Minutes of RSC meeting July 11, 1996 DB

Subject: Co-injection

Attending: J. Alessi, W. McKay, W. Glenn, E.T. Lessard, S. Musolino, A. Etkin, A. Soukas, D. Beavis, A. McGeary, and L. Ahrens

A safety system to prevent high intensity protons into the RHIC transfer line or to RHIC during the sextant test was discussed.

Motivation: It is desired to deliver high intensity protons to the SEB program or g-2 target station and on a pulse by pulse basis be able to deliver low intensity protons to the transfer line for testing, the RHIC sextant test, and eventually RHIC operations.

History: A system of current transformers and associated electronics has been designed and built for the BTA line. The purpose was to detect high intensity pulses and prevent their extraction into the RHIC transfer line, ATR. Recently, it has been recognized that it may be possible to transfer low intensity bunches to the AGS which satisfy the current transformer limits but then accumulate many bunches in the AGS and thereby have the potential to deliver a high intensity spill into the ATR. Furthermore, A. Soukas (see attached memo) has expressed concerns on possible failures of the synchronization scheme for these pulsed current transformers. However, it has been suggested upon reanalysis that the transfer line could have a single full intensity AGS cycle lost in the worst location and not violate any dose limits to personnel or the public on site. This offers the possibility of decreasing some of the requirements on the system to prevent such faults.

Recommendations: The committee was unable to make any firm recommendations by the close of the meeting and agreed to meet on July 17 for further discussion.

Discussion: The committee would encourage as much of the testing of ATR/sextant as possible be conducted with heavy ion beams which does not have the risk potential of full intensity proton beams.

The committee would probably not be able to recommend the use of any device such as pulse sensitive current transformers in BTA or transformers (DCCT) in the AGS ring without operational history in place supplementing the design reviews.

There are the limits of dose rate in an hour and dose delivered in a single fault which the design must satisfy. The committee mainly discussed Thompson Road which is accessible to the public. For a full intensity proton beam faulting under the road, the dose rate is 140 rem/hr and 80 mrem/cycle. The factor of two often used by RHIC for neutrons has been removed and a cycle contains eight bunches. Although the committee concentrated on Thompson Road, it was requested that RHIC personnel examine the ATR and sextant test areas for other locations in which compliance with fault conditions could be an issue.

There are options that are being discussed such as limiting the linac intensity delivered to the Booster which reduces the dose rate. After the meeting, J. Alessi (attachment #3 - July 17 minutes) provided a table of intensity reduction by turning off either solenoid at the source. Other options are also under consideration. However, there is still the potential to accumulate many bunches in the AGS (or Booster) and deliver a high intensity fault to ATR.

Most if not all the committee agreed it would be best if a current transformer system was developed for the AGS ring which would eliminate any potential accumulation scenarios. Unfortunately, such a system has not been designed. The BTA current transformer system is essentially complete and could be tested this year. Such tests may be very useful for a backup system in ATR which could detect a high intensity bunch and limit a fault in ATR/RHIC to a portion of a cycle, for example, two bunches out of eight. Also, if this system is used in BTA it could reduce the potential dose in an hour and reduce the possibility of high intensity faults in ATR.

Following the meeting, the acting chairman requested the following items to be pursued and tracked via an action item (A. Soukas and L. Ahrens ACT-11-96):

1. A reliable switch to turn off the appropriate source solenoid.

2. A reliable switch to turn off extraction in less than one AGS cycle and preferably reducing the maximum extracted bunches to less than eight.

3. Testing the BTA transformer system this Fall with heavy ions and then protons.

4. Investigate the option of purchasing and installing appropriate DCCT in the AGS ring for the FY 1997 run so that they can also be tested in place.

attchs.
/vb