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- C) Bolus Shaping Studies - The ability of bolus to three-dimensionally shape the beam are still in progress. Again the impact of such studies is of little value without comparison with calculated values.
- H) Treatment Planning Comparison - A variety of experiments in phantom and in Rando man are being performed to compare with Rx planning computation.

I) MILA - Development of a multiple ionization array system.
 2) **TIME REQUIREMENTS**

The list of research projects are all clinically oriented and only a small segment of the overall physics picture which I feel should be understood prior to clinical trials. To accomplish this minimal effort would require at least 3-4 man years, unfortunately nowhere near this amount of time can be devoted to such problems at the present rate. I probably do 90% of the work in these areas and only get to devote approximately 20% of my time, meaning these problems could be understood in 15-20 years. The reasons for such little time being devoted to this effort are:

- A) Delay-PIPLAN - The dosimetry of individual patient ports requires 18 hours of beam time and 36 man hours per week. This would be completely eliminated if PIPLAN were operational.
- B) Treatment Planning - Due to PIPLAN not working I have devoted probably an average of 10-12 hours/week over the past 2 years either doing treatment planning by hand, writing isodose calculational software, or supervising the isodose distribution calculations of old patients.
- C) Range-Shifter - Due to Howard Amols' absence I have inherited responsibility for the range-shifter, which has required about 8-10 hours/week of writing software, developing range shifter function, and coordinating all activities.
- D) Patient Load - The increasing patient load ties up physics personnel such that very few man hours can be devoted to research.
- E) Radiobiology Dosimetry - Pion and x-ray dosimetry for radiobiology requires 8-10 hours/week.

3) **POSSIBLE SOLUTIONS**

Some solutions which are either in progress or new that I feel could strengthen the pion dosimetry effort are:

- A) Get PIPLAN working continually as soon as possible.
- B) Free up some of my time by assigning radiobiology dosimetry to Eric Gelfand NLT fall cycle.

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- C) Turn responsibility of all Rx planning codes which Isaac and I have written over to Pete and Sandra if used for the fall cycle.
- D) Emphasize computational effort for XY dosimetry scans if PIPLAN not working for fall cycle.
- E) Negotiate with Bradbury for H. Amols spending some fraction of his time to work on dosimetry with our group.

KH/ve

cc: CA Kelsey
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