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**INFCE**

INFCE/DEP./WG.3/18

LONG TERM ASSURANCE OF SUPPLY OF HEAVY WATER

INFCE WORKING GROUP 3

LONG TERM ASSURANCE OF SUPPLY OF HEAVY WATER

(Subject No 17 in Appendix 3 of Working Group 3 Report)

Arising out of its discussion of papers presented to it, Working Group 3 developed a list of key questions concerning the long term assurance of supply of heavy water, excluding non-proliferation aspects which are considered under Subject No 18 in Appendix 3 (refer INFCE/DEP/WG3/19). The list of questions and the responses received were distributed by Working Group 3 as working documents. For the convenience of participants in INFCE and those seeking background information to the INFCE Final Report, the list of questions and the responses are consolidated in the attached documents.

- |                                 |                          |
|---------------------------------|--------------------------|
| 1. List of questions            | CO-CHAIRMEN/WG3/39 Rev 2 |
| 2. Response from Switzerland    | CO-CHAIRMEN/WG3/42       |
| 3. Response from United Kingdom | CO-CHAIRMEN/WG3/47       |

Key Questions

Task Force C

1. Ref. Document Co-Chairmen/WG.3/27

Is there sufficient evidence for the thesis that heavy water supply assurances for nuclear systems based on heavy water will not be a mater of concern.

- for reactors purchased from a heavy water producing country?
- for reactors manufactured in other countries?

2. Ref. Document Co-Chairmen/WG.3/22

- a) Since some utilities in the past have committed reactors without long-term assurances of supply why is it necessary for them to do so now? Why are supply assurances required for nuclear fuel over and above those sought by utilities committing generating facilities using other fuels?
- b) What is the impact, if any, of national decisions on reprocessing and recycling on short-term and long-term uranium supply and demand and how could this effect nuclear programmes and the reactor market?

Swiss Contribution  
INFCE - WG.3

14.6.1978

**ANSWERS TO KEY QUESTIONS AND PROPOSAL  
FROM THE SWISS DELEGATION**

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**1. Task Force A, B and C; from the point of view of the Swiss utilities**

**1.1 General Considerations**

The Swiss utilities are responsible toward the People of Switzerland for the reliable and sufficient supplying of electricity.

Because some questions in Task Forces A, B and C lead to similar answers, it has been chosen to cover the questions in these three Task Forces in a topic orientated manner rather than to answer each question specifically.

It has also been sought to balance the interests of both suppliers and consumers. If this balance occasionally appears somewhat consumer orientated, this results from the fact that Switzerland not being a supplier country might underestimate suppliers' concerns and it should not be interpreted as an intention to ignore suppliers' requirements.

**1.2. Assurance of Supply**

Fundamentally, the access to raw materials and services has to be open, within the framework of a single comprehensive mutually agreed non-proliferation regime, on a non-discriminatory base to all interested parties accepting this regime. The circulation of raw materials, of elaborated products as well as of technical information and know-how should be free between the parties accepting the non-proliferation regime (Task Force A, II, 2a; Task Force A, II, 3; Task Force B, A, 2a).

Furthermore, any unilateral proposition for political modification of the existing rules for access to and control of raw materials and services should not have any effect before a consensus of all parties on the proposed modifications has been reached. (Task Force A, I, 2; Task Force A, II, 1; Task Force A, II, 2a; Task Force B, A, 2a; Task Force C, 2a).

Assurance of supply depends heavily on investment incentive in the facilities required to produce raw materials or to perform services. Propensity to invest is related to the risks associated with the investments. The better those risks are known the larger the propensity to invest will be. Today, the consumers are in a better position to calculate the risks on investments associated with uranium prospecting, enrichment and reprocessing. This statement is, of course, only valid if the Governments of the countries in which the investments take place maintain a policy guaranteeing adequate returns on these investments. (Task Force A, I, 3; Task Force A, I, 4; Task Force B, B, 4). Furthermore, multinational consumers' investments lead to a self reinforcement of non-proliferation because it makes the hiding of unilateral diversion almost impossible and reduces the need for national facilities (Task Force B, A, 3; Task Force B, C, 7).

A further measure to improve the assurance of supply is the creation of stocks of raw materials and elaborated products. In order to complement the assurance resulting from the free circulation of raw materials and elaborated products, these stocks should be established on a national basis first and if possible consolidated by multinational stocks (Task Force A, I, 7).

### 1.3. Market Stability

All measures described in paragraph 1.2 above will also have a stabilising effect on the market of raw materials and services.

Market stability will generally be improved by reducing waste of raw materials and elaborated products such as can be done by recycling residual uranium and plutonium in thermal reactors and by introducing breeder reactors (Task Force C, 2b).

Furthermore, once the pooling effect resulting from the large number of reactors supplied by most facilities of the fuel cycle is recognized, measures like: fractional contracting for enrichment and reprocessing, requirement type contracts for enrichment and reprocessing, consumer free selection of enrichment tail assay within technically acceptable limits, etc. will enhance diversification of supply and, therefore, market stability (Task Force A,I,6; Task Force B,A,1.; Task Force B,B,5).

## 2. Task Force D; from the point of view of the Federal Administration

### 2.1. General considerations

1) The security of supply of nuclear material and equipment and of access to nuclear fuel services and scientific and technological information can only be achieved on the basis of an equal treatment of all States having accepted the same basic undertakings and the same conditions to achieve non-proliferation. Conversely, assurances of supply and of access are prerequisites for an effective and credible worldwide non-proliferation policy, as difficulties or interruptions of supply and of access due to differing or changing non-proliferation policies force the customer States to evade the non-proliferation system or to search for autonomous measures (questions 4, 9a, 10).

2) As experience has shown, bilateral solutions are based on differing and changing national non-proliferation policies; they imply the risk of unequal treatment leading to insecurity of supply and access, as well as the risk of market distortion thus undermining the effectiveness and the credibility of the whole non-proliferation regime, and of nuclear energy in general. Therefore, a common set of internationally agreed non-proliferation undertakings and conditions is indispensable, and this set should reflect a unified, basic definition of non-proliferation. (questions 3,4,9a).

- 3) The procedure for defining non-proliferation, its undertakings and conditions, should be a multi-lateral one and embrace also arbitral jurisdiction over its implementation. The work of INFCE could serve as a base for its preparation and should be followed by negotiations within an adequate frame-work. (questions 3,4,9a,11).
- 4) For the sake of security of supply and of access, the common set of undertakings and conditions should be as stable and as long-ranged as possible. It is nevertheless recognized that procedures for amending the conditions according to changing political and technical circumstances are necessary. However, this amending mechanism should also be of a multilateral nature, and supply and access should be further secured during the negotiation phase. The possibility of unilateral and bilateral modifications of non-proliferation conditions should be excluded (if, however, unilateral modifications should be allowed henceforth, the changed non-proliferation conditions should not have an impact on previously agreed commercial contracts).(questions 2,9b).

## 2.2 Definition of non-proliferation

Non-proliferation is best defined by defining proliferation. The term proliferation should be strictly understood to mean the appearance of new nuclear weapons' States. Based on this very strict definition, all other aspects are to be considered as ways and means and must be integrated into an optimal regime. In this respect, security of access to sensitive services of the nuclear fuel cycle or to the services of peaceful nuclear explosive devices etc. appear as constructive aspects of non-proliferation. (question 1 ).

## 2.3 Main weaknesses of the actual non-proliferation regime and remedies thereto

The most important instrument of non-proliferation today is the treaty on the non-proliferation of nuclear weapons (NPT), to which more than 100 States have adhered. Several years ago, it has been recognized that this instrument contains several weak points (questions 4,9b):

- 2 -
- a) no provision for the control of transfer of scientific and technological information
  - b) withdrawal of a State from NPT can lead to an unsafeguarded situation in this State
  - c) full scope safeguards are not requested for non nuclear weapon States not party to NPT

a) Export of technology

Some States have recently postulated that restraint should be exercised in the transfer of sensitive technologies and facilities as well as of weapons usable material in order to slow down the spreading of nuclear weapons' capabilities. This does not seem to be in conformity with Art. IV of the NPT, which provides for unrestricted access of the Parties to all scientific and technological information for the peaceful uses of nuclear energy. Taking into account only national interests for energy production, one is forced either:

- 1) to confirm the right of access to the sensitive technologies and to develop sensitive activities, or
- 2) to demand an absolute security of access to the sensitive services of the nuclear fuel cycle.

If one goes along with the first option, one is forced to admit that the transfer of sensitive technologies and facilities has to be done under certain restrictive conditions concerning their use and retransfer, as well as the safeguarding of installations produced with the help of the sensitive transfer.

If one goes along with the second option, one is forced to envisage the development and the implementation of an internationally agreed set of obligations of public and private nature, which should be applied to all national and multinational sensitive installations for peaceful purposes (plants for enrichment, reprocessing, plutonium storage, plutonium fuel element fabrication, etc.). This set of obligations should be conceived so as to ensure the highest degree of security of access for customers (commercial and financial conditions) and of non-proliferation conformity (eg. international safeguards on the sensitive materials and their subsequent generations, <sup>unlimited</sup> in time and space), on the



b) Withdrawal of a State from NPT

The above-mentioned set of internationally agreed obligations should be thus conceived that uranium enriched or plutonium separated in all the sensitive national and international installations be stored in these installations or in multinational storage installations, and not in the owner State, except for the quantity of sensitive material needed to support the operation of nuclear power plants. By this, the proliferation risk in the case a State withdraws from NPT, is drastically reduced.

c) Full scope safeguards

Full scope safeguarding being already a mutual commitment among non nuclear weapon States parties to the NPT, it appears to be a <sup>logical</sup> necessity to impose such a commitment also on non nuclear weapon States not parties to the NPT, in order to achieve equality of treatment of States and to speed up universalisation of the non-proliferation regime.

3. Proposals resulting from the answers to Key Questions

As logical consequence of its answers to the key questions of Task Forces A to D, the Swiss delegation makes the following three proposals to INFCE WG.3:

- 1) The group should try to define an acceptable set of international obligations of public and private nature which could be applied to all national and international sensitive installations with a view to achieve high degrees of security of access and of non-proliferation at the same time;
- 2) The group should define a set of general rules of good practice for Governments to encourage and protect consumers' investments in uranium prospection and production as well as in other fuel cycle facilities;
- 3) The group should outline the conditions required to make possible the constitution of national stocks of raw materials and elaborated products consolidated by multinational stocks or reassurance schemes.

**HEAVY WATER AND REACTOR SUPPLIES - KEY QUESTIONS - INFCE WG 3/39 Rev.2**

**Ans. 1. The UK has no relevant experience.**

**Ans. 2. (a) It is difficult to see why there has been a change of atmosphere. It may however be that whereas in the past uranium supplies had been obtainable as a purely commercial exercise, developing experience of the impact of non-proliferation and other governmental and inter-governmental considerations has made users more concerned about the problems of assurance of supply. It is also the case that in the event of an interruption in nuclear fuel supplies, the opportunity cost to a utility of shutting down a nuclear facility is greater than that of shutting down other generating facilities, because of the greater capital charges involved.**

**(b) In the short term, recycling of uranium in thermal reactors could reduce natural uranium demand from consumers by about 10%; recycling of plutonium in thermal reactors could reduce it by a further 10%. But in the long term, recycling in thermal reactors does not affect the total available world supply of uranium. Thus recycling in thermal reactors would slightly postpone the date at which expected shortages would influence reactor ordering decisions, which is at present probably some time in the 1980s.**

**Recycling of plutonium in fast reactors, however, offers the possibility of transforming the uranium supply situation in the long term, and of surmounting the major uranium shortage foreseeable on present forecasts after 2000.**