Dear Bob:

The subject of very high yield weapons is of continuing concern to the Atomic Energy Commission. During the moratorium, major AEC developmental effort in this area was terminated, this action being in consonance with the known requirements of the Department of Defense. As you are aware, our largest yield weapon is the ------------------- -------------------. At the time of entry into stockpile, ------------------- represented our most advanced technology for the achievement of high yields within given weight and size limitations.

The purpose of this letter is to provide estimated present capabilities and limitations as well as our projected capabilities in high yield weapon development. (See enclosure 1 for detailed discussion.) As a result of the recent atmospheric series, the AEC has successfully pursued concepts which may lead to extremely high yields in relatively light configurations but with relatively large diameters. In view of these achievements, we have reviewed our capabilities and associated problems pending a decision to continue development of large yield devices. Dr. Johnson, ATSD(AE), by letter dated August 7, 1962, provided the AEC with the possible requirements of the DOD for nuclear weapon developments, including those which were being considered for application of high yield devices. Accordingly, our analysis has been made of our present and projected capabilities to develop weapons vis-a-vis the proposed requirements of the DOD. For your information, specific systems for which possible future requirements were considered are:

a. High yield PUFO bomb for the B-52 aircraft,

b. High yield warhead for TITAN II (without re-entry), and

c. High yield warheads and bombs for TITAN III, Saturn and the C-133B.

Our present nuclear capabilities to produce advanced high yield weapons can be categorized under three general areas. The first would be the result of refining and increasing of size and weight of conventional nuclear systems -------------------. It is perhaps in this area that
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this end. Although these are formidable problems, their ultimate solution is within the capability of the AEC. However, the cost of such a development program to date, and other weapon programs, must be delayed, or additional resources must be forthcoming.

Executive Decision

f. Presidential Approval. Implicit in the decision of an earlier administration is the requirement that Executive approval must be obtained prior to a major development and production effort to achieve a high yield weapon capability. Before expending our current program to such a major effort, we believe that Presidential approval should be obtained.

In summary, we wish to emphasize our confidence that the AEC can fulfill the many demands placed upon it if a decision is made for the United States to embark on a high yield weapon capability. However, we would also like to emphasize that a high yield weapon development effort represents a major financial and technical drain on our resources which we would be extremely reluctant to embark on unless a firm decision were forthcoming which would justify our effort. We realize that this is a complex decision one that will affect the necessary nuclear testing, as well as the establishment of firm requirements. With regard to nuclear testing, we could be ready for a test series as early as late summer or early fall of 1952. At this present time, these test preparations do involve the selection of technical designs and areas in which we intend to explore. To this end, your specific requirements, particularly in the area of high yield weapons, are, of course, solicited.

While the question of the military requirement for very high yield weapons is one for your decision, we are all aware that the USSR has a definite high yield capability, and the ensuing political-psychological advantages thereof are being exploited to the maximum. It may well be that more than purely military needs ought to be considered. I suggest, therefore, that we prepare a joint letter to the President raising the question as to whether we should have a high yield weapon capability, considering not only the military requirements for such weapons, but also the resulting political implications.

If you wish to discuss this subject further, we will be most pleased to do so. A copy of this letter is being provided to Mr. McGeorge Bundy.
FIRST GENERATION BOMBS

First generation high yield weapons would be...concept has provided...to provide weapons to the...rather firm dimensional and weight estimates. Current capabilities of the two nuclear laboratories on first generation weapons are as follows:

1. The Los Alamos Scientific laboratory has provided the following parameters on a conceptual high yield bomb:

   - **Yield (total)**: 100 kT
   - **Plutonium yield**: 20-30 kT
   - **Weight**: 30,000 lbs.
   - **Diameter**: 6 ft.
   - **Length**: 27 ft.
   - **Laydown**: 10,000 lbs. additional

   It is possible to vary slightly the stated weight and yield trade-off, but the extreme yield-to-weight appears to be...If a requirement materializes for a weapon of this nature, a test would be proposed at a later...A period of some ten to as much as three years would be required for development.

2. The LASL has also proposed a similar version of the above weapon configuration. It would be required to test such a development.

b. The Lawrence Radiation Laboratory has proposed a...at a weight of 20,000 lbs. (non-W70). The initial development period to ready such a device for testing would be about one year. With an additional period of time, further extrapolation...could result in a...device weighing about 30,000 lbs.

**Note:** Although each laboratory has used a different initial concept a comparison of the two approaches reflects that within the present state of the art it would be feasible to design...weapon in the 20,000 - 30,000 lb. weight class (non-W70).
Second Generation

a. was first demonstrated in the Pamlico event of Operation Domino. The gratifying results of this test opened a new range of possibilities in the design of high yield thermo-nuclear warheads, particularly in weights above 1,000 lbs.

b. has increased our confidence in this concept, as opposed to the more Current estimates of yields and weights which are achievable.

<table>
<thead>
<tr>
<th>Weight</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000 lbs.</td>
<td></td>
</tr>
<tr>
<td>18,000 lbs.</td>
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c. Several points should be noted.

Further, to develop any particular weaponised version will probably require at least two atmospheric tests - one experimental test at the approximate weight and yield, plus a prototype test. Lastly, it is estimated that at least a four year developmental period will be required to FFTO for any weaponised version.

Third Generation

a. To approach further the theoretical upper limit yield-to-weight ratio, it is necessary to
b. It is premature to predict capabilities in this area; however, a test involving this principle is planned for inclusion in the next series of atmospheric tests.

**Work Load**

The impact on the AEC development and production complex to initiate a specific high yield weaponization program is of considerable magnitude. This is understandable when one realizes the weights, volumes and types of materials being considered. Also, with respect to pre-production tooling, the AEC will have to establish new fixtures and equipment of magnitudes heretofore unknown insofar as nuclear weaponry is concerned. In summary, to produce high yield weapons will require a scope of effort much larger than any previous AEC weaponization effort.