERNMENT NOTICE 740, SCHEDULES 1, 2, 3 AND 4 RESPECTIVELY. THE DECLARATION REPEALS THE GOVERNMENT NOTICE 740 OF 16 APRIL 1994.

**SCHEDULE 1: RESTRICTED MATERIAL****1. Beryllium**

Beryllium as follows: Metal, alloys containing more than 50% of beryllium by mass, compounds containing beryllium, and manufactures thereof, except-

- (a) metal windows for X-ray machines;
- (b) oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits.

*Technical Note:* This control applies to waste and scrap containing beryllium as defined here.

**2. Hafnium**

Hafnium of the following description: Metal, alloys and compounds of hafnium containing more than 60% hafnium by mass and manufactures thereof.

**3. Zirconium**

Zirconium as follows: Metal, alloys containing more than 50% zirconium by mass and compounds in which the ration of hafnium content to zirconium content is less than 1 part to 500 parts by mass, and manufactures wholly thereof.

*Technical Note:* This control applies to waste and scrap containing zirconium as defined here.

**SCHEDULE 2: SOURCE MATERIAL**

Source material is any substance containing the following unless the Minister gives an exemption for insignificant quantities (as determined by the Minister and on specific applications)

- (a) uranium, expressed as a conversion to uranium oxide ( $U_3O_8$ );
- (b) thorium, expressed as a conversion to thorium oxide ( $ThO_2$ );
- (c) uranium by products of enrichment processes, e.g enriched in isotope U-238 or depleted in the isotope U-235;
- (d) uranium containing the mixture of isotopes occurring in nature.

**SCHEDULE 3: SPECIAL NUCLEAR MATERIAL**

- (a) plutonium-239;
- (b) uranium-233;
- (c) uranium enriched in its uranium-235 isotope;
- (d) transuranium elements; or
- (e) any compound of any of the materials referred to in paragraphs (a), (b), (c) and (d) or of anything so referred to and any other substance or substances in a quantity consisting of or containing a mass of any of the isotopes or elements referred to in paragraphs (a), (b), (c) and (d), regardless of the concentration thereof.

**SCHEDULE 4: NUCLEAR RELATED MATERIAL AND EQUIPMENT****CATEGORY A: MATERIAL****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.

**2. Nuclear grade graphite**

Graphite having purity level better than 5 parts per million boron equivalent and with a density greater than 1,50 g/cm<sup>3</sup>.

**CATEGORY B: EQUIPMENT****DISPOSAL OF TECHNOLOGY REGARDING EQUIPMENT**

Pursuant to the authorisation required by Section 34 (1) (u) of the Nuclear Energy Act for the disposal of "technology" associated with the equipment specified in this Category, the disposal of "technology" directly associated with any item in this Category will be subject to the same authorisation requirements as the item itself.

Such authorisations of the disposal of "technology" do not apply to information "in the public domain" or to "basic scientific research".

"Technology" means specific information required for the "development", production", or "use" of any item contained in the Category. This information may take the form of "technical data", or "technical assistance".

"Disposed of" used in the context of safeguards means sell, exchange, donate, distribute, lend or in any other manner transfer and "disposal of" has a corresponding meaning.

"Basic scientific research" - means experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena and observable facts, not primarily directed towards a specific practical aim or objective.

"Component parts" - means an integral part of plants, systems, assemblies, or equipment, without which such plants, systems, assemblies or equipment cannot perform their intended function or achieve the characteristics or performance level that make the aforementioned plants, systems, assemblies or equipment controlled.

"Development" - is related to all phases before "production" such as:

- design
- design research
- design analysis
- design concepts
- assembly and testing of prototypes
- pilot production schemes
- design data
- process of transforming design data into a product
- configuration design
- integration design
- layouts

"In the public domain" - as it applies herein, means technology that has been made available without restrictions upon its further dissemination.

(Copyright restrictions do not remove technology from being in the public domain)

"Production" - means all production phases such as:

- construction
- production engineering
- manufacture
- integration
- assembly (mounting)
- inspection
- testing
- quality assurance

"Technical assistance" - may take forms such as: instruction, skills, training, working knowledge, consulting services.

Note: "Technical assistance" may involve transfer of "technical data".

"Technical data" - may take forms such as blueprints, plans, diagrams, models, formulae, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

"Use" - Operation, installation (including on-site installation), maintenance (checking), repair, overhaul and refurbishing.

Furthermore, the authorisations required by Section 34 (1) of the Act for the equipment listed in this Category, should not be circumvented by the transfer of component parts of such equipment without adequate review and authorisation as is necessary.

**1. Reactors and equipment, intended or especially designed or prepared therefor**

- (i) Complete nuclear reactor capable of operation so as to maintain a controlled self-sustaining fission chain reaction producing plutonium.

*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.*

- (ii) Reactor pressure vessels as complete units or as major shop-fabricated parts, intended to contain the core of a nuclear reactor referred to in subparagraph (i), and are capable of withstanding the operating pressure of the primary coolant.
- (iii) Reactor fuel charging and discharging machines intended for inserting or removing fuel in nuclear reactor referred to in subparagraph (i), which is capable of on-load operation or 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.
- (iv) Reactor control rods, intended for reaction rate control in a nuclear reactor referred to in subparagraph (i).
- (v) Reactor pressure tubes which are intended for containment of fuel elements and the primary coolant in a nuclear reactor referred to in subparagraph (i).
- (vi) Primary coolant pumps intended for circulating the primary coolant for nuclear reactor referred to in subparagraph (i).
- (vii) Zirconium metal and alloys in the form of tubes or assemblies of tubes, intended for use in a nuclear reactor referred to in subparagraph (i).
- (viii) Nuclear reactor internals including support columns and plates for the core and other vessel internals control rod guide tubes, fuel channels, thermal shields, baffles, core grid plates and diffuser plates intended for use in nuclear reactors referred to in subparagraph (i).
- (ix) Heat exchangers (steam generators) intended for use in the primary coolant circuit of a nuclear reactor as referred to in subparagraph (i).

- (x) Neutron detection and measuring instruments intended for determining neutron flux levels within the core of a reactor referred to in subparagraph (i).
- (xi) Any other component intended for use therein.
- (xii) Any technology related to any of the above mentioned equipment.

**2. Plants for the reprocessing of irradiated fuel elements and equipment, intended or especially designed or prepared therefor**

*A plant for the reprocessing of irradiated fuel elements includes the equipment and components which normally come in direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.*

- (i) Plants for the recovery of fissionable materials from irradiated nuclear materials.
- (ii) Irradiated fuel element chopping machines that breach the cladding of the fuel to expose the irradiated nuclear material to dissolution.
- (iii) Dissolvers which are critically safe tanks intended for the dissolution of irradiated nuclear fuel assemblies, bundles or rods.
- (iv) Solvent extractors and solvent extraction equipment for the separation of uranium, plutonium and fission products in the dissolved irradiated fuel.
- (v) Chemical holding or storage vessels, which are critically safe vessels for use in a plant for the reprocessing of irradiated fuel.
- (vi) Any other component intended for use therein.
- (vii) Any technology related to any of the above mentioned equipment.

**3. Plants and subsystems for the fabrication of fuel elements, intended or especially designed or prepared therefor**

Items of equipment for the fabrication of fuel elements include equipment which:

- (i) Normally comes in direct contact with, or directly processes, or controls, the production flow of nuclear material;
- (ii) Seals the nuclear material within the cladding;
- (iii) Checks the integrity of the cladding or the seal; or
- (iv) Checks the finish treatment of the sealed fuel;
- (iv) Any other component intended for use therein.
- (v) Any technology related to any of the above mentioned equipment.



4. **Plants for the separation of isotopes of uranium and equipment, other than analytical instruments, intended or especially designed or prepared therefor**
- (i) **Gas centrifuges and assemblies and components for use in gas centrifuges, including-**
    - (a) rotating components such as complete rotor assemblies, rotor tubes, rings or bellows, baffles, top and bottom caps;
    - (b) static components such as magnetic suspension bearings, bearings and dampers, molecular pumps, motor stators, centrifuge housing/recipients and scoops.
  - (ii) **Auxiliary systems, equipment and components for use in gas centrifuge plants, including-**
    - (a) feed systems/product and tails withdrawal systems;
    - (b) machine header piping systems;
    - (c) UF<sub>6</sub> mass spectrometers/ion sources; and
    - (d) frequency changers.
  - (iii) **Assemblies and components for use in gaseous diffusion enrichment, including-**
    - (a) gaseous diffusion barriers;
    - (b) diffusor housings;
    - (c) compressors and gas blowers;
    - (d) rotary shaft seals;
    - (e) heat exchangers for cooling UF<sub>6</sub>.
  - (iv) **Auxiliary systems, equipment and components for use in gaseous diffusion enrichment, including-**
    - (a) feed systems/product and tails withdrawal systems;
    - (b) header piping systems;
    - (c) vacuum systems;
    - (d) special shut-off and control valves;
    - (e) UF<sub>6</sub> mass spectrometers/ion sources; and

(v) **Systems, equipment and components for use in aerodynamic enrichment plants, including-**

- (a) separation nozzles;
- (b) vortex tubes;
- (c) compressors and gas blowers;
- (d) rotary shaft seals;
- (e) heat exchangers for gas cooling;
- (f) separation element housings;
- (g) feed systems and product and tails withdrawal systems;
- (h) header piping systems;
- (i) vacuum systems and pumps;
- (j) special shut-off and control valves;
- (k) UF<sub>6</sub> mass spectrometers and ion sources; and
- (l) UF<sub>6</sub> and carrier gas separation systems.

(vi) **Systems, equipment and components for use in chemical exchange or ion exchange enrichment plants, including**

- (a) liquid-liquid exchange columns (chemical exchange);
- (b) liquid-liquid centrifugal contactors (chemical exchange);
- (c) uranium reduction systems and equipment (chemical exchange);
- (d) feed preparation systems (chemical exchange);
- (e) uranium oxidation systems (chemical exchange);
- (f) fast-reacting ion exchange resins and adsorbents (ion exchange);
- (g) ion exchange columns (ion exchange); and
- (h) ion exchange reflux systems (ion exchange).

(vii) **Systems, equipment and components for use in laser-based enrichment plants, including-**

- (a) uranium vaporization systems (AVLIS – Atomic Vapor Laser Isotope Separation);
- (b) liquid uranium metal handling systems (AVLIS);
- (c) uranium metal 'product' and 'tails' collector assemblies (AVLIS);
- (d) separator module housings (AVLIS);
- (e) supersonic expansion nozzles (MLIS – Molecular Laser Isotope Separation);

- (f) uranium pentafluoride product collectors (MLIS);
- (g) UF<sub>6</sub> with carrier gas compressors (MLIS);
- (h) rotary shaft seals (MLIS);
- (i) fluorination systems (MLIS);
- (j) UF<sub>6</sub> mass spectrometers and ion sources (MLIS);
- (k) feed systems and product and tails withdrawal systems (MLIS);
- (l) UF<sub>6</sub> and carrier gas separation systems (MLIS); and
- (m) laser systems {AVLIS, MLIS and CRISLA (Chemical Reaction by Isotope Selective Laser Activation)}.

**(viii) Systems, equipment and components for use in plasma separation enrichment plants, including-**

- (a) microwave power sources and antennae;
- (b) ion excitation coils;
- (c) uranium plasma generation systems;
- (d) liquid uranium metal handling systems;
- (e) uranium metal 'product' and 'tails' collector assemblies; and
- (f) separator module housings.

**(ix) Systems, equipment and components for use in electromagnetic enrichment plants, including-**

- (a) electromagnetic isotope separators;
- (b) high voltage power supplies; and
- (c) magnet power supplies.

**(x) Any other component intended for use therein.**

**(xi) Any technology related to any of the above mentioned equipment.**

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

- (i) Water-hydrogen sulphide exchange towers;**
- (ii) Blowers and compressors;**
- (iii) Ammonia-hydrogen exchange towers;**
- (iv) Tower internals and stage pumps;**
- (v) Ammonia crackers;**

- (vi) Infrared absorption analysers;
- (vii) Catalytic burners;
- (viii) Complete heavy water upgrades systems or columns therefore;
- (ix) Any other component intended for use therein.
- (x) Any technology related to any of the above mentioned equipment.

**6. Plants for the conversion of uranium and plutonium for use in the fabrication of fuel elements and the separation of uranium isotopes and equipment intended or especially designed or prepared therefor**

**(i) Plants for the conversion of uranium, equipment and systems**

- (a) conversion of uranium ore concentrates to  $UO_3$
- (b) conversion of  $UO_3$  to  $UF_6$
- (c) conversion of  $UO_3$  to  $UO_2$
- (d) conversion of  $UO_2$  to  $UF_4$
- (e) conversion of  $UF_4$  to  $UF_6$
- (f) conversion of  $UF_4$  to U metal
- (g) conversion of  $UF_6$  to  $UO_2$
- (h) conversion of  $UF_6$  to  $UF_4$
- (i) conversion of  $UO_2$  to  $UCl_4$

**(ii) Plants for the conversion of plutonium, equipment and systems**

- (a) for the conversion of plutonium nitrate to oxide.
- (b) for plutonium metal production.

**(iii) Any other component intended for use therein.**

**(iv) Any technology related to any of the above mentioned equipment.**

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