

JCO accident at Tokai-mura

SS-II-1 Summary of JCO Criticality Accident & Dose Assessment

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The criticality accident occurred on September 30, 1999 in a conversion test facility at the JCO Tokai site gave serious radiation dose to 3 employees and fatal dose to 2 of the 3. Neutrons and gamma-rays emitted with the accident caused meaningful dose to the residents of the surrounding area. The accident triggered by pouring 18% enriched uranyl nitrate solution to a precipitation vessel beyond the critical mass had continued for about 19 hours before stopping the criticality, and emitted continuously neutrons and gamma-rays from fission reactions. Total number of fission reaction was 2.5×10^{18} , which was estimated by the activity analysis of fission products in solution of the precipitation vessel.

Dominant dose for the residents and the JCO employees was brought by neutrons and gamma-rays from the precipitation vessel, while the contribution of radioactive plume was negligible. The individual dose was estimated for 200 residents, 169 JCO employees and 60 emergency personnel. The maximum doses were 21mSv for the residents, 48mSv for the JCO employees, and 9.4mSv for emergency personnel, respectively. Subsequently, no deterministic influence has been observed except for the 3 workers.

SS-II-2 Cytogenetic study on weakly irradiated cases in Tokai-mura criticality accident.

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Chromosome analysis of peripheral lymphocytes of the weakly exposed cases in the Tokai-mura criticality accident was performed in collaboration with 5 Institutions noted above. Informed consent was obtained from 36 persons. Peripheral blood was drawn from them at Mito-city within 4 weeks after the accident. The blood kept in the cold preservation medium was brought to NIRS. The chromosome preparation was made according to the separated lymphocyte culture for the study of low dose estimation at NIRS. More than 200 cells per case per Institution were analyzed in all cases. Totally 58,023 cells (about 2.67 million chromosomes) and in average 1,612 cells (about 74,000 chromosomes) per case were examined. Increase of the frequency of dicentrics and centric rings accompanied by fragments was detected in 18 cases. The estimated mean doses of them were: less than 5 mSv in 13 cases, 6-10 mSv in 3 cases, and 11-16 mSv in 2 cases.