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MINUTES OF MEETING OF MTA REVIEW COMMITTEE HELD MAY 20, 1952

Milton F. Moore

Berkeley, California

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RESEARCH SERVICE BRANCH
Atomic Energy Commission
Berkeley Area
Berkeley, California

MINUTES OF MEETING OF MTA REVIEW COMMITTEE
HELD MAY 20, 1952
AT LIVERMORE

Present: UCRL: Alvarez, Bradner, Brobeck, Cooksey, Farly, Gordon, Gow, Latimer, Lofgren, McMillan, Norton, Reynolds, Sewell, Thornton, Van Atta, Wallace

CR&D: Brighton, Carlson, Cope, Davis, Hansen, Hildebrand, Kent, Mayer, Lamb, Pearce, Powell, Price, Robinson, Salisbury, Tillotson, Wyatt

AEC: Brown, Fleckenstein, Kilgore, Moore, O'Donnell, Shute

Alvarez stated that on Monday, May 19, a 1-milliampere proton beam at A-12 gradient had been obtained from the Mark I. The measured beam current is lower than the actual beam current for two reasons, namely: that the 4-inch Faraday cup used for current measurement collects ions from only a small portion of the beam area and that the focusing magnets in the last few drift tubes were not operating at the designed flux, thereby allowing the beam to diverge. The beam energy will be determined by range-energy measurements.

During the previous week the tank voltage rose steadily until 20.5 Mv had been reached with all the drift tube magnets functioning. At this voltage serious sparking developed between the No. 0 and No. 1 drift tubes. After the first spark, it was impossible to re-excite the tank to the above voltage. It was thought that a crack or some other local source of ions had developed in the surface of either drift tube No. 1 or No. 0.

In an attempt to alleviate the sparking conditions all drift tube magnets were de-energized and several gases, including air, helium, and hydrogen, were added to the vessel. It was found that the addition of hydrogen decreased the sparking frequency sufficiently to allow the rf voltage on the tank to reach 19.5 Mv. After attaining a voltage of 19.5 Mv the magnets were again excited, whereupon the tank voltage rose to 20 Mv, when sparking again occurred. After several such cycles it was decided to hold the voltage at 19 Mv and attempt a beam.

The addition of hydrogen to the vessel caused numerous fine cracks to appear on the vacuum surfaces of the viewing ports. To prevent the weakened glass ports from collapsing, vacuum-tight lucite windows were installed on the air side and provision made to evacuate the space

between the lucite and the glass.

Powell wanted to know what plans and tests were under consideration now that the machine was in operation, and also when the next shutdown was anticipated and the nature and extent of repairs needed.

Bradner stated that the accelerator should remain in operation, if possible, for a week in order to study the beam energy by range-energy measurements, recalibrate the rf voltage meters, and determine the beam center. The low beam current will allow a week's operation before the Zn-65 (half-life - 250 days) concentration becomes an activity problem.

Drift tube No. 1 has developed four raised copper strips about 1 inch high and 2 inches long on the entrance end. The method of formation is entirely unknown and further observation of this phenomenon will be made while the machine is in operation.

After the vessel has been let down to air several weeks may be needed to clean up the drift tube surfaces. A thorough study will be made of all drift tube surfaces to obtain sufficient information to indicate the need of installing graphite or other special surfaces on the drift tubes. Conducting glass or shutters, or a combination of both, will also be installed.

Carlson reported that while the vessel was inoperative a major repair program should be conducted on the entire vessel to improve operating efficiency. The major repair jobs would include possible replacement of the rotating pre-exciter loop seals and Chapman valve gaskets, elimination of remaining vacuum leaks in the vessel, installation of larger beam measuring device, improvement in operating efficiency of entire vacuum pumping system, and a thorough cleaning of all drift tubes.

Powell stated that before repairs started a program should be made indicating the total repair costs and itemizing the pieces of equipment which would need immediate approval before repairs could be started. It was decided to appoint a committee to formulate such a program.

Brobeck reported that the B-1 cavity had been operated successfully with the Hg diffusion pump baffles cooled to -60° C instead of the usual liquid nitrogen temperature of -196° C. The quantity of Hg that backstreams past the baffle is not known, but this quantity has not been found detrimental to the sparking problem. If it is possible to cool the Hg diffusion pump baffles at temperatures other than liquid nitrogen, the quantity of liquid nitrogen needed for cooling in Mark I and A-12 can be substantially reduced, thereby allowing a considerable financial savings.

Thornton summarized the information contained in a letter from David Langmuir, U. S. Atomic Energy Commission Liaison Officer, Chalk River, Ontario, to F. T. Hobbs, Division of Research, AEC, Washington. Dr. Lewis, Vice President in Charge of Research in Chalk River, presented a lecture to the Chalk River staff on the subject of neutron multiplying devices other than reactors. The lecture opened with a general discussion of the energetics and economics of nuclear reactions using Pu^{239} and U^{235}. The economics of a thermo-nuclear reaction was discussed and summarized with a statement that if such a reaction is possible it would produce more neutrons more economically than other methods.

Dr. Lewis pointed out that at the heavy end of the periodic table a possible method of neutron production might be the bombardment of Bi^{209} with 500-Mev deuterons produced from a linear accelerator. This reaction was assumed to release five neutrons per incident deuteron.

Dr. Lewis summarized by saying that people might criticize the above reactions by saying that they could not be sound or that the United States would have adopted them. His rebuttal was that: (a) the United States is not infinite and might not have thought of the ideas nor acted upon them and that (b) if they had done so they undoubtedly would not have told the Canadians.

Browne stated that the staff paper concerning A-12 construction was currently being studied by the General Manager and would not be presented to the Commission before next week.