

MONSANTO RESEARCH CORPORATION THIS IS CONFIDENTIAL - Office Correspondence 3A

From LOCATION :

Research Department, Mound Laboratory

cc :

Distribution

DATE :

July 19, 1962

Copy 1 - D. L. Scott

SUBJECT :

VISIT OF W. K. EISTER OF DID, AEC,
WASHINGTON, AND PERSONNEL FROM THE
MARTIN-MARIETTA CORPORATION ON
JULY 19, 1962.

Copy 2 - D. L. Scott

REFERENCE :

Copy 3 - J. E. Bradley

Copy 4 - B. C. Blanke

Copy 5 - W. B. Creamer (DAO)

Copy 6 - G. R. Grove

TO :

Mr. David L. Scott

Copy 7 - W. J. Haubach

Copy 8 - F. D. Lonadier

Copy 9 - E. A. Rembold

~~SECRET~~
DATE 1/24/67 INIT. [Signature]

Released through the
NSA/ISSR PROJECT
EXEMPT FROM FOIA PENNS INITIATIVE
EXEMPT FROM FOIA MOUND FACILITY

On July 19, 1962, Douglas Harvey, Justin L. Bloom and Meyer Pobereskin of the Martin-Marietta Corporation, and W. K. Eister of DID, Washington, D. C., visited Mound Laboratory to discuss isotopic power source requirements using plutonium-238 and polonium-210 with G. R. Grove of Mound Laboratory and E. A. Walker and E. V. Springer of DAO.

A firm requirement is expected in the near future for a communications satellite to operate with an output of 160 electrical watts for a five-year mission in an earth orbit of 5000 miles or greater. This source will be designed to be fueled with strontium-90, however, the first source is planned to contain plutonium-238. The electrical conversion efficiency for this source operating at a temperature of about 1400°F is estimated to be six per cent. The fuel capsule surface temperature is expected to be 1500°F and the mid-line temperature, assuming plutonium metal is used, would be about 1550°F.

The first phase of this effort would be the evaluation of plutonium fuel forms and containment studies by Mound Laboratory and the performance of impact studies and the evaluation of electrical conversion systems by the Martin-Marietta Corporation. This phase would extend over a twelve-month period. The second phase would include the detailed generator design by the Martin-Marietta Corporation and the fabrication of the source subject to the specifications determined from the Phase I study and should be completed in six to eight months, thus, the overall program would cover a period of 18 to 20 months.

1 DAY
2 CLASSIFIED
3 CONFIDENTIAL
4 UNCLASSIFIED
5 UNCLASSIFIED WITH
6 COORDINATE WITH
7 CLASSIFICATION CONTROL
8 CLASSIFIED INFO TRACKED
9 OTHER SPECIFIC

ALMD62072460202

~~SECRET~~

~~RESTRICTED DATA~~
This document contains restricted data as defined in the Atomic Energy Act of 1954. Its transmittal or the disclosure of its contents in any manner to an unauthorized person is prohibited.

~~SECRET~~

Mr. David L. Scott

- 2 -

July 19, 1962

Included in the Phase I studies by Mound Laboratory would be the following:

1. Metal containers with tantalum liners for the loading of about one cubic centimeter of plutonium-238 would be prepared and time-temperature studies on the effect of the plutonium on the tantalum would be performed. Samples would be maintained at 1400, 1600, and 1800°F for periods of 1, 2, 4, 8, 16, 32, and 52 weeks, following which they would be examined in detail for reliability of containment.
2. Studies of the suitability of selected alloys of plutonium would be made and the most promising mixtures would be subjected to the time-temperature evaluation described in Item 1 for the 1600°F temperature.
3. The preparation and characterization of plutonium oxide particles in the one-micron or smaller diameter size range and the one to fifteen mil diameter size range would be made. The oxide appears to be an attractive form of the plutonium-238 if it can be fabricated in a matrix material such as nickel and would exhibit desirable burn characteristics.
4. Compounds of plutonium such as the nitride, arsenide and selenide and some alloys of potential merit should be evaluated.
5. Evaluation of the potential value and fabrication practicability of plutonium-238 carbide for use as an isotopic power source material should be made. Inasmuch as a considerable amount of information exists for plutonium carbide, initial efforts would be limited to literature studies.

Mr. Eister requested that a program proposal be submitted to the Division of Isotope Development covering this work starting in FY-1963 and extending through FY-1964.

~~SECRET~~

~~SECRET~~

Mr. David L. Scott

- 3 -

July 19, 1962

A review of other power source requirements revealed the following:

1. The third one-kilogram plutonium-238 source is not required until the second quarter of FY-1963, however, if early fabrication of this source can be effected it can serve a useful purpose until its scheduled launch time.
2. Three additional one-kilogram sources will be required during the next 12 to 18 months. The exact schedule for the delivery of these sources has not been established.
3. In conjunction with the lunar probe shots a requirement for five 100-gram plutonium-238 sources is expected to be established. These presumably will be of the SNAP III design.
4. The four-gram polonium-210 compound source previously discussed probably will not be required.
5. Fifteen sources of the SNAP 9A design may be required for short missions. The present plans are to fuel these sources with either curium-242 or polonium-210 compounds. The polonium required for each of these sources would be about six grams and delivery at the rate of three sources per quarter would be necessary. Mr. Eister has the estimated costs for the production and source fabrication at Mound Laboratory of 100 grams of polonium-210 per year which are compatible with this requirement.

B. C. Blanke, C. J. Kershner and J. A. Powers reviewed the technical activities at Mound Laboratory on the polonium compound studies and the plutonium-238 metal and alternate fuel forms, and a tour was conducted through the research and development areas being used for work on these materials.



G. Richard Grove

GRG:la

~~SECRET~~