8. CONCLUSIONS AND RECOMMENDATIONS

The main purpose of phase-I of this Task Force is to have common understandings in the member countries for the announced transmutation devices, their physics performances and their related fuel cycle consideration. To this end the task force has examine more than 20 different transmutation concepts and has collected the results of the calculation of transmutation capability of each concept.

The transmutation concepts which the Task Force has examined are listed below;

1) Thermal Reactor based concepts
   - PWR based systems with homogeneous and heterogeneous arrangements of minor actinides, contributed from the CEA,
   - PWR based system, contributed from the JAERI, and
   - High flux PBR based system proposed by the BNL, taken from the open literature.

2) Fast Reactor based concepts
   - MOX fueled systems with homogeneous and heterogeneous arrangements of minor actinides, contributed from the CEA,
   - MOX fueled system, contributed from the PNC,
   - Metal fueled system, contributed from the CRIEPI,
   - Metal fueled system with flat core, contributed from the Toshiba Corporation,
   - Two types of minor actinides burner system, contributed from the JAERI.

- Th loaded system, contributed from the JAERI,and
- ALMR actinide recycling system proposed by the GE and ANL, taken from the open literature.

3) Accelerator based concepts

- Two types of system consisting of fast subcritical core and relatively small accelerator, contributed from the BNL,
- Three types of system consisting of fast subcritical core and relatively large accelerator, contributed from JAERI,
- Los Alamos ATW system,taken from the open literature,
- PHOENIX system proposed by the BNL,taken from the open literature ,
- Thorium-bearing Breeder-Burner Subcritical System (BBR), contributed from CEA, and
- ATW-type systems, contributed from the ENEA,Royal Institute of Technology and ITEP.

Based on the comparison of the results of the calculation of transmutation rate of each concept, there seem to be significant discrepancies between the concepts. As for reactor based system, for example, there is a significant difference of Cm-244 burnup characteristics among fast reactor based systems, although it might depends not only cross-section itself,but also neutron flux and initial isotopic vector of minor actinides. And there is only one calculated result of mass balance of minor actinides between BOEC and EOEC of accelerator based systems, this might be partly due to some difficulties of taking account of high energy neutron above 20 MeV into burnup calculation. Therefore, it is felt that further investigation by benchmarks for a set of common systems

on calculation methods of transmutation rate should be beneficial in order to understand and assess their physics performances precisely.

In addition to that, the task force members have suggested that the following fundamental issues should be resolved in terms of scientific aspects of transmutation concepts, such as:

- radiotoxicity after transmutation,
- safety features of transmutation system, and
- nuclear data of transuraniurn nuclides

A further discussion should be held to analyze discrepancies and uncertainties lying in the above scientific issues. Also it has been suggested that the above issues are too broad to be reviewed thoroughly within the present small task force. Therefore, as a starting point of phase II of the Task Force, a specialist meeting is proposed with a view to identifying subjects to be handled by the NSC with respect to the above issues.

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