C-AD

Radiation Safety Committee

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Minutes of Radiation Safety Committee of March 2, 2010

Subject: LINAC Access Controls and NSRL Operatorless Access

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NSRL Operatorless Access

A summary of the testing results from the operator-less controlled access system from the last NSRL run was provided[1] to the committee. The PLC for the systems has had coding changes which appears to have removed the few failures to a safe state that were not understood after the testing phase. It has been requested:

1. During the next NSRL run that the system have a two week test period fooled with a subcommittee review of the performance. If the performance is found to be satisfactory then the system will be approved for operations.
2. The Liaison Physicist should be allowed to log a failure and re-sweep the area should a failure to a safe state occur rather than have MCR intervene.

The committee approved the requests.

LINAC Access Controls

The Linac access controls system is intended to be upgraded soon. The system has not been reviewed as a whole since it has been installed. Several suggestions[2] have been made for consideration before a new access control system is designed.

One goal of the review is to examine the various options in the present access control system and see if they are still necessary.

RF Area

The RF tanks 1-9 are enclosed in an area with gates at the beginning of tank 1 and after the end of tank 9. The tank1 gate and the tank 9 gate define a zone for RF operations. Typically the RF system is conditioned for several weeks before the other sections of the RF tunnel are closed for beam operations. Access to HEBT, LTB, and the BLIP spur can be achieved by entering the Linac through the Plug door gate or the AGS-HEBT gate. The potential exposure levels inside the tank1-9 area from the RF pulsing can be up to several rads/hr at a foot.

The RF tank area has another mode for repair and inspection while the RF is pulsing. This mode is typically used when a problem is detected after the tanks have been conditioned. It is desired that the tanks without problems remain conditioned. This access is controlled by the access control system.

The committee will review the logic of the RF area when a specific proposal is presented for the new system. The following recommendations should be incorporated into that system:

(CK-LINAC-FY2010-691) Define the RF area and its options with a single layer system with as little interfacing to the beam operational portion of the access control system.
(CK-LINAC-FY2010-692) The access into the RF area with pulsing should be covered by a procedure or RWP, whichever is the best option. Issues of the correct dosimeter for radiation exposure and potential RF exposure should be examined. The access and potential exposure levels should be compared to the new RADCON manual.
(CK-LINAC-FY2010-693) All devices, especially critical devices, should be examined for where they are in their life cycle and it decided whether they should be replaced as part of the upgrade.

Low Energy Emittance Measuring Option

The low energy end of the Linac has an option for measuring the emittance of the beam. The option uses LEBT beam stop 2 and a Kirk-key that ensures that tank 1 RF pulsing is off. If these conditions are satisfied then the beam can be operated to LEBT beam stop 2. The beam stop one needs to be removed since it is located upstream of the RFQ. It probably would have been wise to have located this stop downstream of the RFQ (if possible) last year when changes were made to the LEBT. The other RF tanks cannot accelerate the beam if the tank 1 has not increased the velocity of the proton beam.

The access control system for beam operations should have this mode incorporated. The committee recommends:

1. **(CK-LINAC-FY2010-694)** If possible move LEBT beam stop.
2. **(CK-LINAC-FY2010-695)** Examine that the Kirk-key system meets the desired requirements for prevent the RF pulsing for tank 1.

Machine/Component Protection

The committee prefers that all machine protection items be removed from the access controls when they are upgraded unless they are required to ensure that the device will do its desired safety function. The following are a sample of potential device protection issues in the present system:

1. Beam allowed on beam stop if water flow detected.
2. Beam allowed on some beam stops without water flow if RF is off
3. Thermal overloads on the plug door.
4. Bumper switches on the plug door to avoid hitting objects or personnel.

An evaluation[3] of some of the Linac beam stops determined that the water cooling was not necessary for the device to stop the beam but was necessary to protect the device itself. The evaluation of the beam stops was motivated by the failure of the water flow switches in an unsafe state. It was determined at the time that they were not a required component of the access control system.

The committee recommended:

1. **(CK-LINAC-FY2010-696)** Remove device protection from the access control system when possible.
2. **(CK-LINAC-FY2010-697)** Re-examine if the cooling of the beam stops should be in or out of the access control system. The review should consider the potential damage and exposure during repairs in the event of a failure. More reliable devices are also an option.
3. **(CK-LINAC-FY2010-698)** Appropriate changes should be made to the control systems of devices to compensate for the removal of device protection systems. A maskable independent system with minimal coupling to the access control system is suggested for device protection.

The committee will meet again to discuss more issues related to the Linac upgrade.

References

1. A. Rusek et. al. ,"Commissioning of the Operator-less Controlled Access System at NSRL", March 1, 2010
2. D. Beavis, "Linac Access Control System", Feb. 12, 2010
3. R. Damm, "LTB Beam Stop Review Clarification", March 13, 1991.

CC: Present
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RSC Minutes file
RSC NSRL file
RSC Linac file