Replacement of the Drain System of Secondary Circuit at Monju Plant

Kenji Itoh, Koji Onuki, Katsuma Tomobe, Sadami Taniyama

Monju Construction office, Japan Nuclear Cycle Development Institute
1-banchi, 2-chome, Shiraki, Tsuruga-shi, Fukui-ken, Japan, 919-1279

Introduction

Monju is a Japan’s prototype fast breeder reactor cooled by liquid sodium. In the course of power buildup tests, the sodium leakage accident broke out on 8th December 1995. Though Monju has been already equipped with countermeasure systems against the sodium leakage accident, some additional improvements will be taken in order to reduce the damage by the leaked sodium when another leakage accident should recur. The most characteristic work is the drain system modification that leads to shorten the drain time and to reduce the quantity of leaked sodium in the event of sodium leakage.

Drain System Modification

Two improvements should be required for the drain system of the secondary circuit. One is the provision of a new drain line at the inlet of the secondary circulation pump and the other is the replacement of all drain lines from smaller diameter to larger diameter pipes. In the existing drain system, each drain line has two drain valves in series to protect an accidental drain caused by a single failure of error actuation. In the modification, each drain line will be provided with double drain valves not only in series but also in parallel so as to keep the drain function even if the single valve failure to open should be assumed.

After the modification, the drain time will be shortened from approx. 50 minutes to approx. 20 minutes and this will reduce the damage of facilities caused by the leaked sodium.

Characteristic Features of the Replacement Work

The most characteristic feature of the replacement of sodium piping is a work that should be done under the consideration that sodium is a chemically active material in the air. Before the replacement work, the sodium in the piping is drained and the piping is filled with argon gas. But the sodium cannot be completely drained and a small amount of sodium remains in the piping. Therefore, the residual sodium in the piping must be isolated from the air by using a plastic bag or a sealing tool as practical as possible during the replacement work.

Another feature of the replacement work is a weld. A small amount of sodium still remains on the pipe surface even after drain. The residual sodium in the vicinity of the weld shall be fully removed before welding in order to avoid a bad effect on the weld.