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Subject

PROBLEMS IN DESIGN OF EPB
(MEMO TO A. L. READ)

There are a large number of specific jobs that must be undertaken in the design of the EPB and its associated experimental areas. Some examples, which I'm sure you are aware of, are listed below.

(1) The EPB optics and various modes of operation for both spacial and time sharing of beam.

(2) Requirements and design of beam elements, control systems for beam elements, and power supply requirements (including superconducting magnets).

(3) Power and utility distribution systems.

(4) Specific and detailed designs of secondary beams and in particular incorporating them compatibly within the target stations. Many designs will have to be made in detail.

(5) Problems in alignment of beams, survey problems.

(6) Target mechanisms and beam dumps.

(7) Shielding and radiation problems.

(8) Safety interlocks for radiation, magnet protection, etc.

(9) Monitoring and tune-up of beam systems - both EPB and secondary beams.

(10) Collimators for independent intensity variation in secondary beams utilizing the same target.

(11) Shielding along high-intensity secondary beams.

(12) Access features to specific areas - trouble spots outlined - what to do in case of failure.

(13) Incorporate new beams in target areas as they are suggested.

(14) Which items must be remotely controlled and from where.

(15) Special techniques for dealing with active areas and/or components.

(16) Experimental buildings and facilities.

This is not meant to be a complete list in any way. Your own list will probably grow exponentially in the next few years.

While it might be said that most or many of these problems are engineering problems, experience at other laboratories has shown that while good engineers can and will perform most of the details, they must be guided almost continuously by competent physicists.

Also, I refer to NAL Report # B. 7-68-46 by Marty Perl which gives some indication of what is to be expected when bringing a new facility into operation even with the best of care. Experience at AGS, LRL, CERN, and ANL also shows that when bringing new items into operation such as target stations, new beams, pulsed magnets, separators, etc., there are usually problems. In many cases these can be related to insufficient control in the engineering designs. Even

some items which operate satisfactory "on the bench" have bugs that were not anticipated for continuous operation and there is ususally never time for endurance tests.

Since initial detailed designs are anticipated for April 1969, I would hope that you would have at least 5 physicists (in addition to A. L. Read and Maschke) who would become involved in and assume some responsibility for detailed designs of experimental areas and facilities. They could divide the jobs into individual areas of responsibility, but, of course, generally work as a team because of the intricate relations of one problem to another. These ~ 5 physicists might be initially part-time, but would rapidly become involved full-time, as various items of apparatus or equipment progressed from design to fabrication to testing to final operations. I believe this evaluation (ignoring budget problems) would (or should) occur at a rapid pace such that by 1970, this number of 5 physicists will become 10. By 1973 it is perhaps 10 full-time. As this provides only about 2 physicists per experimental area it is still somewhat marginal. The degree of marginality will depend on the caliber of physicists that are obtained. It is hoped that most of them would have some degree of experience.