together during the final training period.

A dummy target was to be laid out at some suitable place in the desert in such a way that the axis of attack might be simulated, and individual targets located in conformity with their actual position. In addition individual practice targets were to be available at all times to target force commanders. Briefing procedures, which are dealt with in a subsequent section of this chapter, were defined. Training was to be accomplished by target force commanders. Training policies and directives were to be the responsibility of the Special Staff.

The proficiency to be obtained was exactly set forth in the Training Plan. Individual crews were to be able to drop bombs at a level no higher than 300 feet with a maximum circular error of 100 feet, and to navigate at minimum altitude to the target with no greater than 5° corrective turns from the IP to the target. Flights, composed of six aircraft, were to be able to take off and form within 10 minutes, change from route formation to the six-ship company front during the turn from the IP to the axis of attack, bomb from a height of 300 feet, at most, specific targets assigned to individual aircraft with a circular error of not more than 150 feet in each case, and resume route formation subsequent to bombing with minimum individual aircraft maneuver. Target forces were expected to be able to take off and form in not more than 50 minutes, to change from route formation to four 12-ship company front waves during turn at IP to axis

of attack, to make corrective turn up to 5° in either direction when in wave formation without stretching out the formation, to pass over the target in not more than 30 seconds, to bomb individual targets with no greater maximum circular error than that allowed in the case of the six-ship flight, and to resume route formation after passing over the target. Each group commander was to see to it that each target force attached to his group received the maximum amount of training and maintenance aids.

A Training Program for minimum-altitude bombing was also produced to supplement the general Training Plan, just outlined.[12] The training in bombing was to be carried on by individual ships, by 3-ship elements, and by 6- and 12-ship waves. In the first instance, each bombardier was to drop a minimum of 10 bombs from an altitude of 100 feet and at an air speed of 190 to 210 miles an hour. Any available vertical target might be used. Unless the altitude at the target were definitely known and were in the immediate vicinity of the landing field the pilot should set his altimeter by flying over the target at a very minimum altitude. All runs on the target should be made from a minimum low-level approach of five miles. The pilot should concentrate on having his airplane in level flight at least three seconds prior to the release and especially should maintain level flight until the instant of release. While the first five bombs were to be released without correcting for personal error, the second five were to be dropped with corrections for personnel error as obtained from first five releases. Bombardiers

should direct the pilot over the center of the target by use of interphone communication. In the case of the three-ship elements, each bombardier was to drop a minimum of six bombs using personnel corrections as obtained from individual ship bombings. As in individual-ship bombing, the setting of the altimeter, low-level approach, and level flight at the instant of release of bombs were to be emphasized; however, in this case, bombardiers in lead ships only were to direct pilots over the center of target. Other ships were to fly close formation and release for range only. As for the training of 6- and 12-ship waves, each bombardier was to drop a minimum of 4 bombs, using personnel correction. The setting of the altimeter, low-level approach, and level flight at the instant of release were, again, factors of very great importance.

The construction of a dummy target was at once undertaken and completed just in time for the opening of the intensive training program. This was primarily the work of a RAF intelligence officer, W/C J. S. Streater, under the direction of Lt. Col. S. L. Brown, 835th Engineers. The dummy target was laid out in a remote section of the desert near Soluch, near Bengasi. A flat reproduction of the Ploesti targets was marked off, exact as to size, major details, and relationship of parts.[13] Anything available that would show up well from the air was utilized to delineate refineries. Contrary to an erroneous impression that has arisen, the individual targets were not constructed in three dimensions. Such a reproduction would have meant running the risk of identification by enemy photo-reconnaissance

planes, which frequently scouted the area from Cretan bases, whereas the dummy as actually devised was intelligible only to the initiated. Steel girders were set up at the corners of the range as markers and topped with mattresses to make them visible from the air. When pilfering Arabs carried off the mattresses they were replaced by strips of cloth which also disappeared. Finally, punctured five-gallon gasoline tins were put up with better results. The area of the dummy target was carefully guarded, only military personnel being allowed to enter. Its natural isolation helped to guard the secret it held. On 20 July, General Eisenhower reported to General Marshall that all training programs for TIDAL WAVE had been established and staff work completed.[14]

The intensive training period opened on Tuesday, 20 July, with the briefing of group commanders, leaders and deputy leaders. General Brereton was present to strike the key note of the mission in a brief, but highly effective, talk.[15] At the close of the talk the assembled officers were shown for the first time the briefing aids that had been prepared and were introduced to the officers who had been responsible for preparing them. Later on, pilots and navigators were briefed for the fuel consumption test to be made the following day.[16] The second day, likewise, was devoted to preliminary briefing, lecturing and discussion by groups on the following subjects: low-level formation; fuel consumption; low-level bombing, conducted by group bombardiers; methods of turning at low level; the practice target at Soluch.[17]

Having personally seen the project launched, General Brereton wrote to General Arnold, as follows: "Tidal wave training is well underway. I am thoroughly pleased with the attitude of all Commanders . . . and the planning has been excellent. We will have a plane for every combat crew available which will be 185. . . . I think every possible contingency has been considered, and feel confident."[18]

Meanwhile, maintenance work was being carried on, preparing the aircraft that had just taken part in the HUSKY operations for the flying and bombing training scheduled for TIDAL WAVE. The intensive training period, which opened on 22 July, lasted through 29 July, two days before D-day. Training proceeded according to plan. The employment of approximately 200 airplanes in a coordinated low-level attack required flying virtually wing tip to wing tip and wave close on wave. This could not be done by amateurs and was achieved only after strenuous effort. During the first 5 days, training was by units--individual aircraft, 6-ship formations, 12-ship formations, target forces, and natural combinations of target forces. These were arduous days of training, days in which pilots learned to fly their heavy aircraft just a few feet off the ground for miles and miles. Navigators learned new methods of direction-finding under novel conditions, and bombardiers, using the new type of bombsight, learned to bomb the targets with a rare degree of coordination and accuracy. Critiques and discussions were an outstanding feature of the training. By the end of this phase of the training, each man knew the section

of the target assigned to his crew perfectly, and target forces were able to fly over their targets with not more than 60 seconds elapsing from the time the bombs dropped by the first wave had hit the target until those dropped by the last had struck.

One of the crew members who participated in this training wrote of it as follows: "We ran approximately twelve missions over the replica of the oil fields, approaching, attacking and departing exactly as we intended doing on the actual raid. Each element was given a specific dummy target . . . and we practiced until we could bomb it in our sleep. When we finally did get over the real Ploesti, our movements were almost automatic."[19]

A matter that caused considerable concern was whether or not the target information was up to date. It was feared that new installations might confuse crews or that smoke from smoke stacks might obscure pinpoints. In order to minimize these possible difficulties, the aircraft in running up over the dummy targets timed their runs so as to coincide precisely with the number of minutes and seconds it would take to run up from such points as railroad tracks or river beds to their assigned targets.[20]

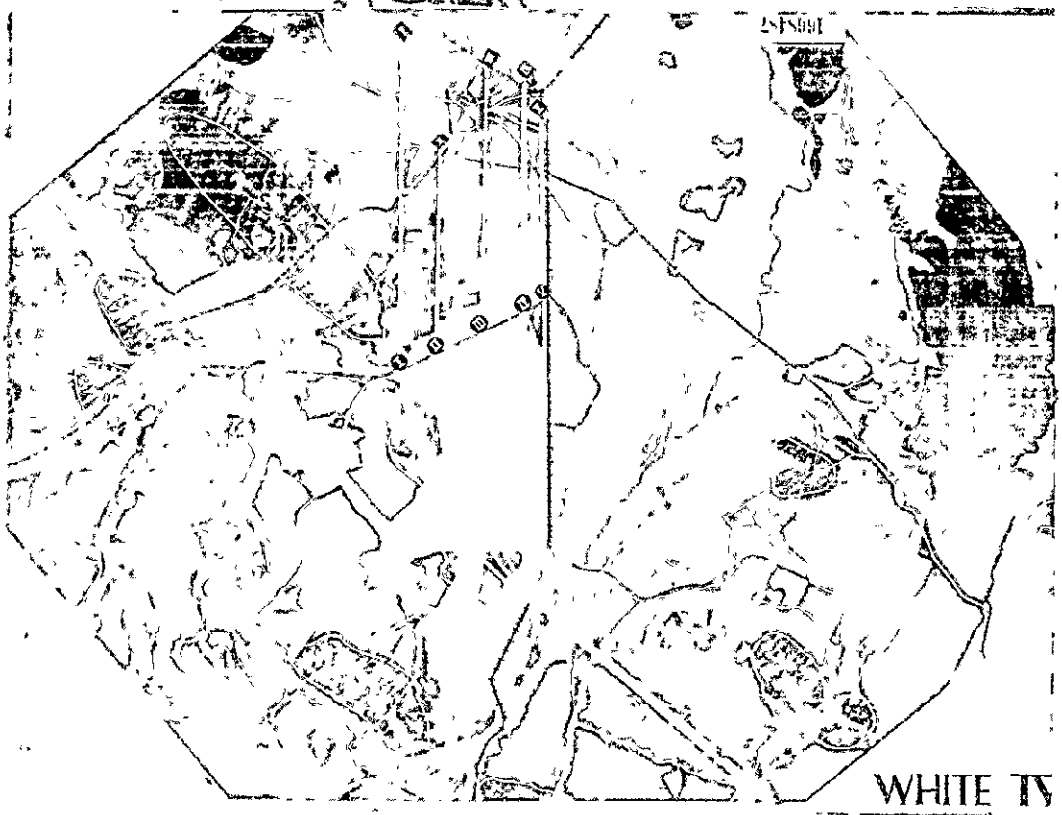
General Brereton returned to Bengasi on 28 July in order to be present during the last stages of training and at the time of the mission itself. On 28 and 29 July the entire task force participated in two great coordinated mock missions. In the final dry run the carefully planned operation was executed without a hitch. In less than two minutes the dummy targets were completely destroyed by the

100-pound delayed action bombs carried by each of the aircraft on that occasion.[21] Thus, the crews demonstrated their readiness. The last two days of July were devoted to final briefing and maintenance on the planes.

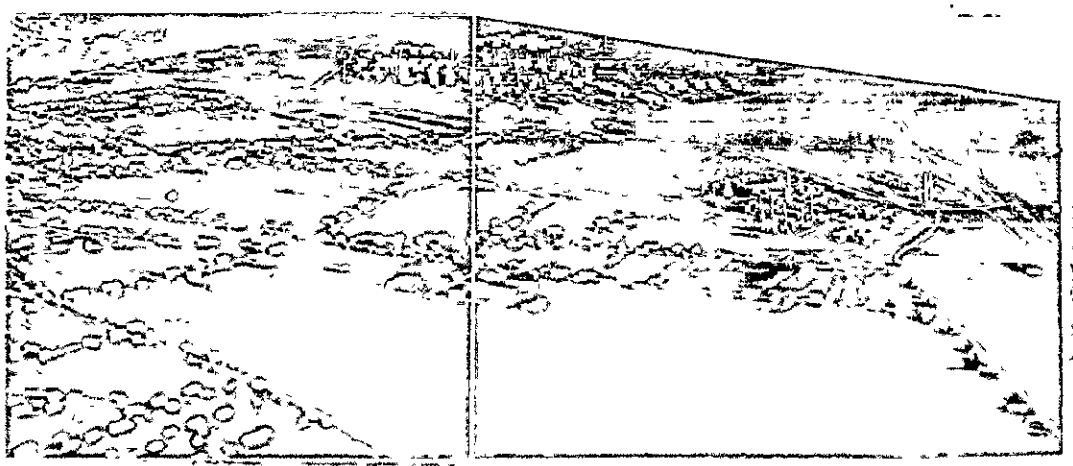
The training aspect of the Ploesti mission was dependent upon briefing. These two aspects of the preparation for the mounting of TIDAL WAVE cannot be separated for they closely accompany each other, step by step. This mission presented the most difficult briefing problem yet encountered by the Army Air Forces. Detailed instruction was required in order that the crews might recognize the pinpoint targets assigned them, yet aerial reconnaissance of the target was ruled out because of the danger of warning the enemy of the impending attack. The solution of this problem is a tribute to the ingenuity of the intelligence officers of the Eighth Air Force and of the RAF officers who collaborated with them in preparing the briefing data used for the mission.

The comprehensive Training Plan discussed above contained a section on briefing.[22] This declared that the success of the mission depended on each pilot, navigator, and bombardier having a thorough understanding of the entire problem. They should understand the importance of the destruction of the target, possess a knowledge of the complete target area and the general plan of attack, the method to be employed by their own target force, and the specific target assigned to their own crew. In order to accomplish these things, it was deemed necessary to prepare a single large briefing room where crews and flight leaders might obtain and study information relative

Liberators over African Base



Vertical Photo of the 1:50,000 Relief Model of the Ploesti Area Showing Routes of Target Forces. Taken from Target Sheet.



Oblique Photo of a Section of the Detailed Model of Ploesti Showing Targets White IV and V. From Target Sheet

to the project. In addition, each target force should have a room containing briefing material pertaining to its target alone. These briefing rooms or tents should be established early enough to enable all crews to study the problem thoroughly. One briefing crew was to be designated as the chief briefing unit for all target forces and it was to compile data and establish standard briefing procedure so that all forces, even though on separate airdromes, would receive identical briefing.

The following briefing schedule was adopted:[23]

20 July: Briefing of Group Commanders, Flight and Deputy Leaders. General Ent /General Brereton?/ was to open the briefing by describing the significance of TIDAL WAVE in relation to the current war situation. A briefing film was to be shown. Major Geerlings was to describe the whole operation, making use of his target material and the Medmenham models. The leader of the operation was to describe the defenses of the target in relation to surprise attack.

24 July: The TIDAL WAVE film and pictures were to be shown to officers of the crews.

29 July: Enlisted crewmen were to see the film.

29-30 July: Major Geerlings was to describe the entire operation to officers of each flight and also speak of the defenses in relation to the attack.

31 July: Final briefing was to take place. Group Commanders were to repeat General Brereton's description of the significance of TIDAL WAVE in relation to the current war situation. A final checkup was to be made on target details. The film was to be shown again if considered necessary.

Security Lectures: Intelligence officers were to insure that all crews were thoroughly security trained before the mission.

It appears that this schedule was closely adhered to.

The officers especially concerned with the briefing were Lt. Col. P. S. Zuckerman, assistant intelligence officer of the IX Bomber Command; Lt. Col. W. L. Forster, of the Combined Chiefs of Staff, Washington, an Englishman who had lived at Campina and who for about eight years had operated the Astra Romana refinery at Ploesti; W/C J. S. Streeter, RAF intelligence officer; Maj. G. K. Geerlings, target expert and intelligence officer of the Eighth Air Force; and Capt. M. G. Phipps.[24]

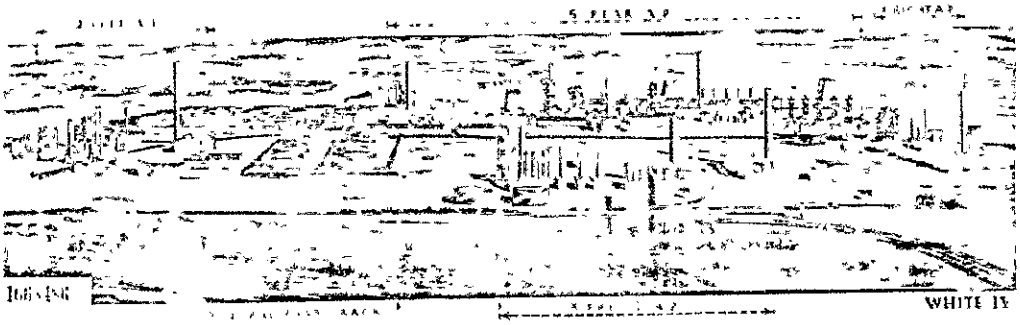
In the absence of reconnaissance photographs, it was necessary to sift an enormous amount of material for detailed briefing data concerning the mission and to interview numerous individuals who had firsthand knowledge of the Rumanian refineries. One of the best sources of intelligence data was the Admiralty Library at London, which maintained a catalogued file of thousands of photographs, clippings, etc., collected since the opening of the war.

The briefing materials employed in connection with the TIDAL WAVE project fell within four classifications: maps, models, illustrations, and prepared information.[25] The maps included a small-scale map of the entire route of flight to and from the target, a large-scale map of the Ploesti area and one of the general region of Campina, together with various small-scale maps of eastern Mediterranean regions where aircraft might be forced to land. Five models were constructed. Those of Ploesti, Brazi, and Campina were on the scale of 1:50,000, while models of the general areas of Campina and Ploesti were on the scale of 1:500,000 and 1:100,000 respectively.

The illustrations consisted of photographs, drawings, target sheets, target maps, pictures, etc. Information was assembled on a wide variety of subjects pertaining to the refineries and the general area: RAF information sheets on individual refineries; detailed descriptions of the route from Pitesti to Ploesti and from Pitesti to Campina; notes on Rumania; memoranda on suggested ways of escape from Rumania, and conditions affecting escape in the Balkans; a phrase list for Balkan countries; a list of available airdromes; and a briefing movie. Certain of these briefing aids were so unusual or important as to call for special description.

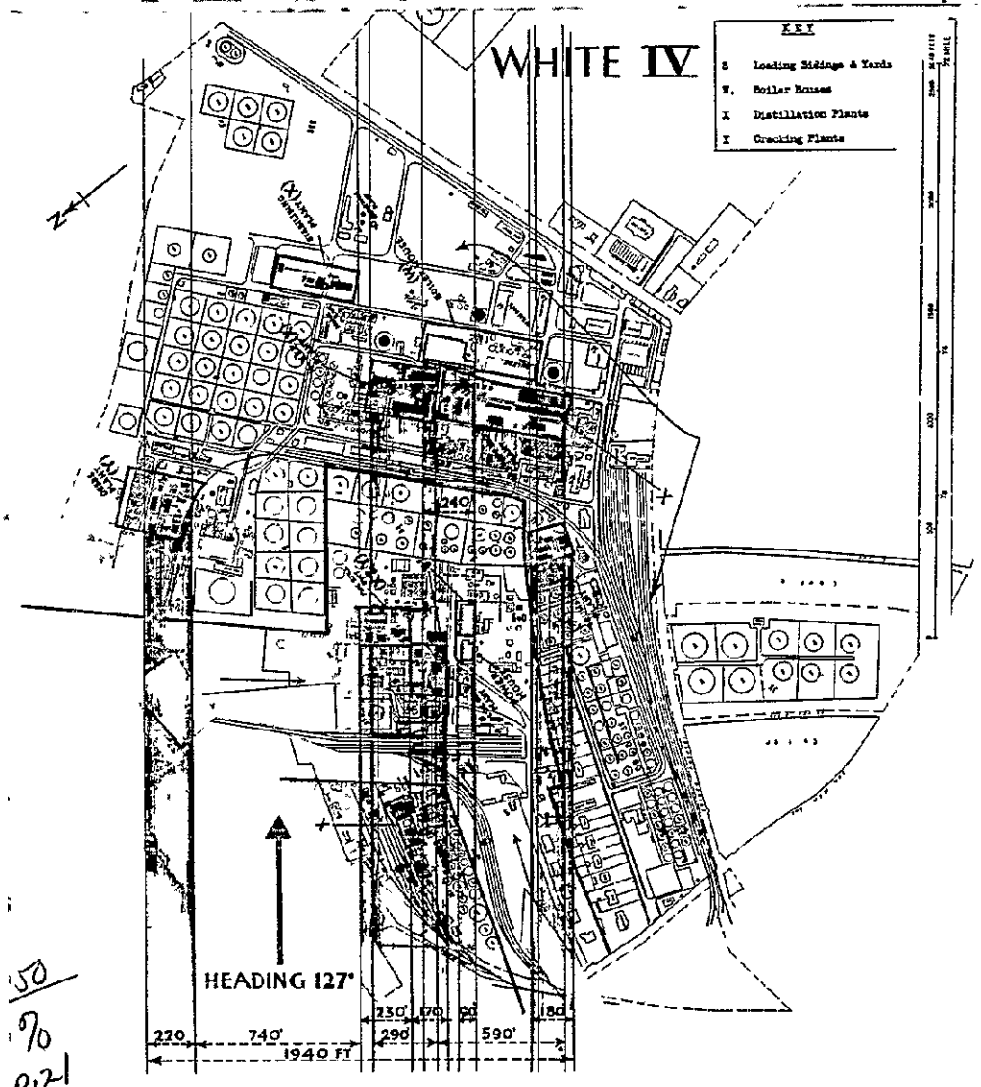
A new navigational aid was a map measuring about 23 inches square which was so pasted together and folded as to make it unnecessary for the navigator to use a series of separate maps. A printed strip 6 1/2 inches wide and 33 inches long was fastened with paper clips along the left edge of the navigational map, consisting of 11 details, drawings, and photographs of the main check points along the route. Three narrow columns along the right edge of the map were provided for the navigator's log, under the headings "Distance in miles," "ETA and Altitude," and "Magnetic Headings."[26]

One of the chief aids rendered by the RAF was the construction of various scale models of the targets and relief maps of surrounding areas. These models, constructed within one week, were transported to North Africa by airplane. There they were made available to the crews who were expected to familiarize themselves thoroughly with them. Thought and care had been exercised in planning for the mission



1668486 WHITE IV

[illegible] Target White IV As It Would Appear Only a Few Hundred Feet Away. From Target Sheet.



50
0/0
p.21

1668485

Diagram of Target White IV Showing Pinpoint Targets and Plan of Attack. From Target Sheet.

and thereby served to emphasize its significance, for never before had crews been provided with carefully constructed models for study on their own airfields.[27]

Under Major Geerlings' direction target folders were prepared of unexcelled merit. Their principal feature was a new type of perspective drawing of each refinery. Each crew was supplied with its own target folders, including target map sheets upon which were printed photographs of the drawings and oblique views of the various models to show how the target would look to each crew coming in on correct heading at minimum altitude at varying distances from the target. On the reverse side was a large-scale, detailed plan of the target area. In view of the fact that the available materials were often inadequate a great deal of imagination, as well as patience, had to be exercised in preparation of these aids. Nevertheless, the bombardiers who carried out the attack and the photographs made during and subsequent to it all attested the accuracy of the sketches and models.[28]

Details of aiming points for each bombardier were prepared. Sometimes portions of the comprehensive perspective view were adequate; again they had to be amplified by more detail. Bombardiers were briefed to look only for structures which stood up well into the air, and to disregard low-lying ones. The bombardiers had all their necessary data on two pieces of paper: the target map sheet and the detail of the aiming point.[29]

A unique and highly effective briefing aid was a 45-minute movie, the fruit of the combined labors of British and American officers over a period of three weeks. It presented intelligence material that had been carefully gathered and sifted over a period of several months. The movie fell into three general sections. An introductory section set forth general information of interest to all participating crews; the second section was of interest primarily to navigators and pilots; and the final one was addressed to bombardiers. The general impression created by the film was that the job was a tough, although by no means an impossible, one and that its importance justified taking any risk. The crewmen were told that they could not see it too often, and were asked to digest it in detail. It was so arranged that pilots, bombardiers, and navigators could simultaneously study those portions of the film that were of special interest to themselves alone.[30] The principal purpose of the movie was to insure uniformity of briefing and the omission of no important information.

Much of the time devoted to briefing was spent with specialists in intelligence and low-level bombing. The crewmen were taught the rudiments of oil refining, what the key installations were, and how to put them out of commission. Both slow and fast movies were made of the model oil fields, and these were shown to accustom the men to the appearance of the refineries when approached by a low-flying plane. Time was also spent discussing the problems of low-level

bombing and the reasons for it. Pertinent phases of international law were expounded. The men were told to let themselves get captured if they had to land in enemy territory and then try to escape. If captured in civilian clothes after having first been captured as soldiers they might expect only to be interned again, but on the other hand, if captured for the first time in civilian dress they might be shot as spies. They were supplied with various equipment which might aid in their escape, purses containing U. S. money and money of the countries in which they might be forced to land,[31] small steel files, compasses, etc. While it was suggested that it would be useless for them to carry revolvers because they would not be able to use them, this was apparently left to their own discretion.[32]

In the beginning the reaction of the individual crew members to this unusual mission had been lukewarm, at best. It seemed too radical. When the whole matter was laid before them, however, and its importance explained, earlier doubts gave way to enthusiasm. The elaborateness of the briefing data created the impression that the mission was in a class by itself; for no other had there been a movie, models, and so much briefing material. It has been suggested that the results might have been better if the officers had not been acquainted with all the briefing data until 5 to 4 days before the mission was to be carried out, instead of 12 to 8 days. As it was, the planning committee observed that toward the end there were questions indicative of worry, especially concerning the hazards of

flying through a balloon barrage.[33] However, a feeling of confidence was restored by the presence of General Brereton and Air Chief Marshal Tedder the day before the mission. They, together with General Ent, made the rounds of the camps that afternoon and evening addressing words of encouragement to the men and emphasizing the importance of the undertaking. Tedder spoke as follows: "I'm proud to be here with you just before this job. I want to wish you the best of luck in it. It's a hard, dangerous mission. It will take all of your famous American courage and resourcefulness."[34]

In the end it was difficult to determine who should be allowed to go and who should be left behind.[35] This, despite the fact that the hazards were openly admitted and "the crews' unofficial estimates of their chances ranged between fifty per cent and 'suicide'."[36] Colonel Smart, speaking from experience, declared:

> I am convinced that no operation, however hazardous it may be, is too dangerous for the American combat crew member to willingly undertake so long as he knows the target he is attacking is well worth the effort expended and the lives and the material that may be lost in accomplishing its destruction. Our crews are brave, but they are also smart. They cannot be fooled; nor must we ever underestimate the danger involved in any mission on which they may be sent. Such is entirely unnecessary. We need only to convince them of the importance of the Target and impress upon them the fact that they are being given a task which cannot be accomplished by any other means and that their accomplishment of the task, even if heavy losses are sustained, will eventually result in the saving of lives.[37]

While this intensive training and briefing were under way, maintenance was also playing its highly significant, if less spectacular,