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D. L. Selby

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By Doug Selby

During the month of October 2000, the High Flux Isotope Reactor (HFIR) located at Oak Ridge National Laboratory (ORNL) was shutdown for a scheduled outage to replace the reactor's beryllium reflector and to install certain facility upgrades. The reactor was restarted in December 2001, and full power operation at 85-MW was resumed. During the 14-month outage, a number of activities were completed:

1) the beryllium reflector support structure and the beryllium reflector were successfully replaced;

2) the HB-1 and HB-3 beam tubes were replaced with larger beam tubes that provide beams that are 2 ½ times the previous beam height and thus provide a substantial increase in the number of neutrons delivered to the experiments;

3) the old reactor cooling tower was demolished and replaced with a new modern cooling tower;

4) the main beam shutters at HB-1 and HB-3 were replaced; and

5) the hydraulic rabbit facility used in the production of medical isotopes was upgraded.

These modifications represent the first phase of a series of activities at the HFIR facility that are intended to greatly increase the scientific capabilities at the reactor site.

The next phase of HFIR modifications will be completed by the end of the calendar year. These activities will include a number of separate projects:

1) A new HB-1 monochromator shield and an existing triple-axis spectrometer will be installed and should be operational in May. Figure 1 is a picture of the newly assembled monochromator at HB-1.

2) A project is underway to provide major modifications to the area around the HB-2 beam port. A shield tunnel and thermal guide will be installed that will allow the beam to be transported out into the beam room, providing a substantial increase in the number of instruments that can be supported by the neutron beam. As a result of the heavy equipment associated with the shield tunnel and instruments, the beam room floor in this area has been demolished and was replaced in March with a new thicker and more reinforced floor section. On April 1st work began on the installation of the new larger HB-2 beam tube. This new beam tube will provide a substantial increase in the number of neutrons available to the experiments and should be installed by the end of April of this year. The beam tube installation will be followed by the installation of a new crane system for the HB-2 area, the

shield tunnel, the thermal guide, and the instruments. If all goes well, we should have some instruments operational on the HB-2 beam line by the end of the calendar year.

Figure 1: New HB-1 Monochromator Drum

3) A new HB-3 monochromator shield and existing triple-axis spectrometer will also be installed during the present phase of activities. This system is expected to be operational by the end of September of this year.

The final phase of the planned upgrade activities and potentially the most exciting includes the installation of a hydrogen cold source in the new HB-4 beam tube, the installation of four cold neutron guides and the construction of a new guide hall with new neutron research instruments. A contract for the construction of the guide hall has been awarded, and site excavation is expected to begin in April. The new guide hall will house a new 40-m SANS facility and a 35-m biology SANS facility, and construction should be completed in January or February of 2003. The guide system should be installed by the summer of 2003, and the cold source installation in the reactor is expected to begin in the spring of 2003. A full description of the instruments that will be available at each beam line is provided at neutrons.ornl.gov. Figure 2 shows the planned layout of guides and instruments.

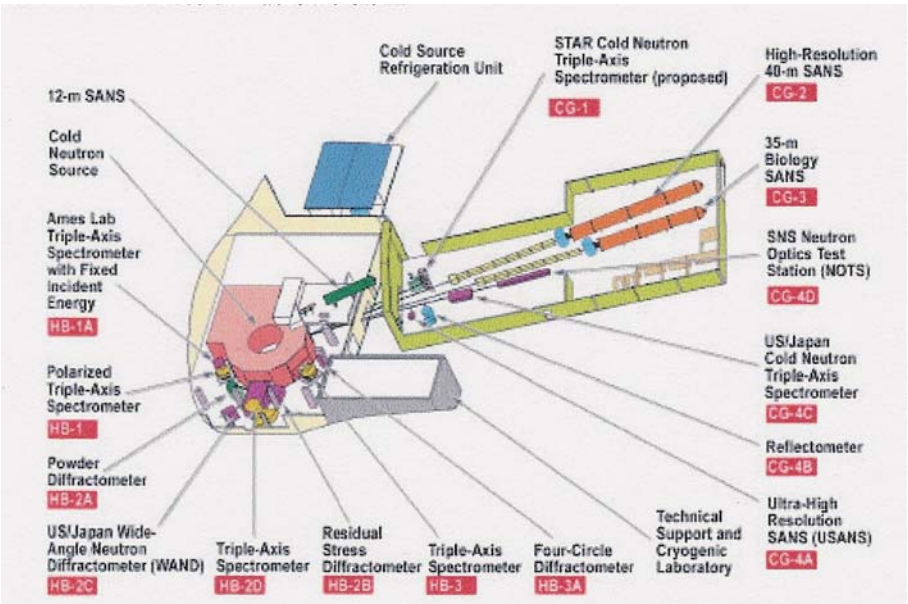

Figure 2: Planned Layout of Guides and Instruments

With the completion of these upgrades the HFIR's steady-state neutron-scattering capabilities will be comparable to the world's best and will complement those at the Spallation Neutron Source facility that is presently being constructed at ORNL.