

C-AD

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Radiation

Safety Minutes of Radiation Safety Committee of April 13, 2011

Committee

Subject: Review of Changes for the AGS ACS

Present: D. Beavis, R. Karol, E.T. Lessard, A. Etkin, C. Theisen, J. Sandberg, J. Reich, P. Ingrassia, L. Ahrens, D. Hillis, and C. Montag

This meeting continues the discussions¹ from the April 7, 2011 RSC meeting on the logic changes to the AGS Access Control System (ACS) for the PLC upgrade of the ACS. A preliminary agenda² was distributed before the meeting and used to guide the discussion.

Equipment Protection and other Safety Items

The committee discussed a series of items that may need to be interfaced to the ACS.

Siemens→ The Siemens (and Westinghouse) system will be connected to the interlocks for additional electrical safety to prevent people from being in the ring with the magnet buss powered. Exceptions to this exclusion will be conducted by procedure in conjunction with the Siemens operators. This however, is not considered a certified electrical interlock but is used as defense in depth for the electrical hazard. Contacts and status will be provided by both divisions. Both divisions were chosen since this is being provided as supplemental protection for a potential lethal hazard. **(CK-FY2012-AGS-759)**

Heat runs→ Heat runs will be conducted under procedure in conjunction with the Siemens operations. The heat run will be done with the AGS ring in Controlled Access. An indicator of the AGS ring access state status will be available for Siemens operations. **(CK-FY2012-AGS-760)**

RF→ The RF system has not been in the ACS for many years. The voltage is considered sufficiently low with the associated mechanical structures that there are no x-ray hazards. It will therefore not be coupled to the ACS. The RF group leader will be contacted to review this conclusion. **(CK-FY2012-AGS-761)**

Other HV Devices→ There are no other HV devices that can generate x-rays outside of their respective vacuum chambers. The electrostatic septum that existed in the ring are no

longer operated. This will be reviewed with the Liaison Physicist of the AGS ring. (CK-FY2012-AGS-762)

ODH→The ACS does not need to take action for any ODH issues. The A20 cold snake does not require any interlocks. However, for informational purposes an IO input to the ACS will be provided.

Vacuum Valves→ The vacuum valves have been in the ACS system for decades. The valves are in the controls system and that system should be able to alert operations if a valve is obstructing the beam. As the valves are potential thin targets they do represent potential sources of radiation. However, bumps and other means to scrap the beam on the vacuum chambers can create similar hazards. **The committee would prefer that these are not put into the upgraded access control system.** Controls should provide an alert if any valves are closed or the valves could be placed in the injection inhibit system used to protect the cold snake from large beam losses.

J10 Scrapper/dump→The J10 scrapper is in the relay interlock system as equipment protection. The residual activity in the scrapper could cause large doses to personnel if it was damaged and required repair. It was determined that the potential dose is large enough that the J10 scrapper should be protected by a highly reliable system. At this time the ACS is probably the only system that meets the requirements. Therefore the **committee recommends that the protection of the J10 scrapper be placed into the upgraded ACS.** If a beam permit system (or beam injection inhibit system) is designed and installed in the future then the scrapper would most likely be moved to that system. The scrapper will be in Div. A. (CK-FY2012-AGS-763)

Beam Permit System→ The committee has been pleased with the RHIC system which has the dual interlocks and a separate beam permit system for device protection and defense in depth for radiation and ALARA. The committee recommends that the Department consider a similar system for the AGS ring, The system could incorporate the vacuum valves, the scrapper, the loss monitors, and other equipment protection. (CK-FY2012-AGS-764)

The placement of equipment protection items in the ACS will be implemented in a manner so that they are easily identified.

Critical Devices and Alternate Critical devices

The ACS will have two devices that remove the radiation hazard. The devices can be the immediate injection devices, which for the AGS are F6 and DH2/3 or devices farther upstream in the beam current such as the dual pairs of beam stops preventing Booster injection. There are advantages to using particular sets of critical devices depending on the mix of programs operating. For example when NSRL is operating the use of the Booster beam stops by the AGS causes interruptions to the NSRL program.

The committee rejected the scheme of picking two out of four or more possible devices. Rather the committee recommends that the critical devices be selected in pairs. Thus the AGS would be protected by AGS Injection Off (F6 and DH2/3) or by Booster Injection Off (three pairs of dual beam stops). The devices being used for protection will be selected with a selector “switch” which chooses a pair of critical devices. This scheme of using pairs also makes the testing of the interlocks easier. **(CK-FY2012-AGS-765)**

The committee discussed how the PLCs will provide permission for the critical device to turn on. It was noted that the testing and diagnostics would be simpler if there was a one-to-one correspondence between the PLC Division and the critical device. **The committee recommends that this approach be used. Division A will operate critical device 1 and Division B will operate device 2. (CK-FY2012-AGS-766)**

The committee recommends that an engineering review of the critical devices be conducted to ensure that they are not approaching the end of their useful life. A convenient time to replace critical devices would be during the upgrade process, if the devices need to be replaced. This review should occur early in the upgrade process. The power supplies that provide current for F6 and DH2/3 have contactors. The potential gain from using safety rated contactors versus the contactors presently in the supplies was not clear to the committee. The engineering review should consider the advantages/disadvantages of using safety rated contactors. For some power supplies safety rated contactors may not be available. **(CK-FY2012-AGS-767)**

The reachbacks³ for the critical devices should follow the same one-to-one correspondence as the critical devices. This has an impact on the potential communication methods to the upstream devices. The Booster and Linac relays system do not follow the one-to-one correspondence which means the reachbacks will lose the one-to-one correspondence feature until those systems are upgraded. The system must latch if a reachback occurs, requiring the operator to clear the latch before the device can be turned on. **(CK-FY2012-AGS-768)**

The two PLC divisions will have a communication link such that if one system does not have a set of satisfactory conditions it will notify the other PLC system. **(CK-FY2012-AGS-769)**

Remote Controlled Access and Key trees

The committee recommends that the South gate and North Conjunction Area (NCA) gate have key trees for remote controlled access. The North gate is rarely used for controlled access so a remote system was not recommended for that gate. The south wiring tunnel does not require remote controlled access. The keys will be released at the gates by iris scanners or equivalent approved devices to qualified personnel. **(CK-FY2012-AGS-770)**

There will also be a key tree in MCR. Personnel entering the AGS under Controlled Access with a gate watch will be required to carry a key from a key tree. **(CK-FY2012-AGS-771)**

The preliminary number of keys was established as:

- 16 keys for the NCA gate
- 24 keys for south gate
- 8 keys for the MCR

There were several issues related to the Controlled Access keys that will require another RSC meeting, allowing people time to consider the options. These issues included:

- How will the present limit of 32 accesses be maintained or does it need to remain the same under the new system
- Can a person leave through another gate
- Must the person return the key to the same gate.

The details of the key trees will be established at a future meeting. **(CK-FY2012-AGS-772)**

South Wiring Tunnel

The south wiring tunnel has three gates. This area is rarely accessed when the machine becomes operational. **The committee recommends that the target building and pump room gates be converted to escape gates.** The entrance gate for the area will be the gate to the terminal room. There should be no hardware for opening the escape gates from the outside. The gates should have a locking crash bar or other mechanical means of locking the gates, which can not be reached from outside the gate. The escape gates must meet the design requirements of being inaccessible. The gates will have dual sensors to detect the position of the gate and also a sensor for the locking mechanism. The area does not need separate check stations as the resets on the gates serve this function. The area must meet all the requirements for a primary area due to the potential radiation levels from beam losses. The entrance gate can provide Controlled access via a gate watch. **(CK-FY2012-AGS-773)**

The present sweep procedure for the south wiring tunnel requires that the locks on the gates on the target building catwalk be examined. A subgroup will determine how to check the locks on these gates. **(CK-FY2012-AGS-774)**

AGS Chipmunks

The AGS has a series of chipmunks to prevent unacceptable dose rates in areas external to the shielding. In many locations there is only one chipmunk required to provide protection from potential beam losses. For the situations where only one chipmunk is required, the chipmunk will be placed in Division A. Locations where two chipmunks are required either due to the size of the potential dose rate or where untrained personnel may acquire exposure one chipmunk will be placed in each division. **(CK-FY2012-AGS-775)**

Open AGS Item

A meeting will be scheduled as soon as possible to complete the review of open items. The details or the interlock design are being updated and will be provided to the committee by next week.

References

- 1) RSC Meeting minutes of [April 7, 2011](#).
- 2) D. Beavis, [Agenda](#).
- 3) Reachback is a term that has been used by the committee for decades. It describes the feature of examining if the critical device shutoff as requested with an allotted time window and if not the interlocks “reach back” to an upstream device capable of providing the radiation protection. This is a means of detecting known failures and providing protection on the detection of a potential failure.

CC:

Present
RSC
RSC AGS File
RSC Minutes File
H. Huang
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