March 27, 1954

NND 892001
IIRm/SG 8/30/10

MEMORANDUM FOR THE FILE

FROM: Ken Mansfield

SUBJECT: Intercontinental Ballistic Rocket Program

TOP SECRET

Earlier during the month, Mr. Trevor Gardner, Special Assistant to the Secretary for Air for Research and Development, and Lt. Colonel Vincent Ford, Gardner's assistant, briefed Mr. Cole, Corbin Allardice, and me on the intercontinental ballistic rocket program. Yesterday, I visited with Colonel Ford and was brought up-to-date on this matter.

The background is as follows:

Last summer, Gardner undertook a survey of the Air Force activities in the field of long-range missiles. At that time, the Air Force had three such projects under way--Navajo, Snark, and Atlas. The first two of these devices were "missiles"--in the sense of vehicles following a horizontal flight course. Atlas was a "ballistic rocket"--that is, its course would describe a free-fall trajectory.

Snark and Navajo, as envisaged, were essentially extrapolations of conventional missiles. In other words, their prospective speeds were on the low end of the Mach scale--in the neighborhood of Mach 2 or 3. It was anticipated, however, that Atlas would have a maximum speed of Mach 20 and re-enter the atmosphere at Mach 10 or 12.

The Air Force assumed that Atlas, which was being developed by Convair, was a long-term proposition, and that such a device--if it were at all feasible--could not be made operational until 1962 or 1964.

The reasons for this long time scale lay, first, in the guidance problem and, secondly, in the metallurgical problem associated with a device re-entering the atmosphere at Mach 10. The Air Force had put down a required C.E.P. of 1500 feet. This, in a rocket with a prospective 5,000-mile range, constituted a fantastically difficult technical challenge. In addition, to this it was anticipated that great advances in metallurgy would have to be accomplished before the device could re-enter the atmosphere at such high speeds without burning up in the process.

When the Gardner survey team looked at the long-range missiles program, Gardner had great misgivings concerning its scope and direction,

JKM:MJP

TOP SECRET

and an intuitive feeling that all was not proceeding as it might. Last fall, Gardner accordingly assembled a scientific advisory team consisting of 26 scientists--including such men as Von Neumann, Kistiakovsky, Weisner, and Lauritsen. This group, in other words, represented a wide spectrum of scientific thought. This advisory panel was requested to take a fresh look at the long-range missiles program. Gardner also pressed for an intensive study of possible Soviet activities in the field of long-range missiles.

Four intelligence studies were thereupon undertaken--one by CIA, another by regular Air Force intelligence channels, a third by Rand, and a fourth by a "special" group within the Air Force--the latter presumably relying upon intelligence secured by covert means.

Upon studying the findings of these intelligence surveys, the consensus of thought among the scientific advisory group was that the Soviets were probably "significantly ahead" of us in the field of long-range missiles.

Turning next to the question of what we could do to accelerate our own progress in this field, the scientific consultants concluded that we could measurably step up our timetable by relaxing certain of the then-existing specifications for a long-range ballistic rocket. Assuming that the specifications were so relaxed, and assuming further that we instituted a ballistic rocket program on a crash basis, the majority of the scientific advisors believed that we could have in existence a "Ph.D.-type" ballistic rocket four to six years from now.

It is important to note that the technical feasibility of the ballistic rocket was not seriously questioned by any members of the advisory panel. The only question of debate centered around how soon we could have it--with the optimistic group (which includes Von Neumann, Weisner, and Gardner) saying that we could secure it in four years; with the moderates saying that it might take five to six years; and with the conservatives saying it might be an eight-year program.

The changes in specification agreed upon by the scientific advisors concerned C.E.P. and the speed at which the rocket would re-enter the atmosphere. The original 1500-foot C.E.P. for long-range misiles was set forth four years ago, when few regarded thermonuclear warheads as feasible. Apparently, the 1500-foot figure was established somewhat frivolously--in the sense that the Air Force thought it might as well put the scientific people on their toes by giving them an extremely hard target to shoot at. What the Air Force apparently did not realize was that a 1500-foot C.E.P. was not merely three times as hard, say, as a 4500-foot C.E.P. Rather, the more stringent C.E.P. represented a problem of a new order of magnitude. For instance, in order to achieve such a C.E.P., it would be necessary to calculate the speed of light to another decimal place--and Gardner told us such an achievement would probably be worthy of a Nobel Prize.

By the same token, a rocket re-entering the atmosphere at Mach 10 or 12 would represent a metallurgical landmark--and Gardner said two Nobel prizes might be necessary for achieving alloys capable of withstanding the tremendous resultant temperatures.

Gardner told us it was his personal opinion that the requirement for a 1500-foot C.E.P. had probably set back our long-range missiles program by three years, and he was at a loss to understand why his predecessors had not relaxed this requirement the moment that large-scale thermonuclear explosions appeared feasible.

As a result of the recommendations of the scientific advisors, the Air Force research and development people concluded early this year that they would press for a crash program on the ballistic rocket. In place of a rocket with a 1500-foot C.E.P. and a re-entry speed of Mach 10, the Air Force has now relaxed its specifications to permit a C.E.P. of 3 miles and a re-entry speed of Mach 4 to Mach 6, with a rocket traveling at Mach 1 upon impact.

After a good deal of hemming and hawing on organization and budgets, the Air Force has now agreed that the program shall be carried out by an MED-type organization reporting to the head of the research and development command. The General Groves and the scientific head of the proposed organization have not yet been selected.

Until a few weeks ago, the Air Force had thought in terms of a $2 to $3 billion program, which might result in having 1,000 Ph.D.-type rockets with hydrogen warheads operational four to six years from now. However, less ambitious goals have now been set and the Air Force has agreed upon a billion-and-a-half-dollar program, which should give us a capability of 100 rockets and 20 launching sites during the same time.

The program has been approved by General Twining and Secretary Talbott. It has not yet been approved by the Department of Defense, but the Air Force is confident this approval will be secured.

The Air Force hopes to preserve extreme secrecy concerning this program.

Less than a minute and a half would elapse between the time this rocket re-entered the atmosphere and the time at which it would hit its target.

No interception techniques are known or even foreseeable.