

SUMMARY OF LINAC FAULT STUDIES 1-3

The objectives of Linac fault studies 1-3 were to measure the adequacy of shielding around several Linac penetrations installed for the Booster, determine levels on the Linac berm, and levels in the AGS tunnel. Levels were within the margin of error of those predicted before the fault study.

Actions taken as a result of these fault studies are:

1. The HTB tunnel section near the Linac has been upgraded to a radiation area.
2. The Booster enclosure and Building 914 have been upgraded to a radiation area.
3. The berm over the Linac has been posted as a radiation area.
4. The area surrounding the entrance gate to the BLIP line pump house has been posted as a radiation area.
5. Additional entrance precautions to the AGS tunnel when the Linac is operating have been implemented.

The above actions should bring these areas into compliance with all AGS/BNL/DOE standards for full intensity Linac beam faults in the transport from NZ86 to the HEBT stops.

Fault Study Intensity

All fault studies were conducted with the same beam intensity. The Linac beam parameters were:

1. 20 mA (25)
2. 100 μ s pulse width (500)
3. 3 second repetition rate (0.2)

The maximum for each of these parameters is given in parenthesis. These fault studies were conducted with 4×10^{12} protons/sec at 200 MeV. The maximum beam intensity is 3.75×10^{14} protons/sec at 200 MeV. All numbers given below have been scaled to the full Linac beam intensity.

HTB Tunnel

The quadrupole NQ134 was used to fault the beam (FSP 3). Levels in the HTB tunnel were:

34 mrem/hr at the sandbags in 2-foot driven pipe
131 mrem/hr at the end of the small transport pipe

The area of the transport pipe is much smaller than 1000 cm² and BNL OHSG 3.4.0 allows this to be derated for full body exposure. The reduced dose equivalent rate is well below 100 mrem/hr. Making the section of the tunnel nearest the Linac a radiation area will bring this area into compliance for full Linac beam faults in the transport near the HTB-Linac penetration.

Booster Enclosure

The LTB penetration to Booster was studied by inserting beam stop NZ86 and later the quadrupole NQ68 was detuned (FSP 2). All levels measured were between 9-28 mrem/hr. In addition, a Chipmunk which interlocks at 2 mrem/hr is in this area.

The HTB penetration was studied by detuning NQ134 (FSP 3). Levels along the Booster wall across from Booster dipole C1 were less than 10 mrem/hr. Levels at the sandbags in the pipe were 10 mrem/hr. The end of the beam transport pipe had levels of 80 mrem/hr (average of 3 measurements).

The Booster enclosure and Building 914 were upgraded to a radiation area. In the long term, the Booster enclosure will be a high radiation area and Building 914 a radiation area. This posting will bring the areas near the Linac into compliance for full Linac beam faults.

Linac Berm

Beam was put on the HEBT stops (FSP 1) and the NZ86 stop (FSP 2) to determine the adequacy of the Linac shield. The maximum level measured was 28 mrem/hr with typical levels of 10-15 mrem/hr. The area over the Linac berm was posted as a radiation area. It was previously recognized that full Linac beam on these stops could cause levels of 15 mrem/hr on the berm, and the specification for the Booster fence calls for it to enclose this area in the Booster berm area. The Booster berm barrier will meet Class IV (high radiation area) barrier standards.

The cable pipes into the HTB section of the Linac were examined during fault study 3 and found to have 10 mrem/hr. This area is enclosed in the Linac berm posted area.

BLIP Line Pump House

Measurements were taken at the BLIP line pump house gate with beam on the HEBT stops. Assuming a quality factor of 1 (the HPI 1010 has 5), then the levels at the gate have a maximum level (all beam on HEBT stops) of 19 mrem/hr. A Chipmunk inside the pump room had a quality factor of 1 and was near the demineralizer. It had a maximum reading of 560 mrem/hr for full beam on the HEBT stops. An area outside the gate was posted as a radiation area.

The AGS Tunnel

Levels in the AGS tunnel were measured with Linac beam on the HEBT stops. Levels at three locations were taken and have been corrected for residual background. The locations and levels are (for full Linac beam on HEBT stops):

1. 660 mrem/hr at Linac pipe penetration of AGS ring
2. 800 mrem/hr on wall halfway between Linac pipe and HEBT gate
3. 2800 mrem/hr at the HEBT gate

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These levels are within guidelines for a high radiation area but are certainly not desirable. The following has been done to reduce the possibility that personnel could receive inadvertent doses in this area:

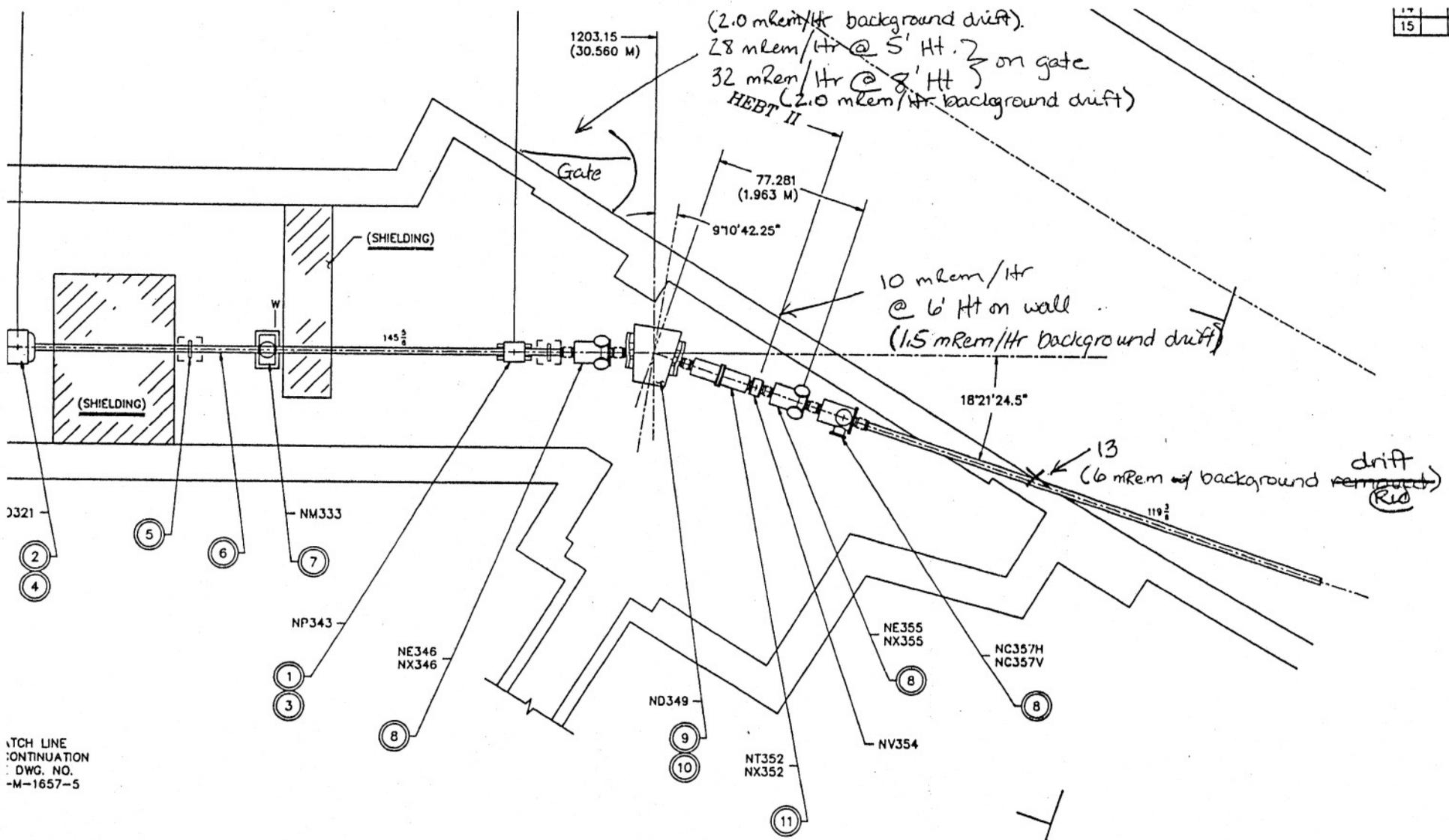
1. Linac operations has been instructed to minimize beam on the HEBT stops. Note that typical beam to the HEBT stops is at least 15 times smaller than the full Linac beam.
2. When the ring is on restricted access, a Chipmunk will be placed in this area as a local area monitor.
3. Additional posting to warn personnel that the Linac-to-AGS interface can have high radiation levels.

Whether these actions are sufficient for this running year will be investigated. When the Booster becomes operational, these stops may be moved upstream toward the LTB section.

mvh

copy to:

AGS RSC
J. Alessi
J. Benjamin
B. Briscoe
V. LoDestro
P. Thieberger



MATCH LINE
CONTINUATION
DWG. NO.
-M-1657-5

MATCH LINE
FOR CONTINUATION
SEE DWG. NO.
D25-M-1659-5

AREA: HEFT Gate DATE: 1/9/91
 SURVEYOR: B. Colichio UNIT: mRem/Hr
 INSTRUMENT: HPI 1010
 SERIAL NO: 251 OF: —

BEAM LINES (First letter)	
N	= HEFT BEAM LINE
P	= BLIP LINE
Q	= CHEM LINE
M	= MEDICAL

DEVI... (and letter)

FINISHED
 TRAIL
 SLOTTED