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UCRL-1218
Technology - Materials
Testing Accelerator

UNIVERSITY OF CALIFORNIA
RADIATION LABORATORY

Contract No. W-7405-eng-48

CALIFORNIA RESEARCH & DEVELOPMENT COMPANY
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MINUTES OF MEETING OF MTA REVIEW COMMITTEE HELD APRIL 3, 1951

E. D. Fleckenstein

Berkeley, California

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MINUTES OF MEETING OF MTA REVIEW COMMITTEE
HELD APRIL 3, 1951

Present: UCRL: Alvarez, Brobeck, Cooksey, Latimer, Lawrence, Lofgren, Longacre, McMillan, Norton, Panofsky, Van Atta

CR&D: Davis, Hansen, Hildebrand, Maker

AEC: Fleckenstein, Moore

Brobeck announced that there are two problems Hildebrand would like to discuss at this meeting. The first concerns the necessity for heating the tank to 125° C to aid out-gassing. The second concerns the question of PW versus CW operation for a 100-milliamp average beam.

Hildebrand stated that the study of the heating of the tank to 125° C has presented many difficulties, which prompts him to raise the question about the necessity for such heating. The difficulties encountered are such things as thermal expansion of the tank, the time of heating and cooling for proper out-gassing, and the fact that an additional million dollars is added to the initial cost.

Lawrence asked if small sections of the tank could be heated to reduce the difficulty. Maker pointed out that this would cause high bending stresses and make out-gassing by this method a lengthy process. Alvarez pointed out that tank heating for the 40-foot linear accelerator operating at the Radiation Laboratory has been tried and found to produce out-gassing but does not improve the over-all operation of the accelerator. Lawrence stated, and Alvarez concurred, that heating of the tank is useful but certainly not worth the additional costs involved. It was agreed that the tank plans should not include provisions for heating.

Hildebrand presented a summary of the arguments for and against CW and PW operations for a 1/10 ampere average beam, as discussed in the accelerator committee meeting held March 29 (UCRL-1212). Van Atta pointed out that the summary should more strongly emphasize that CW is more favorable from a target consideration. This is so primarily because the thermal stresses are less severe for CW than for PW. Lofgren pointed out that the summary as presented does not emphasize enough difference for the injector in the PW and CW cases. He wished to state that there is a definite advantage in CW operation, although not a decisive one. Panofsky pointed out that for PW the beam from the injector could be held in focus for only 20 inches as compared with greater distances for CW. This shorter distance does not allow as much

leeway in designing beam focusing devices that can be placed between the injector and the first drift tube. These devices may be necessary for the higher beam currents. Alvarez asked what became of the molecular ions in the beam. Panofsky stated that his calculations indicate that the molecular ions blow up quite rapidly, depending upon the number of drift tubes, and therefore will not be of great concern in beam focusing problems. It was generally agreed that CW operation is more favorable.

Hildebrand pointed out that the summary is based on starting CW without motor generator sets. However, he is certain that the power company is going to object to starting up without MG sets because of the uncertainty in load conditions. The number of times the load will drop from the line cannot be determined.

In order to prevent delays in the completion of Mark II and also to allow some operating experience before the final decision on the need for M-G sets is made, Hildebrand suggested that the following criteria be used in ordering equipment for the power supplies:

(1) Buy equipment which is common to both the 100-ma average PW and the 100-ma average CW designs.

(2) Buy sufficient M-G sets to allow start-up and operation with a 20-ma average PW beam.

(3) Buy sufficient oscillator capacity to operate at the 100-ma average PW level.

Brobeck objected to spending a million dollars on M-G equipment before the power company expressed a need for such equipment. He inquired if the power company would be able to state definitely in the near future what would be required. Hildebrand pointed out that the power company did not have cleared engineers and that it would be some time before they could come to any decision on such needs. Also, CR&D has to get bids for this equipment in the near future to prevent having a heavy workload of installing equipment at a later date. All present agreed that this proposal is very satisfactory and would allow completion of the machine with the least delay and expenditure of money.

Brobeck reported that his recent trip east to determine if NaK alloy could be used for cooling was quite successful. The trip uncovered the fact that approximately 40 systems are in operation, using pipe sizes ranging from 1/2 inch to 8 inches and in many degrees of complexity. Although some accidents have occurred using NaK all of the reported accidents could have been prevented by proper precautions.

Hansen reported on the status of Mark II and Mark I. There is a group of engineers at Site 2 who are making borings to determine allowable

bearing loads. CR&D is having difficulty in obtaining aluminum for spraying the inside of the Mark I tank. They are asking for priorities from Washington to obtain the necessary aluminum. The steel work on the Mark I tank will be finished by the middle of the month. There have been some delays in completing the steel work due to the necessity for replacement of ladders within the tank. These ladders incorporated hidden surfaces that could not be properly cleaned and aluminum sprayed. Final tests for the Mark I are expected to begin the early part of November.

Alvarez brought up the question of lighting which is to be used in conjunction with the periscopes in Mark I. The figure of 30 foot-candles has been given to the designer of the tank lighting, as the necessary amount. If this amount is necessary a change would have to be made on the nozzles which are already in place in the tank. This amount of illumination seems unnecessarily high. It is the consensus that one foot-candle would be sufficient illumination. Lighting for this amount can be handled by the present design.

Norton reported that effective April 30, 1953, research laboratories will be required to conform with F.C.C. regulations governing scientific apparatus. The rules and regulations as presently set forth require that any scientific device capable of radiating R.F. energy be operated in any one of three manners:

1. Operate in one of three assigned frequency bands. No license required.

    a. 13,560 kc (plus or minus 6.78 kc.)
    b. 27,120 kc (plus or minus 160.00 kc.)
    c. 40,680 kc (plus or minus 20.00 kc.)

2. Operation outside of assigned frequency bands without a station license if sufficient shielding and power line filtering is provided so that R.F. emission, including spurious and harmonic emission, will not exceed 10 microvolts per meter at a distance of one mile from the equipment on frequencies other than those indicated in (1.) above. The R.F. field from the power line (due to R.F. energy originating in the equipment) at distances beyond one mile must be less than 10 microvolts per meter when measured at one mile from the equipment and 50 feet from the power line.

3. Operation outside of the limitations imposed in (1.) or (2.) above, but with a station license granted by F.C.C.

It was suggested by Norton that the design frequency of Mark II be changed at this time from 12.1 megacycles to the 13.560 megacycle F.C.C. assigned frequency. Alvarez and Panofsky stated that it would be impossible for the

frequency of Mark II to be contained within the allotted limits of ± 6.78 kc. The consensus of opinion recommended that the present design frequency of 12.1 mc be held, and negotiations with F.C.C. be undertaken if and when interference develops. The probability of interference seems remote at the present time because of the small utilization of the spectrum around 12 mc.