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Working Paper

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NATIONAL REGULATIONS OF ACCOUNTING
FOR AND CONTROL OF TRITIUM
COMPARATIVE DOCUMENTATION

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11 Hungary

All of the following information was given by Országos Atomenergia Bizottság (National Atomic Energy Commission)\textsuperscript{15}:

Hungary adheres to the standards of nuclear export policies which have been adopted by the members of the Nuclear Suppliers Group (INFCIRC/254, document of the IAEA). This is regulated by the Governmental Order on Nuclear Exports (No. 2/1986(I.19.)Mt). The responsible authority is the National Atomic Energy Commission.

Recently there are negotiations under way to join the international COCOM regulations and agreements. In connection with that effort the scope of nuclear export/import regulations will be extended to tritium, its compounds and mixtures containing tritium.

\textsuperscript{15}Letter from OAB; Dr. MS.I.Csóch; dated 1st August 1990
12 Indonesia

All of the following information was given by Badan Tenaga Atom Nasional (National Atomic Energy Agency)\(^\text{16}\):

**Import/export regulations**

1. **Limits (concentration or absolute activities) above which a declaration and/or licence is required**
   
   (a) In general, for tritium, the limit is \(5 \times 10^6\) Bq or 140 µCi.
   
   (b) In the case that tritium is used for radioluminiscent paint, the limit is \(2 \times 10^9\) Bq\(^\text{17}\).

2. **Relevant law, ordinances or other regulations**

   (a) Act Number 31 Year 1964 on The Basic Provisions of Atomic Energy.
   
   (b) Government Regulation Number 12 Year 1975 on Licencing of The Use of Radioactive Material and/or Other Radiation Sources.
   
   (c) The Decree of The Director General of the National Atomic Energy Agency No. PN 00 01/145/DJ/89 on The Exemptions of Having Licences of The Use of Radioactive Materials and/or Other Radiation Sources.

3. **Responsible authority** is The Atomic Energy Control Bureau, National Atomic Energy Agency, Jakarta

There are no activities planned or ongoing to amend regulations. The existing regulation was issued by the end of December 1989 and is regarded to be sufficient. So far, there has not been any report of violation of the regulation.

**Acquiring/possession and production regulations**

Same as above referred to in import/export regulations.

**International cooperation**

1. **Compliance with international regulations and agreements (COCOM, IAEA, etc.)**

   In the drafting of regulations Indonesia usually takes into consideration regulations issued by international organizations such as IAEA, Commission of the European Communities.

2. **Bilateral agreements and cooperations concerning tritium trade**

   There are no special bilateral agreements or cooperations concerning tritium trade.

\(^{16}\)letter from BTAN; Mr. Surptno; dated 4th April 1990

\(^{17}\)As conversion the letter mentions 540 mCi, which is a mistake
Data on tritium trade

Data taken from the applications for licence of the use of tritium, up to April 1990, is as follows:

1. Medical installations and research installations

<table>
<thead>
<tr>
<th>Applications</th>
<th>Total activity (mCi)</th>
<th>(= MBq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Diagnostic</td>
<td>12</td>
<td>444</td>
</tr>
<tr>
<td>2. Research</td>
<td>0.009 - 6000</td>
<td>0.333 - 222,000</td>
</tr>
</tbody>
</table>

2. Industrial installations

<table>
<thead>
<tr>
<th>Applications</th>
<th>Total activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Logging  (Tritium Minitron)</td>
<td>34 units</td>
</tr>
<tr>
<td>2. Research</td>
<td></td>
</tr>
<tr>
<td>2.1 Tritium target</td>
<td>48000 mCi (1,776 GBq)</td>
</tr>
<tr>
<td>2.2 Calibrated reference sources</td>
<td>$4.5 \times 10^{-6} - 0.01159$ mCi</td>
</tr>
<tr>
<td></td>
<td>$(167$ Bq - $429$ kBq)</td>
</tr>
</tbody>
</table>

\footnote{This is presumably a mistake}
All of the following information is taken from ‘Regulations on Nuclear Trade’ [NEA 88].

The Italian regulation dealing with the export of tritium is the Export List published by the Ministry of Foreign Trade. It is identical with the COCOM recommendations.

Export List – Specific Provisions relating to Exportation of Goods\textsuperscript{19}

Ministerial Decree of 27th May 1983

ex 28.50

II) Tritium, compounds and mixtures containing tritium in which the ratio of tritium/hydrogen is over 1:1000, and products containing one or more of the aforesaid substances, excluding:

1. consignments of tritium, compounds, mixtures and separate products containing one or more of the aforesaid substances so long as they do not exceed 100 curies (3.7 TBq);
2. tritium contained in luminescent paint, luminescent products, gas and aerosol detectors, electronic tubes, lightning or static electricity devices, ion generating tubes, or cells for gas chromatography, and calibration devices;
3. tritium compounds and mixtures the components of which, when separated, cannot lead to the development of an isotopic hydrogen mixture where the ratio of tritium to hydrogen is higher than 1:1000 in atoms.

\textsuperscript{19}Unofficial translation
14 Japan

All of the following information is taken from 'Regulations on Nuclear Trade' [NEA 88]. Although Japan is a member of the countries complying to COCOM-regulations their national law dealing with the export of tritium is stricter. A licence is required for any amount of tritium to be exported. The Export Trade Control Order reads as follows:

Export Trade Control Order

(Cabinet Order No. 378, 1st December 1949, as Amended on 26th January 1981)\(^\text{20}\)

48. Heavy hydrogen compounds, heavy hydrogen mixtures, tritium compounds, tritium mixtures, lithium compounds and lithium mixtures, which fall under any of those mentioned hereunder and heavy hydrogen and tritium.

(B. Tritium compounds or tritium mixtures, of which the ratio of the number of atoms of tritium to the number of atoms of hydrogen exceeds 1-1000 (in the case of tritium mixtures and when tritium and hydrogen are separated, those, of which the ratio of the number of atoms of hydrogen does not exceed 1-1000, are excluded).

\(^{20}\text{Unofficial translation by Japanese authorities}\)
15 Malaysia

All of the following information was given by Lembaga Perlesenal Tenaga Atom (Atomic Energy Licensing Board)\textsuperscript{21}:

Import/export regulations

1. **Limits (concentration or absolute activities) above which a declaration and/or licence is required**
   There is no limit of exemption under the law, currently.

2. **Relevant law, ordinances or other regulations**
   The relevant law or act in enforcement in Malaysia is the 'Atomic Energy Licencing Act 1984' (Act 304) [MAL 1].

3. **Responsible authority** is The Atomic Energy Licencing Board (LPTA), Kuala Lumpur

Excerpts of the Atomic Energy Licencing Act 1984:

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Part III
Control and Licencing

12. (1) Without prejudice to the requirements of any other law, no person shall –

(b) deal in, possess or dispose of any radioactive material, nuclear material, prescribed substance or irradiating apparatus,

unless he is the holder of a valid licence issued under section 16 (5) by the appropriate authority for such purpose and as specified in the licence.

16. (5) The appropriate authority may thereafter issue to the applicant a licence in the prescribed form upon payment of the prescribed fee or may, if it thinks fit, refuse to issue such a licence.
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Acquiring/possession and production regulations

Same as above referred to in import/export regulations.

Data on tritium trade

There is presently no tritium in Malaysia.

\textsuperscript{21}letter from LPTA; Dr. Ahmad Sobri Haji Hashim; dated 4th April 1990
16 Mexico

All of the following information was given by the National Committee for Nuclear Safety and Health-protection (Comisión National de Seguridad Nuclear y Salvaguardias)\textsuperscript{22}:

Import/export regulations

1. Limits (concentration or absolute activities) above which a declaration and/or licence is required
   (a) in gaseous form: $2 \times 10^5$ Bq
   (b) in solid and liquid form: $1 \times 10^6$ Bq

2. Relevant law, ordinances or other regulations
   (a) Ley Reglamentaria del Artículo 27 Constitucional en Materia Nuclear.
   (b) Ley General de Salud.
   (c) Reglamento General de Seguridad Radiológica.

3. Responsible authority is the National Committee for Nuclear Safety and Health-protection (Comisión National de Seguridad Nuclear y Salvaguardias), México

Acquiring/possession and production regulations

Same as above referred to in import/export regulations.

Data on tritium trade

Tritium is used in Mexico mainly for radioimmunanalysis and seldom also as radioactive tracers in the petrochemical industry. In 1989 the National Committee for Nuclear Safety and Health-protection licensed 61 GBq of tritium, in 1990 it licensed 21 GBq.

\textsuperscript{22} Letter from CNdSNyS; Lic. Hermenteñildo Maldonado M.; dated 17th August 1990
17 Netherlands

All of the following information is taken from 'Regulations on Nuclear Trade' [NEA 88].

The Dutch regulation dealing with the export of tritium is the Appendix to the Decree of 12th June 1981 on the Export of Strategic Materials (Stb. 351) – Twelfth Amendment Dated July 1987. It is identical with the COCOM recommendations.


Nuclear Goods

0162 Tritium, tritium compounds and mixtures containing tritium, in which the ratio of tritium to hydrogen by atoms is greater than 1:10³, as well as products which contain one or more of the foregoing, excepting:

1. consignments of tritium, tritium compounds, mixtures as well as individual products which contain one or more of the foregoing, with a radioactivity of 3 700 giga bequerel (100 curie) or less;
2. tritium in luminiscent paint, self-luminescent products, gas and aerosol detector, electron tubes, lightning or static elimination devices, detector cells for gas chromatography devices, and calibration devices;
3. tritium and tritium compounds where the separation of the tritium from its compounds cannot result in the evolution of an isotopic mixture of hydrogen in which the ratio of tritium to hydrogen by atoms is greater than 1:1000.

23 Unofficial translation
The Norwegian regulation dealing with the export of tritium is the Atomic Energy list. It is identical with the COCOM recommendations.

Atomic Energy List
Established by the Ministry of Trade (1987)\textsuperscript{24}

A12 Tritium, compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1 000, and products containing one or more of the foregoing.

Exceptions:

i) Shipments of tritium, compounds, mixtures and individual products containing one or more of the foregoing substances not exceeding 100 curies (3.7 TBq);

ii) Tritium contained in luminous paint, self-luminous products, gas and aerosol detectors, electron tubes, lightning or static elimination devices, ion generating tubes, detector cells of gas chromatography devices, and calibration standards;

iii) Compounds and mixtures of tritium, where the separation of the constituents cannot result in the evolution of an isotopic mixture of hydrogen in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1 000

\textsuperscript{24}Unofficial translation by Norwegian authorities
Pakistan

According to a letter we received from Dr. Hasibullah of the 'Pakistan Atomic Energy Commission' dated April 14th 1990, Pakistan has not, as yet, finalized regulations on the subject of tritium control.
20 Philippines

All of the following information was given by Philippine Nuclear Research Institute, Department of Science and Technology:\textsuperscript{25}:

Import/export regulations

1. Limits (concentration or absolute activities) above which a declaration and/or licence is required
   The limit is 1000 $\mu$Ci (37 MBq).

2. Relevant law, ordinances or other regulations
   The relevant regulation is the CPR\textsuperscript{26} Part 2, Licencing of Radioactive Material.

3. Responsible authority is The Philippine Nuclear Research Institute, Quezon City.

Acquiring/possession and production regulations

Same as above referred to in import/export regulations.

Data on tritium trade

In 1988 the Philippines imported 37 MBq, in 1989 83 MBq of tritium. Export of tritium was in the form of watch dials (TMX), but the activity ceased more than 5 years ago.

\textsuperscript{25}letter from PNRI; Dr. Carlito R. Aleta; dated 10th August 1990

\textsuperscript{26}Code of PAEC Regulations
21 Romania

All of the following information was given by Romania Comisia Nationala Pentru Controlur Activitati­tilor Nucleare (National Commission for Nuclear Activities Control)27:

According to Dr. Olariu, significant Research and Development works have not been developed yet in Romania (except utilization of isotopic techniques on a rather small scale). Consequently the need of issuing special regulations for a tritium safeguards system did not arise. The only ordinances in force are safety regulations for handling tritium sources, based on IAEA recommendations. This is why nothing in the field of tritium safeguards has been done so far.

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27Letter from RCNPCAN; Dr. Stefan Alexandru Olariu; dated July 19th, 1990
22 South Africa

All of the following information was given by Atomic Energy Corporation of South Africa Limited (AEC)\textsuperscript{28}:

**Import/export regulations**

1. **Limits (concentration or absolute activities) above which a declaration and/or licence is required**
   In South Africa one presently requires an authorization (licence) to import or export any source of tritium which has a specific activity greater than 74 kBq/kg, and which has an activity above 3.7 kBq.

2. **Relevant law, ordinances or other regulations**
   The relevant regulations are those published in Government Gazette No.3105, No.R2410 of 28 November 1980. These regulations list the conditions relating to the possession, disposal, importation, export, use and conveyance of radioactive nuclides in the RSA.
   New regulations are in the process of being drawn up and should be published in 1991. With regard to control over the import/export of tritium, the existing regulations are adequate, and according to Mr. D M Kemp are in fact overconservative. In the new regulations, instead of specifying one limit for all radionuclides, radiotoxicity will be taken into account and different limits will be specified for different nuclides, or groups of nuclides. Because of its low radiotoxicity, the limit specified above is therefore likely to be increased for tritium in the future.

3. **Responsible authority is** The Department of National Health and Population Development, Radiation Control Division, Belleville. This division is responsible for controlling the use of radioisotopes in South Africa, excluding those which are associated with the Nuclear Fuel Cycle. Thus, for example, they would authorize scientific, industrial, commercial, medical and educational applications of tritium, in both sealed and unsealed form, as well as its use in products such as warning signs, gunsights etc.

**Acquiring/possession and production regulations**

Same as above referred to in import/export regulations.
Certain consumer products containing tritium may be acquired without any authorization. These are known as ‘exempt’ items. The maximum allowable activities presently specified for each type of ‘exempt’ product, are listed in Government Gazette No.3105, No.R2411. Suppliers/importers, etc. must, however, obtain authorization to acquire and distribute these products.

\textsuperscript{28}Letter from AEC; Mr. D M Kemp; dated 9th August 1990
Device
(a) Luminous markers:
   Hydrogen-3 in gaseous form
(b) Watches with luminous dials:
   (i) Wrist-watches:
      Hydrogen-3 in gaseous form
      Hydrogen-3
   (ii) Pocket-watches:
      Hydrogen-3
   (iii) Other watches (including alarm clocks):
      Hydrogen-3
   (iv) Special watches (e.g. as used by deep sea divers, etc):
      Hydrogen-3
(c) Compasses with luminous dials:
   Hydrogen-3 in gaseous form
(d) Other instruments with luminous dials (e.g. in aircraft instruments):
   Hydrogen-3
(e) Luminous paint used by watchmakers:
   Hydrogen-3
(h) Occluded gunsights:
   Hydrogen-3 in gaseous form

<table>
<thead>
<tr>
<th>Device</th>
<th>Max. activity per item</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Luminous markers:</td>
<td>4,000 millicuries (148 GBq)</td>
</tr>
<tr>
<td>(b) Watches with luminous dials:</td>
<td></td>
</tr>
<tr>
<td>(i) Wrist-watches:</td>
<td>200 millicuries (7,400 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3 in gaseous form</td>
<td>7.5 millicuries (277.5 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3</td>
<td></td>
</tr>
<tr>
<td>(ii) Pocket-watches:</td>
<td>7.5 millicuries (277.5 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3</td>
<td></td>
</tr>
<tr>
<td>(iii) Other watches (including alarm clocks):</td>
<td>25 millicuries (925 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3</td>
<td></td>
</tr>
<tr>
<td>(iv) Special watches (e.g. as used by deep sea divers, etc):</td>
<td>25 millicuries (925 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3</td>
<td></td>
</tr>
<tr>
<td>(c) Compasses with luminous dials:</td>
<td>200 millicuries (7,400 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3 in gaseous form</td>
<td></td>
</tr>
<tr>
<td>(d) Other instruments with luminous dials (e.g. in aircraft instruments):</td>
<td>25 millicuries (925 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3</td>
<td></td>
</tr>
<tr>
<td>(e) Luminous paint used by watchmakers:</td>
<td>20 millicuries (740 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3</td>
<td></td>
</tr>
<tr>
<td>(h) Occluded gunsights:</td>
<td>200 millicuries (7,400 MBq)</td>
</tr>
<tr>
<td>Hydrogen-3 in gaseous form</td>
<td></td>
</tr>
</tbody>
</table>

Other regulations
Transport
All radioisotopes, including tritium, must be transported in accordance with the current IAEA transport regulations.

International cooperation
1. Compliance with international regulations and agreements (COCOM, IAEA, etc.)
   IAEA regulations are adhered to, and the recommendations of the ICRP are taken into account when drawing up South African regulations.

2. Bilateral agreements and cooperations concerning tritium trade
   There are no special bilateral agreements or Cooperations concerning tritium trade.

Data on tritium trade
1. Data on tritium imports/exports.
   At present 4 companies have authorization to import gaseous tritium light sources to South Africa. Based on figures supplied to the Department by these companies between 1986 and 1988, the total activity of gaseous tritium imported to South Africa per annum is typically in the region of 4,000 Ci (148,000 GBq), with about 300 Ci (11,000 GBq) being exported in products containing these light sources.
   In addition to this, there are a number of other companies who have authorization to import small amounts of tritium (mainly to radioimmunoassay kits, or static eliminators, or as tritiated water).
However, quantities are limited to micro- and millicurie amounts and can thus be considered negligible.

2. Data on licences for acquiring and possessing tritium.

At present there are 118 persons/institutions in South Africa who have authorization to possess tritium.

3. Data on production (deliberate/incidental) in the country.

No companies/institutions under control of this Department have authorization to produce tritium. (Incidental production of tritium in Nuclear Power Stations and other nuclear facilities does not fall under this Department).
All of the following information is taken from 'Regulations on Nuclear Trade' [NEA 88].

Import/export regulations

The Swedish regulation dealing with the export of tritium is the Ordinance on Nuclear Activities (SFS\textsuperscript{29} 1984:14). Annex III to this ordinance deals with small quantities of substances for which an export licence is required:

Annex III to the Ordinance on Nuclear Activities

The SKI\textsuperscript{30} considers applications for licences to export from Sweden the smaller quantities of uranium, plutonium, thorium or tritium in pure form or in the form of an alloy, compound or mixture on each occasion of such an export:

7) no more than 1 gram of tritium.

\textsuperscript{29}Svensk Författningsamling – Swedish Code of Statutes

\textsuperscript{30}Statens Kärnkraftinspektion – Swedish Nuclear Power Inspectorate
Import/export regulations

1. **Limits (concentration or absolute activities) above which a declaration and/or licence is required**

   The limits above which a licence is required are regulated in the 'Radiation Protection Ordinance' of 30th June 1976. A licence is required for substances whose absolute activity is more than 100 times the exemption limit specified in Appendix 4, column 2 of the Ordinance. These limits depend on the toxicity class of the substance. There is also another licence required when exporting tritium. Tritium is an article, which is technically important for the Swiss economy and therefore is listed in the Annex to the 'Ordinance of 16th December 1985 on the Export and Transit of Goods' (Custom tariff Number ex.2850.01). There is no specific limit mentioned, so a licence is required in every case. In general a licence is required under both texts at the same time.

2. **Relevant law, ordinances or other regulations**

   As cited above, the relevant ordinances are:

   (a) the 'Radiation Protection Ordinance' of 30th June 1976, Appendix 4, column 2.

   (b) the Annex to the 'Ordinance of 16th December 1985 on the Export and Transit of Goods'

3. **Responsible authority is:**

   (a) the 'Federal Office of Public Health' for licencing according to the 'Radiation Protection Ordinance'

   (b) the 'Export Division of the Federal Office of External Economic Affairs' for licencing according to the 'Ordinance on the Export of Goods'
The possession of and trade in radioactive substances is governed by the Radioactive Substance Act 1948, the Medicines Act 1968 and the Radioactive Substances Act 1960. The limits above which a licence is required are regulated by the 'Security Export Control' [GB 1]. We cite this regulation in the 'Standards Established by International Organizations' section of our documentation, because it is identical with those established by COCOM.

However Mr. C Lloyd of 'Her Majesty's Inspectorate of Pollution' states in a letter dated August 31st 1990, that there are no import/export regulations in the UK, and that the UK has no international cooperation concerning tritium. This information is obviously not true and appears to be an intentional misinformation by the British authority. The reason for the conflicting information is probably the fact that data concerning tritium trade are classified.
United States of America

According to the United States Regulatory Commission; Rules and Regulations [USA 1] tritium is classified as a 'byproduct material', which is defined in §110.2 of that regulation.

Import/export regulations

Excerpts of the NRC Policy Issue [NEA 88], p.271 pp.:

II. Nuclear Export and Import: Licensing and regulations

1. Atomic Energy Act
   The NRC\textsuperscript{31} had been given the function of export licensing of facilities, special nuclear material, source material and byproduct material.
   
   (d) Exports of by-product material
   (...) The criterion for issuance of export licenses for by-product material is that the export not be inimical to the national defence and security.

3. Arms Export Control Act
   Title 22 CFR\textsuperscript{32} Part 121 is the United States Munition List.
   (b) Category XVI lists:
      i. Any article, material, equipment or device which is specifically designed or modified for use in design, development, or fabrication of nuclear weapons or nuclear explosive devices.

Under 22 CFR Part 123, titled 'Licenses for the Export of Defence Articles', the export of any article on the United States Munition List requires a license from the Office of Munitions Control prior to the export unless a specific regulatory exemption applies.

[USA 1], Part 110, Export and Import of Nuclear Equipment and Material, excerpts:

Subpart A - General Provisions

§110.2 Definitions

'Tritium' means not only tritium but also includes compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds one part in 1,000.

\textsuperscript{31}Nuclear Regulatory Commission
\textsuperscript{32}Code of Federal Regulations
Subpart C - General Licenses

§110.23 Export of byproduct material

(a) A general license is issued to any person to export to any country not listed in §110.28

2. Tritium in any dispersed form (e.g. luminiscent light sources, luminiscent paint, accelerator targets, calibration standards, labeled compounds) in quantities of 10 curies (370 GBq) or less per item. No person may export more than 1,000 curies (37,000 GBq) per shipment or 10,000 curies (370,000 GBq) per year to any one country.

3. Tritium in luminiscent safety devices installed in aircraft.

(c) A general license is issued to any person to export bulk, undispersed tritium in individual shipments of 100 curies (3,700 GBq) or less to any country not listed in §110.28 or §110.29. No person may export more than 10,000 curies (370,000 GBq) per year to any one country.

§110.28 Embargoed destinations

Cuba, Kampuchea, North Korea, Vietnam.

§110.29 Restricted destinations

<table>
<thead>
<tr>
<th>Afghanistan</th>
<th>Chile</th>
<th>Libya</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>Comoros</td>
<td>Malawi</td>
<td>St. Kitts</td>
</tr>
<tr>
<td>Algeria</td>
<td>Djibouti</td>
<td>Mauritania</td>
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<td>Guyana</td>
<td>Mozambique</td>
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<tr>
<td>Burma</td>
<td>Kuwait</td>
<td>Saudi Arabia</td>
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</tbody>
</table>

Subpart E - Review of License Applications

§110.40 Commission review

(b) The Commissioners shall review a license application for export of the following:

6. An export involving over:

   iv. 1,000 curies (37,000 GBq) of tritium, to any country listed in §110.28 or §110.29.

§110.41 Executive Branch review

(a) A license application for export of the following will be promptly forwarded to the Executive Branch for review:

3. Deuterium, nuclear grade graphite, or over 100 curies (3,700 GBq) of tritium.

7. An export to any country listed in §110.28 or §110.29.

§110.42 Export licensing criteria
(c) The review of license applications for the export of byproduct material and for source material for nonnuclear end uses is governed by the criterion that the proposed export is not inimical to the common defense and security.

§110.44 Issuance or denial of licenses

(a) The Commission will issue an export license if it has been notified by the State Department that it is the judgement of the Executive Branch that the proposed export will not be inimical to the common defense and security; and -

1. Finds, based upon a reasonable judgement of the assurances provided and other information available to the Federal government, that the applicable criteria in §110.42 or the equivalent are met.

(d) The Commission will deny:

2. any byproduct material export license application for which the Commission is unable to make the finding in paragraph (a)(1) of this section.

Data on tritium trade

[NRC 89], NRC Export Licensing Activities in 1988, excerpts:

Tritium

NRC licensed about 3.4 million curies of tritium (126 x10^6 GBq, about 353 grams) for export to the UK, Japan, Canada, and Switzerland, mostly in the form of gas for the manufacture of light sources. This compares with 2.275 million (84 x10^6 GBq, about 236 grams) in 1987, and an average of about 1.6 million curies (59 x10^6 GBq, about 166 grams) from 1982 to 1988 (see Enclosure 3). DOE's\textsuperscript{33} commercial sales price for tritium has risen from about $1.00 per curie in the early 1980's to $2.90 per curie at present. We understand the recent closing of DOE's tritium production facilities has not had an impact on DOE's sales price or the continued availability of tritium. Published reports indicate that the amount of tritium exports reported is a small percentage of overall government requirements.

According to [?] the export of tritium is increasing dramatically. During 1975 20,000 curies (740,000 GBq), in 1976 less than 10,000 curies (370,000 GBq), in 1977 660,000 curies (24.4 \times 10^6 GBq) and in 1978 2,160,000 curies (80 \times 10^6 GBq) were licensed for export.

Enclosure 3 to [NRC 89]:

\textsuperscript{33}Department of Energy
<table>
<thead>
<tr>
<th>License number</th>
<th>Date of receipt</th>
<th>Issued/ Completed</th>
<th>Applicant/ Licensee</th>
<th>Quantity Curie</th>
<th>Quantity TBq</th>
<th>Comm. descr.</th>
<th>Importing country</th>
<th>end use</th>
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</thead>
<tbody>
<tr>
<td>XB1141</td>
<td>11/23/81</td>
<td>02/11/82</td>
<td>US Army</td>
<td>64,000</td>
<td>2,368</td>
<td>Disper.</td>
<td>Various</td>
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<tr>
<td>XB1141/01</td>
<td>03/03/82</td>
<td>03/05/82</td>
<td>US Army</td>
<td>45,000</td>
<td>1,891</td>
<td>Disper.</td>
<td>Various</td>
<td>Light Source</td>
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<tr>
<td>XB1141/02</td>
<td>11/23/81</td>
<td>03/15/82</td>
<td>US Army</td>
<td>40,000</td>
<td>1,480</td>
<td>Disper.</td>
<td>Various</td>
<td>Light Source</td>
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<td>XB1141/03</td>
<td>04/01/82</td>
<td>02/11/82</td>
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<td>153,000</td>
<td>5,661</td>
<td>Disper.</td>
<td>Various</td>
<td>Light Source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300,000</td>
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<td></td>
</tr>
<tr>
<td>XB1181</td>
<td>04/20/83</td>
<td>08/02/83</td>
<td>Self-Powered</td>
<td>1,200,000</td>
<td>44,400</td>
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<td>UK Light Source</td>
<td>mfg.</td>
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<tr>
<td></td>
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<td></td>
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<td>1,200,000</td>
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<tr>
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<td>10/05/84</td>
<td>12/06/84</td>
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<td>14,800</td>
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<td>UK Labeled</td>
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<tr>
<td>XB1223</td>
<td>10/05/84</td>
<td>12/06/84</td>
<td>Edlow</td>
<td>100,000</td>
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<td>500,000</td>
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<tr>
<td>XB129</td>
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<td>Hyfuel Ltd</td>
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<td>7</td>
<td>Gas</td>
<td>UK Research</td>
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<tr>
<td>XB1230</td>
<td>02/15/85</td>
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<td>mfg.</td>
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<tr>
<td>XB1234</td>
<td>05/16/85</td>
<td>07/19/85</td>
<td>Edlow</td>
<td>1,200,000</td>
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<td>Gas</td>
<td>Switzerland</td>
<td>Light sources mfg.</td>
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<td>72,157</td>
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<tr>
<td>XB1181/01</td>
<td>11/26/86</td>
<td>12/12/86</td>
<td>Self-Powered</td>
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<td>Gas</td>
<td>UK Light Sources</td>
<td>mfg.</td>
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<td>XB1238</td>
<td>02/20/86</td>
<td>03/19/86</td>
<td>MS Fusion</td>
<td>5,000</td>
<td>185</td>
<td>Gas</td>
<td>Canada Purification &amp; return</td>
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<td>XB1239</td>
<td>08/07/86</td>
<td>08/18/86</td>
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<td>180</td>
<td>7</td>
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<td>South Korea</td>
<td>Light Sources</td>
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<td>XB1340</td>
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<td>Western Atlas</td>
<td>90</td>
<td>3</td>
<td>Disper.</td>
<td>Columbia</td>
<td>Neutron generators</td>
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<td>XB1241</td>
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<td>08/12/86</td>
<td>Western Atlas</td>
<td>10,000</td>
<td>370</td>
<td>Disper.</td>
<td>Various</td>
<td>Neutron generators</td>
</tr>
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<td>09/11/86</td>
<td>Safety-Light</td>
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<td>1,665</td>
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<td>Various</td>
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<td>09/11/86</td>
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<td>22,200</td>
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<td>12/12/86</td>
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<td>SRB Technol.</td>
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<td>9,250</td>
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<td>UK Light Sources</td>
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<td>02/02/87</td>
<td>Transnuclear</td>
<td>200,000</td>
<td>7,400</td>
<td>Gas</td>
<td>Switzerland</td>
<td>Research at SIN</td>
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<td>05/29/87</td>
<td>SRB Technol.</td>
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<td>mfg.</td>
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<td>05/29/87</td>
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<td>33,000</td>
<td>Disper.</td>
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<td>Light sources</td>
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<td>XB1251</td>
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<td>06/16/87</td>
<td>NRD</td>
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<td>11,100</td>
<td>Disper.</td>
<td>Switzerland</td>
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<td>XB1252</td>
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<td>11/20/87</td>
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<td>3,700</td>
<td>Gas</td>
<td>Japan R &amp; D, JAERI</td>
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<td>03/22/88</td>
<td>Edlow</td>
<td>10,000</td>
<td>370</td>
<td>Gas</td>
<td>Canada R &amp; D</td>
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<td>XB1267</td>
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<td>07/29/88</td>
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<td>111,000</td>
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<td>UK Light Sources</td>
<td>mfg.</td>
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<td>07/20/88</td>
<td>08/15/88</td>
<td>Edlow</td>
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<td>72</td>
<td>Disper.</td>
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<tr>
<td>XB1269</td>
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<td>08/19/88</td>
<td>Edlow</td>
<td>60,000</td>
<td>2,220</td>
<td>Gas</td>
<td>Japan Fusion Bard, JAERI</td>
<td>Light Sources</td>
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<tr>
<td>XB1270</td>
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<td>09/02/88</td>
<td>Safety Light</td>
<td>300,000</td>
<td>11,100</td>
<td>Disper.</td>
<td>Canada</td>
<td>Light Sources</td>
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<td>NRD</td>
<td>30,000</td>
<td>1,110</td>
<td>Gas</td>
<td>Switzerland</td>
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<tr>
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<td>11/07/88</td>
<td>LANL</td>
<td>5,260</td>
<td>194</td>
<td>Gas</td>
<td>Switzerland</td>
<td>Fusion Research</td>
</tr>
</tbody>
</table>

Total 1982-1988 11,002,670 407,098

34 This column has been added by the author
Standards Established by International Organizations

Compliance with COCOM

COCOM stands for Coordinating Committee for Multilateral Export Control. It is an informal non-treaty organization of 17 countries operating according to the rule of unanimity. It comprises members of NATO, less Iceland plus Japan and Australia. The proscribed countries are Afghanistan, Albania, Bulgaria, People's Republic of China, Czechoslovakia, Hungary, Mongolia, North Korea, Poland, Romania, the USSR and Vietnam. According to our informations the British Security Control List [GB 1] is identical with the COCOM regulations. Concerning tritium there are as follows:

Security Export Control: Atomic Energy List

A12 Tritium, compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000 and products containing one or more of the foregoing, except:

(i) Shipments of tritium, compounds, mixtures and individual products containing one or more of the foregoing substances not exceeding 100 curies;

(ii) Tritium contained in luminous paint, self-luminous products, gas and aerosol detectors, electron tubes, lightning or static elimination devices, ion generating tubes, detector cells of gaschromatography devices, and calibration standards;

(iii) Compounds and mixtures of tritium, where the separation of the constituents cannot result in the evolution of an isotopic mixture of hydrogen in which the ratio of tritium to hydrogen exceeds 1 part in 1,000 by atoms.

C5 Equipment specially designed for the production or recovery of tritium.

Some of the COCOM countries (as far as we know, Belgium, France, Germany, Italy, Netherlands, Norway, and the United Kingdom,) have adopted this regulation in their national laws.

[INT 1]excerpts:

Radiation Protection Standards for Gaseous Tritium Light Devices

Decision of the Council on the Adoption of Radiation Protection Standards for Gaseous Tritium Light Devices (Adopted on 24th July 1973)

(...) Considering the importance of establishing special standards to ensure that the users of gaseous tritium light devices and the whole population are adequately protected, while facilitating international trade in this field;

1. DECIDES that the governments of member countries shall ensure that appropriate measures are taken to provide adequate protection against the hazards of ionizing radiations for users of gaseous tritium light devices and for the whole population.
2. RECOMMENDS to the governments of member countries that the measures referred to in this Decision be based upon the Radiation Protection Standards for Gaseous Tritium Light Devices annexed hereto, and that the Prototype Tests described in the Annex to the Standards be applied to ensure that the manufacture of gaseous tritium light devices complies with the requirements set out in the Standards.

3. DECIDES, in addition, that the Radiation Protection Standards for Gaseous Tritium Light Devices shall be published.

4. Requirements for Manufacturing of Gaseous Tritium Light Devices (GTLDs)

4.1. The manufacture of GTLDs shall be subject to authorization.

4.7. No authorization shall be required for the manufacture of a limited quantity of a given GTLD produced for development purposes provided the aggregate activity of the devices within this quantity does not exceed 100 Ci (3700 GBq). However, such manufacture shall be notified to the competent National Authorities.

5. Requirements for the Import of GTLDs

5.1. The import of GTLDs shall be subject to authorization.

5.2. In the case of import of GTLDs the requirements in Section 4.1. to 4.5. inclusive relating to manufacture shall apply mutatis mutandis to importers except that the information which may be required from the importer under Section 4.3.(vi) and (vii) shall be in the form of a certificate from the exporter that these requirements have been complied with. This certificate shall be endorsed by the competent National Authorities of the exporting country.

4.3. (vi) says: Proposals for prototype testing of the GTLD in addition to the minimum programme set out in the Annex, to demonstrate the effectiveness of the encapsulation of the tritium, protection of the GTLDs and other safety features under both normal and severe conditions of handling, storage and use of the GTLD.

4.3. (vii) says: Quality control procedures proposed to be followed in the production of the GTLD, to ensure that the quality of the GTLD is the same as the quality of the device on which the prototype tests were conducted.

5.3. Notwithstanding the provisions of Section 5.2, the importer may be exempted from the requirements of Section 4.2. to 4.4. inclusive as applied to import on condition that the importer provides a certificate proving that the manufacture of the imported GTLDs has been authorized by the competent National Authorities in the country of origin in accordance with these Standards.

6. Requirements for Use of GTLDs

6.1. The use of GTLDs containing up to 500 mCi (18.5 GBq) shall be unrestricted provided the requirements in Section 4.2. are fulfilled.
6.2. GTLDs containing between 500 mCi and 2 Ci (18.5 GBq and 74 GBq) may be exempted, partially or totally, by the competent National Authorities, from the requirements of 6.3. if the function of the device meets the criteria in Section 4.2.(i) or (ii). 35 This exemption shall not affect however recovery and disposal requirements. If the function of the device does not meet the required criteria, the provisions of 6.3. shall apply.

4.2. (i) says: possible saving of life
4.2. (ii) says: protection against personal injury

6.3. The use of GTLDs containing more than 2 Ci (74 GBq) shall be controlled according to applicable national or international rules for radiation protection. Under such control, the use of GTLDs in this group shall be subject to notification or registration, unless specifically exempted from this latter requirement, as well as to recovery or disposal requirements.

8. Recommendations Concerning Administrative Control Procedures

8.1. The following administrative procedures are recommended to ensure proper control over GTLDs whose use is subjected to special requirements under these Standards. They are aimed in particular at ensuring the recovery and properly controlled disposal of such GTLDs either during or after their mission lifetime.

9. Surveillance

The competent National Authorities should maintain surveillance over the manufacture to ensure that all GTLDs meet the authorized specifications. The competent National Authorities should also maintain general surveillance over GTLDs subsequent to their manufacture or importation to ensure that individual and population exposures from the use of disposal of GTLDs are being maintained within acceptable limits. In particular, the competent National Authorities should ensure that records are kept of all necessary information relating to the disposal of spent devices (date, activities, place of disposal, etc.) on the one hand and to damage, defects, loss, etc., of GTLDs on the other hand. Such a surveillance will be facilitated by using the following information:

i) reports provided by manufacturers or importers on the total activity of tritium contained in the GTLDs manufactured or imported;

ii) reports which may be required by the competent National Authorities on defects noted in the course of use, which are likely to change the data used for the initial safety evaluation;

iii) records which competent National Authorities may deem it desirable to be kept by manufacturers or importers of persons or institutions to which GTLDs have been transferred.

35 This provision has been accepted by the French authorities insofar as the activity of the individual sources contained in such GTLDs does not exceed 500 mCi (18.5 GBq). (this footnote except "(18.5 GBq)" is part of the original text)
References:

[AUS 1] Customs (Prohibited Exports) Regulations, Ninth Schedule, as amended on 31st July 1986

[Bu 82] Umweltradioaktivität und Strahlenbelastung, Jahresbericht 1982, Bundesminister des Innern


[CDN 1] Atomic Energy Control Regulations: Consolidated Regulations of Canada c.365

[D 1] Verordnung zur Durchführung des Außenwirtschaftsgesetzes (Außenwirtschaftsverordnung) of 18th December 1986 (BGBl. I, p. 2671)

[D 2] Verordnung über den Schutz vor Schäden durch ionisierende Strahlen (Strahlenschutzverordnung - StrlSchV) of 30th June 1989 (BGBl. I, p. 1321)


[D 4] Ausfuhrverordnung zu Artikel 26 Abs. 2 des Grundgesetzes (Gesetz über die Kontrolle von Kriegswaffen), of 29th July 1987

[GB 1] British Overseas Trade Board: Consolidated List of Goods Subject to Security Export Control, March 1990

[INT 1] Nuclear Energy Agency: Radiation Protection Standards for Gaseous Tritium Light Devices; Organization for Economic Co-operation and Development; 1973


[Si 86] Sinden, D.B.: Tritium related exports, Notice 86-5 by the Atomic Energy Control Board; Ottawa, 14th March 1986

[USA 1] United States Nuclear Regulatory Commission; Rules and Regulations; Title 10 Code of Federal Regulations - Energy /part 110; December 31, 1987


[ZA 1] Republic of South Africa, Government Gazette; Regulation Gazette No.3105, Pretoria, of 28th November 1980
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IANUS-10/1990: Martin Kalinowski, „Technical Problems with Safeguarding Tritium“
IANUS-12/1990: Achim Seiler, „Neue Technologien und Rüstungskonversion“
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IANUS-2/1991: Lars Colschen, Martin Kalinowski, Jan Vydra, „National Regulations of Accounting for and Control of Tritium“
IANUS-3/1991: Jürgen Scheffran, Jan Vydra, „The Application of Military-Related Resources to Protect the Environment“
IANUS-7/1991: Isolde Stumm, Kathryn Nixdorff, „Haben Toxinwaffen militärische Relevanz?“
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IANUS-6/1992 Martin Kalinowski, „Die Problematik der Tritiumemissionen aus einem Endlager für radioaktive Abfälle“
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• IANUS-4/1993 Wolfgang Liebert, „The Relationship between Missile and Nuclear Weapons Proliferation“

• IANUS-5/1993 Wolfgang Liebert, Martin Kalinowski, „Stellungnahme zu aktuellen Problemen der nuklearen Non-Proliferation aus naturwissenschaftlicher Blickrichtung / Present Problems of Nuclear Non-Proliferation (and Nuclear Disarmament) from a Natural Scientists Point of View“

• IANUS-6/1993 Markus Jathe, „Neuronale Netze: Was sie sind, was kann man von ihnen erwarten?“


• IANUS-8/1993 Jürgen Scheffran, „Opportunities and Conditions for Conversion of Military Science and Technology“

• IANUS-1/1994 Lars Colschen, „Die Kernwaffen in der Ukraine - Politische und technische Aspekte“

IANUS-Dokumentationen

• I „Neue Technologien und Rüstungsdynamik“, Interdisziplinäres Seminar, Wintersemester 1987/88

• II „Methoden der Technikfolgenabschätzung und Technikgestaltung“, Interdisziplinäres Seminar, Sommersemester 1989

• III „Konfliktdynamik und Konfliktmodelle in der Sicherheitspolitik“, Interdisziplinäres Seminar, Wintersemester 1989/90

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