

## §1. Investigation of Tritium Traceability and Safety Confinement in Facilities for D-D Burning in LHD

Okuno, K. (Radiochem. Res. Lab., Shizuoka Univ.),  
Matsuyama, M. (HIRC, Toyama Univ.),  
Fukui, M. (KURR, Kyoto Univ.),  
Kondo, K. (KEK),  
Yamanishi, T., Oikawa, A., Shu, W., Ohira, S. (JAERI),  
Kitamura, K. (JNC),  
Uda, T., Asakura, Y.

Deuterium-deuterium experiments at the Large Helical Device (LHD) are being planned by the National Institute for Fusion Science (NIFS). Tritium will be produced by the D-D fusion reaction during the experiments. A part of tritium produced in the vacuum vessel of LHD will be retained in the plasma facing components and structural materials, and the rest will be exhausted to the tritium recovery system via the vacuum systems. The produced tritium during the D-D experiment, however, could be only trace amounts, in contrast to that handled in nuclear facilities and tritium facilities for fusion reactor development. Therefore, to reveal tritium behavior inside of the vessel and establish tritium traceability and tritium recovery and processing in the LHD facility could be more difficult.

The main purpose of the present investigation is to assess whether experiences and data-base of tritium handling and management accumulated in nuclear facilities and tritium facilities for fusion reactor development is useful for performing safely D-D experiments at LHD.

The meeting for the investigation was held on September 27-28, 2001 at NIFS. Many researchers participated from Ibaraki University, the University of Tokyo, Toyama University, Shizuoka University, Nagoya University, Kyoto University, Osaka University, Kyusyu University, the Japan Atomic Energy Research Institute (JAERI), the Japan Nuclear Cycle Development Institute (JNC), the High Energy Accelerator Research Organization (KEK), Institute for Environmental Sciences (IES), and some private companies. The total number of the participants was 43.

The meeting consisted of two sessions, tritium handling in facilities related fusion research and that in nuclear accelerator facilities. In the first session, following subjects were discussed;

1) tritium handling experience and achievements at the Tritium Processing Laboratory (TPL) of JAERI,

- 2) Design study of processing systems for tritiated exhaust gas and liquid during D-D experiments in LHD and their future plan,
- 3) Achievements of tritium-related research in the Hydrogen Isotope Research Center (HIRC) of Toyama University,
- 4) Tritium management in JT-60,
- 5) Tritium handling at the Tokamak Fusion Test Reactor (TFTR), and
- 6) Tritium safety in the International Thermonuclear Experimental Reactor (ITER).

In this session, the subject 2) was discussed intensively and it was agreed that a closer collaboration between universities and research facilities and NIFS should be built up to carry out effectively the R&D of the processing systems for exhaust gas and liquid for D-D experiments at LHD. On the other hand, in the second session, the subjects discussed were as follows; 1) Tritium management in "FUGEN" of JNC, 2) Behavior of tritium released from Kyoto University Research Reactor (KURR), and 3) Tritium behavior produced in the accelerator tunnels of KEK. It was recognized from these discussions that the data base and experiences related to tritium traceability and management in the nuclear and accelerator facilities is very useful for those in the LHD facility during D-D experiments and fusion reactors.

It was concluded through the discussion in the two sessions that the research and development planning of tritium gaseous and liquid wastes processing systems proposed by NIFS was appropriate to perform early and safely D-D experiments at LHD. It was also concluded that to carry out the planning effectively a closer collaboration between universities and research facilities and NIFS should be built up. It was also recognized that the data base and experiences related to tritium traceability and management in the nuclear and accelerator facilities should be reflected to those in the LHD facility during D-D experiments and fusion reactors.