Wednesday 25 January 1995

K. Reece

Minutes of meeting: Radiation Safety Committee (sub-committee)

Date: Wednesday 25 January 1995

Present: H. Brown, I.H. Chiang, D. Lazarus, E. Lessard, K. Reece

Subject(s): C4 (E787) intensity limit.

The initial RSC review of E787 in the C4 beamline (8 May 1992) defined the experimental enclosure as a Class III area and is presently interlocked and controlled for that classification. The trip limit for the NMC unit in the C4 beamline was set to 2×10^7 particles/spill. A request has been made to increase the trip limit of this NMC unit by a factor of 4 to 5.

The minimum beam size has been found to be no less than 16 cm^2 and the repetition period is nominally 3 seconds. Using the guidelines found in AGS OPM 9.1.11, the sub-committee approved the NMC trip limit to be increased to 8×10^7 particles/spill and determined this area classification will remain Class III.

I.H. Chiang noted that there are a few locations where hand-access to the secondary beam may be possible. However, the beam height at these locations is approximately 10 ft. The sub-committee recommended that these locations be reviewed for the possible addition of barriers to eliminate this hand-access. If barriers are later added, the C4 experimental area sweep procedures must be appropriately modified.

cc: RSC file (w/attachments)
RSC (w/o attachments)

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From: BNLDAG::CHIANG
To: REECE
CC: CHIANG
Subj: radiation paddle limit of C4

Ken:

The experimenters want to raise the paddle limit of C4. I did ask for 2x10**7 Now it did trip some time and since we want to get to higher intensity, they like to raise to 10**8 if possible. The beam size is about 5x5 cm in the paddle area. We nomallly collimator it down to 2 cm by 5 cm. The beam is basically enclosed and only pion will escape through the center of detector. The beam size will be 10cm by 10cm at the center of the detector. The K will be stop and decay. Normally, we we only hav faction of pi in the beam, but we could bring the pi in the detector. We should assume the beam is pion and beam is limited by a beam plug with 8 inch hole. (the beam plug is iron for magnetic field return, which is 21.5 inch steel.). All the pion

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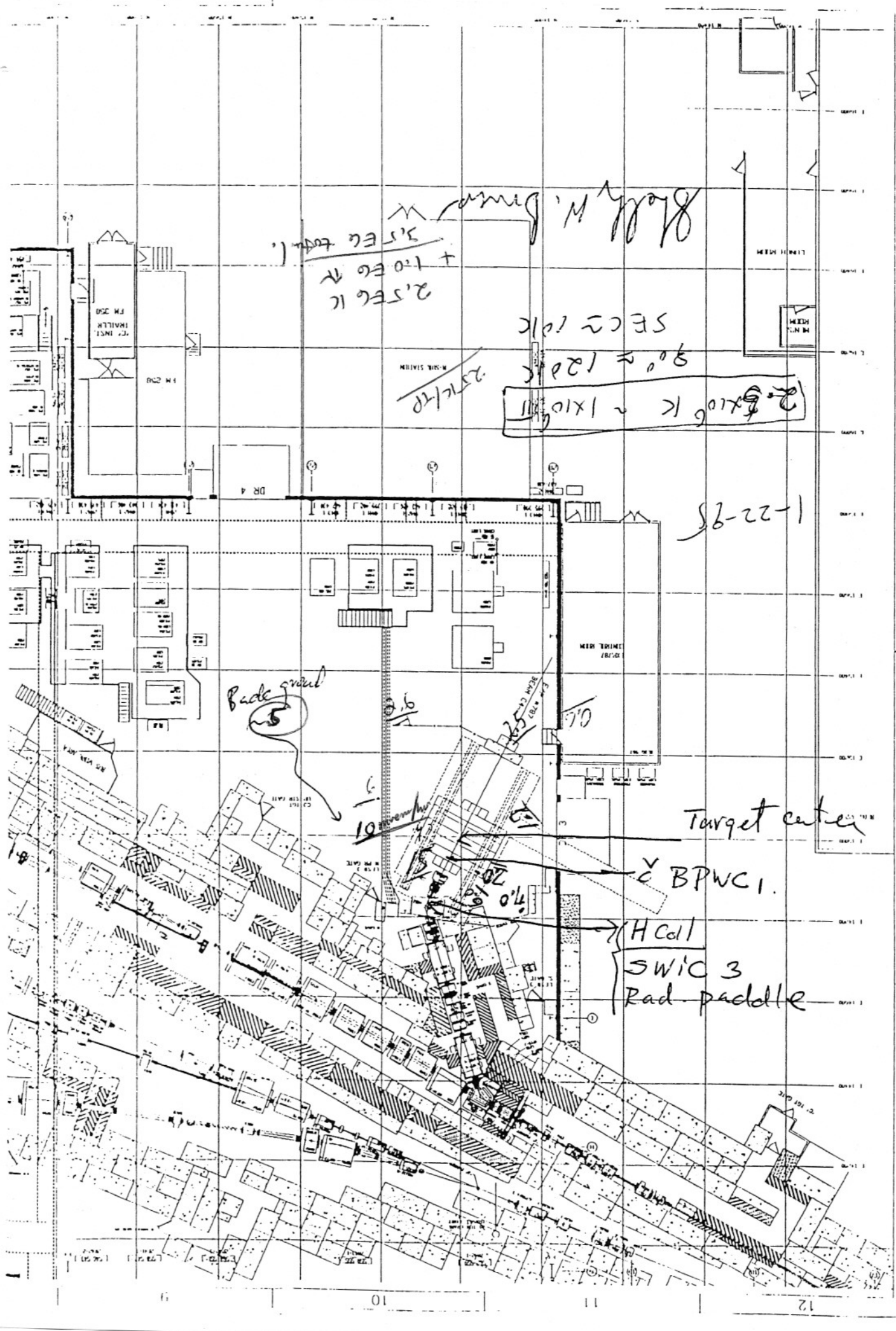
will stop in the yoke if it enters the yoke. The yoke is about 40 inch down stream the center of target. The beam size at this point is circle of 10cm radius. The end of the detector is about 100 inch from the center of target. So the beam size will be (100/40) larger in diameter, 25 cm radius.

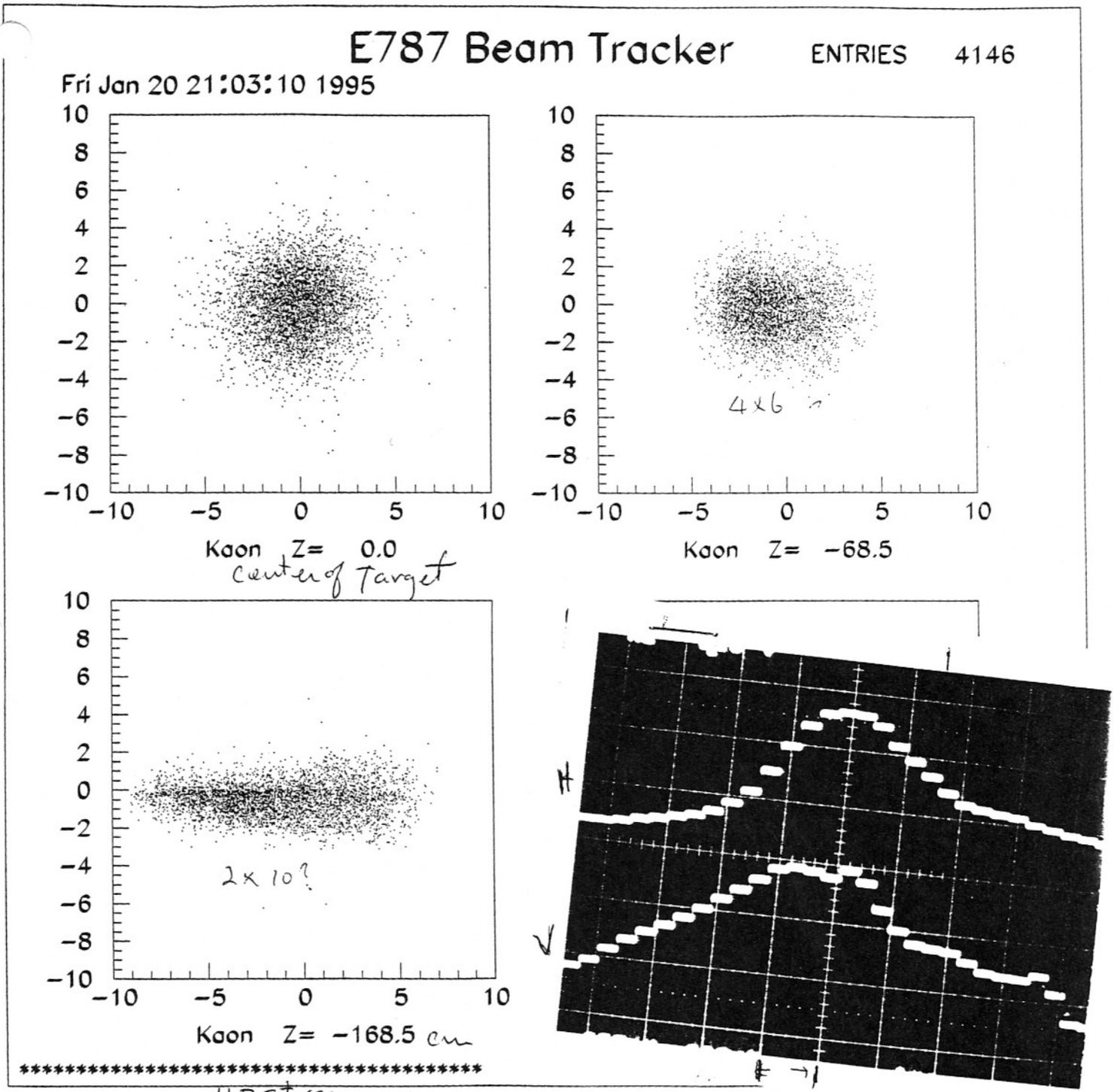
If we use 10**8/(3.14x25*25)=51,000 /cm**2.

I had not do any check of beam with beam on inside the beam cave. The above is my back of envelope calcualtion. Please let me know what do we need to raise the intensity. I understood from Phil that both C1 and D6 line have the 10**8 limit.

I-Hung

MAIL>


Target center
BPWC 1.
H Call
SWIC 3
Rad. paddle



center of Target

upstream of detector

1-23-95

The C4 beam are enclosed in the beam component and detector. The the end of the detector, the attenuated and blow up beam is then exposed. The
tector are basically 10 ft in the air, 6' beam height plus the depth of the pit. It is not very easy to get to access the upstream beam without removing the beam components. With ladder and one could only put one's hand in the beam but not the head.

With this assumption, detector is enclosed, we only have to worry about the exposed area. Since, all the K are stopped in the detector, we only have to worry about the pion.

A.Area classification:

At the end of detector, only pion will reach there. let consider the pure pion beam.

1.only 1/6 of the pion beam reach the target.

2.We have 2 meter of scintillator in the beam path, which is 3 interaction length. Exp(-3)=.05, so we have another factor of 20.

3.The "beam size" at the end of the detector is more than 3.15x25x25=2000 cm**2

For 10**8 beam, the rate in the end of detector is

10**8/6/20/2000=4200/cm**2/pulse. Scale to 3. second per pulse

4200/3.=1400/cm**2/sec 5x10**5/cm**2/hour

If we are very sure of all this factor, we could argue that we may not need the fence at all. But this is not the case. The fault in the Separated beam could increase the rate by order of magnitude, Phil think it could be up by factor of 100, but I had not bring the full pion beam down but I did it to set the paddle with .2 tp on target to get 2x10**7. So it is about right.

Fro 40 TP on target, we could get about 2x10**7 K. and 2x10**9 pion if we tune both separators to it. This will make the the rate at the end of the detector,

2x10**9/10**8x5x10**5=2x10**6/cm**2/hr

Well within class IV guide line.

B.The survey shows for 2.5x10**6 k,1x10**6 pion. The paddle should should see about 2x(2.5+1)x10**6=7x10**6. this is about factor of 16 less than 10**8.

The maximum radiation is about 7rm/hr. We will get 112 mr/hr for 10**8. (this could be over estimate). The Chipmunk in the pit read 15 mr/hr. It was set to alarm at 40 mR/hr and trip at 50 MR/hr. So we could not get to more than (7/15)x50=23 mr/hr in the area for more than 3 pulses.