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MINUTES OF MEETING OF MTA REVIEW COMMITTEE HELD APRIL 8, 1952, at Livermore

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MINUTES OF MEETING OF MTA REVIEW COMMITTEE
HELD APRIL 8, 1952
AT LIVERMORE

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MINUTES OF MEETING OF MTA REVIEW COMMITTEE
HELD APRIL 8, 1952
AT LIVERMORE

Present: UCRL: Alvarez, Brobeck, Cooksey, Hudgins, Kane, Lawrence, Latimer, Lofgren, McMillan, Norton, Reynolds, Thornton, Twitchell, Van Atta, Wallace

CR&D: Avery, Crandall, Cope, Hildebrand, Hammond, Hansen, Kent, Mayer, Maker, Miller, Powell, Tillotson, Tomlinson

AEC: Fidler, King, Moore, O'Donnell

General Advisory Committee: Libby

Van Atta reported that during a meeting with Manson Benedict, it was brought out that Benedict had concluded that amortization of the capital investment should be at the rate of about 16 percent per year for MTA and other proposed new methods for plutonium production. Benedict has re-figured the production cost for MTA, using the shorter amortization period, and has compared it with the H. K. Ferguson light-water-moderated, slightly enhanced reactor, which is the most economical converter-type reactor so far proposed. To be strictly competitive as a plutonium producer the MTA costs should be reduced to 75% of the present level.

The production cost of U-233 by the MTA method is not as favorable, being about 50% too high. It is thought these costs are not truly representative, since the case presented was designed primarily for plutonium production. Kane will conduct a design study for U²³³ production using a beryllium primary and beryllium secondary. It is thought the production costs by this method will be more favorable, since in this case the major product will be U²³³.

Libby asked if any study had been made for the production of tritium or radiological warfare materials. Van Atta replied that the production costs for tritium are comparable to that for U²³³ on a mole for mole basis, but that no study has been made for the production of R. W. } ask committee

Preliminary results indicate that the production of Pu-236, 238 and 240 in the primary and secondary target second lattice will not be of sufficient quantity to be a problem to the weapons program.

In reply to a question from Alvarez as to why Pu²⁴⁰ content is low, Van Atta stated that a much larger proportion of production results from resonance capture in the present MTA design than is the case for existing reactors.

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Mayer reported that the various repair jobs on Mark I would be completed within a few days. The tank will again be evacuated and excited within the next four to five days. The precessor and injector have been assembled and are ready for operation in the near future. It appears that a local strike may prevent a sufficient nitrogen supply from being available in time.

Hudgins summarized the recent repair work on Mark I, as follows:

1. It is hoped that the sparking between drift tubes No. 0 and No. 1 will have been eliminated by removing all the bolts on the Nos. 0 and 1 drift tubes and soldering a copper strip over the holes. Since sparking has caused the pitting of surfaces of both drift tubes, all surfaces have been re-cleaned and electro-polished. The newly cleaned surfaces, although smooth, contain many brown patches. Since a previously approved cleaning method was used, a study is being made of this problem. An attempt to reduce the damage caused by sparking will be made by triggering the rf crowbar from the increase in X-rays that precedes a spark. An X-ray detector unit will be added at each drift-tube gap to determine frequency of sparking.
2. The pre-exciter transmission line seals have been operated over 20,000 times and were leaking badly. Newly designed seals are currently being installed, which have performed better on test.
3. The No. 8 drift tube stem connections have been repaired.
4. Some of the water leaks in the cooling lines on the tank liner have been repaired, while others could not be located (presumably too small), so that the entire liner panel is again water-cooled.
5. An inter-communication system is currently being designed to allow improved contact with workers in various locations around the tank.
6. All periscopes have been aligned but the glass front surfaced mirrors and plastic repeat lenses have given poor visibility.

Thornton summarized research work on the Thomas-type cyclotron or J-16 program. The work has been divided into four groups, namely: the electron model group, the new electron model group, the 20-inch cyclotron group, and the theoretical group.

The electron model group has been using the 1/10-scale model electron cyclotron (based on the Thomas theory) which was designed and built early in 1950. This machine has a 36-inch diameter magnet pole face and will accelerate electrons to approximately 70 Kev. Since the shape of the magnetic field is extremely important in the Thomas cyclotron, considerable time has been spent on obtaining data to design a new magnet pole face which will provide a magnetic field accurate to 0.1%. Such information has been obtained and the new electron model group have designed and are building two magnet pole faces which

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will provide a magnetic field of the desired accuracy. This new model will be an eighth-scale model of a 300-Mev deuteron accelerator.

Another important function of the electron model group is the design of the dee structures. Three pairs of wedge-shaped dee tips which grade into simple pipe stems are currently being used. This group has also studied the minimum rf voltage on the dees required for complete acceleration. The threshold dee voltage is now 200 volts to ground.

The new electron model group, besides designing the more accurate magnet pole face as described above, is studying methods and procedures for extracting the circulating beam from the cyclotron. It is expected that the new pole face will be completed by July 1 of this year, and that the slight field shimming necessary will be completed in six weeks.

The 20-inch cyclotron group is using the quarter-scale bevatron injector cyclotron to study ion source conditions, servomechanisms for 3-phase operation, and capacitance interaction between dees.

This machine will accelerate protons to 0.9 Mev. To date, an off-center calutron ion source (a low-voltage DC arc source with a graphite accelerating slit) has produced sufficient protons to obtain a 5-milliamp internal beam. Sufficient rf power is not now available to produce beam currents in excess of this. The servomechanism has been designed which will maintain the phase relations with good efficiency. The effect of capacitance between dees has been eliminated by neutralizing connections between all dees.

The theoretical group has developed the Thomas theory and calculated the magnetic field up to the sixth order terms. Calculations have also been made on shaping the magnetic field to allow the beam to be removed. The orbital trajectory of the first few turns has been graphically plotted.

Thornton stated that studies on the full-scale J-16 indicated a horizontal magnetic field has the following advantages over a vertical field:

1. Since the pole faces are vertical, dust will not settle by gravity on the magnet pole faces. The elimination of dust will reduce sparking.
2. The magnet pole pieces would act as shielding.
3. It is more advantageous structurally to suspend dees in vertical position.

Brobeck suggested that all future meetings be held in Livermore in the conference room, Building 43, at 1:30 p.m. This was acceptable to those present.

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