

## **Evaluation of the Gravity-Injection Capability for Core Cooling After A Loss-of-SDC Event**

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### **Abstract**

In order to evaluate the gravity-drain capability to maintain core cooling after a loss-of-shutdown-cooling event during shutdown operation, the plant conditions of the Young Gwang Units 3&4 were reviewed. The six cases of possible gravity-drain paths using the water of the refueling water storage tank (RWST) were identified and the thermal hydraulic analyses were performed using RELAP5/MOD3.2 code. The core cooling capability was dependent on the gravity-drain paths and the drain rate. In the cases with the injection path and opening on the different leg side, the system was well depressurized after gravity-injection and the core boiling was successfully prevented for a long-term transient. However, in the cases with the injection path and opening on the cold leg side, the core coolant continued boiling although the system pressure remains atmospheric after gravity-injection because the cold water injected from the RWST was bypassed the core region. In the cases with the higher pressurizer opening than the RWST water level, the system was also pressurized by the water-hold in the pressurizer and the core was uncovered because the gravity-injection from the RWST stopped due to the high system pressure. In addition, from the sensitivity study on the gravity-injection flow rates, it was found that about 54 kg/s of RWST drain rate was required to maintain the core cooling. Those analysis results would provide useful information to operators coping with the event.