

## **First trial for post irradiation examination on the JSNS target**

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### **Abstract**

The mercury target was installed at the Materials and Life Science Experimental Facility (MLF) in Japan Proton Accelerator Research Complex (J-PARC) and the first neutrons at Japan Spallation Neutron Source (JSNS) were recorded on 30 May 2008. During the beam operation, the mercury target suffers the radiation damage by the proton beam and spallation neutrons. The moment the proton beam bombards the mercury, the pressure waves induced by the thermally shocked heat deposition are generated and propagate in the mercury. These pressure waves generate the negative pressure near the mercury vessel wall and cavitations occur at the interface between the mercury and mercury vessel wall. The localized impact load generated at the moment of cavitation bubble collapse is imposed on the inner surface of the mercury vessel. These impacts form a cluster of pits on the surface of the mercury vessel wall. The pitting damage is thought to be highly sensitive to the operation condition (the beam profile and operation time). In order to predict the lifetime of the JSNS target, we estimated the formation of the pitting damage for the mercury target vessel wall based on the result of off-beam tests and the used SNS target at the Oak Ridge National Laboratory. The maximum depth of the pit on the mercury vessel wall with the thickness of 2.5 mm is estimated to be about 0.7 mm. During the first replacement of the JSNS target in November 2011, the post irradiation examination (PIE) at MLF started. An overview of the results of PIE for the JSNS target is presented here.