

OFFICE MEMORANDUM

TO : Distribution

DATE: November 22, 1972

712270

FROM : J. E. Barnes *JEB*

SUBJECT : NOTES ON MEETING TO DISCUSS THE CONFIGURATION AT THE END OF THE BIOMEDICAL BEAM LINE

SYMBOL : MP-3

MES-200

Attending: E. Rodgers, A. S. Lundy, R. L. Hutson, D. J. Liska,
M. M. Kligerman and J. E. Barnes

The present design of the beam line provides for a distance of 84 cm from the end of the last quadrupole to the focal point. Part of this space must be filled with various apparatus described previously (A. Lundy memo, 10/10/72). Most of the discussion at this meeting concerned the amount of "free space" (i.e. space between the last fixed physical structure and the skin of the patient) at the end of the channel. The dialogue was oriented toward 1) what is essential and desirable from patient set-up and treatment considerations, 2) what is essential and desirable from beam monitoring and control considerations and 3) what trade-offs would result from a change in dimensions .

Kligerman stated that a free space of 30-32 cm was needed. Reasons given included the need for viewing space to the patients skin for proper orientation of the patient under the beam. This will include use of the light localizing beam for orientation to certain physical "land-marks." Flexibility in the use of auxiliary devices for various purposes such as beam trimming and shaping and other unanticipated applications later on should be maintained. Sufficient free space should be provided for these applications which may play an important part in the successful application of the beam to patient therapy.

*OK
I.E.B.
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Hutson discussed the distance to the focal spot saying that it was originally designed to be 1 meter from the effective edge of the last magnet. He was asked what would be the trade-off if the focal point was lowered. This would require some extensive calculations to get a good answer but a "seat-of-the-pants" guess would be that a 10 cm lowering would decrease the beam flux by 10%. Kligerman indicated that this would be an acceptable trade-off as far as patient treatment was concerned. A second trade-off mentioned was sharpness of beam edges. Other trade-offs were sought but could not be thought of.

The fixed devices below the last magnet were mentioned. Assurance was given that these would be designed with minimum dimensions. Liska stated that a prototype of one design for a range shifter is being built. Slabs of polyethylene (1/2 cm thick) would be moved in and out of the beam to vary the position of the stopping pions. He said this device would require a minimum of 25 cm space below the magnet.

(Comment: Has a higher density material for the absorber slabs been considered? This would decrease the total thickness required for the device. However some undesirable trade-offs might result.) Lundy stated that the space required for the various devices outlined in his memo of 10-10-72 were minimal. They might be reduced by 5% but not by as much as 20%.

It was stated that after all the devices have been designed, a detailed study of affects on the beam and other trade-offs will be made on the biomed beam line. Kligerman asked if some of this work might be done at some other facility such as the Berkeley cyclotron. He was assured that the work could only be done on the biomed channel here at LAMPF.

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It was agreed that collimators next to the patient could be tolerated as long as they are removable during patient set-up. This led to a discussion of the possibility of having some of the devices below the last magnet hinged so they could be moved out of the way. This was agreed to be satisfactory if it can be done so accurate repositioning can be achieved. It was also pointed out that patient set-up must be kept simple so that therapy technicians can do it easily and with little chance for error (i.e. devices should be interlocked to prevent errors.)

Additional physics assistance to help get some of the work done was discussed. Hutson indicated that some immediate help would be very beneficial but if delayed it probably would not be too worthwhile. Kligerman offered to seek relief funding for immediate help if desirable.

The lack of a firm design on beam configuration was criticized by Kligerman. He was reassured by Hutson, Rodgers and Lundy that the "sausage" beam with vertical and horizontal scanning was still the plan and is feasible. (Comment: This scanning procedure is probably the only way we will be able to vary the intensity of the pion flux over the treatment field to get sloped isodose lines in the patient analogous to the result of using wedges in photon therapy.)

The height of the treatment room floor in the biomedical channel stub-out was discussed. A vertically adjustable floor section directly below the beam was stated as being desirable to allow the positioning of patients at vertical angles or in sitting positions. Lundy suggested that the fixed floor position should be such that 90% of the patients could be set-up without raising or lowering the movable floor section.

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Some vertical positioning capability will be built into the treatment couch but this will be limited to approximately 30 cm of vertical travel. Part of the table adjustment mechanism may have to be recessed into the floor. If this is the case, a pit will have to be made in the simulator room to house a similar mechanism. Provisions are being made in the plans for this room for such a pit.

JEB:km

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