Operations

The NIST neutron source (NBSR) operated for 240 full power (20 MW) days during the past year, or 100 % of the scheduled time. Routinely, the NBSR is scheduled to operate a seven-week cycle, seven times a year. Each operating cycle includes 38 days on-line and 11 days shutdown for refueling, routine maintenance, and surveillance tests. (Figure 1 shows the operations staff adjusting the power-regulating rod.) This year, four days in March were required for maintenance on the Thermal Column Cooling System. The NBSR was shutdown on August 26, 2001, for a planned maintenance period of three months. During this time the cold source will be replaced, building transformers and switchgear will be replaced to provide additional electrical capacity, and the new cooling tower will undergo final hookup and testing. (Figure 2 shows the new cooling tower in the final stages of construction. For comparison the old cooling tower is seen on the left.)

A comparison has been made of thermal-hydraulic characteristics of the NBSR based on two calculations. The first calculation used correlations and simple models available when the licensed power level was raised to 20 MW in 1985. The second used newer correlations that better represent research neutron source characteristics. The analysis shows that the heat transfer coefficient, onset of flow instability, and critical heat flux of the original calculation are all well within the operating conditions predicted by the new calculation. In addition, the NBSR also has an ample margin before the onset of nucleate boiling.

The above results are for extreme yet still conceivable conditions of operation. The Energy Sciences and Technology Department at the Brookhaven National Laboratory has been tasked to perform transient analysis with state-of-the art methods. Monte Carlo calculations will be used to accurately predict parameters that are used in the transient analysis.

Work is also continuing in the preparation of an updated license renewal submittal to the NRC. In conjunction with this effort, an in-service inspection and ultrasonic testing of the primary cooling system are planned for the summer/fall shutdown.

FIGURE 1. Bill Mueller and Greg Heller of the operations staff adjust the power-regulating rod.

FIGURE 2. The new plume-abated cooling tower (right) nears completion. It will replace the lower capacity and less efficient system that had no abatement ability (left).