Summary of Session 1

Co-Chairman: Dr. T. Mukaiyama

Professor Y. Fuji-ie, Commissioner of the Atomic Energy Commission (AEC), welcomed the participants. During his welcome address, he stressed the important role of nuclear energy for the future, and highlighted the Japanese position in carrying forward R&D efforts towards commercial implementation of the nuclear fuel cycle. One of the most important tasks for the mature nuclear fuel cycle, he said, was the establishment of the HLW management scheme. He noted that P&T type of work should continue at all times, because policy changes may occur in the future, and because basic research had rather long lead times. Such basic studies may provide insight into better and novel methods in solving HLW problems.

Mr. G. Stevens, Head of the Nuclear Development Division of the OECD Nuclear Energy Agency (NEA), opened the meeting and welcomed the participants on behalf of the NEA. He summarised the history of the NEA P&T programme and explained how it stimulated international collaborations for better understanding of the technical issues involved, and better orientation of future work. He was very pleased to see that so many participants from all around the globe were able to participate in the meeting and underlined that substantial benefits could be achieved from wider international co-operation. He thanked the Japanese Government for the generous support it provided in this field.

Mr. T. Arimoto, Director of the Radioactive Waste Policy Division, Science and Technology Agency (STA) of Japan, described the important position of geological disposal of HLW in the "Long-Term Programme for R&D, and Utilization of Nuclear Energy" issued by the AEC of Japan in 1994. In 1995, the AEC set up two committees for addressing the disposal of HLW, and the policy for the back-end of the nuclear fuel cycle. A wide range of studies for obtaining public understanding and for approving the implementation of HLW disposal would be performed. Other studies would consider technological isuues concerning disposal. P&T was considered to be a future technology in the Long-Term Programme.

Mr. M. Hugon, European Commission (EC), reported on the EC-funded research activities on new fuel cycle concepts. These included three work areas, namely: strategic studies; partitioning techniques; and transmutation techniques. The strategic studies covered four projects: evaluation of possible P&T strategies; nuclear data for advanced MOX fuels; thorium cycles as nuclear waste management options; and impacts of accelerator-based technologies on nuclear fission safety. Experimental work on partitioning was carried out under two projects: new partitioning technologies, and extraction and selective separation of long-lived nuclides by functionalised macrocycles. Transmutation techniques studies were covered under two projects: the joint EFTTRA experiment on Am transmutation, with irradiation experiments performed in the HFR at Petten, and neutron driven transmutation by adiabatic resonance crossing. About forty European research institutions had participated to the projects since 1996, aiming at having a clearer picture in efficiently reducing the radiotoxicity of nuclear wastes.

Dr. A. Grigoriev, IAEA, reported on the IAEA activity on partitioning and transmutation. The IAEA first started a Co-ordinated Research Programme (CRP) in 1976 and its results were published in 1982. The conclusion of that report was rather negative for P&T. In 1990, the former Soviet Union requested the IAEA to re-active its P&T programme. Since then, the IAEA organized two consultant meetings and one technical committee meeting on this subject. The IAEA had also initiated two CRPs, one on the safety, environmental and non-proliferation aspects of P&T, and another on benchmark calculations of a PWR-cell loaded with (Pu-Th)O_2 fuel and Th-cycle accelerator-driven systems. Two status reports

were in preparation, one on transmutation activities in non-OECD countries, and another on accelerator-driven hybrid systems. These IAEA activities which were complementary to other international programmes, especially to those of the OECD/NEA, were not expected to address possible proliferation issues regarding partitioning.

Mr. J.-F. Babelot of the JRC ITU reported on the EFTTRA irradiation experiments in Phenix and in the HFR. The objective of the European collaboration for Experimental Feasibility of Targets for Transmutation was conducting joint experiments for studying various materials for transmutation. Tc metal rods were irradiated in the HFR up to 6.4 per cent burn-up, and no swelling of the rods was observed. Based on the examination of the irradiated iodine containing capsules, NaI was concluded to be better than CeI_3 or PbI_3. Inert matrices, namely oxide and nitride, were evaluated for MA transmutation both in a PWR and in a fast reactor, and the irradiation behaviour experiments of the candidate matrices were planned. The irradiation of Am oxide embedded in a spinel matrix was under preparation.

The international meetings organized by the NEA and the IAEA for exchange of information were seen as one of the most effective ways in obtaining a clearer picture of P&T aspects, which were both technically very complex and politically sensitive.

In Europe, as was reported by Messrs. Hugon and Babelot, well oriented and well organized collaborative P&T studies, including strategic studies, evaluations and experiments, were performed. The experimental data obtained by those joint efforts, especially irradiation data, would be very valuable for the international community in performing future work.

Following the introductory remarks and the reports on international activities, two invited key-note presentations were made: one by Dr. L. H. Baestle of SCK-CEN on a systems analysis approach for P&T issues and another by Professor M. Salvatores of CEA on the physics and strategies of transmutation.

Dr. Baestle was the Chairman of the NEA Expert Group on P&T System Studies which was preparing a report on that subject. His presentation focusedon the general scope and the work of the NEA expert group. Professor Salvatores discussed the reactor physics approach for comparing different transmutation systems, namely, a fast reactor, a PWR, an accelerator-driven system, heterogeneous recycling and homogenous recycling. One of the conclusions of his analysis was that transmutation in PWRs was less attractive, and therefore, the role of Superphenix was very important for the development of targets for Am irradiation.