

Tritium Assay and Dispensing in TriMARS

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The Tritium Metering, Assay, Recovery and Storage(TriMARS) facility at Korea Electric Power Research Institute(KEPRI) has been established to develop expertise in the tritium handling technology and to provide technical support for the tritium control system of tritium export in Korea. The facility is scheduled to start operation in 2010. The TriMARS facility has been designed for four major functions of receiving and holding, metering and assaying, dispensing, and recovering tritium. The major systems and equipment of the facility consist of a tritium assaying and dispensing system(TADS), a tritium recovery system(TRS), a purge gas recombiner system(PGRS), a tritium calorimeter, a gas chromatograph(GC), tritium monitoring systems and secondary boundaries of high integrity glove boxes and air purged enclosures. The TriMARS facility is classified as a radioisotope handling facility, and the tritium inventory will be restricted below 11.5 PB of tritium. The tritium dispensing and loading will be carried out by batch transfers to limit exothermic heat and consequences due to malfunctions. Three uranium beds were proposed for all tritium storage and transfer vessels to store tritium from outside and to recover the tritium residual of process equipment in the facility. Each uranium getter bed has 550g of depleted uranium to store 3.7 PBq of tritium. Tritium assay is based on accurate pressure-volume-temperature(PVT) measurements and GC analysis. Three metering vessels were designed to measure 0.37 TBq to 185 TBq of T₂ gas at sub-atmospheric pressure. For the tritium accountancy for all shipments in and out at the facility, a dedicated twin cell tritium calorimeter was installed and demonstrated at KEPRI tritium laboratory. This paper describes the design and installation of the TriMARS facility, and initial operation for tritium accountancy.