

**DEVELOPMENT OF MODIFIED MDA (M-MDA),
PWR FUEL CLADDING TUBE FOR HIGH DUTY OPERATION IN FUTURE**

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ABSTRACT

MHI (Mitsubishi Heavy Industries) had completed the development of MDA (Zr-0.8Sn-0.5Nb-0.2Fe-0.1Cr) whose corrosion resistance is higher than Zircaloy-4, and more than 50,000 fuel rods with MDA cladding have been irradiated as the Step 2 fuel of Japanese PWR whose maximum assembly burn-up limit is 55GWd/t at 8 plants since 2004. However, there are still growing demands for further high-performance cladding applicable to the fuel rod under high duty operations in future. In order to come up to them, MHI has developed M-MDA (Modified MDA) as a new fuel cladding with higher corrosion-resistance than MDA. The primary concept of M-MDA is to improve corrosion resistance but to maintain the other characteristics such as mechanical properties, dimensional stability, and high temperature properties under LOCA conditions. From this viewpoint, M-MDA takes over niobium content which is the main feature of MDA, and tin, iron, and chromium contents are optimized. The corrosion resistance, mechanical properties, and the other characteristics of M-MDA have been investigated by means of out-of-pile tests. Autoclave tests in several conditions showed that corrosion rate and hydrogen pickup were lower than MDA. On the other hand, physical properties, mechanical properties, and the other basic characteristics were almost comparable to MDA. As the next step in the development, in order to clarify the in-core performance, fuel rods with M-MDA cladding were subjected to the irradiation test in a Spanish commercial reactor. The irradiation test is in progress and will be completed in 2007.