A FFA test bed: the old BSY dump line
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Background

After the FFA working group meeting Friday March 17, during which part of the JLAAC draft discussing the need for a test of a permanent magnet cell was shown, Kirsten and Ryan were discussing possible locations. UITF and LERF were thought to have too low an energy. Kirsten asked about the BSY dump. Ryan emailed Jay. He did some digging.

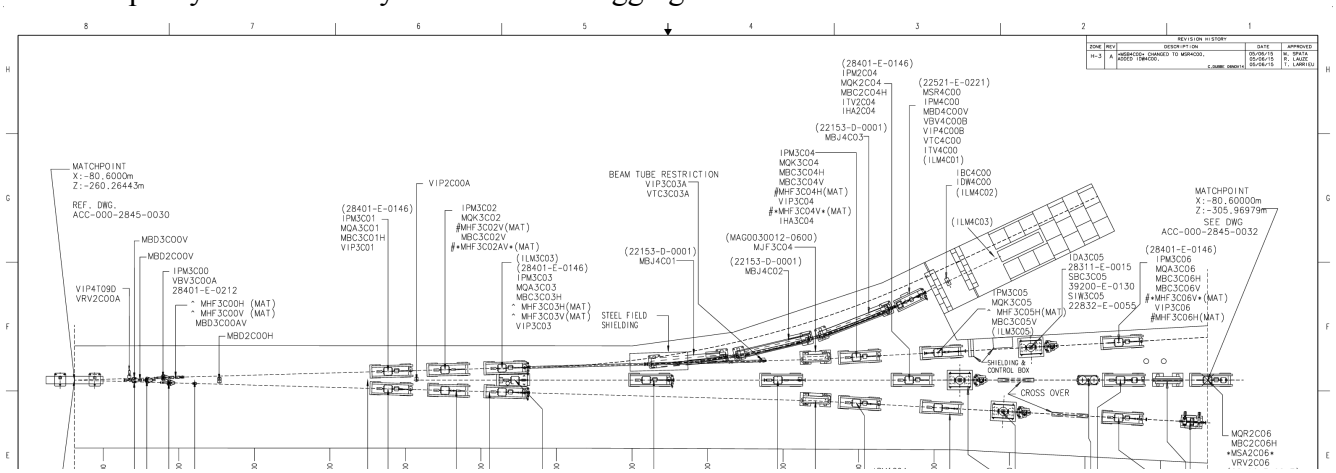

Figure 1. Song sheet containing BSY dump. It was decommissioned during 12 GeV upgrade

Proposal

With the proper power supply the magnets in the BSY dump could be upgraded from 6.06 GeV to 6.66 GeV capability, third pass energy for the present machine. The third dipole in the string could then be replaced with a permanent magnet FODO cell. This would allow testing of the permanent magnets at 30% of planned final FFA momentum. Significant other work would be required to recommission the beam line. The water-based diffuser might be replaced with one like those at the Hall A and C dumps. The 100 kW beam dump would have to be pressure tested. A booster water pump might be needed to allow 550-600A to be used in the two electromagnets. Machine protection systems would be re-installed. The 60 Hz raster magnets would likely need 20 A trim supplies.

Jay then upped the ante. The dipole magnet in TN-20-051 is capable of the 17.8 kG needed to upgrade the BSY dump line to 11 GeV. Removing all three dipoles and replacing them with two new electromagnets and one permanent magnet FODO cell would be much more costly than displacing the third dipole and assembling the FODO cell from small pieces in situ as all of the Hall beam lines in the area would have to be temporarily removed to get the three dipoles out and the new ones in. Nevertheless it would allow the lab to demonstrate that both electromagnet and permanent magnet designs needed for the 22 GeV upgrade are feasible. It would provide a useful capability to CEBAF which has been lacking since the 12 GeV upgrade. The beam energy would be the same as the first pass through the planned FFA rather than 60% of it. Instrumentation including button BPMs could be tested there (K. Price).