Subject: Summary of Target Committee Meetings on 20 and 21 May 1915

1. The second meeting of the Target Committee convened at 9:00 AM 20 May in Dr. Oppenheimer's office at Site 7 with the following present:

   General Farrell  Dr. L. Leupold
   Colonel Searman  Dr. Haney
   Captain Parsons  Dr. Hendrix
   Major Perry      Dr. Van Norman
   Mr. Tolman       Dr. Witson
   Dr. Oppenheimer

   Dr. Bethe and Dr. Brooks were brought into the meeting for discussion of item A of the agenda. During the course of the meeting panels were formed from the committee members and others to pass in the afternoon and evening discussions to items discussed in the agenda. The concluding meeting was held at 11:00 AM 21 May in Dr. Oppenheimer's office with the following present:

   Colonel Searman  Dr. Stearns
   Captain Parsons  Dr. Tom Newman
   Major Perry      Dr. Hendrix
   Mr. Tolman       Dr. Perncy
   Dr. Oppenheimer
   Mr. Wilson

2. The agenda for the meetings presented by Dr. Oppenheimer consisted of the following:

   A. Weight of Detonation
   B. Report on Weather and Operations
   C. Gadget Setting and Landing
   D. Status of Targets
   E. Psychological Factors in Target Selection
   F. Use Against Military Objectives
   G. Radiological Effects
   H. Coordinated Air Operation

   (Continued on next page)
2. The speeds for the settings -- continued:

2.3.5.4.2.1. Operating Requirements for Safety of Aircrafts

2.3.5.4.2.2. Coordination with Host Authorities

3. Height of Detonation

A. The criteria for determining height selection were discussed. It was agreed that conservative figures should be used in determining the height since it is not possible to predict accurately the magnitude of the explosion and since the bomb can be detonated at any point in the atmosphere. The height above the ground where the explosion will occur should be the same as the bomb's altitude. It has been agreed that these should be prepared to meet the following possibilities:

(1) For the Little Boy the detonation height should correspond to a pressure of 5 atm, a height of the bomb's ejection of 1000 feet, and a magnitude of explosion of either 5,000 or 12,000 tons of TNT equivalent. With present knowledge the fuse would be set at 5,000 feet, the two equivalent a 5,000 foot equivalent would be used but testing for this would be available in case were known at the time of delivery. The height of detonation corresponding to 1,000, 2,000, and 3,000 feet and 5,000 feet, respectively.

(2) For the Fat Man the detonation height should correspond to the height of the bomb's ejection of 1000 feet, and a magnitude of explosion of 5,000 or 12,000 tons of TNT equivalent. With present knowledge the fuse would be set at 2,000 feet, the two equivalent a 2,000 foot equivalent but testing for the other values should be available at the time of final delivery. The height of detonation corresponding to 1,000, 2,000, 3,000, and 5,000 feet are 200 feet, 1,000 feet, and 1,500 feet, respectively. Testing will be used for this purpose.

B. In the case of the Fat Man delay circuits are introduced into the setup for other purposes which make the detonation of the bomb 200 feet below the height at which the fuse is set. For this reason as far as the Fat Man is concerned the fuse settings should be 000 feet, 1,000 feet, or 1,500 feet.

C. In view of the above it was agreed by all present that plans should be available at three different heights settings. These heights are 1,000 feet, 1,500 feet, 2,000 feet and 2,500 feet. With present information the 2,000 foot height would be most likely to be used for the fat man and the Little Boy. Later data presented by Dr. Jepson noting the above conditions on testing and detonating activities for the differential height for the Little Boy is 200 feet and for the Fat Man 500 feet, for this reason some of the work (which must be reported).
4. Resort to Dummy and Gliders

A. Dr. Donahue reported on the same subject. His report essentially covered the material in his Feb 22nd report of 3 day-2 reports "Advanced Report on Operational Procedures". For this reason his report will not be repeated here but is attached as an appendix. It was agreed by those present that the nations if at all possible should be a visual bombing mission. For this we should be prepared to wait until there is a good weather forecast in one or one of these alternative targets. There is only a 3K chance in this case that we will have to wait over 1000 hours. When the mission does take place there should be another aircraft over each of these alternative targets in order that an alternative target may be selected in the last hour of flight if the weather is unsatisfactory over the highest priority target.

B. In case the aircraft reaches the target and finds, despite these preparations that visual bombing is impossible, it should return to its base provided that it is in good operating condition. Only if the aircraft is in sufficiently bad shape that it is unlikely that it can return to base and make a safe landing or if it is essential that the drop be made that day should the drop be made with radar equipment. For this purpose it may be desirable to have an Eagle radar equipped airplane accompany the mission in order that formation bombing with the Eagle planes in the lead can be made to obtain the increased accuracy from range. A final decision as to the feasibility of this experiment procedure can only be made after further combat experience is obtained with Eagle aircraft. In any case every effort should be made to have the mission such that blind bombing will be unnecessary.

C. It was agreed that Dr. Stevens and Dr. Donahue should keep themselves continuously informed as to radar developments. If at any time new developments are available which show a marked improvement of accuracy the basic plan may be altered.

D. It was agreed that the plan for visual bombing even though this may require a one day to three week's delay success of the mission is such that for a pilot on the short range mission there will be at least three weeks until the mission is being carried out. The difficulty in this regard was foreseen by those present.

5. Refueling, Attaching and Lancing

A. It was agreed that if the aircraft is to return to its base with the refueling and if it is in good condition when it has reached there, it should make normal landing with the greatest possible care and with such preparations as to prepare the equipment being held on the ground. This operation will invariably involve some risks to the base and to the other aircraft parked in the field. However, the chance of a crash when the aircraft is in good condition and the chances of the crash initiating a large group explosion are both sufficiently rare that it was the view of those present that the landing operation the unit under these circumstances was a judicious one. Present landings in front and E.S. filled units have been made in the past. Training in landing the unit should be given to all men who can be on active unit.
In the event the aircraft returns at low altitude it may be necessary to "climb to speed". In the case of the little Air Force airplane, it would not be possible to "climb to speed" at the same time due to the limitations imposed by its altitude and the restrictions on its speed. However, it will be necessary for the little Air Force plane to avoid flying at low altitudes and to maintain a safe distance from the terrain. Therefore, it will be necessary to fly at a higher altitude, where there will be less risk of falling into a low altitude, but still be able to avoid flying at low altitudes. In the event of the little Air Force airplane flying at a lower altitude, it will not be possible to "climb to speed" in the same manner as the little Air Force plane, and the little Air Force plane will have to take a different approach to flying at a lower altitude. This approach will be determined by the specific conditions and limitations of the little Air Force plane.
5. It was the recommendation of those present at the meeting that the first four choices of targets for our weapon should be the following:
   a. Kobe
   b. Hiroshima
   c. Yokohama
   d. Kobe Arsenal

6. Mr. Stimson agreed to do the following: (1) brief Colonel Fisher thoroughly on these matters, (2) request reservations for those targets, (3) find out more about the target area, including exact locations of the strategic industries there, (4) obtain further photo information on the targets, i.e., (5) to determine the nature of the construction, the area, heights, contents and size of the target area. He also agreed to keep in touch with the above in the matter of the target area and to keep the positive surfaces of other possible targets. He will also advise on locations of small military targets and obtain further details on the Emperor's palace.
7. Psychological Factors in Target Selection

A. It was agreed that psychological factors in the target selection were of great importance. Two aspects of this were (1) obtaining the greatest psychological effect against Japan and (2) making the initial use sufficiently spectacular for the importance of the weapon to be internationally recognized when publicly on it is released.

B. In this respect Kyoto has the advantage of the people being more highly intelligent and hence better able to appreciate the significance of the weapon. Hiroshima has the advantage of being such a size and with possible fallout from nearby mountains that a large fraction of the city may be destroyed. The Emperor's palace in Tokyo has a greater face than any other target but is of lesser strategic value.

8. The Against "Military" Objective:

A. It was agreed that for the initial use of the weapon any small and strictly military objective should be located in a much larger area subject to blast damage in order to avoid undue risks of the weapon being lost due to bad placing of the bomb.

9. Radiological Effect

A. Dr. Oppenheimer presented a paper he had prepared on the radiological effects of the gadget. This paper will not be repeated in this summary but is being sent to General Groves as a separate exhibit. The basic recommendations of this paper are (1) for radiological reasons no aircraft should be closer than 3-1/2 miles to the point of detonation (for blast reasons the distance should be greater) and (2) aircraft must avoid the cloud of radio-active materials. If other aircraft are to conduct missions shortly after the detonation a monitoring plane should determine the areas to be avoided.

10. Coordinated Air Operations

A. The feasibility of following the raid by an incendiary mission was discussed. This has the great advantage that the enemy's fire fighting ability will probably be paralyzed by the gadget so that a very serious conflagration should be capable of being started. However, until more is learned about the phenomena associated with a detonation of the gadget, such as the extent to which there will be radio-active clouds, an incendiary mission immediately after the detonation of the gadget should be avoided. A coordinated incendiary raid should be feasible on the following day at which time the fire raid should still be quite effective. By delaying the coordinated raid to the following day, the despatching of our already contemplated operations will not be made even more difficult. Photo reconnaissance of the actual damage directly caused by our device can be obtained without confusion from the subsequent fire raid, and damage from radio-active clouds can be avoided.

B. Fighter cover should be used for the operation as directed by the 21st Army General.
11. PRELIMINARY

A. It was agreed by all that very complete rehearsals of the whole operation are essential to its success. It is possible for thirty (30) plane/ship units for this purpose to be shipped from the country in June with perhaps sixty (60) being shipped in July. These rehearsals over the Atlantic targets, use of fighter cover, etc., should take place in July. At least one of the rehearsals should be very complete including the placing of spotter aircraft over the alternative targets, use of fighter cover, etc. Even though it is hoped that radar will not be used these rehearsals of radar operations are required in order that the operations may be carried out successfully if emergency arises for which they are required.

12. OPERATING REQUIREMENTS FOR SAFETY OF AIRCRAFT

A. Mr. Fossey reported some very encouraging information he had just received from England in this respect. His previous information was that no one could guarantee the safety of a large aircraft at blast pressures greater than 1/2 lb. per square inch. However, since recent experiments in England have been flown over detonations of 2,000 lbs. of TNT and pilots have not objected to going as low as 500 feet. On this basis with a 100,000 ton total equivalent energy release of a 14,000 ton equivalent blast energy 20,000 feet would be a safe altitude on the basis of these experiments if allowance is made for the rarefication of the atmosphere at high altitudes. However, due to the greater duration of the blast in our case, the safe height will probably be somewhat greater.

13. COORDINATION WITH 21ST FLEET

A. This matter was included as part of the other discussion and is included in previous paragraphs of this summary.

14. It was agreed that the next meeting of the Target Committee should take place at 9:10 AM EST on 24 May in Room 6820 of the Pentagon Building in Washington. Dr. Oppenheimer recommended and others agreed that neither Harrell nor I or Dr. Haney should attend this meeting.

15. In view of the high classification of the minutes of this meeting it was agreed that copies should not be sent to those present but that instead one copy should be kept on file in General Groves' office, one copy in Dr. Oppenheimer's office, and one copy in Captain Parsons' office.

Major J. A. Darby
Dr. N. F. Reaney

Distribution:
Copy 1: Maj Gen L. R. Groves
Copy 2: Capt. Parsons
Copies 3 & 4: J. M. W. Neield

RECEIVED 30 JUNE 1945 FROM Maj FOB

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