EFFECT OF NEUTRON DOSE AND IRRADIATION TEMPERATURE ON THE MECHANICAL PROPERTIES AND STRUCTURE OF DISPERSION STRENGTHENED COPPER ALLOYS –A. S. Pokrovsky (Scientific Research Institute of Atomic Reactors), S. A. Fabritsiev (D.V. Efremov Scientific Research Institute), D. J. Edwards (Pacific Northwest National Laboratory), S. J. Zinkle, and A. F. Rowcliffe (Oak Ridge National Laboratory)

Extended Abstract (the full paper will be published in the Journal of Nuclear Materials as Proceedings of the Ninth International Conference on Fusion Reactor Materials, October 10-15, 1999, Colorado Springs, Colorado).

This report is the first to present data on the effect of neutron irradiation doses of 0.2 and 0.4 dpa at T_{irr} ~150°C and T^{irr} ~300°C, on the mechanical properties of the GlidCop Al25IG alloy in different metallurgical conditions (Cr + annealed, HIP, extruded). It was found that low temperature radiation embrittlement was less pronounced in GlidCop Al25 fabricated to the IGO specification than in earlier versions of the alloy. At $T_{test} = T_{irr} = 150°C$, the increase in yield strength increased with dose to reach a value of $\Delta\sigma_y$ ~100 MPa at 0.4 dpa. Irradiation at 300°C to 0.4 dpa produced only a small ~30 MPa) increase in yield strength.

Although the uniform elongation was reduced significantly under these conditions, total elongations remained in the range 6 to 10%. However, IGO material that was subjected to a HIPping cycle during the manufacture of a GlidCop/316 SS joint exhibited a marked tendency towards intergranular fracture during tensile testing ≥300°C. this tendency was exacerbated by irradiation and brittle failure occurred following irradiation to 0.4 dpa at $T_{irr} = T_{test} = 300°C$.