

Extract FEB up to 8 Bend Point

G. W. Bennett

September 1973

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

Notice: This technical note has been authored by employees of Brookhaven Science Associates, LLC under Contract No.AT(30-1)-16 with the U.S. Department of Energy. The publisher by accepting the technical note for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this technical note, or allow others to do so, for United States Government purposes.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

SEPT. 12, 1973

FEB BEAM COMMISSIONING STUDY

NO. 37

BENNETT, BLUMBERG, CASEY, CULWICK, GLASMAN, GUTHY, KEANE, RAKA

SCHEDULED: 000/-0800 ACTUAL: 000/-0730

OBJECTIVE: EXTRACT TO 8° BEND POINT. SET UP OPTICS, OBTAIN RADIATION SURVEY. FRACTIONAL EXTRACTION.

1. STABILITY OF H10 EJECTOR MAGNET POWER SUPPLY WAS STUDIED BY OBSERVING SHUNT SIGNAL ON TEKTRONIX 555 WITH TYPE Z PLUG-IN. WE SAW $\sim 4\%$ FLUCTUATIONS IN AMPLITUDE OF 21000 A PEAK CURRENT, WHICH COULD ACCOUNT FOR PREVIOUSLY OBSERVED ~ 1 " FLUCTUATIONS IN BEAM POSITION ON U15 FLAG. HOWEVER, SCHIRMER POINTS OUT THAT SHUNT SIGNAL CAN FLUCTUATE FOR REASONS OTHER THAN CURRENT VARIATION, SO CAUSE OF POSITION VARIATION IS STILL UNCERTAIN.
2. BEAM SPOT WAS OBSERVED ON U273 FLAG ($\sim 8^\circ$ BEND POINT), vertically truncated. WE LATER DISCOVERED THAT TOP JAW OF U259 COLLIMATED WAS LEFT IN. WITH JAW REMOVED, SPOT WAS > 2 " VERTICALLY AND $\sim \frac{1}{8}$ " HORIZ. CALCULATED VALUES FOR FRACTIONAL EXTRACTION AT THIS POINT ARE $.3$ " H X 1 " V. WE DID NOT HAVE CALCULATED LENS SETTINGS, HOWEVER, SINCE INCREASING UQ2 EXCITATION STEERED BEAM. WE HAD UQ1 AT $\sim 60\%$ (52 MV) STRENGTH AND UQ2 $\sim 20\%$ (17 MV). STEERING BY QUADS IS EXPECTED SINCE SPOT AT U15 FLAG IS $\sim \frac{1}{2}$ " LOW. THE SPOT WAS HORIZONTALLY WELL CENTERED AT U273 ($\sim \frac{1}{16}$ " OFF) AND VERY STABLE IN POSITION. THE $4\frac{1}{4}^\circ$ BEND WAS VARIED BY $\sim \pm 2\%$ WITH NEGLIGIBLE MOTION OF U273 SPOT. THIS PROVES THAT WE HAVE MOMENTUM RECOMBINATION AT 8° POINT, AS INTENDED. INCREASING EXCITATION OF QUADS UQ3, ...7 FROM 150 A TO 320 A PRODUCED SPOT AT U273 OF $\frac{1}{2}$ " V X $\sim \frac{1}{4}$ " H SO ITS PRETTY CLEAR THAT WE CAN GET THROUGH THE $2\frac{3}{4}$ " 8° APERTURE.
3. RADIATION SURVEYS WERE TAKEN WITH ABOVE CONDITION AND WITH "FAULT" CONDITION OF U259 JAW CLOSED. LEVELS ABOVE EARTH SHIELD WERE ~ 1.5 REM/HR WITH FAULT AND $\sim 4 \times 10^8$ P/P (25% OF 1.7×10^{12} C/BA) EXTRACTION. WITH BETTER SET UP, LEVELS ABOVE EARTH SHIELD DROPPED TO ~ 500 MR/HR ~ 60 MR/M IN RECTIFIER BLDG, AND ~ 3.5 REM/HR ON SIDE OF EARTH SHIELD DOWNSTREAM OF 8° . WITH A FACTOR OF 10 MORE INTENSITY, WE MAY BE IN TROUBLE IN RECTIFIER BLDG. UNLESS ^{and bigger beams} US AND U12 COLLIMATORS CLEAN UP THE HALO.