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THE SECRETARY OF DEFENSE
WASHINGTON

7 October 1957

MEMORANDUM FOR THE PRESIDENT

SUBJECT: Earth Satellite

The first serious discussion of an earth satellite as a scientific experiment to be incorporated in the program for the International Geophysical Year took place at a meeting of the International Council of Scientific Unions in Rome, Italy, in October 1954. At this meeting which Russian scientists attended, a resolution was adopted recommending--"In view of the advanced state of present rocket techniques, ... that thought be given to the launching of small satellite vehicles . . . . . " We assumed at that time that the Russian scientists were innocently concurring in this resolution. It now seems likely that it was part of a deliberate plan.

We in Defense were concerned at that time about international reactions to a reconnaissance satellite that the Air Force was giving serious study to. It was felt that scientific satellites which would be clearly non-military and clearly inoffensive might help to establish the principle that outer space is international space. Thus, reconnaissance satellites traveling in it could not be objected to by the countries overflown because the space is free and the satellite itself is inoffensive in character.

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Pursuing this line of thought with our own scientists led to the adoption by the U. S. National Committee for the International Geophysical Year of a resolution recommending that the U. S. institute a scientific satellite program. This matter was considered at the highest government level with the conclusion that such a program should be pursued as part of IGY. Within the Government, responsibility for scientific aspects was assigned to the National Science Foundation. Defense participation would be to supply the rocketry needed to place such a satellite in orbit. Since such rocketry would follow the same general lines as our long-range ballistic missile developments, it was part of the stated policy at that time that the scientific satellite should not interfere with the top priority ballistic missile program. In line with the recommendations of the Scientific Advisory Committee that studied the matter at that time, the Navy's proposals were accepted, and the scientific satellite project was assigned to the Naval Research Laboratory as Project VANGUARD.

In order to meet the requirement that it be non-interfering with top priority ballistic missile projects, and for other technical reasons, the Navy pursued an independent course of rocketry involving improvements in earlier Navy high-powered rockets, as well as the development of new equipment.

The National Science Foundation worked with the U. S. Committee of IGY to formulate plans for the satellite as such and its instrumentation, as well as for the preparation and deployment of the ground observor equipment required for the program. To guide public relations in this area, a special sub-committee of OCB was established with representation from the White House, State, Defense, CIA, USIA, National Science Foundation and the National Academy of Sciences. On July 29, 1955, the White House announced that plans were going forward for the launching of small, unmanned earth-circling satellites as part of the U. S. participation in the International Geophysical year." The military participation in rocketry was de-emphasized as being incidental to the scientific program. All subsequent public releases have followed this same line.

The VANGUARD program was last presented to the NSC on May 10, 1957. The program outlined at that time contemplated the launching of certain test vehicles during the rest of this year and the launching of the first fully instrumented satellite vehicle about the end of March 1958. It was planned that certain of the earlier launchings would carry a smaller satellite sphere which would be placed in orbit and tracked as a check on the rocketry, instrumentation and ground stations. The earliest of these experimental part-size satellites is now scheduled to be launched about December 1, 1957. A current review of the Navy's programs indicates that from where we are today there would be little to be gained by

attempting to accelerate or substantially modify the VANGUARD program in an attempt to launch a satellite at an earlier date than now planned. At best, the changes that could be made would produce either marginal accelerations of schedules or high risk programs that would have a fair chance of failure. Somewhat similar remarks apply to the possibility of paralleling the Navy program with an Army program based on the REDSTONE missile. Since, in any event, the U.S. satellite would be second rather than first, it appears sound to adhere to our program as presently planned.

The satellite which the Soviets launched on October 4th was generally in line with the planning of the International Scientific Committee but deviated in certain respects, the most important of which was the change in the radio signal frequency which had been agreed upon internationally as 108 megacycles and which the Soviets abandoned for reasons of convenience and, no doubt, speed, substituting signals at much lower frequencies (around 20 and 40 megacycles) where their techniques were more readily available.

There is considerable intelligence to indicate that the Russian satellite work has been closely integrated with and has drawn heavily on their ballistic missile developments, including the range facilities. In fact, it seems quite likely that the ICBM test which they announced on August 27th and follow-on experimental work since that time was either

related to or even an integral part of their satellite program. Their scientists who came to Washington to participate in the IGY conferences on the satellite programs must have known when they left Moscow that the first Soviet launchings were scheduled for approximately October 4th. In retrospect, one sees that their whole behavior has been carefully planned to fit either with a successful launching or with a failure, depending on information that they would later receive from Moscow. The fact that what they claim was their first attempt was successful, and that it was timed perfectly in relation to the IGY conferences in Washington supports the thesis that this was all a very carefully laid plan to make maximum cold war capital out of their satellite program.

The satellite they have actually launched is said to carry only radio signalling instrumentation and, of course, this is all we have observed. They describe the satellite as being a 22 inch diameter sphere, about the same as our own, but claim that it has a weight of about 185 pounds as compared with our 21 pounds. This leaves some uncertainty as to whether what they are calling their satellite is not a combination of the 22 inch sphere and the last stage of rocketry required to give this sphere its orbital velocity. In our planning, we will separate the sphere from the last stage rocket. Another difference between the two plans is that the Russian satellite has been placed in an orbit averaging about 370 miles above the surface of the earth, whereas the U.S. VANGUARD plan involves

orbit in the range of 300 miles above the surface. Still another interesting point is that the Soviets launched their satellite on an orbit inclined about 65° to the equator (which is probably consistent with their ballistic missile range in Siberia); whereas our plans are to launch VANGUARD in an orbit only about 25° from the equator (which is consistent with our Long-Range Proving Ground layout southeast from Cape Canaveral, Florida). The orbit of the Russian satellite derives less advantage from the rotational velocity of the earth and is, therefore, a more difficult orbit requiring more powerful rocketry, other things being equal. If the 185 pounds is in fact the weight of the sphere, placing it in the Soviet satellite orbit 370 miles above the surface would require substantially more powerful rocketry than that planned for VANGUARD. This again is consistent with the thesis that the Soviets have used their ballistic missile rocketry which we know to be powerful enough to launch a satellite of the general character now being observed.

As we see it, two main cold war points are involved: (1) the impact on public imagination of the first successful invasion and conquest of outer space, and (2) the inferences, if any, that can be drawn about the status of their development of military rocketry. As to the former, we are face to face with the basic unfavorable fact that the Russians have been first. We can take the position, however, that our satellite program has been coordinated throughout with the International Scientific Community and that it has been programmed as a part of the International Geophysical

Year (July 1, 1957 through December 31, 1958). It can be pointed out that as to instrumentation and as to availability of ground observation points and other appropriate scientific arrangements, our launching schedule follows a carefully prepared plan. The question of the first country to launch is minor compared with the question of the success of the program in achieving scientific objectives. Moreover, the Russians agree that their first satellite falls short of scientific objectives and for this reason they propose to launch additional ones from time to time. Consistent with our international planning, we propose to continue with our plans and on our schedule.

As to the military implications of the Soviet satellite, the facts as indicated above appear to be that the satellite success does indicate competence in long-range ballistic missiles and does tend to corroborate their ICBM claim of August 27. Parenthetically, one might observe that the Russians, if they were sure that we would not start a war, could properly conclude that their speed in developing ICBM was not so important as to require non-interference from their satellite program. In other words, both their objectives would be cold war objectives, and they would therefore logically follow the program that would yield the maximum cold war results. In our own case, this logic would not apply, and our decision to make the VANGUARD program non-interferring with the

high-priority ballistic missiles was certainly reasonable at the time, even though it may appear questionable in retrospect. On this second point, our public position might well be that our own VANGUARD program was divorced from military rocketry as much as possible, and the fact that our schedules have not produced a satellite at as early a date as the Russians have succeeded in doing is without military significance. The rocketry we are using is completely separate from ICBM and IRBM rocketry. Other technical requirements than the mere production of high-powered rockets have controlled our schedules.

A proposed public announcement stressing these two key points is attached. (Given to Hagerty)

Attachment