Minutes of Meeting: Radiation Safety Committee

Date: Tuesday 12 March 1996


Subject(s): BLIP upgrade.

The BLIP facility has just completed an upgrade project to accept an increase in the average Linac beam current of 250% (average value of 150µA). The Operational Safety Limit (OSL) for Linac is 200µA. For BLIP operation, the Linac beam parameters will be: beam current = 35mA, pulse width = 570µs and repetition rate = 7.5 Hz. Of these parameters, possible increases (as estimated by the Linac liaison physicist (LP)) are +5mA (beam current) and +30µs (pulse width). These increases would not exceed the Linac OSL. However, an increase in the Linac repetition rate (at the standard 150µA operating level) would by itself reach the OSL. Therefore, to allow for increased peak current and/or pulse width, the Linac repetition rate must be LOTO by the Linac LP such that 10Hz operation is not permitted, (CK-BLIP-01).

Note: by agreement with the Medical Department, groundwater activation from BLIP cooling water and airborne release concerns are NOT under the jurisdiction OR control of the AGS Department (or Radiation Safety Committee) but are the responsibility of the Medical Department (Memo of Understanding).

Shielding for the BLIP water column annulus was re-designed and installed since last operating period. This design was reviewed and approved by the RSC chair and was previously documented in the RSC files. BLIP critical devices remain BLIP BM1 And BM2 which have separate power supplies and redundant wiring paths. This review is for BLIP only, CLIF and/or REF beamline use is not approved and must be presented for RSC when requested to operate. CLIF and REF must be disabled by LOTO of REF BM3 and REF BM4 respectively, (CK-BLIP-02, CK-BLIP-03). In order to provide improved attenuation of prompt radiation into the REF beamline. Shielding has been installed downstream of REF BM4 both just after REF BM and after the “right” bend of BM4 toward the REF penetration, (CK-BLIP-04, CK-BLIP-05).

Previous fault studies of the BLIP pump house suggest possible water activation levels (Quality Factor = 1) in this house in excess of 50 Rem/hr if the area interlocking chipmunk were not to interlock the Linac beam. This committee recommends a second chipmunk be added to this location with identical alarm/interlock levels (10 mrem/hr/50 mrem/hr) (CK-BLIP-06). Since this BLIP pump house chipmunk (while monitoring the water activation) also provides indirect protection for those in the AGS ring near the AGS/HEBT door, an additional recommendation was to implement procedural control over access to the AGS/HEBT door area and/or restrictions
on the Linac beam intensity into the HEBT NZ304/307 beamstops. An alternative is to add ~ 3ft of light concrete shielding immediately downstream of the NZ304/307 beamstops, (ACT-01-96 Beavis, Alessi). Another concern regarding this pump house is the “water containment” capability were a leak to develop in the house. Q1: are there floor drains? Q2: to where do they drain? Q3: what is the containment capacity? (ACT-02-96 Lessard, Dale).

Immediately following “low intensity” commissioning of the BLIP beamline, fault studies must be conducted prior to routine operation. Three fault studies were identified:

1. normal operation,
2. beam loss at the graphite collimator just before BLIP tank, and
3. beam loss in the last BLIP quadrupole doublet region.

Measurement locations in each case are:

1. REF penetration (area monitor chipmunk presently in place),
2. BLIP room penetrations, and
3. CLIF room penetrations.

The BLIP facility rooms (A, B & C) must all be posted as Radiation Areas CK-BLIP-07).

Several interlock changes for BLIP were reviewed and approved by the RSC chair (previously documented in RSC files, mtg. minutes 27 January 1995). In general, interlocks changed to FBI only were not prompt radiation concerns and were also not considerations presently interlocked in other AGS areas. Interlocks changed to FBI only must be appropriately verified, (CK-BLIP-08).

1. Water shaft leak probes, now FBI only. Redundant to two separate water level indicators remaining in the AGS security system.
2. BLIP vacuum okay, now FBI only.

The AGS security system interlocks must be re-certified, (CK-BLIP-09). Also, the shield cover over the BLIP pumping pit must be locked and posted as a High Radiation Area, (CK-BLIP-10).

cc: RSC (w/o attachments)
    RSC file (w/attachments)
Linac Intensity:
Operational safety limit - 200 \( \mu A \) \( (1.2 \times 10^{15} \text{ p/s}) \)
BLIP upgrade = 150 \( \mu A \). Expect to run at:
35 mA
7.5 Hz
570 \( \mu A \)
For now, we propose to limit intensity administratively, i.e. running at wider pulses takes effort by Linac staff. Staff will be informed that limit is not to be exceeded. If we are able to increase the peak current further, we will decrease the pulse width accordingly (we may prefer to operate at 40 mA, 500 \( \mu s \)).

REF:
1. Two REF magnets are lock & tagged (security red tags by J. Alessi)
2. >20'' section of beam pipe right REF after bend has been removed and 20'' of heavy concrete put in the beam path.
3. There is a chipmunk on the REF side of the wall as an area monitor.

BLIP pumproom:
Chipmunk with same interlock levels as previous years.
Alarm at 10 mr/hr, interlock at 50 mr/hr, QF=1

Chipmunks:
BLIP pumphouse - alarm 10, interlock 50
Tank 4/5 alcove - alarm 16, interlock 20
Tank 6 low energy transmission line penetration
Tank 6/7 intertank vacuum penetration
Tank 8/9 intertank vacuum penetration
Cable tray downstream of Tank 9
REF tunnel, where beampipe comes through shield wall
(Temporary - in CLIF by penetration through floor)

BLIP house shielding design reviewed & approved by Ken Reece.

BLIP interlock changes reviewed & approved by Ken Reece.
<table>
<thead>
<tr>
<th>HOLE</th>
<th>Inside ID.</th>
<th>$f$ from North</th>
<th>$f$ from West</th>
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<tbody>
<tr>
<td>A</td>
<td>6&quot;</td>
<td>11 3/4&quot;</td>
<td>47&quot;</td>
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<tr>
<td>B</td>
<td>2&quot;</td>
<td>5 1/2&quot;</td>
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<tr>
<td>J</td>
<td>7&quot;?</td>
<td>89&quot;</td>
<td>47 1/2&quot;</td>
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</table>

* Reduces to ~4" ID at 34" from floor level down. 4" E ~ 48" from west.
RABBIT SHIELD

CONCRETE 78" H1 FROM FLOOR

HEAVY CONCRETE 20' H;
1/2" PLATE
SS BEAM OVER 20'V

1/2" PLATE

RABBIT HOLE

1/96 - AS INSTALLED
M. MAYS
Extrapolate 1/14/92 Fault Study to 200 mA
(full linac beam into beam stop NZ 96)
(111 x measured)

All numbers in mr/hr

LINAC

33
6 (95)

56
6 (95)

Heat exchanger

167,000

53,250
Pumps

House

(92)

8325

5000

(91)

11

(09)

11

(09)

Posting

9

(07)

Posting

11

(09)

Chipmunk

11,100 on roof

(91)

Chipmunk would see 6105 mr/hr

Chipmunk interlocks at 50 mr \( \Rightarrow \) 122
Alarm at 10 mr \( \Rightarrow \) 610
<table>
<thead>
<tr>
<th>Fraction</th>
<th>200 µA</th>
<th>Chipmunk</th>
</tr>
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<tbody>
<tr>
<td>Linear Berm</td>
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<td>HTB turner</td>
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<td>Booster at LTB</td>
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<td>D6 Pump Pipe</td>
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DATE: March 6, 1996

TO: A. McGeary

FROM: L. F. Mausner

SUBJECT: BLIP/Linac Interlock changes

Several changes to the BLIP/Linac interlock are desirable. These changes have been discussed with and approved by K. Reece, Head of the AGS Radiation Safety Committee. I would like to request that you implement and document the following modifications at this time:

1. Delete the two shaft leak (not level) probes from the bending magnet trip. Instead we will send a signal through our computer to shut beam with the FBI system.

2. Change the beamline Ashcroft pressure switch alarm to an FBI trip, rather than a bending magnet trip as at present. However, we still require the return signal from you that a trip has occurred.

Since we hope to be ready to get beam within a few days, your prompt attention to this matter will be appreciated. Thanks.

cc. K. Reece      V. Wong      H. Schnakenberg      B. Briscoe