

NISHINA RIBF water-cooling system 2013

T. Maie,^{*1} K. Kusaka,^{*1} M. Ohtake,^{*1} Y. Watanabe,^{*1} E. Ikezawa,^{*1} M. Kase,^{*1} M. Oshima,^{*2} K. Kobayashi,^{*3} and J. Shibata^{*3}

1. Operation condition

In the fiscal year 2013, the Nishina and RIBF water-cooling installation was operated for five and three months, respectively. These operation periods correspond to the scheduled beam service time of RIBF, that is three months. In addition, Nishina's cooling installation was used not only for the full RIBF operation but also for the AVF standalone and AVF + RRC operations. During FY2013, there were no severe problems that caused beam service interruption for the Nishina and RIBF cooling water systems. In addition to the existing system, the new water-cooling system was built only for the rare-RI ring, and its test operations also started in FY2013.

2. Periodic maintenance

Routine maintenance works as listed below are performed during the scheduled summer and winter maintenance periods of the RIBF accelerators.

- 1) Cleaning the cooling towers
- 2) Checking and overhauling the cooling-water pumps
- 3) Checking the control system of the RIBF water-cooling system
- 4) Replacing some dated UPSs used for the control system of the RIBF water-cooling system
- 5) Cleaning the plate heat exchangers
- 6) Checking and overhauling the air compressor
- 7) Replacing some superannuated hoses, joints, and valves used in the system
- 8) Cleaning of the strainers and filters used in the deionized water production system
- 9) Extending the sensing-wires of the water leakage alarm to floors of new areas

3. Extension and improvement of the water-cooling system

A new beam transport line connecting the Intermediate-stage Ring Cyclotron (IRC) to the E5 experimental vault is now under construction, aiming at more efficient production of seaweed mutations induced by heavy-ion beams. Branches of cooling-water supply system were added to the existing system in order to supply cooling water to the magnets and other devices used in this IRC-E5 beam line. The construction of a new experimental apparatus, called SLOWRI, is also ongoing, and a new water-cooling system for SLOWRI has also been constructed. In addition, in order to raise the cooling capability of the RF amplifiers used in IRC and the Superconducting Ring Cyclotron (SRC), we plan to divide the existing supply system commonly used for IRC and SRC into two independent supply systems dedicated to each cyclotron. The present improvement will be effective for achieving high-power operation of the RF amplifiers.

4. Others

Because 30 years have passed since the construction of the Nishina water-cooling system, its deterioration is now remarkable. Performance degradation of the water-cooling system, especially in its temperature stability, is a possible source of the unstable behavior in the RIBF accelerator complex. Hence, the author recommended that the superannuated parts of the Nishina's water-cooling system should be updated as soon as possible.

References

- 1) T. Maie et al.: RIKEN Accel. Prog. Rep. 46 (2012).
- 2) M. Wada et al.: In this report.
- 3) Y. Yamaguchi et al.: In this report.

^{*1} RIKEN Nishina Center

^{*2} Nippon Kucho Service Co., Ltd

^{*3} SHI Accelerator Service Co., Ltd