

Minutes of Radiation Safety Sub-Committee of March 4, 2003

For Linac Capping

Attending: D. Beavis, E. Lessard, R. Karol, K. Yip, J. Alessi, A. Javidfar, D. Paquette (ESD), D. Bennett (ESD), L. Mausner (MO), J. Bullis (MO), M. van Essendelft (ESD)

A subcommittee was formed to Review the Need to Cap Activated Soils at Linac/HEBT

1. Agenda

The subcommittee met to review the results of recent soil activation analyses at the Linac and HEBT and recent groundwater analyses in wells south of BLIP. The purpose was to determine if some areas at Linac and HEBT should be capped.

2. Results of soil samples at Linac/HEBT

Soil samples were taken near the BLIP Y-Chamber downstream of magnet PD-19; near bending magnet ND-249 in HEBT, and near the first water stop NZ304 at the end of HEBT line. The soil samples were taken just outside of the tunnel wall downstream of the estimated loss locations. The results are summarized below:

Soil Sample Location	Results for ^{22}Na (microCi/g)	Computed Leachate Concentration of ^{22}Na and ^3H (pCi/L) ¹ at soil Sample Location
BLIP Y-Chamber	9.78×10^{-6}	1450, 2280
ND-249	1.82×10^{-7}	27, 45
NZ304	7.80×10^{-7}	116, 182

Based upon the results from the above table, a cap is apparently needed at the BLIP Y-Chamber location and at the HEBT Water Stop since the calculated leachate exceeds 5% of the DWS. It is noted that the ^{22}Na in soil at the water stop area is lower than the Y-chamber soil because beam was not sent down the HEBT line for about 10 years until the line was used again for polarized proton measurements the last 3 years.

3. Well Sample Results

Recent results of well samples taken south (down gradient) of BLIP in January 2003 have shown a rise in tritium concentrations. The results are summarized below and the well locations are shown in Attachment 1.

Well Number	Results (pCi/L of ^3H)
064-48	3740 ± 338
064-50	4830 ± 367
064-67	27700 ± 788

The results of well 064-67 have been near background since the BLIP groundwater plume was originally addressed in 1999. Karol discussed some preliminary groundwater calculations that he performed using Greene's functions to see if the BLIP Y-Chamber could be ruled out as the source of the recent increase in tritium activity at well 064-067. The preliminary

¹ Using the model in the Accelerator Safety Subject Area, Design Practice for Known Beam-Loss Locations (BLLs).

calculations could not rule this out as a source.² If the BLIP Y-Chamber soil was the source, a single release could not produce these well sample results. However, a continuous release of about 11 microCi/day would closely match the sample results in wells 064-67 and 064-50. Karol noted that the wells are far enough from the source such that assuming a point, line or horizontal area source has no effect on the computed tritium concentrations at the well locations.

4. Work Assignments

The following assignments were made to determine the design of the caps which should be installed during the available shutdown:

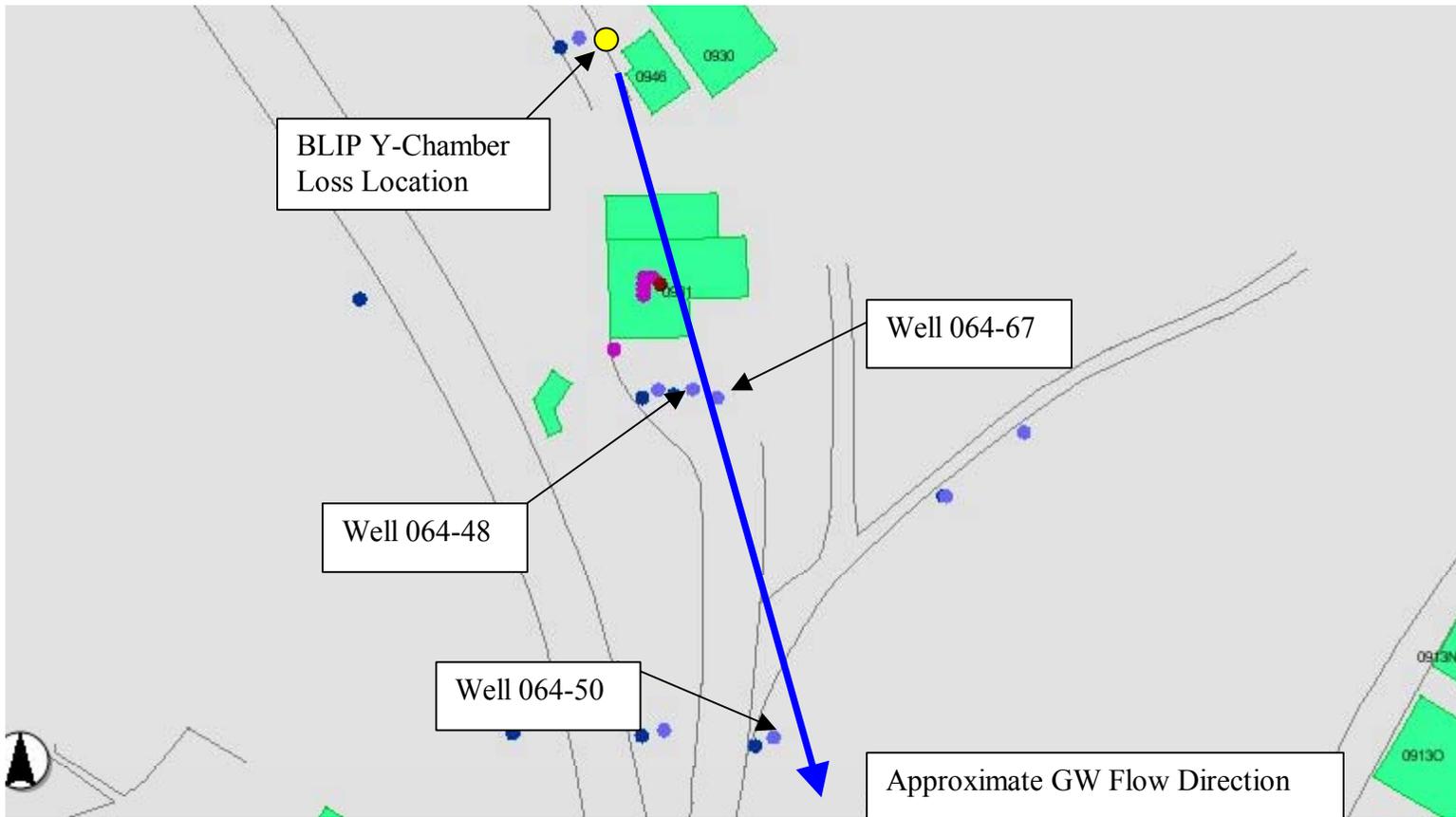
- a. The soil sample results need to be documented to show that the BLIP Y-Chamber area and the HEBT Water Stops area need to be capped in order to comply with the SBMS requirements. In addition, the groundwater model and results need to be documented (Karol).
- b. The layout and details of the loss points need to be determined for input for an MCNPX calculation (Javidfar).
- c. The expected future annual proton fluence at the beam stop needs to be estimated as input for determining the water stop cap dimensions (Alessi).
- d. MCNPX calculations are to be completed to determine the cap dimensions needed at the two loss points of concern (Yip).
- e. The REF Y-Chamber should be removed to prevent future losses at this location for ALARA purposes (Alessi).
- f. The cap by the BLIP Y-Chamber should extend to also cover the new EBIS beam stop and the LTB area in order to assure future EBIS, MECO and KOPIO losses are addressed proactively (Javidfar).
- g. The viscous liquid barrier (VLB) integrity injected into the activated BLIP soils should be checked for integrity (Bennett).

Distribution:

Attendees
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² Rough estimate by use models in text by A. H. Sullivan, A Guide to Radiation and Radioactivity Levels Near High Energy Particle Accelerators, 1992. See calculations by R. Karol, Soil Activation Outside Linac Tunnel Wall Caused by Beam Losses at BLIP Y-Chamber, January 23, 2003 and Soil Activation Outside HEBT Tunnel Wall Caused by Beam Losses at Water Stop NZ304, February 24, 2003. The ND-249 loss profile was assumed to be the same as the water stop. NOTE: These calculations have not been checked for accuracy.



Attachment 1