C-A TPL 08-03 TEMPORARY PROCEDURE: MONITORING BEAM DUMPED IN THE LAMBERTSON MAGNETS DURING FY08 RHIC X/Y ARC SETUP

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Assoc. Chairman for ESHQ Date

P. Ingrassia

C-A TPL 08-03 TEMPORARY PROCEDURE: MONITORING BEAM DUMPED IN THE LAMBERTSON MAGNETS DURING FY08 RHIC X/Y ARC SETUP

1. Purpose

1.1 The purpose of this procedure is give instructions to Operators to monitor the number of ions/protons dumped in the RHIC injection Lambertson magnets during the FY08 RHIC X/Y arc setup and during "arc setup" periods that occur when beams are stored in the RHIC.

1.2 Flux limits are annual limits and are set to allow ions/protons to be dumped in the RHIC injection area while keeping production of tritium and Na^{22} well below the limits established by the SBMS Subject Area for known beam losses.

1.3 **Allowable annual flux limit (dumped) per RHIC ring lambertson magnet is:**

Species	AGS Extraction Energy [GeV/u]	**Number of Ions limit [n]**	**Number of Pulses limit [ion/pulse]**	AtR_ASE limit [(GeV/u)*u]
d^2	10	**2.5x10^13**	**250** @ 10^11 / pulse	5.0x10^14
Au^{197}	10	**2.5x10^11**	**250** @ 10^9 / pulse	5.0x10^14
p^1	20	**2.5x10^13**	**250** @ 10^11 / pulse	5.0x10^14

2. Responsibilities

2.1 The MCR operators and Operations Coordinators are responsible for the execution of this procedure.

2.2 The MCR Group Leader or his designee is responsible to ensure that alarm display filters are set such that ASE alarms are displayed on the ADT.

3. Prerequisites

3.1 The AtR current transformer wxf1 is operational

3.2 The GPM watchdog (Jeff) ATR_ASE.mon is running

3.3 The ATRASE server must be operational.

3.4 The target group for this procedure is the MCR Operators, Operations Coordinators, and the cognizant physicist responsible for the arc setup.

3.5 The RHIC liaison physicist has defeated the beam such that the ions will be stopped in or around the injection Lambertson magnets.

3.6 The training requirement for this procedure is read and sign.

3.7 The minimum number of staff members that need to be trained in order for this procedure to be effective is three, one OC, one MCR Operator, and the cognizant physicist who is responsible for the X/Y arc setup.

4. Precautions

4.1 The ATR_ASE.mon watchdog can generate two alarms. One alarm is generated when 90% of the flux limit per arc is exceeded. The second alarm is generated when the "hourly" flux limit per arc is exceeded. The "hourly limit" is set at 12% of the allowable limit of 2.5x10^11 Au ions or 2.5x10^13 protons or 2.5x10^13 deuterons.

- IF 5x10^8 Au ions {or 5x10^10 deuterons} {or 5x10^10 protons} are extracted per bunch THEN the hourly limit will be exceeded after **60** bunches are extracted.

5. Procedure

5.1 Calibrating wxf1 – before using this procedure

5.1.1 wxf1 will be used by ATR_ASE.mon to count ions. To calibrate wxf1 BEFORE the X/Y arc setup

5.1.1.1 Turn off/standby the switching magnet power supply and the X and Y arc power supplies.
5.1.1.2 Extract beam and optimize transmission to the W dump.
5.1.1.3 Calibrate wxf1 by verifying that the AGS CBM at extraction, uxf1, uxf3, wxf1 are within ten percent of each other.
5.1.1.4 When wxf1 is "calibrated" THEN turn on the switching magnet power supply and the X/Y arc power supplies to setup the arcs.
5.1.1.5 IF the wxf1 transformer fails during the X/Y arc setup then the ATR_ASE cognizant operator (Kling) is authorized to modify the GPM ATR_ASE.mon to utilize uxf3 (or uxf1) in place of wxf1.

5.2 This procedure shall be used:

5.2.1 During initial set up of the RHIC IF the OC, or the RHIC Machine Specialist (RMS), or the Liaison Physicist (LP) has evidence that the beam is not surviving past the lambertson magnet, and the goal is to circulate beam -- not to dump beam intentionally in the lambertson, or
5.2.2 During initial set up of the RHIC IF the OC, or the RHIC Machine Specialist (RMS), or the Liaison Physicist (LP) decides to dump beam intentionally in the lambertson in order to tune the arcs (see paragraph 5.3), or
5.2.3 At the request of the OC, the RMS, or the LP after circulating beam is established in order to re-tune the arcs with the expectation that the beam will be intentionally dumped in the lambertson (see paragraph 5.4), or
5.2.4 At the request of the OC, the RMS, or the LP after circulating beam is established in order to significantly change the optics in the arc and the expectation is for high beam loss on the lambertson (see paragraph 5.4).
5.2.5 In every instance where this procedure is invoked, the tuning exercise shall end, and the measurement watchdog/application turned off, when the 90% alarm limit annunciates, or when the requestor (OC, RMS, LP) is satisfied with the result of the exercise.

5.3 Setting up the arcs

5.3.1 Verify ATR_ASE.mon is running
5.3.1.1 Use VBAR to select the video and verify that the cycle number is updating.
5.3.1.2 Verify that the ADT filter is set to allow ASE alarms.

5.3.2 Transport beam down the arcs.
5.3.2.1 The RHIC liaison physicist shall ensure that beam will be stopped in or around the RHIC injection Lambertson magnets.
5.3.2.2 Turn on the server to count dumped beam
5.3.2.2.1 Turn the server on from StartUp /diagnostics/Servers/MCRservers/ATRASEServer start

5.3.2.3 IF a level III ASE.X_Arc_Hourly range error alarm or a level III ASE.Y_Arc_Hourly range error alarm is seen on the ADT, THEN consult the ATR_ASE.mon video and verify that the "% of Limit" for the X/Y Arc "Run Total" is small. IF the "% of Limit" is **not** small, THEN alert the OC and the cognizant physicist that the Run Total could be exceeded for an arc if the extracted beam intensity is not reduced.

5.3.2.4 IF a level IV ASE.X_Arc_Run_TOT range error alarm or a level IV ASE.Y_Arc_Run_TOT range error alarm is seen on the ADT, THEN 90% of the flux limit for the run has been exceeded. Alert the OC and the cognizant physicist that the Run Total could be exceeded for an arc and consideration must be given to reducing the beam intensity or terminating the setup exercise.

5.3.2.5 At the conclusion of the exercise TURN OFF THE ATRASES server and remove the LOTO

5.4 Using the procedure AFTER initial collider setup and during routine collider operation

5.4.2 Arc setup/tuneup is authorized while the collider is in operation (physics). Follow the steps below when tuning up the arcs and dumping beam in the lambertsons during Collider operation.

5.4.2.1 The RHIC Liasion Physicist (LP), the Operations RHIC Machine Specialist (RMS), or their designee shall authorize arc tune up with beam circulating in the RHIC.

5.4.2.2 The RHIC LP or RMS shall insure that the beam transported through the arc is dumped in the lambertson magnet by applying LOTO to XP1-ps and/or YP1-ps or an equivalent method authorized by the LP.

5.4.2.3 Determine the total beam dumped in the lambertsons during Run8 by looking at the % of the Limit (Run Total) on the AtR_ASE watchdog.

5.4.2.3.1 IF the Run total is 80% of the limit then ask the LP for authorization to proceed.

5.4.2.4 Turn on the server to count dumped beam

5.4.2.4.1 Turn the server on from StartUp /diagnostics/Servers/MCRservers/ATRASEServer start

5.4.2.5 At the conclusion of the exercise TURN OFF THE ATRASES server and remove the LOTO

6. Documentation
6.1 None

7. References:
7.1 None

8. Attachments:
8.1 Sample ATR_ASE.mon display

Attachment 8.1 Sample ATR_ASE.mon display