

OAK RIDGE 25URC TANDEM ACCELERATOR
2011 SNEAP LAB REPORT

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ACCELERATOR OPERATION:

In FY 2011, the 25URC operated for more than 2700 research hours. The radioactive beams (RIBs) ^{10}Be , ^{26}Al , ^{80}Ge , $^{126,127,128,132,134}\text{Sn}$ and $^{132,134}\text{Te}$ accounted for about 1400 of these hours. Ge, Sn and Te were provided using an on-line production target, while the long-lived species ^{10}Be and ^{26}Al were provided with a sputter-type ion source operating in “batch” mode, where the targets are prepared elsewhere and inserted into the ion source. The other 1300 research hours were for stable ion beams in support of RIB experiments and ISOL development. In addition to the tandem-related research hours, there were slightly more than 1000 hours of radioactive beams delivered to the Low Energy Radioactive Ion Beam Spectroscopy Station (LeRIBSS) and to the High Power Target Laboratory (HPTL). Since these beams can be delivered without benefit of the tandem accelerator, it is possible to continue radioactive ion beam research during tandem maintenance periods.

Operation for the experimental program was at terminal potentials from 4.09 to 24.59 MV. Approximately 800 hours of conditioning was required to return the machine to operation at 24.5 MV after two instances in which the accelerator tubes were let up to atmospheric pressure. The first instance was when a pancake valve at the terminal had to be replaced and the low energy tube had to be let up. The second instance was an SF₆ leak in the high energy tube which was caused by a failed bellows on a Faraday cup. There were five tank openings during the year. The first was a scheduled opening for regular maintenance. The other four were unscheduled for different reasons. A broken shorting rod string caused a brief opening. Problems with acrylic power shafts caused two openings: one due to a spark-damaged section that had to be replaced and the other due to a shaft coming apart at the coupling. The shaft that came apart had had the bearings replaced during scheduled maintenance, but the key for coupling had fallen out on assembly and finally caused the shaft to uncouple. The keyway used to be very tight but has become looser over the years. Applying super glue to the key before assembly is now being done to keep the key from being bumped out of position. The last unscheduled tank opening was due to a failed Faraday cup bellows which caused an SF₆ leak in the high energy tube.

RIB hours provided using an on-line production target significantly increased this year due to the refurbishment of the Oak Ridge Isochronous Cyclotron (ORIC) which provides the driver beam to the production target. The trimming coil assemblies, whose failure caused the extended shutdown last year, were replaced. Improvements to the

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vacuum and RF systems were also implemented, and considerable preventative maintenance performed. ORIC was restarted in January and ran reliably for about 2200 research hours before an internal water leak caused a major failure in August. It is thought that ORIC will be back up and running in mid-October.

The SF₆ handling system has had a thorough review this year to determine how best to increase reliability and decrease leaks. There has been a plan to upgrade the control system for a while, but it was delayed due to higher priority projects. However, two recent significant leaks and DOE's new rules on reporting Greenhouse Gas emissions have given refurbishment of the whole system, including controls, an elevated priority. Due to the complexity and age of the system, more than 30 years, this refurbishment will require several years.

IRIS2 PROJECT:

The IRIS2 Project Closeout Review was conducted, via video conference, on April 14, 2011 following successful completion of required commissioning activities. The review committee noted the technical success of the project, completion 8% under budget, and looked very favorably on use of the beams for research during the commissioning period. IRIS2 awaits some administrative paperwork to begin full operation for production.

FUTURE PLANS:

As of October 1, 2011, the Holifield Radioactive Ion Beam Facility (HRIBF) is no longer a DOE user facility. However, it is scheduled to continue operations through February 2012 in order to finish several high-priority, neutron-rich radioactive ion beam experiments.