

Annex 2

JAPANESE PROPOSAL ON PRELIMINARY SYSTEM STUDY OF PARTITIONING AND TRANSMUTATION OF LONG-LIVED NUCLIDES IN HIGH LEVEL RADIOACTIVE WASTE

M. Nakamura(STA, Japan) , H. Yoshida (JAERI, Japan)
S. Tani(PNC, Japan) and T. Inoue(CRIEPI, Japan)

1. BACKGROUND

1. Partitioning and transmutation (P-T) of actinides and fission-products is currently the subject of long-term research in several OECD countries and also in Russia from the viewpoints of its perspectives of potential utilisation of resources and possible advances in radioactive waste management.

2. International collaboration is indispensable, since R&D's on P-T technology cover wide range of research fields. In this context, the OECD Nuclear Energy Agency decided to initiate an Information Exchange Programme on Actinide and Fission Product Partitioning and Transmutation in 1989, as a five-years programme.

3. Since initiating this programme, the OMEGA program in Japan and the Actinide Recycling Program in the USA have been steadily in progress, and the SPIN programme was newly established in France. In addition, many international conferences on the P-T technology indicate a worldwide interest in this subject.

The information exchange programme has played an important role on such a steady progress of the P-T technology in the world and is now expected to identify clear incentives for its application through strategy or system study, as next step.

4. Various P-T concepts have been proposed and studied on **the bases of their** own strategies. All of them are **still** at the R & D stage of laboratory-scaled experiment and/or conceptual study **without engineering verification, due to their advanced and long term nature.** Consequently, **data base** is not provided enough for the accurate strategy or system study.

5. The **OECD/NEA Nuclear Science** Committee has decided to initiate new task forces relevant to the P-T **technology, such** as "Review of Physics Aspects of Different Transmutation Concepts", **"Benchmarks on spallation** neutron source for Accelerator-driven transmutation system, **"Thermodynamic** Data Base for the P-T technology" and "International Code and Model **Intercomparison** for Intermediate Energy Reactions". These should be **very** much useful for the system study on the P-T technology.

6. Under these **circumstances, we** should **initiate** a strategic or system study which is able to clearly suggest the future **direction** of R&Ds on the P-T technology. Taking account of the present status of R&D's on the P-T technology and its data base, the system study would be a preliminary one, since results of the study rely heavily upon data base, assumptions and modeling adopted in the course of the study.

11. Preliminary System Study

II.1 Purpose of the study

The study does not aim at selecting a few P-T concepts among a wide range of proposed ones or directly comparing them with geological disposal concept, but aims at exploring the future direction of R&Ds on the P-T technology. In this context, the followings should be made "in the study:

- 1) to find incentives for introducing the P-T technology into nuclear fuel cycle.
- 2) to identify the key technologies which require breakthrough to the P-T technology to largely mitigate the high level radioactive waste issues, and,
- 3) to provide target capabilities **of partitioning and transmutation technologies, such** as decontamination factor, transmutation rate.

11.2 Contents of the study

According to a schematic flow sheet of the study shown in **Fig.1, the proposed study includes the followings;**

- 1) technical review of proposed P-T technologies, taking account of their introducing **strategies, presently achievable capabilities of partitioning and transmutation etc.,**
The presently proposed concepts are as follows:
 - a) Partitioning
 - partitioning with wet process
 - partitioning in the PUREX process
 - partitioning with dry process

- b) Transmutation
- application of thermal reactor(LWR,high-flux reactor)
 - application of fast reactor(MOX-FBR,Metal fuel FR,Burner FR)
 - application of accelerator(with thermal and fast reactors)
- 2) grouping the proposed technologies into some representative P-T systems,and modeling them as suitable for their system studies,
 - 3) estimation of potential long-term and short-term **risks,and** discussion on economic and proliferation **issues,with** and **without** P-T systems,
 - 4) sensitivity analysis on **assumptions and** models used in the **study,and** overall cost/benefit analysis.
 - 5) Discussion on three **points** described in II.1,**based on the over** all cost/benefit analysis.

11.3 Time schedule

1. A time schedule will be as shown in Fig.2. The study will initiate in the beginning of 1994 just after the completion of the present programme.
2. Prior to starting the study, a task group should be assembled in 1993 to provide details of the study including its procedure,applied methodologies and so on.
3. After authorisation of the member countries participating to the study, some other task groups will be established in early 1994 to work for different items or systems and to prepare a draft of their evaluations.
4. In addition,some expert meetings will be held to discuss the whole study covering wide range of working fields,and to prepare draft and final reports.
5. A final report will be submitted at the end of 1998 after authorisation of member countries participating to the study.

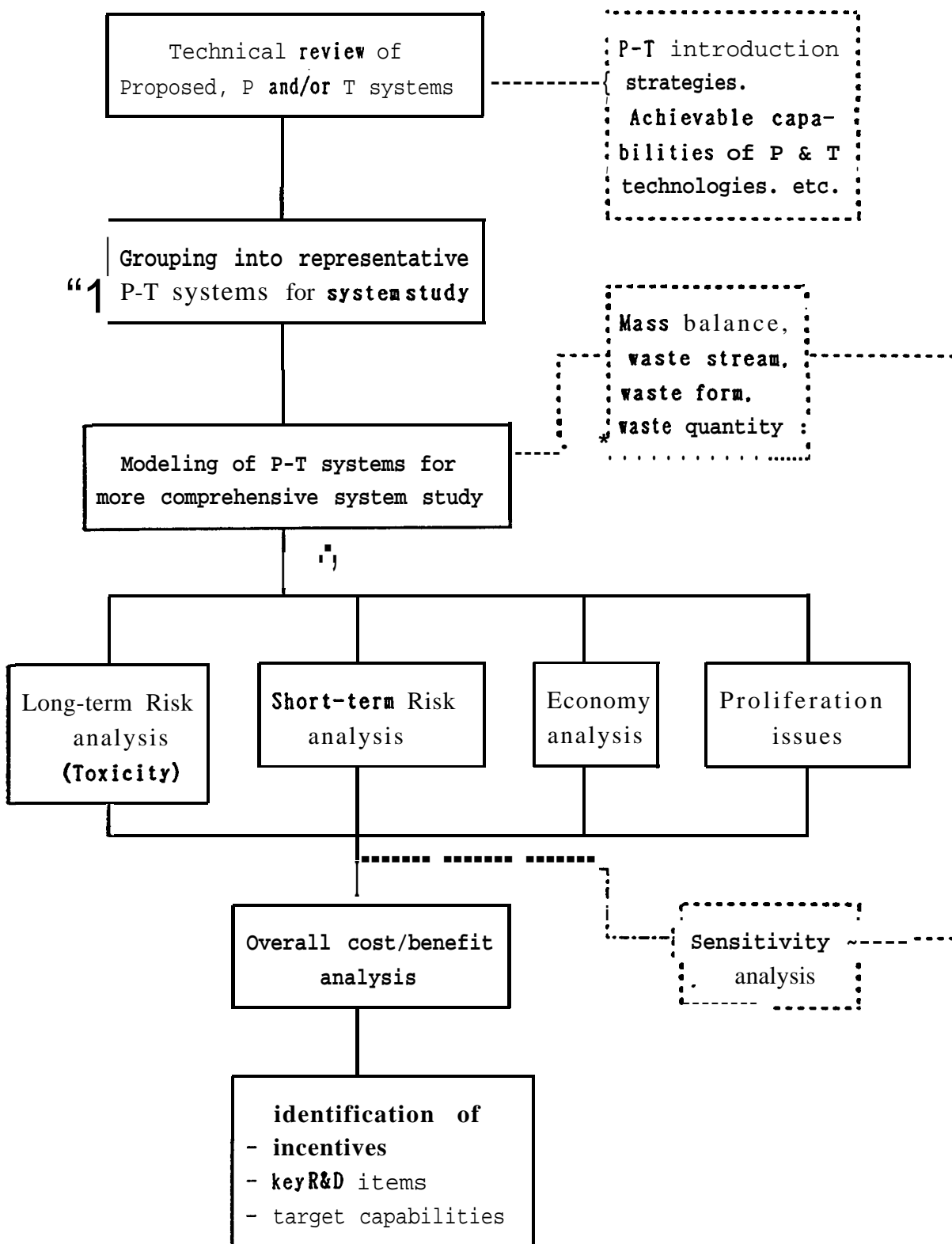


Fig.1 Schematic Flow of Preliminary System Study

Items	1993	1994	1995	1996	1s	1998
Pre-study						
Technical review						
- Partitioning						
- Transmutation						
-- P-T system						
Grouping & Modeling						
Risk analysis						
Economy analysis						
Proliferation issue						
Cost/Benefit analysis						
Identification of						
- incentives						
- key R&D items						
- target capability of P-T						
Report						

Fig.2 Time Schedule of Preliminary System Study on P-T

----- : provisional discussion