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**INFCE**

**International  
Nuclear  
Fuel  
Cycle  
Evaluation**

INFCE/DEP/WG.4/19

RECORD OF THE THIRD MEETING OF SUB-GROUP B, TOKYO, 17 MAY 1978

# International Nuclear Fuel Cycle Evaluation

# INFCE

INFCE/WG.4/33 (B)

19 May 1978

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Working Group 4

Sub-group B

INFCE WORKING GROUP 4, SUB-GROUP B: PLUTONIUM MANAGEMENT

AND RECYCLE

RECORD OF THIRD MEETING OF THE SUB-GROUP

TOKYO: 17 MAY 1978

1. OPENING OF SESSION BY MR. SHIGEFUMI TAMIYA
  - 1.1 Mr. Tamiya opened the meeting and welcomed all delegates\* on behalf of the United Kingdom and Japan.
2. OPENING REMARKS BY CO-CHAIRMEN
  - 2.1. Mr. Tamiya noted that the main task of the meeting would be to reach further consensus on the base cases for plutonium management and recycle, so that their evaluation and the consideration of alternatives could begin at the next meeting of the Sub-group in September.
  - 2.2. Mr. Buck thanked Japan for the excellent arrangements which had been made for the meeting in Tokyo.
3. ADOPTION OF THE AGENDA
  - 3.1. The provisional Agenda was adopted and is attached at Annex A.

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\* List of Delegates at Annex B.

4. RECORD OF THE SECOND MEETING OF THE SUB GROUP

- Paper INFCE/WG.4/27(B)

4.1. The meeting took note of the Record of the second meeting held on 3 April 1978.

4.2. In response to a question, the Technical Secretariat explained the two numbering systems; for INFCE and Co-Chairmen papers. The main distinction was in the distribution they received. INFCE papers were given a full distribution to all participants, but Co-Chairmen papers were restricted to members of the Working Group. In general, contributions received for consideration by the Sub-group would be given Co-Chairmen numbers at first. When discussed and adopted by the Sub-group, papers would be given a full INFCE distribution. The Agenda and Records of Meetings would also be given full INFCE distribution.

4.3. If contributors specifically requested that a paper which had not been considered by the Sub-group should be given INFCE distribution, the Technical Secretariat would meet this request in consultation with the central INFCE Secretariat in Vienna.

5. PROGRESS REPORTS FROM THE JAPANESE/BRITISH TECHNICAL SECRETARIAT, CONTRIBUTING COUNTRIES AND ORGANISATIONS

Task 1: Collection of Basic Data

- Papers: INFCE/WG.4/18(A,B)  
INFCE/WG.4/22(B) Rev. 1.  
Co-Chairmen/WG.4/5(B)  
Co-Chairmen/WG.4/13(B) (+ Add 1 and 2)

5.1. The Technical Secretariat recalled that two papers (INFCE/WG.4/15(A,B) and INFCE/WG.4/22(B)) summarising replies to the December questionnaire had been circulated in April. A few more replies had been received since then. An up-dated summary (INFCE/WG.4/22(B) Rev. 1), together with copies of all replies to the December questionnaire (Co-Chairmen/WG.4/5(B)) were tabled for the information of the Sub-group.

5.2. The Sub-group noted that this was the end of the work which the Technical Secretariat proposed to do on the results of the December questionnaire, as they would now concentrate on analysis of replies to the questionnaire issued to all INFCE participants in April (INFCE/WG.4/18(A,B)). The replies to the December questionnaire would not be wasted, however, but utilised as far as possible as an additional source of information when analysing the new questionnaire.

5.3. Replies to the new questionnaire had already been received from the following 12 countries:

Australia	The Netherlands
Belgium	South Africa
Canada	Spain
Finland	Switzerland
Italy	UK
Mexico	US

5.4. The Co-Chairmen requested that all participants who had not replied to the questionnaire should do so within four weeks.

Task 2: Current Methods of Plutonium Storage : Base Case

- Papers: Co-Chairmen/WG.4/14(B)  
Co-Chairmen/WG.4/15(B)

5.5. The delegate from France introduced a paper (Co-Chairmen/WG.4/14(B)) describing the principles of long-term storage. He explained that a store for this purpose would have a large capacity (certainly over 10 tonnes) and needed to be capable of providing both for rapid retrieval of some material and for storage of other material for 20 years or more.

5.6. In discussion:

- a. it was noted that more details of physical protection could not be given as these were classified;
- b. it was suggested that a description of an actual store would be helpful to illustrate the principles set out in the paper.

5.7. It was agreed:

- a. to adopt the French paper (Co-Chairmen/WG.4/14(B)) to form part of the base case on plutonium storage; and that it should now be distributed to all INFCE participants (as INFCE/WG.4/32(B));
- b. that, while France could not describe an actual plutonium store for security reasons, her delegation would prepare a supplementary note or diagram to illustrate how some of the principles could be applied in practice.

5.8. The delegate from the Federal Republic of Germany (FRG) introduced a paper (Co-Chairmen/WG.4/15(B)) describing in two parts the short-term buffer storage of plutonium oxide and plutonium nitrate. The paper outlined the handling philosophy of such stores. Differences in storing the two forms were:

- i. capacity;
- ii. method of storage (oxide in cans and nitrate in tanks);
- iii. criticality principles.

5.9. In discussion the following points were made:

- a. it was difficult to separate fully the application of safeguards and physical protection measures, because they overlap;
- b. it was suggested that the problems of heat removal, and hydrogen removal from the nitrate store, should also be considered;
- c. it was noted that while the FRG paper assumed the transfer of nitrate from the reprocessing plant to storage by pipe, transport by truck should also be mentioned;
- d. neither the FRG nor French papers contained any data on the cost of storage.

5.10. It was agreed that:

- a. the FRG paper would be revised in the light of discussion and presented again at the next meeting, when it was hoped it could be adopted to form part of the base case;
- b. FRG would submit a related paper on plutonium nitrate conversion at the next meeting of the Sub-group;
- c. all participants were invited to contribute any data they could on the costs of storage (it was noted that the April 1978 questionnaire sought information which was relevant). In particular, IAEA were invited to consider whether they could provide cost data, drawing on studies such as their work on Regional Fuel Cycle Centres.

5.11. Looking forward to Task 4 (Plutonium Storage: Technological Alternatives), the Co-Chairmen invited all participants in the Sub-group to consider what input they could make to this Task, in view of the progress which had been made on the base case under Task 3, and to send any contributions to the Technical Secretariat.

Task 3: Current Methods of Plutonium Transport: Base Case

- Paper: Co-Chairmen/WG.4/16(B)

5.12. The delegate from the Commission of the European Communities (CEC) introduced this paper and reminded delegates that it formed the first section of a four part study. It looked forward to the period 1990-2000. It was noted that the paper related to transport within the European Community.

5.13. Following discussion it was agreed that:

- a. Problems associated with movements of low activity waste fell more properly to Working Group 7 to consider and should therefore be omitted from the paper, but the information on this topic would be transmitted to Working Group 7.

b. CEC would revise the paper to reflect a. and in the light of other minor points raised in discussion. It would be considered further at the next meeting, when it was hoped that it could be adopted to form part of the base case. It was also hoped that by that date further sections of the CEC study would be available.

5.14. The delegate of the United Kingdom gave a progress report on the preparation of the UK paper on plutonium transport. This would not now be a joint paper with CEC, but would complement the CEC input by drawing on UK experience of plutonium transport on a worldwide scale. It was hoped that this paper would be circulated before the next meeting.

5.15. Looking forward to Task 5 (Plutonium Transport: Technological Alternatives), the Co-Chairmen invited all participants to consider what input they could make to this Task, in view of the progress made on the base case, and to send any contributions to the Technical Secretariat. It was noted that the CEC study presented under Task 3 would also be relevant to Task 5.

#### Task 6: Alternative Institutional Arrangements

5.16. The Co-Chairmen recalled that, at their meeting in January 1978, the Sub-group had noted the IAEA programme of work on the international management of plutonium. They had invited IAEA to submit their discussion paper, then under preparation, to the Sub-group; and to continue the study of this subject within IAEA, in consultation with interested member states, keeping the Sub-group informed of progress.

5.17. The delegate of IAEA reported that the Agency's discussion paper on International Management of Plutonium would be published in the near future, hopefully in June 1978. It would be distributed to all member states, whether or not they were participating in INFCE, and its publication would be followed by discussions between IAEA and interested member states on the possibilities for establishing a system for the international management of plutonium. The discussion paper would be made available to the Sub-group as soon as it was published; the Sub-group would also be kept in touch with the results of international discussions conducted under IAEA auspices.

Task 7: Definition of Base Case on Plutonium Recycle

(a) National Plans for Recycle

- 5.18. The Sub-group noted that information on this area of study would be obtained from the replies to the questionnaire issued in April 1978.

(b) Definition of Reactor

- Papers: Co-Chairmen/WG.4/4(B)  
Co-Chairmen/WG.4/4(B) Add. 1.

- 5.19. The Japanese delegation introduced these papers, pointing out that Co-Chairmen/WG.4/4(B) Add. 1 contained supplementary information on the later recycles of plutonium as requested at the last meeting. Also included was information on the isotopic composition of plutonium and its specific activity and neutron yields in later recycles.

- 5.20. After discussion, it was agreed that due to the complexity of the subject, the procedure to be followed would be that delegations should send written comments on the papers to the Technical Secretariat (Japan) within four weeks. The papers would be revised to take account of comments in time for circulation prior to the next meeting of the Sub-group in September. It was hoped that, at that meeting, it would be possible to agree to adopt the reactor base case.

(c) Fuel Fabrication Facility

- Paper: Co-Chairmen/WG.4/1(B)

- 5.21. The delegate from Belgium introduced this paper, which had been presented at the last meeting of the Sub-group.

- 5.22. In discussion, the following points were made:

- (a) Radiation exposure was assumed at an average of 1.4 rem per person annually; and always less than 5 rem per year (the accepted maximum) for any individual.
- (b) Several delegations said that the paper was still under study in their countries and they could not offer final comments at this stage.

5.23. It was agreed that:

- (a) Any delegation wishing to comment further on the paper should do so direct to the Belgian delegation within four weeks.
- (b) The conclusions mentioned at the end of paper might be premature and should be omitted.
- (c) The paper, as amended in the light of (a) and (b), would be considered further at the next meeting, when it was hoped that it could be adopted to form part of the base case.

(d) Cost Data

- Papers: Co-Chairmen/WG.4/3(B) Rev. 1  
Co-Chairmen/WG.4/20(B)

5.24. The Technical Secretariat introduced paper Co-Chairmen/WG.4/3(B) Rev. 1, noting that considerable revisions had been made to the previous paper (Co-Chairmen/WG.4/3(B)), tabled at the last meeting in April, on the following points:

- (a) several important additional references were incorporated;
- (b) unreliable data for cost trend analysis were deleted;
- (c) the cost data were escalated or de-escalated to 1978 U.S. Dollar values using appropriate factors.

5.25. After discussion, it was agreed that:

- (a) the Technical Secretariat would make further refinements, using inputs from participants and other Working Groups;
- (b) a revised paper would be introduced by the Technical Secretariat at the next meeting, when it was hoped it would be adopted, so as to assure the early start of Task 8.

5.26. The IAEA delegate introduced paper Co-Chairmen/WG.4/20(B) outlining the input IAEA could make to this part of the Task.

Task 8: Assessment of Base Case on Plutonium Recycle

- Paper: Co-Chairmen/WG.4/24(B)

- 5.27. The Italian delegate tabled this paper, describing Italian experience of plutonium recycle in thermal reactors. It was agreed to discuss this further, in the context of Task 8, at the next meeting.
6. FUTURE PROGRAMME OF WORK
- 6.1. It was agreed that the next meeting of the Sub-group would be on 20/21 September 1978 in Vienna (see Annex C).
- 6.2. With reference to Task 9 (Plutonium Recycle: Reactor Alternatives) the Canadian delegate reported that the paper which he had offered on plutonium recycle in a Heavy Water Reactor would probably be ready for this next meeting. The Japanese delegation offered a paper for Task 9 on plutonium recycle in the FUGEN-type Heavy Water Reactor: this would be available for the next meeting.
7. SUMMARY REPORT BY CO-CHAIRMEN TO GROUP 4 AND TO TCC
- 7.1. The Co-Chairmen reported that the next meeting of TCC would be held on 12 June, when the Co-Chairmen of all INFCE Groups would present progress reports.
- 7.2. For this purpose, Group 4 needed a progress report from Sub-group 4B. The Co-Chairmen and the Technical Secretariat would prepare a report covering the progress made on each Task, for consideration by the main Group 4 meeting on 19 May. The report would reflect the fact that the Sub-group was still at the first stage of its work, assembling data and defining the base case on plutonium management and recycle in thermal reactors; but it would also indicate that the Sub-group hoped to begin evaluation of the base case and the consideration of alternatives at its September meeting.
8. ANY OTHER BUSINESS
- 8.1. The Indian delegate proposed a vote of thanks to the Japanese Government for their hospitality and the excellent facilities provided for the meeting. He also expressed the thanks of the Sub-group to the Co-Chairmen and joint Japanese and British Technical Secretaries for the efficient and courteous way in which its business was always conducted.

ANNEXES

- ANNEX A - Agenda as adopted
  - ANNEX B - List of delegates
  - ANNEX C - Dates of future meetings
  - ANNEX D - List of papers relevant to  
Sub-group 4B
  - ANNEX E - Addresses of Technical Secretariat
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International  
Nuclear  
Fuel  
Cycle  
Evaluation

INFCE/WG.4/28(B) Rev.(1)

15 May 1978

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PROVISIONAL AGENDA FOR THE THIRD MEETING OF  
INFCE WORKING GROUP 4, SUB-GROUP B  
INTERNATIONAL CONFERENCE ROOM OF  
THE MINISTRY OF FOREIGN AFFAIRS, TOKYO  
17-18 May 1978, 10.00 HOURS

1. Opening of session by Mr Shigefumi TAMIYA
2. Opening remarks by Co-Chairmen:  

Mr Shigefumi TAMIYA (Senior Technical Adviser, The  
Federation of Power Electric Companies)

Mr Cyril BUCK (Director, British Nuclear Fuels Limited)
3. Adoption of the agenda
4. Record of the second meeting of the Sub-Group:  
To note INFCE/WG.4/27(B)
5. Progress reports from the Japanese/British technical  
secretariat, contributing countries, and organisations
  - (1) Task 1 - Collection of basic data  
Oral presentation on the progress report  
for the February 1978 questionnaire  
(CO-CHAIRMEN/WG.4/13(B))
  - (2) Task 2 - Current method of plutonium storage;  
base case
    - b) Definition of plutonium storage  
Reports from France and the FRG.  
(CO-CHAIRMEN/WG.4/14(B) and 15(B)).

- (3) Task 3 - Current method of plutonium transport;  
base case
    - a) Definition of transport  
Progress report by UK and CEC  
(Co-Chairmen/WG.4/16(B))
  - (4) Task 6 - Alternative institutional arrangements
    - a) International management of plutonium  
Report by IAEA.
  - (5) Task 7 - Definition of base case
    - b) Definition of reactor  
(Co-Chairmen/WG.4/4(B))  
Additional contributions and discussions
    - c) Fuel fabrication facility  
(Co-Chairmen/WG.4/1(B))  
Additional contributions and discussions
    - d) Cost data  
(Co-Chairmen/WG.4/3(B))  
Additional contributions and discussions.
6. Future Programme of Work
  7. Summary report by Co-Chairmen to Group 4 and to T.C.C. (oral)
  8. Any other business

I N F C E

Date: 17 May 1978

Issue No. 1

NOTIFICATION OF A MEETING HELD AT THE FOREIGN MINISTRY (CONFERENCE ROOM No. 751)

**Title of Meeting:** International Nuclear Fuel Cycle Evaluation (INFCE) Opening Meeting: 10:00  
Working Group 4 on Reprocessing, Plutonium Handling Recycle Enquiries: Scientific Affairs  
Division, United Nations  
Sub-Group B on Plutonium Management, Recycle Bureau, MOFA  
580-3311 Ext. 2378

**Dates, inclusive:** 17 May 1978

**Place:** The Foreign Ministry, Conference Room No. 751 Ext. 3071, 3072

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**Note:** Names of participants are shown in alphabetical order within the delegation.  
Delegation leader is underlined.

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**Co-Chairmen:** United Kingdom Dr. C. Buck  
Japan Dr. S. Tamiya

**Technical Secretaries:** United Kingdom Dr. M.L. James  
Japan Dr. K. Uematsu

ANNEX B

Delegate

A. Countries

AUSTRALIA

Cairns R.C.P.  
Hardy, C.J.

BELGIUM

Flipot A.J.

CANADA

Fraser I.  
Slater J.B.

FRANCE

Faussat A.  
Lefevre J.F.  
Savelli P.  
Villard R.A.R.

GERMAN DEMOCRATIC REPUBLIC

Nebel D.

GERMANY, FED. REP.

Diefenbacher W.  
Schneider V.W.

INDIA

Nair M.K.T.  
Prasad A.N.

ITALY

Zifferero M.

JAPAN

Hirata M.  
Ishizuka M.  
Nakamura Y.  
Nakano H.  
Ota H.  
Sato S.  
Tamiya S.  
Tanaka H.  
Toyoda M.  
Uematsu K.  
Yamada S.  
Yamamoto K.

KOREA, REPUBLIC OF

Lee H.

MEXICO

Gonzalez-Romo J.

NETHERLANDS

Bruyns V.J.J.M.  
Mostert P.  
Schoustra T.M.P.

PAKISTAN

Afzal M.  
Qureshi K.A.

ROMANIA

Turcanu C.N.

SPAIN

Jriarte A.

SWEDEN

Rydell N.

SWITZERLAND

Peter J.

UNITED KINGDOM

Buck C.  
Collier J.G.  
Fullerton P.G.P.D.  
Higson M.A.  
James M.L.  
Stanley M.

UNITED STATES

Bray G.R.  
Ferguson D.E.  
Hebel L.C.  
Leary J.A.  
Lowenberg H.

Observer

TURKEY

Metin Goker

B. Agencies

IAEA

Filatkin A.  
Pushkov A.

CEC

Cadelli N.  
Lafontaine F.

NEA

Hogroian P.



LIST OF PAPERS RELEVANT TO SUB-GROUP B

(as at 20 May 1978)

1. Records, Agendas and Working Documents

INFCE/WG.4/1	Provisional Agenda, Working Group 4 Meeting 6-7 December 1977
INFCE/WG.4/2	Working Paper - London
INFCE/WG.4/3	Record of London Meeting (Revised Working Paper attached as Annex C)
INFCE/WG.4/5 (B)	Provisional Agenda Sub-group 4B, 23 Jan. 1977
INFCE/WG.4/5 (B) Rev. 1	" " " " " "
INFCE/WG.4/7	Organisational Arrangements
INFCE/WG.4/8 (B)	Note by Co-Chairmen of Sub-group B
INFCE/WG.4/8 (B) Rev. 1	" " " " " "
INFCE/WG.4/14 (B)	Record of First Meeting of Sub-group 4B
INFCE/WG.4/23 (B)	Provisional Agenda, Sub-group 4B, 3 April 1978
INFCE/WG.4/27 (B)	Record of Second Meeting of Sub-group 4B
INFCE/WG.4/28 (B)	Provisional Agenda, Sub-group 4B, 17 May 1978
INFCE/WG.4/28 (B) Rev. 1	" " " " " "
INFCE/WG.4/31	Progress Report for Submission to the TCC

2. TASKS

Task 1 : Collection of basic data

INFCE/WG.15 (B)	Interim Report on December Questionnaire
INFCE/WG.4/18 (A,B)	Questionnaire issued by the Co-Chairmen in April 1978
INFCE/WG.4/22 (B)	Present status and future programme of reprocessing, Pu handling and recycle
INFCE/WG.4/22 (B) Rev. 1	Present status and future programme of reprocessing, Pu handling and recycle

Task 1 : (cont'd)

CO-CHAIRMEN/WG.4/5 (B)	Answers to December Questionnaire
CO-CHAIRMEN/WG.4/5 (B) Add. 1	Additional Answers
CO-CHAIRMEN/WG.4/13 (A,B)	Answers to Questionnaire INFCE/WG.4/18 (A,B)
CO-CHAIRMEN/WG.4/13 (A,B) Add. 1	Additional Answers
CO-CHAIRMEN/WG.4/13 (A,B) Add. 2	" "

Task 2 : Current method of plutonium storage: base case

CO-CHAIRMEN/WG.4/14 (B) (now INFCE/WG.4/32 (B))	Definition of Pu Storage - France
CO-CHAIRMEN/WG.4/15 (B)	Definition of Pu Storage - FRG

Task 3 : Current method of plutonium transport: base case

CO-CHAIRMEN/WG.4/2 (B)	Current Methods of Transport Progress Report - UK
CO-CHAIRMEN/WG.4/6 (B)	Task 3 Pu Transport Progress Report - CEC
CO-CHAIRMEN/WG.4/16 (B)	Assessment of the Environmental Impact of Plutonium Transport within the European Community - CEC

Task 4 : Pu Storage, Technological Alternatives and  
Task 5 : Pu Transport, Technological Alternatives  
Task 6 : Alternative Institutional Arrangements

No papers to date.

Task 7 : Definition of the Base Case on Pu Recycle

CO-CHAIRMEN/WG.4/1 (B)	Definition of Base Case (c) Fuel Fabrication Facility - Belgium
CO-CHAIRMEN/WG.4/3 (B)	Definition of Base Case (d) Cost Data - Technical Secretariat
CO-CHAIRMEN/WG.4/3 (B) Rev. 1	" " " "
CO-CHAIRMEN/WG.4/4 (B)	Definition of Base Case (b) Definition of Reactor - Japan
CO-CHAIRMEN/WG.4/4 (B) Add. 1	" " " "
CO-CHAIRMEN/WG.4/20 (B)	Fuel Cycle Cost Data - IAEA

**Task 8 : Assessment of Base Case on Pu Recycle**

**CO-CHAIRMEN/WG.4/24 (B)**

**Experience on Pu Recycle - Italy**

**Task 9 : Plutonium Recycle - Reactor Alternatives**

**Task 10: Plutonium Recycle - Technological and Institutional Alternatives and**

**Task 11: Plutonium Recycle - Reprocessing Alternatives**

**No papers to date.**

**3. Papers from Sub-group 4A tabled for information**

**INFCE/WG.4/16 (A,B)**

**Occurrence of Pu at different points in the fuel cycle**

**INFCE/WG.4/16 (A,B) Rev. 1**

**" " " " " "**

**INFCE/WG.4/17 (A,B)**

**Regional differences in energy supplies utilising uranium resources in various fuel cycles**

**CO-CHAIRMEN/WG.4/23 (A,B)**

**The revision of the above paper**

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