APPENDIX C

Inclosure No. 2 to G-2 PIR No. 172

ORDER OF BATTLE HIGHLIGHTS PERIOD 3024001-3124001 DEC

Note: Articles contained herein are published for informational purposes only and have not been confirmed unless otherwise indicated.

ROK I CORPS

ROK Capitol Division	5 PsW (on 30 Dec 50)
ROK 9th Division	26 PsW (vicinity DS3194 on 30 Dec)

Above 26 PsW were reportedly from the 12th NK Division

ROK II CORPS

ROK 3d Division

2 PsW	12th NK Div vicinity DS0955 by 23d ROK Regiment.

1. Above PsW from 12th NK Division stated that elements of their division were located vicinity of capture and were continuing movement to the west.

2. 22d ROK Regiment reported that the entire 10th NK Rifle Div of approximately 4,000 troops was located vicinity DS2290 as of 3114551 and was preparing to move south. The source of this information was reported as PsW.

Comment: Location of above unit is now accepted.

3. One (1) PW captured in the ROK 3d Division sector on 27 Dec, identified the 50th Regiment, 15th NK Rifle Division.

ROK III CORPS

A Chinese officer PW from the 66th CCF Army captured by the ROK 31st Regiment during patrol contact on 30 Dec, reported previously, also identified the 196th Division and stated that the army was deployed opposite the west front of the 2nd ROK Division with 2 divisions on line; 196th Division east and 197th Division west with the 198th Division in reserve. According to field orders read to PW and other officers of the 66th Army on 27 Dec, the 196th Div was to spearhead attack of the 66th Army. Further, that the 42d CCF was deployed to the west of the 66th CCF Army with the 50th CCF Army deployed to the east. PW also

mentioned during preliminary interrogation, heretofore unreported 2nd CCF Army Group (First Field Army) with strength of about 120,000 troops and fifth CCF Army Group (Second Field Army) with approximately 160,000 troops. These units, according to PW, comprise the secondary assault force and are at present located along the Chongchon River.

US IX CORPS SECTOR

ROK 6th Division

1 PW (CCF)	3d Bn, 339th Regt, 113th Div, 38th CCF Army, vicinity CT3117

Above Chinese PW stated that according to an announcement made by his Company Commander at 3022001, the 38th CCF Army had completed preparations for a general offensive which would begin on night 31 Dec 50 - 1 Jan 51. Also that the 38th CCF Army will attack with 3 divisions abreast with regiments positioned in depth in coordination with the 40th and 42d CCF Armies. Further that the 42d CCF Army will constitute the lead echelon followed by the 38th CCF and 40th CCF Armies, respectively. A 7-day supply of rations was procured locally for each individual, according to the PW.

US 2d Division

US 23d Regiment	25 PsW vicinity DS0458

Preliminary interrogations of 1 PW (NCO) from above group, identified 3d Regt, 12th NK Div. This PW stated that mission of the 12th NK Div, II NK Corps, as of 20 Dec, was to break through UN lines, join active guerrilla bands operating in rear of friendly positions and conduct guerrilla warfare. Objective of the 3d Regt, 12th Div, as of 26 Dec, was to seize Wonju, according to this PW. The 2d and 3d Regts, this division, were preceded by the 1st Regt, the PW added.

Comment: Based on this report, the presence of this division in the general area of Hoengsong is now tentatively accepted.

APPENDIX C, ANNEX 2

THE 66TH CCF ARMY AT TAECHON,

KOREA, AS AN ATOMIC TARGET

GENERAL

1. The village of Taechon, Korea, and outlying hills on 25 November 1950 was thought to be the encampment of the 66th Chinese Communist Army. This army was known from a composite of intelligence sources to be made up of the 196th, 197th and 198th Divisions.

2. If deployed according to friendly intelligence, this force could have been destroyed as a coordinated, functioning army during the night of 25-26 November 1950 by a single air burst atomic bomb.

3. An intelligence efficiency rating of low order only can be assigned to this intelligence situation. Supplemental and confirmatory sources should have been sought to improve the rating. However, this study can be useful to illustrate the effects of employment of atomic weapons.

THE ACTION

4. At 241000 November 1950, a coordinated attack was begun by all UN forces on the line: namely, the I and IX US Corps and the II ROK Corps. Within and near the enemy area faced by the I Corps, certain key points along a line roughly parallel to our own were anticipated as probable centers of enemy resistance. These points were centered around Chongju, Taechon, and Unsan. If the enemy were strong enough only to contain our own line he might have been expected to try to prevent our breakthrough at any one place and thus might have been expected to erect moderately strong forces at strategic points along the entire line, as for example, at the three points given. On the other hand, if he commanded a superiority of force such that he could risk and, in fact, exploit a penetration of our forces along some part of the line, he might not have tried to hold the line equally at all points. He might, for example, deliberately have left Chongju weakly held to invite an overextention of our left flank,

later to cut it off.

5. Which of these plans might have been adopted by the enemy at the time of our attack on 24 November 1950 could not be known, for we did not know what strength he had committed. Our whole attack was, in fact, a reconnaissance in force to determine on what scale he intended to commit his forces.

6. However, our aggressive action began to disclose his plans and capabilities immediately. We occupied Chongju quickly and with little resistance. Taechon was strongly defended on the east, but no enemy forces above patrol size were observed anywhere between Taechon and the west coast. This major sector was being left open but not without enemy reconnaissance to follow our moves. Meanwhile, the enemy was countering with strong pressure throughout the hilly and mountainous regions along our IX and II Corps lines, remote from the coast.

FRIENDLY INTELLIGENCE

7. The 12th Regiment of the 1st ROK Division had moved to positions south by east of Taechon and about five miles distant, as shown in Figure 1 which depicts the whole situation. "Civilian" patrols from this regiment were in Taechon during the daylight hours of 24 November. They observed no enemy. However, by daylight of the next day similar patrols reported having observed for seven hours during the night the passage of enemy forces along the road from Kusong, which lies northeastward, into Taechon. At 250530 November, a Chinese captain, S-2 in his regiment, deserted and was delivered to the CP of the 12th ROK Regiment.

8. The Chinese captain was interrogated at this CP and at higher headquarters during the day. His whole story finally was delivered to the Headquarters, I Corps, at 252000, 15 hours after his desertion.

9. A B-26 bomber strike with 260-pound fragmentation bombs was directed immediately thereafter against Taechon by I Corps, largely because of information given by the deserter--which was, however, seemingly corroborated by information from certain other sources.

10. The Chinese captain reported the 66th Chinese Communist Army to be deployed at the time of his capture in and immediately north and east of Taechon.[1] He named three

[1] Interrogation Rpt 528-HISPI-0140, 26 Nov 50, Hq I Corps, 528th Military Intelligence Service Platoon.

divisions as forming the 66th Chinese Army. He gave the deployment of these divisions in detail. One regiment was east of the rivers, presumably the force which restrained the 11th ROK Regiment there. The remainder of the army was deployed in and north of Taechon, as indicated roughly in Figure 1.

11. This officer further placed the 39th Chinese Communist Army in and around the village of Majang-dong, northwest of Taechon by about five miles, and the 40th Chinese Communist Army along the Kusong-Taechon route. His deployments of the 39th and 40th Armies were only roughly indicated and not given by divisions.

12. The deserted asserted that the enemy plan was to let us by-pass Taechon and then to cut off the forces doing so by means of the Chinese Forces hidden there. Such a plan obviously fitted the pattern of enemy resistance already described. Strong action immediately east of Taechon presumably was meant to conceal the true enemy concentrations until our own forces had surged forward west of Taechon.

13. Further information bearing on the target was adduced. At 251800, "civilian" patrols sent into Taechon from the 12th ROK Regiment were still absent and one hour overdue. Three prisoners were taken by the 11th Regiment on 25 November, but their report was not available for this paper.

14. Sharp location, definition, and description of the Taechon target as given was largely and critically dependent upon the deserter. Descriptions of it as an atomic bomb target must, therefore, rest upon his credibility. The other information, while it may be taken as wholly factual, was only corroborative. It was not fully adequate to define an atomic bomb target.

15. The deserter's credibility rests on five factors:

(1) His own demonstration of the existence of enemy forces in the given area.

(2) His evident intelligence and ability to comprehend such military plans and operations as he described.

(3) The frank and unequivocal presentation of his information.

(4) Polygraph tests to which he was subjected.

(5) His studied ideological reasons for defecting.

16. His credibility may be questioned on a single factor, i.e., his mislocation of the 40th Chinese Army. From prisoners captured on 26 November, this Army was known to be in the IX Corps sector. However, this error in the location of the 40th Army may, of course, be easily explained. His information about his own 66th Army would have been derived from direct physical association with it. His information about the 40th would have been necessarily far less direct and, therefore, subject to contradiction by orders and actions occurring without his knowledge.

17. It therefore may be assumed that the Chinese deserter did make it possible to discover an excellent target for atomic bombs. It also may be assumed that this was more than a target of opportunity. As a result of our own aggressive action, it became an enemy concentration and as such it might have been more fully exploited had suitable weapons been available.

FACTORS BEARING UPON USE OF ATOMIC BOMBS OVER TAECHON

18. It is possible to indicate roughly what the physical and tactical effects might have been had an atomic bomb been used on the Taechon target. Specific factors that would have borne critically upon its employment and effectiveness were:

a. Area of the concentration.

b. Number and deployment of forces within the area.

c. Best time of day to catch personnel off guard, and time available after discovery for employment of weapons.

d. Effective cover in the forms of field fortifications, clothing, native huts, natural growths of trees and brush, and hills.

e. Weather conditions at time of burst.

f. Bomb energy and height of burst to achieve desired effect.

g. Safety of friendly troops as dependent upon distance, weather, bomb energy and height of burst, cover available, and forewarning.

APPENDIX C
Annex 2

WEAPONS

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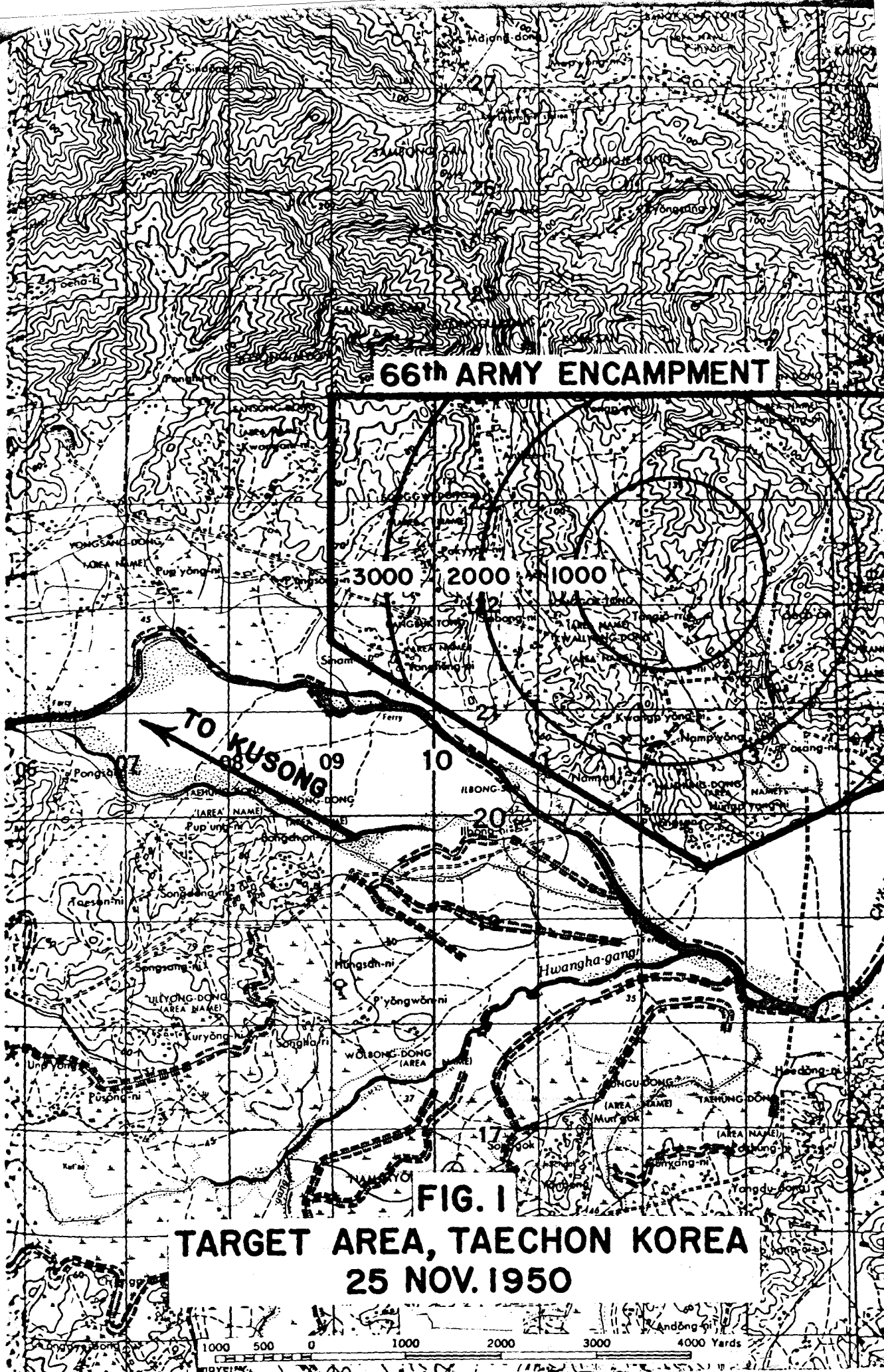


FIG. 1

TARGET AREA, TAECHON KOREA

25 NOV. 1950

h. Means available for providing the weapon, coordinating each step in its employment, and finally placing it on the target at the desired time and with the required accuracy and reliability.

19. Each of these factors will be treated briefly in order. The study that follows does not apply either to the 39th or the 40th Chinese Army for lack of definiteness in the deserter's information concerning them, and for lack of corroborative information.

a. The size of the 66th Army concentration, as indicated in Figure 1, is about eight square miles. The target represents a sufficiently compact area to require only one 40 KT bomb properly placed.

b. Since rough estimates of the over-all 66th Army strength made by I Corps at the time of discovery are consistent with and substantiated by later, more dependable estimates, the latter are quoted herein. The post-target analysis will thereby reveal more accurately what the atomic bomb might have accomplished. Meanwhile, the choice to use the bomb could have rested solidly upon the less certain estimates then available. The personnel strength of the 66th Army in Korea was reported in December 1950 to be 23,900. 2/ This figure does not include army headquarters personnel. In the cited DIS, the corresponding figure for a Chinese Communist Army at full strength is seen to be 33,000 (not including 5,500 headquarters and army troops). Hence, the 66th Army was indicated to be at 72 percent of full strength. The DIS gives regimental strength as 3,243. If regimental strength in the 66th was at the same level as army strength, each regiment would have had about 2,400 men. Since one regiment was east of the rivers, the total force within the target area west of the rivers was indicated to be about 21,500. The deserter's overlay indicated a quite uniform deployment within the given area.

c. Since the North Korean and Chinese Communist armies have shown a marked tendency to operate at night and to seek cover during the daytime, the maximum effect in the employment of atomic bombs against their personnel is probably to be achieved by night-time use. During this time they are most likely to be up and moving about, even when in bivouac. To have achieved the advantage of a night-time atomic burst over the Taechon target without delaying a full twenty-four hours longer, delivery of the weapons would have had to occur within about nine hours of the time when full

2/ Daily Intelligence Summary No. 3005, 1 Dec 50, GHQ, FEC: NKA and CCF Estimated Strength, Chart A.

intelligence reached I Corps.

d. (1) Presumably a strike at night-time would have been favored, because the Chinese troops would not then have been in their individual shelters which consisted largely of Korean huts and some foxholes and trenches. 3/ This was the second occasion on which Taechon had been occupied by the enemy for active defense. Temporary field fortifications consisted of slit trenches and numerous foxholes on the north side of the river. To catch the enemy out of his foxholes and trenches would have favored the destructiveness of the atomic bomb in all three of its manifestations.

(2) The heavy, padded cotton uniform of the Chinese soldier would offer him substantial protection from thermal radiation. In a dry condition, this uniform would require for ignition about 10 to 12 calories per square centimeter. His fur cap would be more readily ignited, but it could be discarded readily. His uncovered face, neck, and ears would have been subject to serious burns at about 5 calories per square centimeter. His feet in canvas shoes with padded soles would have been subject to injury at about 15 calories per square centimeter. The over-all effect of thermal radiation on a Chinese soldier in the open can thus be seen to depend a great deal upon his posture with respect to the bomb as well as his distance from ground zero.

very. Chemical analysis !

(3) Whereas the thatched huts of Taechon and elsewhere within the target area would give virtually complete protection against thermal radiation, they would be a blast hazard to occupying troops in regions where the blast over-pressure equalled or exceeded 4 psi. Figure 1 shows the incidence of such huts.

(4) The low hills north of Taechon have a sparse cover of scrubby trees which would be adequate for partial concealment of infantry in battle. However, in the situation under study they would have afforded little thermal protection and would have added to the blast hazard.

(5) Hills within the target area did not exceed the elevation of Taechon by more than 440 feet. The only part of the target area which would have been screened by hills was the upper right corner consisting of about five percent of the total area.

3/ MRIR (Mission Review Intelligence Rpt) No. 730, 25 November 1950, on photo-reconnaissance mission 8 TRS R 1769-B.

(6) The effects of gamma radiation would have been little influenced by the type of cover described except in the cases of foxholes and trenches. Foxholes and trenches are largely ruled out in this regard by the choice of a night burst.

e. The weather over Taechon on the night of 25 November was nearly ideal for the employment of an atomic bomb. The visibility was good. Conditions were calm. There was a nearly full moon. Delivery of the weapon would thus have been facilitated; the effects of blast and thermal radiation would have been at and near maximum values respectively. Uniforms and combustible materials would have been dry since there had been no rain for several days.

f. Analysis of over-all weapon effect indicates that one 40 KT atomic bomb air burst at about 3,500 feet above ground zero as shown in Figure 1 would have sufficed to knock out the 66th Army (see paragraphs 20-25 for detailed damage estimates). Moreover, an error of 500 to 1,000 yards in ground zero would not have materially affected the tactical result.

g. Friendly forces in the vicinity of Taechon were out of range of the atomic weapon. The 11th ROK Regiment was on high ground about seven miles from the chosen ground zero. The 12th ROK Regiment was about five miles away.

h. It is clear from Appendix F that a bomb could not with certainty have been placed over Taechon within the desired time and with a high assurance of the desired accuracy. This analysis, therefore, graphically portrays the necessity of speeding up intelligence operations, of reducing bomb handling time below present capabilities, and of increasing the accuracy and dependability of all-day, all-weather employment.

PROBABLE RESULTS OF 40 KT BOMBS ON PERSONNEL

20. The disposition of CCF forces is shown on the overlay for Sheets 6233 I and 6333 IV, KOREA (A.M.S. Series L751), of the previously mentioned chart. The target area is an irregular polygen with corners at about (YE090217), (26197), (150205), (150240), and (090240). The position chosen for ground zero is (123223).

21. The physical effects may be approximated by use of data and methods given in Appendix A for a 40 KT atomic bomb burst at a height 3,000 to 3,500 feet, considered optimum against personnel in the situation presented on a clear day of about 12 miles visibility.

22. From a Chinese Communist army of 23,900, there were about 21,500 troops in this target area where about 70 percent atomic bomb casualties would have been expected. Of these, about half would have been killed and the other half incapacitated and removed from action for varying periods of time. In other words, the timely delivery of an atomic bomb against the 66th Chinese Army on 25 November 1950 should have produced total casualties of about 15,000 --more than sufficient to disorganize and defeat this army. A delivery accuracy of 1,000 yards would have been sufficient for good coverage of the target shown in the overlay, Figure 1.

23. The 66th CCF Army had no armor, so no estimate is made of protection which might have been afforded to personnel by armor.

24. No attempt is made to analyze the damage to materiel that might have resulted from use of the atomic bomb. The results of such an analysis could affect little the tactical result from personnel casualties.

TACTICAL EFFECTS

25. Obviously, the physical effects on personnel, as deduced, would have completely destroyed the 66th Chinese Communist Army as a functioning military organization. Moreover, each of the three divisions would have been similarly destroyed and probably, also, all of the regiments with the exception of the one east of the rivers. However, even this one regiment would have suffered minor casualties from thermal burns and secondary blast traumata.

26. Such losses to the 66th Army as those indicated would have represented a significant proportion, namely 10 percent, of all CCF confronting the Eighth Army at the time. 4/ Moreover, such dangerous concentrations of the remaining forces as might have existed in this sector and elsewhere would probably have been deployed by the enemy forces. The probable elimination of his will to risk large concentrations, plus the continuing possibility of inflicting further damage of this sort, might have made a continuation of the UN offensive begun on 24 November possible without risk of serious loss to our forces through the action of large, concealed enemy forces. Such forces did blunt and destroy our initial offensive beyond the Chongchon River as, for example, the 39th Chinese Army at Unsan. The threat of these forces plus intensive line action by the enemy stopped our

4/ See Chart B of Daily Intelligence Summary No. 3005, 1 December 1950, GHQ, FEC.

second offensive.

CONCLUSIONS

27. The Taechon target is one example of a remunerative target for the atomic bomb found during battle at an early enough time to permit its destruction--provided intelligence and operational procedures were improved, amplified, and speeded up.

28. Crucial to the discovery of this target was the capture of an enemy officer who chose to desert his own national army and to assist its opponent.

29. Further steps should have been taken by our G-2 in the effort to confirm or disprove the existence of the target had atomic bombs been available and their use contemplated. In fact, such steps should have been undertaken in the situation as it did occur. The necessary steps would have been greatly facilitated by a better coordinated and speedier use of the information that was available.

30. This example suggests that military intelligence may possibly be so directed upon the problem of using atomic bombs in support of field forces as to make that use an effective one.

31. This example probably demonstrates that even if the CCF is largely reliant upon small arms, automatic guns, and mortars and largely dependent upon a guerrilla type of warfare, nevertheless, the CCF may require the use of large concentrations suitably concealed and employed to counter our offensives built heavily around the use of weapons, large and small.

32. The Taechon target was more than a target of opportunity. It came into being because of our offensive action and possibly as an essential part of the manpower-dependent tactics of our enemy.

33. The atomic weapon system now in being for strategic bombing was inadequate to exploit such a tactical target as the one studied here. However, the means probably are available to adapt it quickly to such use.

APPENDIX C, ANNEX 3

SIZE, DENSITY, AND LOCATION OF PERSONNEL TARGETS FROM GHQ DAILY INTELLIGENCE SUMMARIES[1]

SIZE OF UNITS

1. To obtain information on the most frequently reported size of enemy troop targets in areas of action, the Daily Intelligence Summaries of G-2, General Headquarters, United Nations and Far East Command, were examined for the period from 31 August 1950 (Report No. 65-2913) through 8-9 December 1950 (Report No. 164-3013). Reports were not available for four days during this period, namely, 5 September (No. 2918), 6 September (No. 2919), 10-11 September (No. 2924) and 22-23 September (No. 2936).

2. From 1,647 cases found in Section I, "Ground," of the Intelligence Summaries examined, Table I was constructed showing for different ranges of unit strength the number of times such strengths were reported and the percent of total number in each category. The same data are presented graphically in Figure 1 and consolidated in Figure 2.

3. Table I shows that in 77 percent of the cases the reported strengths of units were 1,000 or less. These 1,647 cases represent reports in which numerical strength was given. In addition there were 1,434 reports of "undetermined strength." Thus, in 46 percent of the total of 3,081 cases reported during this period, there is no indication of the actual number of enemy.

4. A serious difficulty arises in using the G-2 reports in this study: it is not possible to ascertain whether a unit is reported more than once. Therefore the information in Figure 1 may be misleading. For example, it cannot be determined that there actually were 273 targets of 100-200 enemy, because some units may have been reported more than once, e.g., by ground and by air observation. Furthermore,

1/ Prepared by G. Donovan and R. F. Voigt.

APPENDIX C

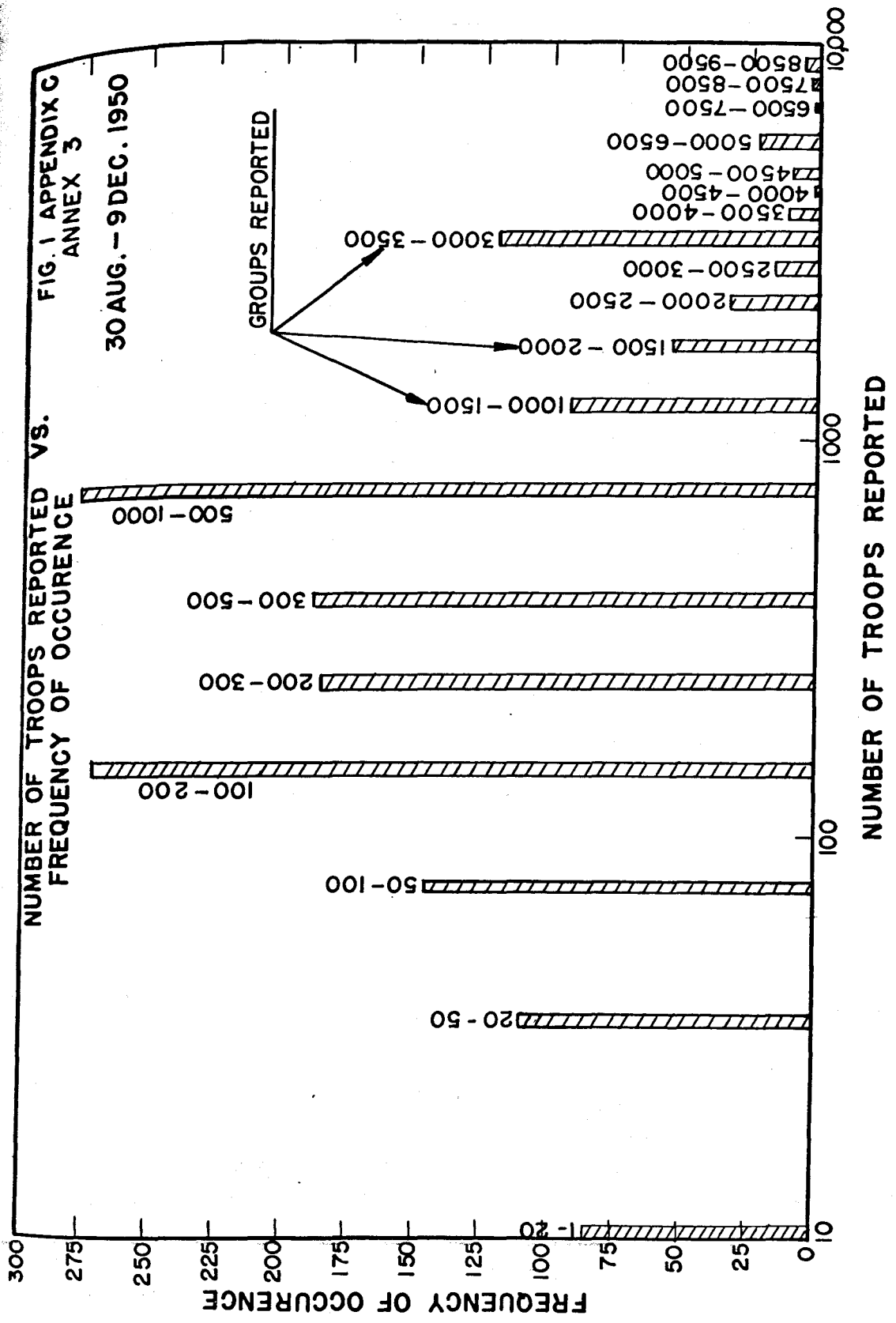
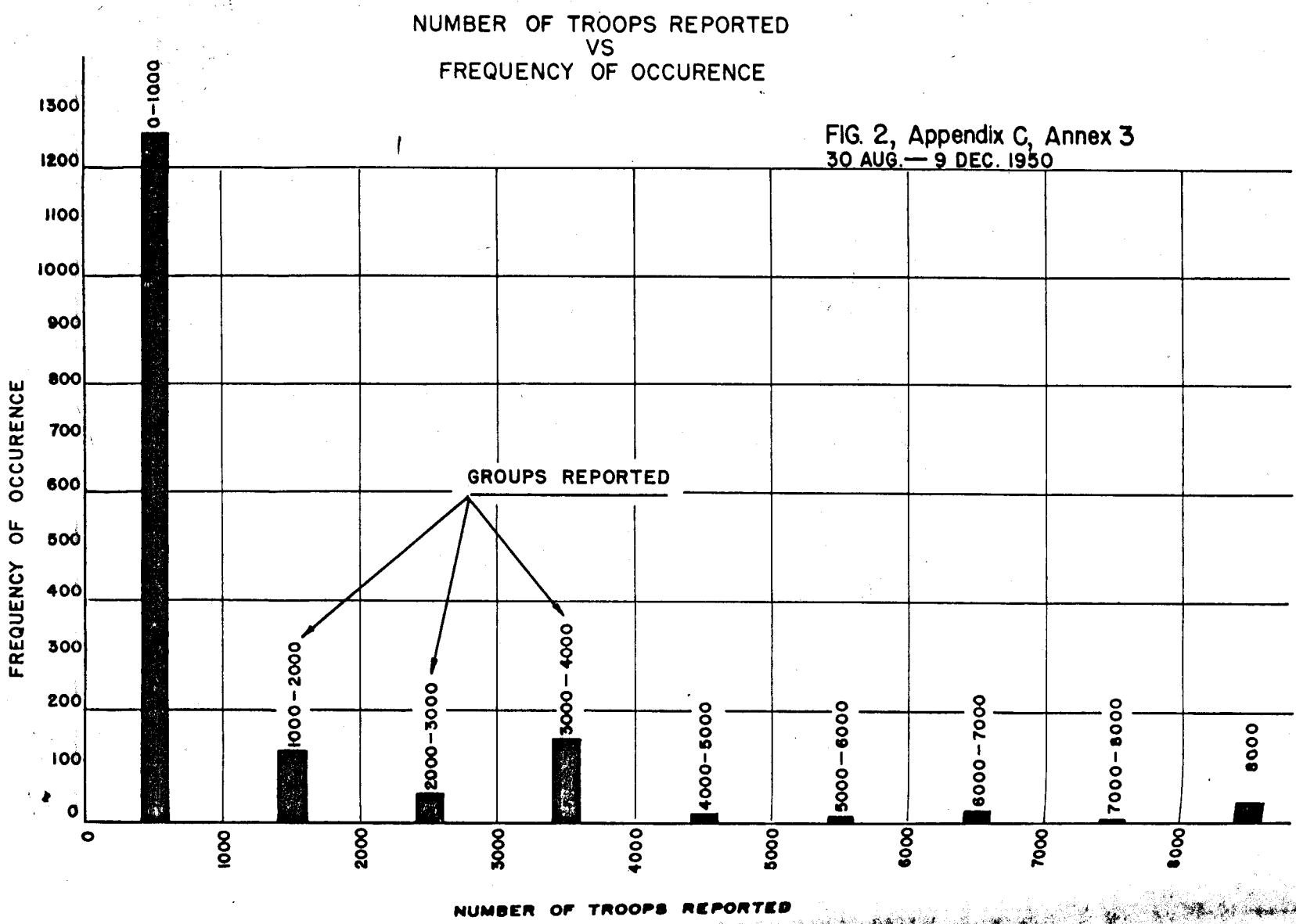


FIG. 1 APPENDIX C
ANNEX 3
30 AUG. - 9 DEC. 1950
NUMBER OF TROOPS REPORTED VS.
FREQUENCY OF OCCURENCE
GROUPS REPORTED
8500-9500
7500-8500
6500-7500
5000-6500
4500-5000
4000-4500
3500-4000
3000-3500
2500-3000
2000-2500
1500-2000
1000-1500
500-1000
300-500
200-300
100-200
50-100
20-50
1-20
10000
1000
100
10
NUMBER OF TROOPS REPORTED
300
275
250
225
200
175
150
125
100
75
50
25
0
FREQUENCY OF OCCURENCE


NUMBER OF TROOPS REPORTED
VS
FREQUENCY OF OCCURENCE
FIG. 2, Appendix C, Annex 3
30 AUG.— 9 DEC. 1950
FREQUENCY OF OCCURENCE
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0-1000
GROUPS REPORTED
1000-2000
2000-3000
3000-4000
4000-5000
5000-6000
6000-7000
7000-8000
8000
0
1000
2000
3000
4000
5000
6000
7000
8000
NUMBER OF TROOPS REPORTED

in some cases a company is reported and a battalion also in approximately the same area, without any clue being given as to whether the company is part of the battalion. If it were, there would be only one target of 700 men and not the two targets listed: one of 160 men and one of 700 men.

TABLE I

Enemy Unit Strength[1]	Times Reported		
	Number	Percent	
1-20	86	5.2	
20-50	111	6.7	
50-100	147	8.9	
100-200	273	16.6	77.0
200-300	187	11.3	
300-500	188	11.4	
500-1,000	279	16.9	
1,000-1,500	93	5.7	
1,500-2,000	54	3.3	
2,000-2,500	34	2.1	
2,500-3,000	16	1.0	
3,000-3,500	121	7.3	
3,500-4,000	12	0.7	
4,000-4,500	2	0.1	
4,500-5,000	9	0.6	
5,000-6,500	24	1.5	
6,500-7,500	2	0.1	
7,500-8,500	3	0.2	
8,500-9,500	6	0.4	
	1,647	100.0	

1/ In cases where strength was reported by units rather than numerically, e.g., as "company" or "battalion," the following numerical values were used:

Platoon . .	40 men	Battalion . .	700 men
Company . .	160 men	Regiment .	2,800 men
		Division . .	9,000 men

5. A further cause of uncertainty in determining target size exists because no account has been taken of possible proximity of units. For example, three battalions are reported separately as three units of 700 men each, whereas they may well be close enough to represent one target of 2,100 men. No attempt has been made to revise the data from plots of actual locations of units, so that even if two or more units actually were close enough to represent a single target, they still have been recorded in Table I individually, just as reported.

6. It was not thought to be worthwhile to extend the graph past 10,000 enemy, so the large targets recorded in Table II are not shown in Figure 1.

TABLE II

Units	Estimated Strength	Location	Date Present	Date Reported
3 divs	30,000	Assembling area Wonju	30 Sept	30 Sept-1 Oct
2 divs	20,000	Area Chongjin	29 Oct	31 Oct-1 Nov
2 CCF divs	20,000	3 mi S-SE Huchang	19 Nov	21 Nov-22 Nov
2 CCF divs	20,000	Chosin Reservoir	7 Nov	9 Nov-10 Nov
2 divs	20,000	Between Yudan and and Hagaru	2 Dec	3 Dec-4 Dec
4-5 divs	50,000	Chosin Reservoir	29 Nov	29 Nov-1 Dec
3 divs	30,000	Vicinity Yudam	26 Nov	27 Nov-28 Nov
66th CCF Army	30,000	N of Taechon with army hq 12 mi NE Taechon & 197th Div CP 5 mi NW Taechon	26 Nov	26 Nov-27 Nov

7. Other possibly important targets not included in Figure 1 are given in Table III. In CCF organization, relative importance of headquarters outweighs numerical strength only at army and field army levels.

TABLE III

Unit	Cases Reported
CCF field army headquarters	1
CCF army (corps) headquarters	3
Division headquarters	18
Regimental headquarters	4
Headquarters (unspecified)	8
Build-up area	3

APPENDIX C

TROOP DENSITY AND DURATION OF TARGET IN FORWARD AREAS

8. Two overlays were prepared from the information in the Daily Intelligence Summaries, Section I, "Ground"; Section IV, "G-2 Estimate of the Situation," 1.a. "Enemy Front Lines," and 2 a. (1) and (2) "Activities in Forward Areas." Overlay No. 1 covers the period 13-19 November and Overlay No. 2 the period 20-27 November. Only the following areas were considered:

Taechon-Anju
Yongbyon-Kunu-ri
Wawon
Tokchon-Oechang

It was thought that this was a large enough section to be a representative sample.

9. If the total enemy strength reported each day in the period 13-19 November is divided by the average area shown on Overlay No. 1 as occupied by the troops on that day, the densities of men per square mile are found to be as shown in Table IV. If the total strengths are divided by the total average area, the average density of men per square mile is 45 for this period.

TABLE IV

Nov 1950	Enemy Strength	Average Area Occupied (Mi)	Density Per Sq Mile (Men)
13	15,930	24 x 5	133
14	5,500	29 x 5	38
15	6,225	48 x 5	26
16	5,480	44 x 5	24
17	560	16 x 1	35
18	2,290	10 x 5	46
19	1,970	24 x 2	41

10. Calculated in the same manner, the troop density per square mile for the period covered in Overlay No. 2 is as presented in Table V; and the average density of men per square mile is 15.5 for the eight days, 20-27 November.

TABLE V

Nov 1950	Enemy Strength	Average Area Occupied (Mi)	Men Per Sq Mile
20	8,920	42 x 10	21
21	5,240	58.5 x 9	10
22	7,210	63 x 5	23
23	3,275	65 x 6	9
24	1,210	57 x 5	4
25	11,980	52 x 9	26
26	14,350	62 x 20	11
27	14,790	59 x 11.5	22

11. From Tables IV and V it is seen that there was an average density of 20 men per square mile for the period 13-27 November and that the mean of the averages was 31 men per square mile.

12. In both cases each unit reported on any one day is taken as a separate unit although it is probable that in more than one instance an enemy unit could have been reported on the same day from several different sources, e.g., ground patrol, air observation, or POW. However, since the units are unidentified it is not possible to determine the amount of duplication. The above figures therefore represent the maximum density that can be calculated for any one day from the figures at hand.

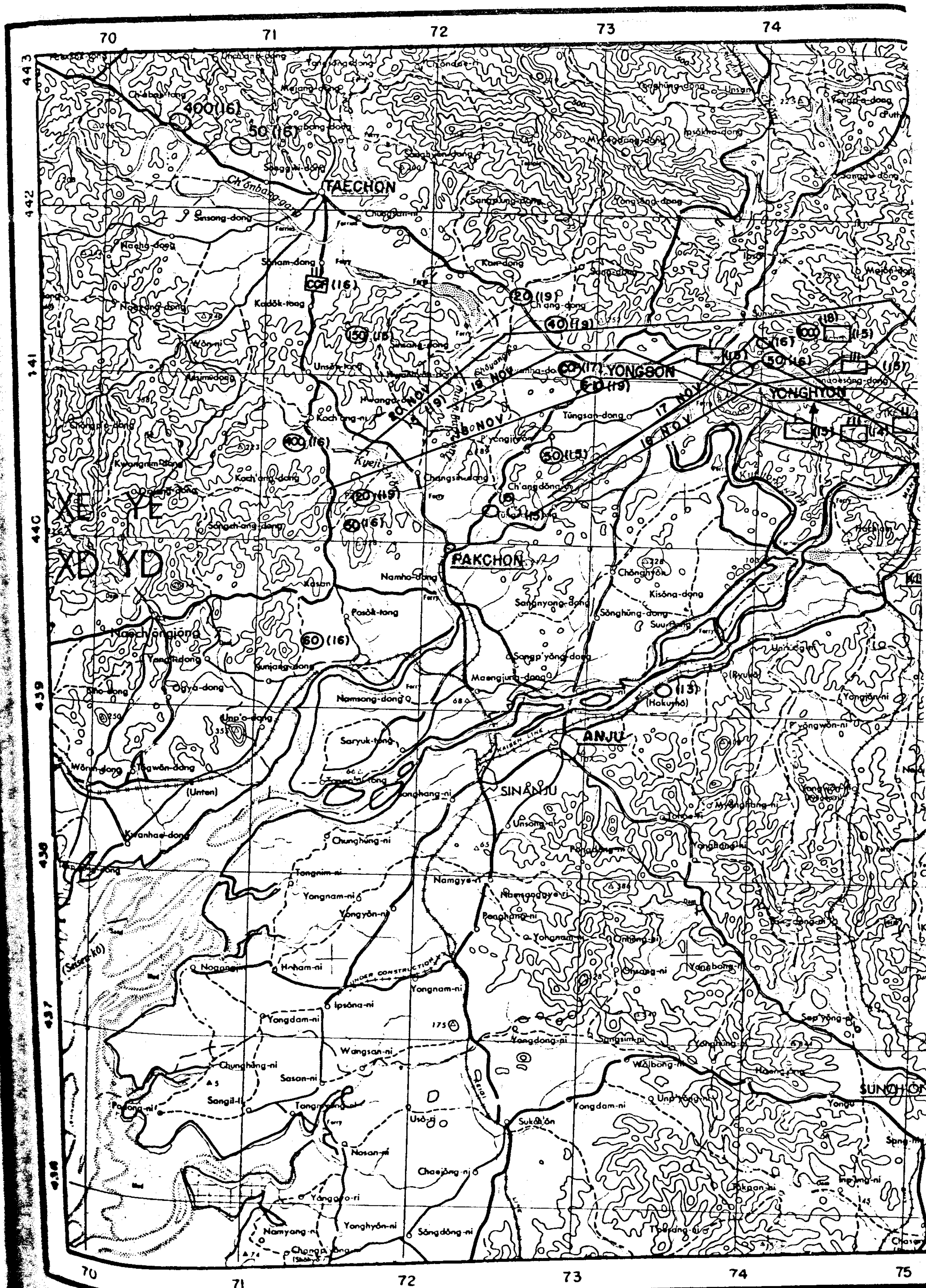
13. The figures also do not take into account the fact that many units reported on one day, for example 13 November, may still be in the area a day or even a week later. Since the units are identified only by size, no indication as to the length of time a unit stays in a particular area is apparent.

14. Comparison of the data in Tables IV and V reveals only one case in which the concentration was sufficiently dense to represent a "lucrative" target--i.e., one in which casualties of 1,000 or more may be expected per bomb (see Appendix B, Annex 1, Figure 3).

15. Since command control and combat effectiveness could not readily be maintained at such low and diffuse troop densities, it appears that one of the following alternatives may have applied in each case shown in Table IV and V.

a. Enemy strength was greater than reported.

b. The area occupied was less than shown on the overlays.



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400(16)
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20(19)
40(19)
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Pasŏk-tong
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Yangri-dong
Gunjang-dong
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P'yŏngjiwŏn
Ch'angdong-ni
Changsin-dong
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Kun-dong
Sangsŏng-dong
Yonghŭng-dong
Unsan
(Hokuryŏ)
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Kwanhae-dong
Wŏnam-dong
Togwŏn-dong
Unp'o-dong
Chunghung-ni
Tongnim-ni
Yongnam-ni
Yongyŏn-ni
Namgye-ri
Namsangdaye-ri
Ponghang-ni
Yongnam-ni
Nogang-ni
Hoham-ni
Ipsŏng-ni
Yongdam-ni
Wangsan-ni
Chunghang-ni
Sasan-ni
Songil-li
Usŏ-ri
Nosan-ni
Chaejŏng-ni
Sukch'ŏn
Yongdam-ni
Yongdong-ni
Wŏlbong-ni
Yonghyŏn-ni
Sŏngdong-ni
Namyang-ni
Yanggo-ri
Tŏksong-ni
UNDER CONSTRUCTION
KAISEN LINE

V.


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OVERLAY NO. 1
ENEMY SITUATION
13 NOV – 19 NOV 50
AREA – TAECHON – ANJU
YONGBYON – KUNU-RI
WAWON
TOKCHON – OECHANG
LEGEND
SQUAD
PLATOON
COMPANY
BATTALION
REGIMENT
15 NOV
17 NOV
20 NOV
ASSEMBLY AREA
WAWON
TOKCHON
KAECHON
KUNU-RI
HYO-RI
YD-BU
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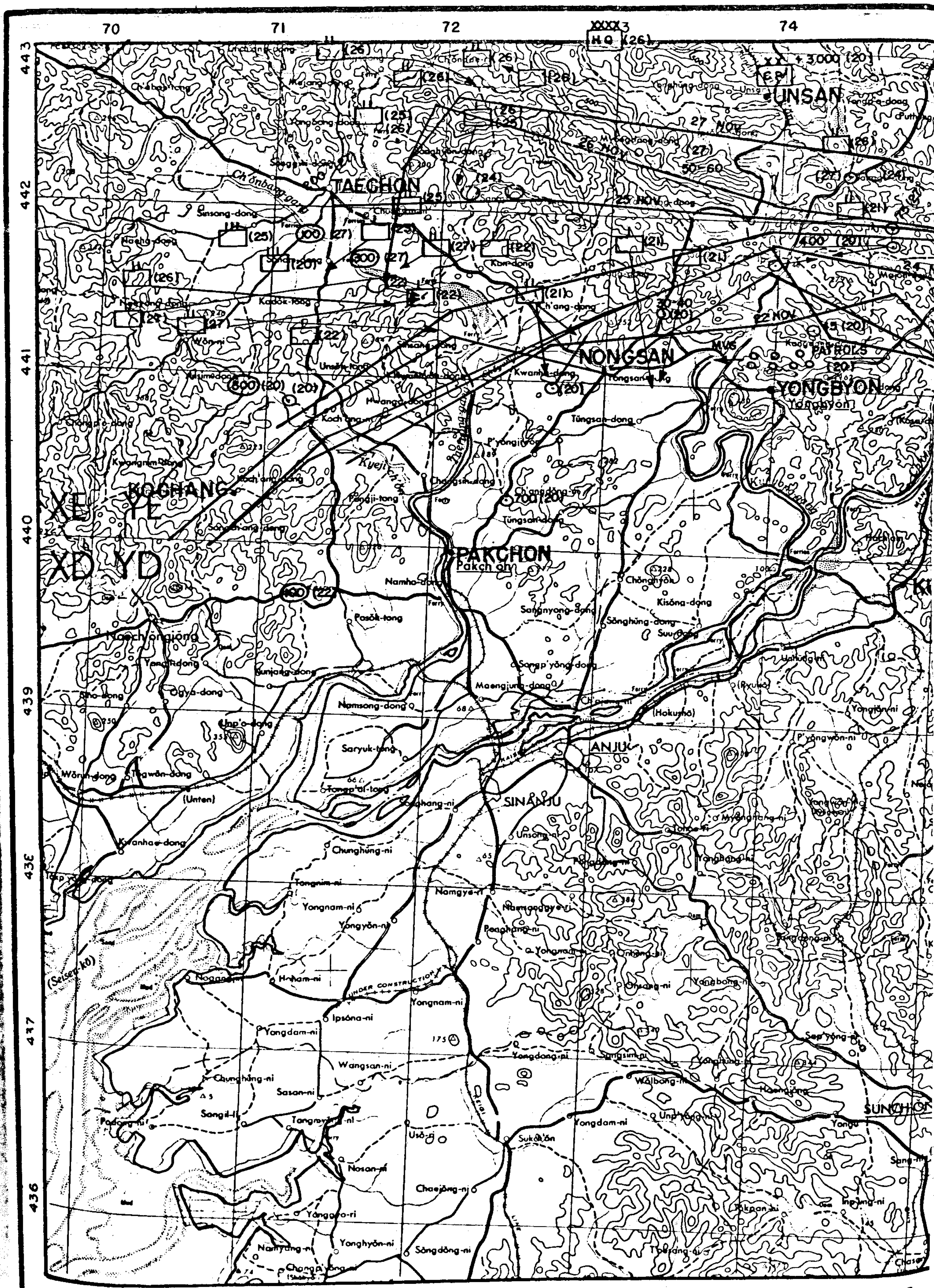

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TAECHON
NONGSAN
YONGBYON
Yongbyon
PAKCHON
Pakch'on
ANJU
SINANJU
KOGHANG
XE YE
XD YD
27 NOV
26 NOV
25 NOV
22 NOV
PATROLS
50-60
30-40
+3,000
Ch'onban-gang
Kyeji-ch'on
Sinsang-dong
Kadok-tong
Unsan-tong
Kwangnim-dong
Pasok-tong
Namho-dong
Sangnyong-dong
Songhung-dong
Sangp'yong-dong
Maengjung-dong
Namsong-dong
Saryuk-tong
Kisong-dong
Unhung-ni
Yongjon-ni
P'yongwon-ni
Chunghung-ni
Tongnim-ni
Yongnam-ni
Yongyon-ni
Namgye-ri
Ipsong-ni
Yongdam-ni
Wangsan-ni
Sasan-ni
Chunghung-ni
Songil-li
Noson-ni
Chaejong-ni
Yonghyon-ni
Songdong-ni
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UNDER CONSTRUCTION
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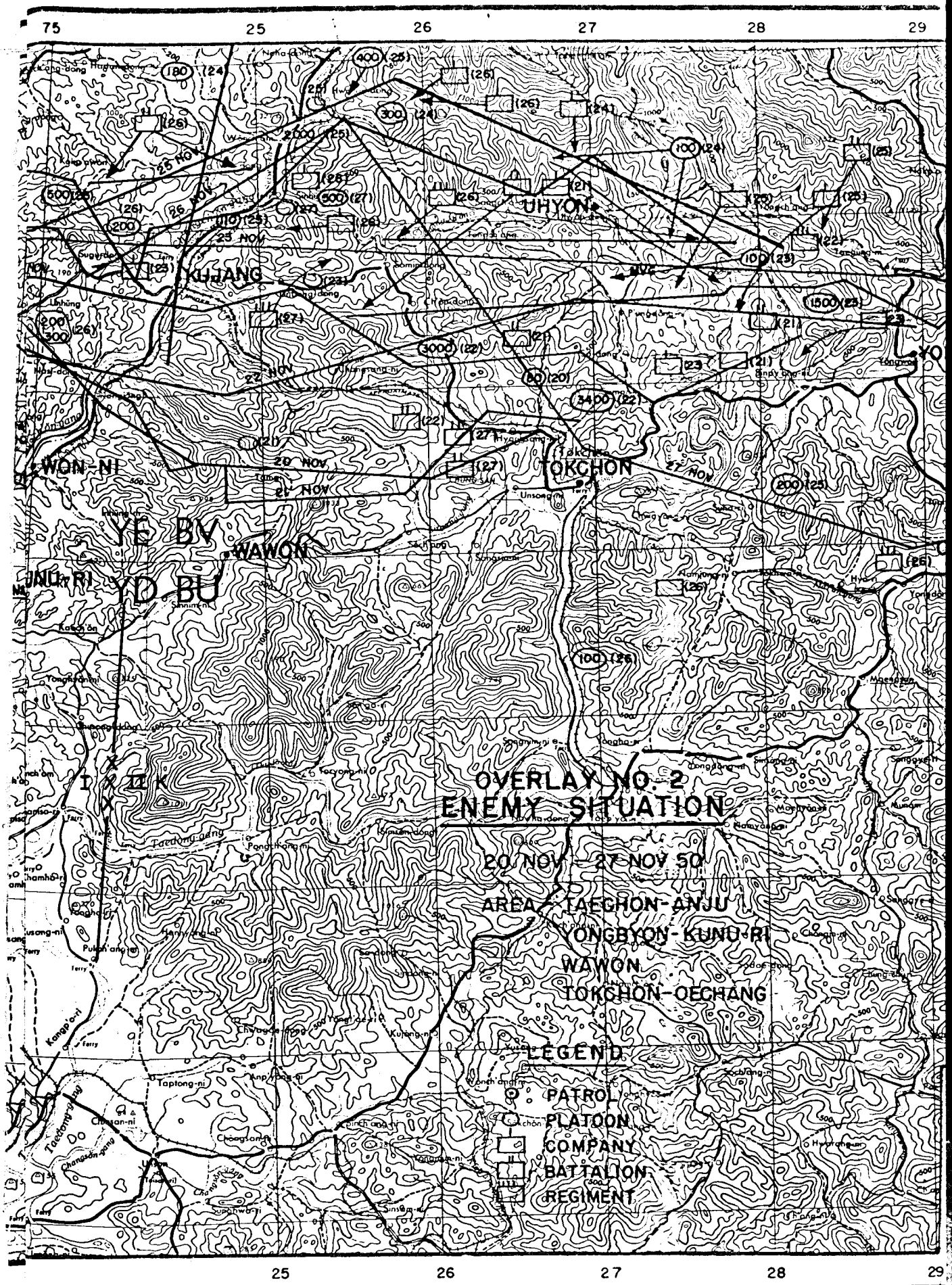
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UHYON
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WON-NI
TOKCHON
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JNU-RI
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II
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OVERLAY NO. 2
ENEMY SITUATION
20 NOV – 27 NOV 50
AREA: TAECHON-ANJU
YONGBYON-KUNU-RI
WAWON
TOKCHON-OECHANG
LEGEND
PATROL
PLATOON
COMPANY
BATTALION
REGIMENT

c. Enemy forces were grouped in organizational units of unknown strength at unspecified points within the area.

DELAYED REPORTING OF REAR AREA STRENGTH

16. To show the daily strength of units reported and their distances from the front line on that day, Table VI was constructed from an analysis of Section IV, 1.b. "Activity in the Enemy Rear Areas," of the Intelligence Summaries for the period 13-27 November.

TABLE VI

Date Observed	Unit Strength	Date Reported	Distance from Front Line (Miles)
30 Oct	10,000	16 Nov	45
6 Nov	2,000	18 Nov	135
7 Nov	2,000	18 Nov	80
8 Nov	1,500	18 Nov	102
9 Nov	3,000	18 Nov	85
13 Nov	0	--	--
14 Nov	15,500	19 Nov	40
15 Nov	6,500	19 Nov	97
16 Nov	3,000	16 Nov	38
17 Nov	0	--	--
18 Nov	1,500	18 Nov	--
19 Nov	20,000	22 Nov	25
20 Nov	0	--	--
21 Nov	0	--	--
22 Nov	8,000	26 Nov	38
23 Nov	175	24 Nov	35
24 Nov	200	26 Nov	45
25 Nov	1,000	25 Nov	6
26 Nov	0	--	--
27 Nov	0	--	--

17. In five out of twelve cases of reported strengths of 1,000 or more, G-2 information was recorded 9 to 17 days after observation. In nine of these twelve cases, the information was delayed three or more days, and in three of the twelve cases, the date of observation and the date of report are the same.

CONCLUSION

18. It is concluded that the Daily Intelligence Summaries are inadequate for the location of lucrative troop targets.

APPENDIX C, ANNEX 4:

THE LOCATION AND EVALUATION OF PERSONNEL TARGETS BY AERIAL PHOTOGRAPHY[1]

INTRODUCTION

1. The present system of photo reconnaissance and photo interpretation in locating and evaluating personnel targets has been examined in detail for: (a) its relationship to the intelligence problem as a whole; and (b) its usefulness to the problem of intelligence in the employment of atomic weapons.

2. The problem presented is one of using aerial photographs to locate and evaluate the movement and concentration of enemy personnel. This problem is basic to any theater. In the Korean campaign, the problem is similar in most respects to operations in China and in parts of North Africa. It is identical to that presented in Iraq, Iran, and in many other parts of the Near East.

PHOTO INTELLIGENCE RESULTS

3. Universal agreement and unquestionable evidence in the form of eight months of negative results show that the present techniques of photo intelligence do not provide information on the size and movement or disposition of units of the CCF.

4. One reason for failure to detect or track the CCF by photo intelligence may lie in the absence of any attempt to adjust or revise the established system to the present problems.

5. Detection of large-scale troop movements almost never sparked further night and day photo reconnaissance.

1/ Prepared by D. J. Belcher. For a detailed discussion see ORO T-13 (EUSAK), A Proposed Joint Intelligence Center for the Selection of Targets in Air Support and Ground Action, 28 February 1951.

Likewise, large quantities of detailed information reported by T-6 (Mosquito) observation have never been used to "trigger" photo strikes.

6. The following examples illustrate the inadequacy of present photo intelligence practices in the Korean theater.

a. Night photo mission R613, 270138I (Dec), scale 1:5,300, from CT4856 to CT3857, showed dense columns of troops accompanied by vehicles and carts, probably in division strength or higher, moving east on a road toward the Pyonggang-Kumhwa-Chorwon assembly area. Both an immediate flash report and a following MRIR (Mission Reconnaissance Intelligence Report) issued on this mission appear not to have been used in G-2, EUSAK. Order of Battle staff were unaware of this large troop movement. Investigation indicates it probably was the CCF 37th Army carried on early January overlays as probably near Pyongyang, but actually in movement more than 100 miles to the southeast to attack VIII ROK Corps.

b. Day photo mission 2168-B, 30 Dec 1950, on a line from CT3510 to BT9705 north of Line Baker, scale 1:7,500, crossed areas known from other intelligence to have been occupied by close to 100,000 enemy (see Appendix D, Annex 1) at the time. These vertical photos show three unidentified vehicles, one cart, and some vehicle tracks. Extensive entrenchments and possible machine gun and mortar positions, apparently recently cleared of snow, also appear, but it is impossible by stereoptic examination at this small scale to form an estimate of the probable number of troops or to decide unambiguously that any troops are present.*

c. During December 1950, following withdrawal of UN forces to Line Baker, extensive photo coverage was ordered in a fruitless attempt to locate CCF and NKA troop movements. The areas ordered for repeated coverage included:

(1) A rectangle, 15 miles on each side of the line from Kitan (BT7951) to Satae-ri (DT1640).

(2) A triangle, corners at Pyongyang (YD3823), Senchon (BU5947), and Songwon (BU4803).

(3) A rectangle, 10 miles on each side of a line from Pyongyang (YD3919) to Singye (BT8464).

(4) A strip, Pyongyang (YD3819) to Sariwon (YC4064).

* This mission also was flown too late for follow-up prior to the CCF attack beginning 312200I (Dec).

The required missions saturated available facilities; the predominating scale was 1:10,000 or less, and the effort was wasted.

d. Day photo mission 8 TRS R 1769-B, 24 Nov 1950, scale 1:10,000, flown over the Taechon area, showed minor trench work and foxholes, but no other evidence of troops. However, from other intelligence sources (see Appendix C, Annex 2), it is known that the area was occupied at the time by more than 20,000 troops of CCF 66th Army.

AERIAL PHOTOGRAPHY

7. a. Vertical aerial photographs are presently taken at scales ranging from 1:50,000 to 1:5,000

b. Photographs at a scale of 1:5,000 or less will not identify any but large groups of closely spaced personnel on roads or on other uniform, high-contrast backgrounds. An attempt by personnel to hide will be successful.

c. Photography of high quality taken at 1:5,000 failed to register the presence of known troops in known positions.*

d. Photography taken at 1:2,000 registered the presence of troops in known positions with varying degrees of accuracy depending upon the type of overhead cover.*

e. Oblique photography taken from low altitudes (500 feet) by fighter-type aircraft has not been satisfactory as a means of locating or evaluating personnel targets.

f. Neither large-scale verticals nor low-altitude obliques can be used economically on random "hunting" missions

g. Foxholes, slit trenches and covered emplacements are readily detected in 1:2,000 photography. Fleeting targets of personnel on foot in dense woods are the most difficult to detect.

h. Existing photographic equipment is adequate for the purpose of obtaining large-scale photography (1:2,000 or larger).

PHOTO REPRODUCTION

8. The photo reproduction units of the USAF in Japan and Korea are well-staffed by competent personnel and the capacity of the equipment is in keeping with the number of photo planes. In these two respects, the air force appears

* See paragraphs 20-29 for description of tests.

to be well in advance of the army.

PHOTO INTERPRETATION

9. The photo interpretation situation was examined with the full cooperation of the personnel. Initially, it was difficult to discuss the work on an open basis because of the evident reaction to adverse publicity regarding the estimates of the CCF strength. The PI units in this theater had been brought together hurriedly. As a result, they were understaffed in the early months of the war and were particularly inexperienced in Korean features and CCF techniques. Acquaintance with local practices and habits is a very important factor in good PI background. Unfortunately, PI work has always been done in a "by-the-numbers" manner and has been based almost wholly on the lessons learned in school. Subsequent experience with photos alone is not necessarily a basis of sound judgment.

10. The PI system and the schools were organized in the early days of aerial reconnaissance and have been influenced largely by the conditions of the European theater. Later developments and a better understanding of airphoto capability has not been incorporated into the system.

11. The morale of the general PI personnel is not good. They are given an implied responsibility, but are without authority to influence decisions that reflect on the quality of their work. In the present situation aerial photography is not producing the results desired and it reflects unjustly on the system. The quality of the PI work is unlikely to improve materially under the present reconniassance-intelligence SOP.

12. PI experience in evaluation of personnel targets does not exist. Their training is keyed to the direct observation of standard military equipment and installations. By training, PI's are not equipped to do the job of personnel counts and estimates. Moreover, PI's have no means by which they can modify their training to fit theater problems.

13. Except for the communication channels, the relationship between PI units, intelligence, and photo recon organization is loose, casual, and often non-existent with respect to their combined objective.

14. No drastic change in these organizations is needed to incorporate the capacity to evaluate personnel targets.

EMPLOYMENT OF PHOTO INTELLIGENCE MATERIAL

15. Although it was important to the mission, it was found to be impossible to get concrete facts on the use of the photo intelligence material that was produced. The considered opinion of the investigator centers on the fact that the bomb damage received most attention, reports of tanks--a number of which were highly imaginative when rechecked on photos and by Mosquito--"pressed the panic button," and supplies and seemingly important personnel and emplacements were passed over. A flow diagram of the intelligence mill seems to break down at this point where it is converted and fed out again for specifc uses. What and where the return channels are is a matter for conjecture.

CONFLICTING PHOTO COVERAGE REQUESTS

16. During the time of this study, a number of requests were made by the army for extensive photo coverage of the battle front. The request received high priority and its execution required the commitment of all the available photo planes to this project. The scale of the photography varied from time to time and ranged from 1:5,000 to 1:10,000. Because this was inadequate for detailed evaluation and because it duplicated terrain-type photography the origin of the request was pursued. Under existing circumstances it was impossible to determine the point of origin or the intent behind the request.

THE PHOTO INTELLIGENCE PROBLEM IN KOREA

17. The entire problem differs materially from the conditions that governed the development of the existing system of photo reconnaissance and photo interpretation and their integration into the intelligence framework.

18. The CCF have been able to escape detection from air for at least two reasons:

a. We have not adapted our methods of detection to their methods of evasion.

b. They can hide very large forces in less than five percent of the hilly terrain near the MSR's. As a result, random hunting via photography has virtually no chance of detecting them.

19. The important breakdown in our system occurs in the lack of directed effort to meet the problem. This in turn results from the lack of appreciation in the higher commands of the possibility of and need for an adjustment of the photo intelligence system.

APPENDIX C

EXPERIMENTS IN PHOTO RECONNAISSANCE AND INTERPRETATION

20. An experimental basis for preliminary evaluation factors for personnel targets was accomplished in the hill country near Taegu. One thousand ROK troops, some of whom had combat experience, were deployed throughout a typical valley near the MSR.

21. One day was spent in rehearsal and the placement of significant numbers of persons in various types of terrain and cover. A number of prone figures were placed on rice paddies as a basis for casualty estimates. Others simulated taking shelter against dikes, under trees, and along stream banks. The balance were distributed throughout the hills. The total area was one square mile. Some areas were kept free of personnel purposely so that the 1,000 troops actually occupied about three-fourths of the space.

22. Visual reconnaissance by an observation plane over the target area for a considerable period at altitudes ranging from 200 to 1,000 feet estimated 300 troops in the area. This included some 50 obvious casualty cases and 200 in the "open ground" class.

23. The scale necessary to evaluate targets of this type was established experimentally and applied to enemy positions with success. An RF-80 photographed the test area at a scale of 1:5,000 and 1:2,000 when the troops were in the field uniform of OD. Later, for the purpose of mapping their exact positions as a basis of comparison, they were re-photographed at the same scales. For this phase they changed into white field jackets. In addition to the vertical photography described, obliques in black and white and in color were obtained. These proved unsatisfactory. The obliques recorded the "presence" of some enemy in the area but were worthless as a basis for estimating numbers.

24. The results of the 1:5,000 scale photography proved the fruitlessness of such photography for evaluating personnel targets. Less than one percent of the troops could be detected and they were rated as "possible" in the system of: positive, probable, possible.

25. Good results were obtained at the scale of 1:2,000. Arms, legs, and heads of "casualties" (prone figures) could be seen in these photos. Numerical evaluation of targets was based upon this scale. Mosquito photography was used to develop an acquaintance with CCF habits in hiding and in the dispersion of supplies. Mosquito intelligence was used to set up a model of a working system for actual use in estimating fleeting personnel targets.

26. With the channels organized informally, detailed locations of CCF troop concentrations north of Suwan were obtained from the Mosquito squadron. Photography at a scale of 1:2,000 was specified and target numbers and priorities were assigned by the Fifth Air Force. The photo missions, with some delay, were accomplished. Although the photography was of extremely poor quality, numerous individuals were identified prone in the fields--anticipating an air strike--and active in digging emplacements. The photos were taken in early morning before the sun was well up and there was much haze and smoke. Stereo-coverage that should be 60 percent overlap did not exceed 10 percent overlap and on one target there was no overlap. In spite of this, the evidence for identification is clear.

27. The field tests on both friendly and enemy troops were eagerly accepted by the pilots and PI's as "finally getting at the problem." A high degree of personal cooperation and interest accompanied this attitude.

28. It was necessary to use "on hand" equipment although some slight improvement would have resulted if time had permitted the use of standard equipment available in Japan in quantity or boxed in Pusan at the PIO office.

29. The practice of using fighter-type aircraft for photo recon is understood. However, they are not ideally suited to the job in this terrain. For safety reasons these planes should fly either at 1,000 feet or less or above 3,000 feet. They are too fast and/or not maneuverable enough to fly low in rough terrain. Consequently, 24-inch lenses are needed to produce the required scales. These are available. The T-6 (Mosquito) aircraft has a camera well for the K-24 (5" x 7") camera that has limited use in area coverage. The PIO furnished K-24's but they could not be installed because extensive modification of the plane would have been required.

EVALUATION FACTORS FOR PERSONNEL TARGETS

30. These factors are based upon good quality vertical aerial photographs having a scale of 1:2,000.

31. The following procedure has been established on the basis of field trials with 1,000 friendly (ROK) troops deployed as fleeting targets in typical Korean terrain and without the advantage of snow cover.

a. Make a mosaic (uncontrolled) of the photo coverage of the area to be surveyed. Use every other photograph in making the mosaic and use the alternates for stereo-inspection.

b. Using a transparent overlay on the mosaic and a stereoscope, divide the area into the following subdivisions:

(1) Level ground. This extends from the base of one hill to the base of an opposite hill. It includes rice paddies and the usual embankments, dikes, and ditches.

(2) Hilly ground. This includes everything that isn't rice paddy. Divide this area into:

(a) Bare hillsides. Short grass is common.
(b) Gullied areas.
(c) Scattered brush and small trees.
(d) Thin forest cover.
(e) Small groves of trees.
(f) Dense forest cover.
(g) Black shadows.

32. These individual areas should be studied carefully under the stereoscope and counts of individuals recorded as positive, probable, or possible. Some judgment is needed at this point because within each area the "positive" identification of some personnel will incriminate nearby "doubtful." The larger the proportion of "positives," the more incriminating is it to nearby associated "doubtfuls" and "possibles."

33. In gullied areas, some small proportion of the gullies may be in black shadow. In summer and during optimum photographic hours (1000 to 1400) shadows will not be important. Where shadows do occur, the available space for personnel can be measured and its potential hiding capacity can be evaluated.

34. No data are available on actual maximum CCF troop densities but it is estimated that it would seldom exceed 750 per square mile. They are not uniformly dispersed and they tend to gather in small groups numbering from five to ten in the protected spots.

35. The tendency seems to be for them to utilize the central two-thirds of a hill slope or length of a gully. Dug-in distribution is different.

36. Using this area breakdown and the general practice on incrimination of "probable" and "possible" personnel, the total count for each area should be corrected as shown in Table I.

TABLE I

CORRECTION FACTORS FOR PERSONNEL COUNTS
(Preliminary)

Multiply the number of personnel counted in each area division by the factor shown.

Terrain Class	Factor	Comment
Level ground	1.0	---
Bare hillsides	1.0	---
Gullied hillsides	1.3 to 1.7	Varies with depth of gullies and proportion of shadow.
Scattered brush, grass, and low trees	1.2 to 1.5	Very common. Factor varies with crown density of trees..
Thin forest cover	2 to 5	Varies with tree density
Small groves of trees	5	Or estimate capacity--four per large tree.
Dense forest cover	Infinite	"Dense" in this case is found only on high mountains and in the areas of northern North Korea.

37. It was determined by trial that small Korean houses will "sleep" a maximum of 20; the large houses as many as 60.*

38. Any digging-in or the use of tents, a type of straw lean-to, can be seen readily.

39. For the purpose of adding some perspective to the problem of making a specific estimate of a large personnel target, the following is offered.

40. An assembly area or training area for CCF personnel could assume the reasonable proportion of a square, five miles on a side. If intelligence from some source indicated the location of such an area, it would take from three hours to twenty-four hours under present arrangements to complete the authorization for photography. Once assigned, it would require six photo plane hours as a maximum for

* See Appendix B, paragraph s 74, 84 for CCF Tactics.

complete coverage. Complete coverage for stereo-inspection would require 800 photographs. These could be developed and printed in a six- to eight-hour interval. Complete coverage would seldom be necessary. Based on other intelligence, sampling strips could be specified.

41. The following table of space intervals between men may assist in a space concept of the problem of detecting and estimating personnel.

TABLE II

SPACE INTERVALS BETWEEN MEN

FOR VARIOUS PERSONNEL DENSITIES

Men Per Square Mile	Distance Apart If Evenly Spaced (feet)
10,000	50
5,000	75
2,000	115
1,000	170

42. Table III gives a scale appreciation in terms of target size.

TABLE III

SCALE EQUIVALENTS

On a Scale of:	A Mile is:	A Man is:
1:2,000	31.7 in	0.018 in
1:5,000	12.7 in	0.006 in
1:10,000	6.4 in	0.003 in

Note: Steroescopic inspection (magnified) brings the 1:2,000 men up by a factor of 5 to about 1/10 inch.

EFFECTS OF CLIMATE AND TERRAIN ON PHOTO DETECTION

43. Summer will not change the situation as far as personnel counts on flat ground are concerned. People walking through paddies will leave tracks in mud or in growing rice and prone bodies in the paddies will be seen easily. Summer will not bring a great change in the foliage because evergreens predominate. In general, the contrast between the field uniforms and the ground will be emphasized. At the time of this study (February) the dispersed CCF troops

on the ground at Suwan could be seen against the paddies and ditches where there was no snow cover. As warm weather comes, the sun will be higher and haze will be less. This will result in greatly improved photo quality and a marked decrease in shadows. This is an important advantage.

44. Absence of snow will:

a. Destroy the advantage of seeing footprints and using them as leads. To date this has not been used except to cause comment in PI reports and by the Mosquitos.

b. On the basis of field trials it will be more difficult for the CCF to hide than when the snow cover and white cape were used to confuse their outlines.

c. Film will be more sensitive to a range of gray values. With snow, the great contrast between the white snow and the black trees and rocks tends to mask detail.

FAILURE OF PHOTO RECONNAISSANCE CAUSED BY CCF TACTICS*

45. The CCF have successfully escaped detection by photo reconnaissance more as a by-product of their methods of using small units and dispersed targets rather than any special technique. Their best counter to our mechanized type of war is to make individual targets unprofitable for the attention of an expensive aircraft, too insignificant for a conventional bomb or rocket, and too small to strafe with accuracy.

46. This same technique has resulted in the inability of our aerial photography to detect them unless they concentrate, as they must at times, for attack or defense. Our photo intelligence system was developed on the basis of massive troop and equipment targets and we have not altered the system to meet the changed conditions. This is the first time that we have been challenged to utilize the flexibility of aerial photography as an aggressive weapon and to direct its use in a scientific search technique.

47. The CCF personnel take only simple precautions, if any at times, against detection from the air. Dispersal accomplishes the desired result. Emplacements of many kinds are crudely covered and easily detected in photography although they may not be obvious to fighter observation. Supplies are stored in the open on hillsides and in gullies in clear view of air observation. Knowledge of their locations is not the end point. Because they are so widely dispersed it is difficult to destroy them by air attack except by an effort that is far beyond the value of the targets themselves.

* See Appendix B, paragraphs 73-84, for CCF tactics.

48. The individuals make little effort at concealment other than to stand still and put on their white capes which blend with the snow. This is highly successful in evading visual detection such as Mosquito observation and oblique photography. Both introduce obliquity so that the angle of vision gives the low trees maximum value in screening and eliminates the view of tracks in the snow or mud.

49. They seem to use tents and straw shelters of the lean-to type when camping in the hills. Numerous photographs show that these shelters exist without any effort at concealment. The tents are dark and tepee-shaped. In small-scale photos they blend well with the dark pine trees.

50. Frequent reports tell of CCF troops hanging many small bundles of rice straw from their shoulders so that they are covered when moving or when resting.

51. The great majority of CCF troops are simply dispersed throughout an area so that the population is not dense and detection is impossible in small-scale photography or in low oblique random photography.

PHOTO INTELLIGENCE REQUIREMENTS

52. An air intelligence program must provide detailed, small target ground information. The need is urgent for direct observation and estimates based on direct observation as well as the location of small targets, POL, and supplies.

53. Very little change in the administration is needed. A significant requirement is for a Joint Intelligence Center* (JIC) that will direct the movement and assignment of photo planes and pass on requests for photography, much as the JOC now functions in its field. In this group, there should be active representation of intelligence, photo interpretation, photo reconnaissance, and an adviser on terrain intelligence.

54. Every photograph must count significantly in the over-all photo intelligence picture. To do this requires proper photography and a system of directing its effort. It must be obtained efficiently and analyzed efficiently. Two fundamental requirements to accomplish these ends are:

a. Personnel in all phases of the work should be familiar with the areas in which they have a primary responsibility. This will come from continuity of effort.

b. Photography should be directed rather than random, scales should be adjusted to targets, and a method of photo sampling should be employed.

* See Appendix D, and also ORO-T-13 (EUSAK), op. cit.

55. With a JIC directing the assignment of planes and effort, the objectives inherent in air intelligence will be accomplished without sacrifice.

56. To achieve the maximum efficiency of personnel in all units concerned, it is necessary to divide the theater into goegraphic blocks and to assign individuals to them. The smaller the block the better, but it provides a system by which one man becomes acquainted with the particular characteristics of an area and is therefore extremely sensitive to changes in that area. This area should be his number one job, not exclusively but primarily. This applies to PI's, Mosquito observers, and less rigidly to photo pilots. It should apply to all who have direct contact with information or material coming from or going into the record of the area.

57. The basis of this geographic block system can be maps but of infinitely greater value are the existing aerial photos of terrain-type photography (small scale). Nearly all of Korea was photographed in the fall of 1950. This is "economical" photography for each of the photos will cover as much as twenty square miles. These should be made into photo mosaics and used as a basis for the entire planning program. These photos record details that do not change materially. They position all land features and provide a map of the network of roads, trails (down to footpath size), rivers, streams, crossings, ground cover, and even individual houses. This is really a terrain inventory of the permanent physical features. It should not be duplicated and can provide the basis for planning later and larger scale photography on smaller land units.

58. The practice of using mosaics will let the JIC act with specific information rather than with the symbols of maps that are presently inaccurate. Using this, the JIC can select spot areas for the periodic sampling with photos. These areas should be small, requiring only three or four vertical photographs. They should cover key points on MSR's, cross-country trails, suspect supply points, and other possible activity areas. The intervals between sampling of the same area should be irregular; the spacing should be based upon judgment of activity and importance of the area. Both night and surprise day photography should be used. The photos should be fed to the PI of the geographic block. Based upon results of the sampling of an area, locations can be adjusted and intervals of sampling can be modified. Once movement is recorded along MSR's or cross-country trails the sampling should be scheduled to locate the probable bivouac. Distance of movement is relatively fixed and the number of good locations is limited; thus the probability of detection is high.

lateral movement off the MSR is extremely limited for transient targets.

59. For close reconnaissance the Mosquito planes will build up a large number of clues that will improve the value of many photo strikes and eliminate the need for others. When large concentrations are indicated, "area inventories" for personnel detection can be ordered. This policy will enlarge the time element within which our forces must react to these concentrations.

60. The terrain "adviser" on the JIC should have the responsibility of proposing the daily schedule of sampling and other photo missions. He should work closely with the PI's and should brief photo pilots on missions. One primary requisite is the need for long experience in photo analysis and interpretation. There are a number of high quality sources of men trained in photo analysis and experienced by field work ranging from two to ten years. Their training in engineering planning, geomorphology, agriculture, and other related fields make them a valuable asset to the aerial intelligence field.

CONCLUSIONS

61. a. It is estimated that the present system of photo intelligence is producing about 15 percent of the total capability.

b. The theater requirements for intelligence photography in Korea are vastly different from those for the European theater in World War II. This is caused more by enemy methods of evasion than by any unique features of Korean terrain.

c. Other than bomb damage assessment, very little satisfactory intelligence is being derived from air photos. A large effort is being expended for a relatively small return.

d. From the records of numerous requests for large area coverage, it is evident that some method of reaching an understanding between ground and tactical air is needed. These requests have created excessive demands upon air, reproduction, and interpretation facilities.

e. Results of field tests over friendly and enemy troops show that personnel estimates can be made by direct observation of personnel and activity recorded in air photos. A scale of 1:2,000 or better is required for average conditions and uses.

f. It is possible to set up a system of photo intelligence that will operate with the available equipment and furnish data on troop movements and personnel targets.

g. A great need exists to inform army personnel, and others not completely acquainted with photo recon, on the uses and limitations of air photos and the production capacity of the photo planes and the reproduction units.

h. The advantages and disadvantages that come with seasonal changes will tend to cancel each other with little net change.

RECOMMENDATIONS

62. a. When personnel targets are to be evaluated, use photos having a scale of 1:2,000 or better.

b. Photography of this scale should not be specified until the target area has been located by other reconnaissance methods.

c. Photo interpreters should have some prior experience in estimating personnel targets.

d. Photo interpreters should have experience with theater characteristics, i.e., ground features, local habits, and enemy techniques.

e. It is imperative to establish a Joint Intelligence Center (JIC) similar to JOC, that will integrate photo-reconnaissance, photo interpretation, and intelligence.

f. Serious consideration should be given to a systematic procedure of aerial reconnaissance that will include periodic sampling of key areas, using planes flying at 3,000 to 3,500 feet and cameras with 24-inch lenses (K-18 preferred) if possible. Cameras should have fast recycle to get needed overlap of photos.

g. The whole photo-intelligence process should be speeded up. Army should critically examine present procedures at every step, with the objective of minimizing elapsed time between initial request for photo coverage and delivery of usable information to the originator of the request.

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APPENDIX D

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APPENDIX D

JOINT STAFF PROBLEMS IN INTELLIGENCE ORGANIZATION, OPERATIONS AND TRAINING

INTRODUCTION

1. Appendix F discusses command and logistics problems in delivering atomic weapons tactically with medium bombers, and Appendix E outlines some alternative means of delivery. Appendices B and C discuss some of the separate problems of operation and of intelligence in relation to the probable employment of atomic weapons in support of ground forces. The present Appendix will consider some of the joint Army-Air Force problems in intelligence, operations, and training which tactical atomic warfare seems likely to raise, and also, will discuss some of the processes which intelligence and operations staffs must carry through jointly before a recommendation can be made to Command that suitable targets have been found and evaluated for exploitation with atomic weapons.

2. These problems are primarily staff problems in organizational structure and procedures, and in the coordination of functions. They are of types which Army Field Forces and Tactical Air Command continually face in providing working doctrines for the units of the field armies and the tactical air forces.

3. It is important to recognize at the start that these problems necessarily include the tactical employment of the whole family of ground and tactical air weapons, of which atomic weapons are only one group.* That is, it generally will not be feasible to set up new separate procedures and doctrines for the tactical use of atomic weapons except to the extent that these new procedures and doctrines can be integrated into, and coordinated with, procedure and doctrine

*For example, see FM31-35, "Air-Ground Operations," August 1946 (Obsolescent); "Joint Training Directive for Air-Ground Operations," Office of the Chief of Army Field Forces and Headquarters, Tactical Air Command, September 1950 (not officially approved); or a forthcoming study by the Operations Research Office, ORO-R-3(FEC), "Evaluation of Close Air Support Operations in Korea."

applicable to the tactical use of all weapons. This is a major task which is more or less continually under study by various groups. The present Appendix proposes only to outline some of the new factors which atomic weapons seem likely to introduce into further studies of means, procedures, principles, and doctrine.

4. It is especially important, however, that atomic explosives be recognized as new tactical weapons of such major performance as to force significant changes in future tactics, procedures, organization and equipment. When atomic weapons first appear in substantial numbers upon the battlefield and behind the front, their impact on military doctrine may be roughly equivalent to the sum of the changes forced by modern artillery, automatic weapons, armor, and air power since the beginning of World War I, except that the time scale probably will be condensed from decades to weeks. In the event of atomic warfare, then, field armies and tactical air forces may succeed in their general mission to the extent that the necessary changes in doctrine have been anticipated.

TACTICAL AIR FORCE PARTICIPATION

5. The required sequence of action in atomic attack is: collection of intelligence data on tactical targets, evaluation of targets, planning of attack, delivery of atomic weapons, and assessment of results as a basis for further or improved exploitation. This sequence is common for all weapons although in Korea the last step often has been neglected. Tactical air force will play an important, often dominant, role at both ends of this sequence. The new factors which the tactical use of atomic weapons will introduce in this sequence will be outlined below.

JOINT INTELLIGENCE

6. The reconnaissance units of the tactical air force will be extensively used to collect primary intelligence by visual, photographic, and electronic reconnaissance. The objective will be to locate and to obtain data for the evaluation of suitable atomic targets, to verify the continued existence of previously reported targets, to supplement fragmentary information on known or suspected targets, and to further exploit trigger intelligence which often may be nebulous.

7. The new requirements will differ from present aerial reconnaissance practice in several particulars. More detailed and more extensive coverage of enemy rear areas will be required. One purpose will be to supply information on such details of terrain and cover as may affect atomic

weapons. Another purpose will be to locate the enemy's bivouac and assembly areas, his logistics and supporting services, the bottlenecks of his MSR, and his command and communications centers. The approximate boundaries for, and the numbers or densities of personnel in, these area targets should be determined by large scale vertical photography* or by other means. They should not merely be inferred from enemy activity or the presence of materiel, as in ETO during World War II, since enemy's deception, camouflage, or apparent** dispersal may defeat this practice.

8. A further purpose will be to aid intelligence in the anticipation of atomic targets; for example, in the maintenance of ground movement plotting boards on enemy rear areas, showing numbers, rates and directions of movement, rates of build-up, and accumulations in concentration or assembly areas.

9. Near the line of battle, aerial reconnaissance often will be required to supplement other sources of intelligence, particularly if the situation is fluid. In addition to furnishing details of enemy positions and deployments by aerial reconnaissance, checks may be made on the ground situation map; or it may be verified that friendly elements have reached the line of withdrawal or that an adequate safety zone exists prior to atomic attack by any of the various means of delivery.

Joint Intelligence Center

10. The logical place to effect the coordination of intelligence from air reconnaissance sources is in a Joint Intelligence Center (JIC). Organizationally, the proposed JIC*** would be organic to the Joint Operations Center JOC**** The mission of JIC initially would be to collect, collate, evaluate, and disseminate information on ground combat and support-area targets, whenever either the tactical

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* See Annex 4, Appendix C, for a description of tests establishing the photo-scales required to identify and count troops.

** Reference to Figure 3, Annex 1, Appendix B, indicates that dispersal to eliminate atomic targets may require impracticably small densities.

*** ORO-T-13(EUSAK); "A Proposed JIC for the Selection of Targets in Air Support and Ground Action," develops a JIC proposal with special reference to photo-reconnaissance See also paragraphs 52-62 of Annex 4, Appendix C.

**** Joint Training Directive; op. cit.

intelligence function required aerial reconnaissance, or target exploitation might require strikes by tactical air force. The responsibilities of JIC would include both pre- and post-strike intelligence within its mission.

11. The mission of JIC would extend to all weapons. That is, through aerial reconnaissance, JIC in the course of its business would uncover many targets more suitable for exploitation by ground than by tactical air forces, but these too, would be included in the JIC sphere of responsibility. There is already a pressing need for the JIC in air-ground and ground-ground combat. The early incorporation of JIC functions in JOC then would provide an organization-in-being capable of undertaking tactical atomic warfare whenever atomic weapons are added to the army and tactical air force arsenals.

Recommendation

12. Details of JIC organization and procedures are beyond the scope and competence of this Appendix. However, it is recommended that JIC include at least the following functions as basic to its mission:

a. Act as the principal staff division at field army--tactical air force level for evaluating, interpreting and analyzing all intelligence for joint use.

b. Promote the joint interests of ground and air in coordinating, integrating, exploiting and improving aerial reconnaissance, with particular emphasis on enemy areas beyond the line of battle.

c. Act as a primary intelligence message center for collecting and disseminating via the liaison communications network in parallel* to all echelons at field army level and below all spot items, flash reports, mission intelligence reports, photo-sortie interpretations, and intelligence analyses and summaries of joint interest to field force and tactical (including naval) air commands.

d. Direct all aerial photo-interpretation (PI) and photo-reproduction (PR) activities** (including distribution of photo-positives to appropriate units) within and below field army level for both Army and Air Force.

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*See paragraph 18

** It is suggested that JIC be allocated operational control (but not the command, training and logistic burdens) of the reconnaissance aircraft, and PI and PR units required to perform its mission

e. Analyze enemy troop and materiel movements and rates of movement so as to direct reconnaissance toward the regions of more probable intelligence gains.

f. Assist JOC in the preparation and transmittal, in parallel to appropriate staffs and commands, of JOC-JIC appraisals, conclusions and recommendations, including firm intelligence judgments and preliminary operational plans.

13. The proposed JIC would have considerably more cognizance over joint intelligence than the Intelligence Division proposed in "Joint Training Directive for Air-Ground Operations"* and would require increased facilities and staff to accomplish its mission. There would, however, be a reduction in the G-2 air branch at field army headquarters since a major part of its function and staff would be more effective if moved into JIC, and similar transfers from A-2 to JIC probably could be effected.

14. JIC, then, would be staffed jointly and in roughly equal numbers and ranks from army and tactical air force. In general each army member would work in cooperation with an opposite number from air force with complimentary, rather than supplementary, skills, experience and training. It might be necessary to designate one of the opposite numbers as the senior of the other in some cases, but for efficiency and effectiveness, team work rather than seniority should be emphasized.

Processing of Joint Intelligence

15. The rapid processing of accurate intelligence is the key to the whole target evaluation and exploitation sequence in tactical atomic warfare. A major fraction of this intelligence, especially up-to-the-hour intelligence of enemy-held areas, will be obtained by air. The processing and routing of joint intelligence through present liaison channels means running up and down command ladders while the information ages and becomes shopworn or mislaid by repeated handling. In atomic warfare, neither Army nor Air Force will be able to afford the degradation of intelligence by time and needless handling, even though they may continue to afford the duplication of facilities and staffs at command levels where coordination of intelligence between ground and air must be effected.

16. In atomic warfare, the greatest need will be for the establishment of procedures for capitalizing swiftly on fast-moving intelligence. The fault in present joint

*Op. cit.

intelligence processing generally lies in failure to establish direct channels to the ultimate user of intelligence; instead, intelligence is passed in series through several levels of command and liaison, and receives some form of delay ranging from examination to consolidation at each level.

17. For example, during December 1950, and January 1951, the elapsed time between request by division commanders and receipt of photo-positives covering division fronts was 7 to 9 days, of which 4½ to 7 days was traceable to lost time in command and staff liaison channels, and about 30 hours to lack of adequate PR equipment.

Recommendation

18. The remedy is obvious. Joint intelligence must pass directly from sources to JIC, receive rapid processing through either JIC or JOC-JIC as appropriate, and thence pass directly to the ultimate users and in parallel to other command, staff, and liaison echelons. A separate "lazy" copy, of course, could be routed through channels for purposes of record.

JOINT REQUIREMENTS IN ORGANIZATION AND TRAINING

19. There are four new requirements in organization and training which army and tactical air general staffs will need to meet in preparation for atomic warfare.

a. Organization and training of general and special staff officers in the procedures and techniques of atomic warfare.

b. Organization and training in combat operations for personnel who will participate in atomic attacks.

c. Indoctrination of all personnel in safety procedures and methods of self-protection.

d. Staff preparation for the assignment and utilization of new services, such as atomic warfare advisory groups, radiological safety personnel, atomic warfare medical units, and additional special staff members.

20. Each of the above four requirements will be discussed in turn. First, it is re-emphasized that steps to meet these requirements should be anticipatory and that the time to initiate them is now.

21. Staff Officer Training in Atomic Warfare

There is an urgent need for the training of staff

officers for corps, field armies and tactical air forces in the tactical employment of atomic weapons. This training should be of the semi-technical nature required to enable these officers to evaluate targets, estimate the effectiveness of various atomic weapons, plan attacks, and devise tactics for the exploitation of atomic attacks.

22. This training can be accomplished in part at the various Army and Air Force schools and staff colleges, and in part by the wide distribution of appropriate classified manuals and reports. The Korean campaign offers an excellent opportunity to inject additional realism into this training.

Recommendation

23. It is recommended that as soon as possible staff officer training sections be formed from officers who have had preliminary training in atomic weapon effects* and that these sections be attached to army, tactical air force, and corps in Korea for further training. These sections should be equipped as self-sufficient units in order not to overburden limited existing facilities or interfere with the work of existing staffs in Korea.

24. These proposed staff officer training sections for atomic warfare would in part adapt the methodology outlined in the various sections of this report and in part develop their own procedures from accumulated experience. Their roster would include representatives from all general staff divisions; i.e., G, A or J - 1, 2, 3, 4. Their activities should include the following:

a. Study the probable high-yield areas, both friendly and enemy, for atomic attack.

b. Develop and carry out staff intelligence procedures appropriate to atomic warfare.

c. Analyze and evaluate all atomic targets recognized, (induced targets, anticipated targets, and targets of opportunity).

d. Perform all of the real staff work required to plan and execute simulated atomic attacks on targets as they develop, using an actual ti[illegible]le at every step until all staff work is complete.

*These training sections presu[illegible]ould be formed from officers who had completed b[illegible]rses in atomic warfare at Sandia Base. Organizationally, the army side of these staff officer training sections might be administered by G-3, DA; C&GS School (Ft. Leavenworth); or possibly AFSWP.

e. Assess, or employ a staff umpire to assess the probable results of each hypothetical atomic attack, again using a realistic time scale throughout.

f. Undertake target prediction as soon as a footing develops in data on enemy tactics and capabilities.

g. Improve or develop methods for target location and anticipation, with particular emphasis on areas in enemy's rear, including his reserve, bivouac, assembly, and supporting services areas.

h. Analyze friendly tactics, organization, and doctrine, and propose changes, for the dual purpose of decreasing the vulnerability of friendly forces to atomic attack and of inducing the enemy to adopt measures which may present atomic targets.

i. Analyze enemy's atomic defense doctrine and tactics on a continuous basis, in anticipation that these will probably change rapidly following initial tactical use of atomic weapons in ground operations.

j. Develop procedures in post-attack reconnaissance, intelligence, and operations for the rapid assessment of results and follow-up exploitation of atomic attacks. (These observations also would be of primary importance as a means of obtaining basic data for improving the tactical efficiency of atomic weapons and for removing present deficiencies in knowledge of atomic weapon effects.)

Combat Training in Atomic Warfare

25. The delivery of tactical atomic attacks by aircraft, rockets, guided missiles or artillery still requires considerable preparatory effort; first, to develop and test weapon-delivery means and procedures, and finally to give combat operations training to officers and enlisted men. These could be accomplished for A-weapon delivery by tactical aircraft under combat test conditions through a relatively small added effort in the Korean campaign.

26. This effort would require the occasional use of various aircraft, ranging from medium bomber to fighter classes, to fly simulated atomic sorties against real enemy targets. These test and training sorties usually might be flown either as a part of an actual bomber or fighter strike with conventional weapons or immediately after such a strike.

27. These test sorties should be made as realistic as possible in all details except that conventional rather than

atomic explosives would be used. That is, most of the steps outlined in Appendix F and in Appendix B under the Section "Planning and Execution of Atomic Attack,"* should be included in the tests. Atomic weapons in stockpile or in development should be duplicated in size, weight, and ballistic characteristics; "safe" bomb release heights for the real atomic weapon should be used; the divergence between aiming point and actual ground zero should be determined, and the safety of friendly troops should be assessed. Distinctive flash, fire, or smoke markings, or other beacons might be used to mark the fall of the simulated weapon, and the test sorties could be accomplished by reconnaissance aircraft to observe and record results.

28. A series of such tests in Korea would be of marked value in establishing joint army-tactical air force operational procedure and doctrine for mounting atomic attacks and in providing Army Field Forces and Tactical Air Command with a group of experienced officers for the further instruction of other combat personnel. Obviously, if these test sorties could be incorporated in and coordinated with the staff officer training program recommended in paragraphs 21 to 24, their value would be further increased.

29. Indoctrination of Personnel in Atomic Safety. The indoctrination and training of personnel in atomic safety has two distinct parts:

a. The indoctrination of all officers and enlisted personnel in Phases I, II, and III of the atomic energy indoctrination course.

b. The training of radiological defense officers and monitors for attachment to headquarters, corps, divisions, and regiments.

30. The indoctrination of recruits can be made comparatively simple by including Phases I, II, and III in basic training. For personnel already in the army or tactical air force, this indoctrination usually will have to be given at duty stations and rest areas. In Korea, Phases I and II have been partially completed, but very few troops have received Phase III indoctrination.** Atomic energy indoctrination is a comparatively simple undertaking, but plans and schedules must be worked out before it can be accomplished for men in combat zones. An emergency plan for completing indoctrination is outlined in paragraph 7 of Annex 1, Appendix H.

*Appendix B, Paragraphs 9-52
**See Appendix H, Annex 1

31. In contrast to atomic safety indoctrination of troops, the training of radiological officers and monitors requires a short training period with equipment and is difficult to accomplish in a theater of operations by present methods. (In Korea, radiological defense officers had been appointed but only two had had adequate training in January 1951*) Consequently, staff plans should include either a rotation-for-training schedule or arrangements for requisitioning trained radiological personnel from a replacement training center in the ZI.

32. Assignment and Utilization of New Services. The advent of atomic warfare will bring new special staff personnel, service units and equipment into the theater of operations. General staff plans and organization should anticipate effective utilization of these new groups. These groups may include: special staff assistants, atomic warfare advisory groups,** atomic ordnance teams, new signal units,*** radiological defense officers, and special medical personnel and equipment.****

33. The tactical use of atomic weapons also will introduce new problems in general staff planning for effective utilization of both existing and new facilities. For example, the logistics officer will need to plan for the evacuation and hospitalization of heavy casualties from division or corps areas where medical facilities may be saturated or destroyed by enemy atomic attacks, and to be prepared for emergency air-lifts of medical personnel and supplies into friendly or enemy atomic disaster areas.

JOINT OPERATIONS REQUIREMENTS

34. In Korea, field army G-3 and tactical air force A-3 are reasonably well prepared to undertake joint operations in atomic warfare. This is primarily possible because of the existence of an effective Joint Operations Center (JOC). That is, the obsolete procedures of FM31-35 have been discarded and many of the suggestions from the "Joint Training Directive***** have been put into effect. An additional factor is an existing efficient communications network for operations in which delays within command and liaison echelons are kept at a minimum in the vertical and the lateral links.

35. In further preparation for tactical atomic warfare,

* Appendix H. Annex 1.
** See Appendix F, Paragraphs 9 and 10.
*** See Appendix B, Paragraphs 36-44
****See Appendix H
*****Joint Training Dir for Air-Ground Operations," op. cit.

the operations and training staffs of army and air force will need to complete the following requirements:

a. Joint arrangements for incorporating atomic warfare into the Air-Ground Operations System, the Tactical Air Control System, and the Joint Operations Center.*

b. Organizational plans to form joint staff atomic warfare advisory Groups (JAAG)**, including technical personnel, to aid in evaluating atomic weapon targets and in planning and exploiting atomic attacks.

c. Indoctrination of officers, troops, and airmen in offensive and defensive safety measures in atomic warfare.

d. Coordinated plans for the tactical employment of specialized combat units, such as atomic weapons crews, aiming-point designation and guide-in control teams, radiological safety units, etcetera.

e. Plans and procedures for collecting and evaluating after-action data on atomic weapons.

COORDINATION OF INTELLIGENCE AND OPERATIONS

36. The coordination of staff activities ordinarily is defined as the responsibility of the chief of staff.*** However, the requirements for tactical atomic warfare might be met more effectively if the coordination of combat intelligence and operations was made automatic by changes in general staff organization and procedure. In Korea, G-3/G-2 coordination has been improved by setting up joint G-3/G-2 offices. This essentially amounts to placing the combat intelligence message center in juxtaposition with the tactical situation functions of G-3.

37. The present G-2 practice in Korea, as carried out at EUSAK and I Corps and perhaps elsewhere, of having a Combat Intelligence branch to handle day-to-day situations and a separate Plans and Analysis branch for the study of cumulative situations, collations, and trends, is believed to be an excellent method which should be adopted as SOP by intelligence at field army level and below. From the atomic weapons viewpoint, the further amplification of these Plans and Analysis procedures in G-2 plus full coordination with G-3 offers promise of leading to better handling of two major intelligence

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* "Joint Training Directive," op. cit.

** See Appendix F for interim JAAG organization and functions, and also paragraphs 47-53 following.

*** FM101-5

and operations problems: anticipation of targets,* and exploitation of enemy rear area situations.**

38. In the proposed Joint Intelligence Center (JIC), paragraphs 10-14 preceding, coordination of intelligence and operations is provided for by making JIC organic to JOC, and therefore, responsible to a Director of Joint Operations. In preparation for atomic warfare, careful consideration should be given to the probable improvements which might result from integrating a part of the present G-2 responsibility with G-3 in a manner similar to the proposed JOC-JIC organization. Specifically, it is suggested that consideration be given to placing the collection, evaluation, and analysis of tactical intelligence at field army level and lower echelons under an assistant chief of staff for combat operations. The reasons for this suggestion are developed below.

39. In the combat zone, it is apparent that the separate responsibility of G-2 ends when trigger information and original plus supplementary sources have been exploited to the extent that intermediate ratings for reliability of sources and credibility of data have been established. At this time, where both target evaluation and preliminary planning for combat exploitation should begin, the problem passes into the joint cognizance of intelligence and operations. At this stage, there is not, nor can there be, some obvious point of separation in the administrative sense between combat intelligence and combat operations.

40. In this nebulous region of overlapping responsibility, it is understandable that intelligence may be reluctant to submit an estimate to operations while data are still incomplete and that operations may become impatient from lack of an intelligence estimate for initiating operations planning. At this point, indecision may develop and Command be subjected to uncertainty or delay. In atomic warfare, where the greatest need will be for means and procedures to capitalize quickly on fast-moving intelligence, such delays often would result in the loss of targets of opportunity (see Annex 1 as an illustration).

41. It is suggested that this "combined" combat intelligence-operations dilemma could be avoided by the commonplace solution of making authority correspond to responsibility. One possible organizational method would be to assign the overlapping part of the "combined" function to a specific

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* Appendix C, paragraphs 21-24.
** Appendix C, paragraphs 28 et. seq.

subdivision of the general staff. However, the overlap merely defines a stage or period at which intelligence enters into operations planning, so it could not be comparted by an organizational boundary. It follows that the better method would be to combine combat intelligence and combat operations in a single organizational unit of the general staff. (In the discussion of a TACTICAL ATOMIC WEAPONS CONTROL SYSTEM, paragraphs 46-57, following, this general staff unit is called the G-3/G-2 combat operations section.) As stated earlier, this suggestion is meant to apply only at field army level and lower echelons in the combat zone. However, the suggestion is not meant to apply only to atomic warfare; it is applicable to all weapons and tactics in which mechanization and rapid movement are emphasized.

STAFF ORGANIZATION FOR TACTICAL ATOMIC WARFARE PLANNING

42. In the preceding discussion it has been assumed, without specific statement, that atomic weapons will be employed chiefly against regiments or divisions as targets. Consequently, new staff organization for operation control and planning in atomic warfare normally would not be needed below corps level. In fact, delivery by tactical aircraft and long-range guided missiles probably always would be planned best at field army and/or JOC levels, rather than at a lower or higher echelon. Delivery by rockets, short-range guided missiles, and artillery probably should be controlled initially by army in coordination with corps, and later, perhaps by corps alone, since the means of delivery will be located within corps sectors, and the targets generally will be near or on the corps front.

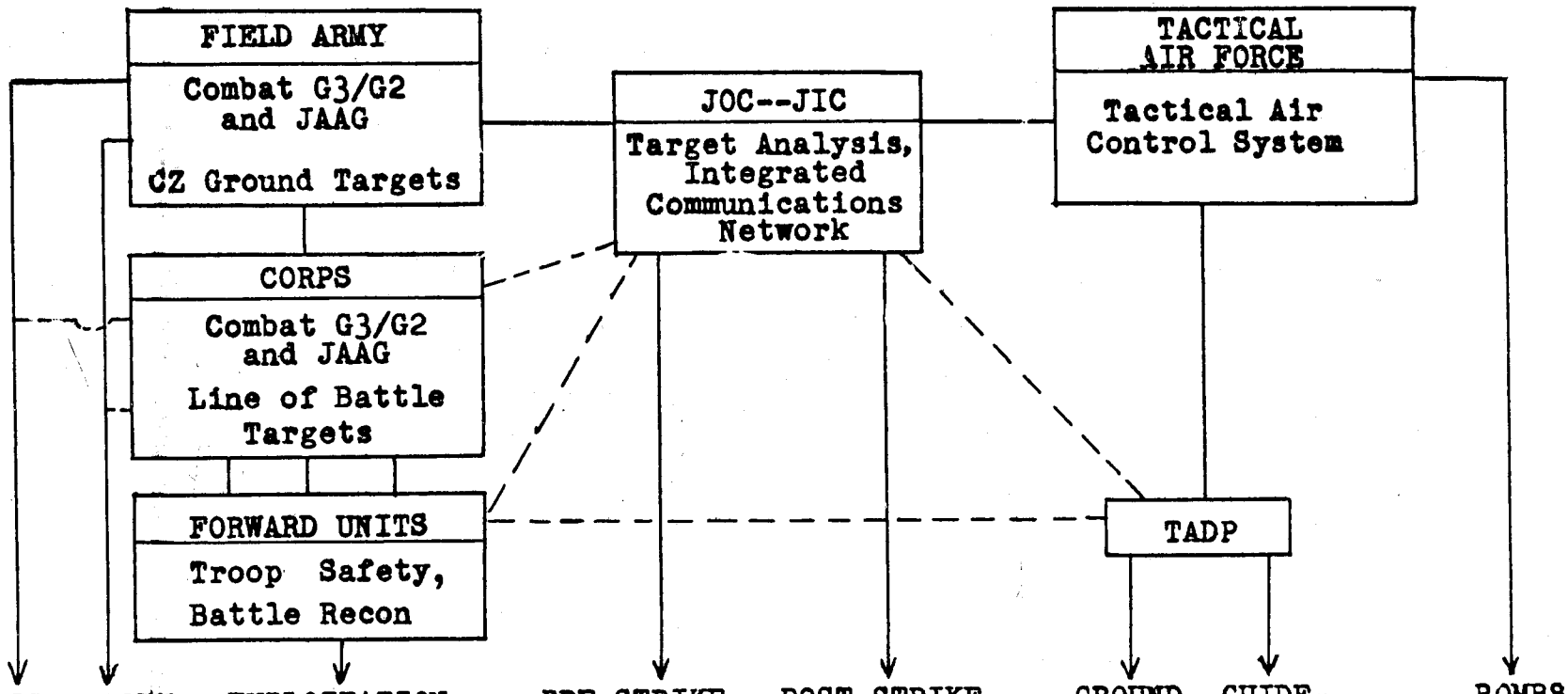
43. This automatically means that the Army's tactical problems in intelligence, organization and operations in atomic warfare will be of primary concern to general staffs at field army and corps levels. Staffs at division level and lower will be concerned principally with new problems in indoctrination, training, troop protection, and battle reconnaissance.

44. Staffs at theater and higher levels will be concerned with policy, allocation of weapons, and other problems beyond the scope of this report.

45. The probable organizational functions in atomic warfare of general staffs at field army levels and lower echelons can be inferred from Figure 1. This diagram is a flow chart showing the general structure and functioning of a proposed Tactical Atomic Weapons Control System.

Figure 1, Appendix D

THE TACTICAL ATOMIC WEAPONS CONTROL SYSTEM
(Joint Tactical Weapons Control System)



SSM--Surface-to-surface guided missiles
ASM--Air-to-surface guided missiles
TADP--Tactical Air Direction Posts
JOC--Joint Operations Center
JIC---Joint Intelligence Center (proposed)
JAAG--Joint Atomic Warfare Advisory Group (interim proposal)

APPENDIX D

TACTICAL ATOMIC WEAPONS CONTROL SYSTEM

46. The nerve center of the Tactical Atomic Weapons Control System shown in Figure 1 is the JOC-JIC. JOC-JIC would operate in essentially the manner outlined in the Joint Training Directive,* with the addition of the JIC functions outlined in paragraphs 10-18 preceding, including, of course, pre- and post-strike aerial reconnaissance. JOC-JIC would also operate the primary communications center for atomic warfare in an integrated communications system.**

47. JOC-JIC would carry out the majority of atomic target analysis and evaluation work with the assistance of field army JAAG. This follows because the major fraction of quantitative intelligence on area targets would come directly into JIC from aerial reconnaissance and photo interpretation, and since final pre-strike reconnaissance usually would be made by air.

48. Field army JAAG would be organic to the combined G-3/G-2 combat operations staff section discussed in paragraphs 36-41 preceding, but elements of JAAG would be physically located in JIC, along with most of the army G-2 air branch, as indicated in paragraphs 13-14 preceding. JAAG should be regarded as an interim measure, however. These groups are designed to fill gaps in general and special staffs pending indoctrination and technical training in atomic warfare of an adequately large number of army and tactical air officer replacements.

49. JOC-JIC staff work in target evaluation would be completed by delivery to army G-3/G-2 combat section of: (1) target evaluation, (2) preliminary operations plan, (3) recommendation of method of weapon delivery. If delivery by tactical aircraft was indicated, Tactical Air Control System would be alerted at this stage.

50. Combat G-3/G-2 then would: (1) select targets and aiming points; (2) complete operational and exploitation planning; (3) prepare operation orders (in cooperation with JOC if tactical air delivery is involved).

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* "Joint Training Directive for Air-Ground Operations," op. cit.

** Integrated communications system, defined in SR 320-5-1, is "one, on either a unilateral or joint basis, in which a message can be filed at any communications center in that system and be delivered to the addressee(s) by any other appropriate communications center in that system without reprocessing enroute." (author's underscoring)

51. Command decision and operation orders, in addition to the usual statements of mission and plan of action, also would specify: (1) aiming points, (2) time and method of delivery, (3) special safety procedures, if necessary.* Operation orders presumably would be joint only in case of weapon delivery by tactical aircraft. That is, post-strike reconnaissance and analysis by JOC-JIC would be SOP and automatic.

52. In general, operation orders would pass through JOC and thence directly and in parallel to all appropriate units in the Tactical Atomic Weapons Control System via the integrated communications network. This action would be SOP and should be carried out even if Command decision for SSM or artillery delivery were delegated to corps by army.*

53. Combat G-3/G-2 and JAAG at corps would carry out essentially the same functions as the section at army level, except that their primary attention would be directed to targets near the line of battle on the front and flanks of corps sector. They would collect and evaluate intelligence on such targets and recommend action to higher headquarters. Part of the information collected at corps would be sufficient to evaluate and specify appropriate atomic targets; another part would serve only as "trigger" intelligence requiring further reconnaissance. The section at corps generally would have first access to intelligence from ground sources (patrols, line crossers, POW, battle reconnaissance, etc.), and more detailed knowledge than army of local ground situations. Consequently, in all close support operations, the corps staff sections would act in a staff advisory capacity to field army, corps, and forward units on the safety of friendly troops from both friendly and enemy atomic weapons and weapon delivery near MLR would be coordinated with corps staffs.

54. The forward units of army; i.e., division, regiment, and battalion commands, would be concerned primarily with: (1) safety of friendly troops; (2) battle reconnaissance to furnish intelligence on atomic targets for close support operations; (3) follow-up and exploitation of atomic attacks on enemy MLR.

55. In addition to the usual command communication links through corps, forward units down to regimental (or battalion) should have direct communications with JOC-JIC

* Atomic air bursts constitute a short-time hazard, and on-ground or underground bursts a longer-period hazard to aircraft in the vicinity of or downwind from ground zero. See Appendix A, paragraph 14, and Appendix B, paragraphs 47-50.

and lateral communications with Tactical Air Direction Posts in their areas. Field grade commanders of forward units would require these links in order to: (1) provide marker panels, colored antiaircraft shell bursts, IFF, or other means of indicating friendly units and positions at the proper time; (2) aid corps, JOC-JIC, and TADP in keeping accurate, up-to-the-minute local ground situation and battle maps; (3) establish safety zones or lines of withdrawal when appropriate; (4) transmit battle reconniassance reports; (5) receive post-strike reconnaissance reports pertinent to the general exploitation order.

56. TADP would perform six principal functions in atomic weapon strikes by tactical aircraft in close support operations: (1) provide all-weather guide-in systems;* (2) provide separate** ground command, plane tracking, and control stations; (3) maintain ground situation, initial point, and aiming point maps and grids for local aircraft control; (4) transmit time reference signals for single and multiple atomic weapon sorties;*** (5) coordinate with forward troop unit commands with reference to safety of friendly forces and exploitation of atomic attack; (6) act as a forward flash message relay center for pre- and post-strike aerial reconnaissance.

57. It is felt that a system similar to the TACTICAL ATOMIC WEAPONS CONTROL SYSTEM, as outlined above and in Figure 1, is compatible with procedures recommended in the Joint Training Directive,**** and that the SYSTEM, if put into effect, would also be beneficial to the use of conventional weapons. For these reasons, Figure 1 has been given the alternate title, JOINT TACTICAL WEAPONS CONTROL SYSTEM. The three primary requirements for any joint tactical weapons control system are: (1) rapid recognition and evaluation of targets; (2) speed in planning, delivering and exploiting attack; (3) safety of friendly troops in close support operations.

SUMMARY OF COMMAND AND STAFF PROBLEMS

58. This Appendix has been aimed at suggesting methods for general and special staffs to pursue in seeking solutions for five primary problems of tactical atomic warfare in support of ground forces, namely:

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* See Appendix B, paragraphs 36-42.
** See Appendix B, paragraphs 43-44.
*** See Appendix B, paragraphs 46-52, and also Appendix B, Annex 4.
**** "Joint Training Directive for Air-Ground Operations," op. cit.

5 major problems

(1) The major tactical problem of anticipating or inducing profitable atomic targets.
(2) The rear area problem of locating, evaluating, and attacking enemy supporting arms and services prior to firm contact.
(3) The joint intelligence--operations combat problem of swift capitalization upon targets of opportunity.
(4) The general problem of protection for friendly forces from friendly and enemy atomic attacks.
(5) The new joint staff problems in training, organization, equipment, logistics, and tactics which tactical atomic warfare may be expected to introduce in ground-ground and air-ground operations.

PROPOSED METHODS OF SOLUTION

59. This Appendix has proposed five principal means of solution for the above command and staff problems in tactical atomic warfare at field army and lower echelons, namely:

(1) Amplification of the functions of the Tactical Air Control System, including emphasis on Tactical Air Direction Posts with ground control stations separated from guide-in stations.
(2) A considerable increase in the functions of the Joint Operations Center; particularly the addition of a Joint Intelligence Center and an integrated joint communications network under JOC direction.
(3) The organization of combined G-3/G-2 combat operations sections, supplemented by Joint Atomic Warfare Advisory Groups, in the general staffs at field army and corps levels.
(4) The organization of a JOINT TACTICAL WEAPONS CONTROL SYSTEM to integrate the functions of (1), (2), and (3) above, and to coordinate and control atomic attacks (or other close support operations) delivered by army or air force units.
(5) The immediate formation and assignment of staff officer training sections to study and practice hypothetical tactical atomic warfare under real combat conditions.

APPENDIX D: ANNEX 1

TIME FACTORS IN THE DEVELOPMENT AND RECOGNITION OF A TARGET OF OPPORTUNITY AND SUBSEQUENT OPERATIONAL ACTION

PROBLEM

To consider the present intelligence-operations process as it is applied to a target of opportunity.

FACTS

Introduction

During the period from about 7 February to 11 February large concentrations of enemy troops were observed to enter the area northeast of Chipyong-ni. This was known to be part of the general build-up of enemy forces aimed at stopping the UN advance and implementing a strong counter-attack.

The development and recognition of a target of opportunity, such as described here, involves important time elements for the various stages in the intelligence-operations process. These time factors will be discussed in their relation to the adequacy of the present intelligence-operations process for exploiting targets of opportunity.

Intelligence Reports of Enemy Concentration

An air OP of 2nd Division, X Corps, reported the following sightings of large concentrations of enemy troops:

100900 Observed one enemy regiment located in the area of CS8158, CS8258 and CS8358, northeast of Chipyong-ni on open ground above the Hukchon River.

101535 Road vicinity CS9286 heavily used, appears to be MSR in area.

101540 Observed an estimated 500 enemy dug-in vicinity CS8574.

101545 Observed a large number of armed enemy moving generally east from CS7352 to CS8256.

101555 Observed 50-75 enemy troops with an estimated 25 pack animals vicinity CS8656.

101710 One thousand enemy troops observed in open vicinity CS8456.

101715 Three hundred to four hundred enemy observed dug-in and in open vicinity CS9256.

101730 Two hundred to three hundred enemy troops observed at CS8757.

101745 One thousand troops previously observed in open vicinity CS8656. Seen again in same area.

Evaluation of Reports by Pilots and Observers

Experienced pilots and observers confirmed the assembly in the open of several thousand enemy troops, probably of division strength, in the area vicinity Chipyong-ni. They reported that the enemy troops made no effort to take concealment from air observation by UN aircraft.

Previous Relevant Intelligence Reports

The discovery of this enemy assembly area coincided with the following previous agent reports:

7 February Two thousand NKA and CCF were seen at Piryong-ni, CS8454.

7 February Twelve thousand CCF were seen at Haengso-ri, CS8157.

8 February Two thousand NKA and CCF were observed at Chungwon-ni, CS7855, and apparently planned to dig positions in the mountains around Chipyong-ni.

7-9 February Forty-eight UN releases reported that 5000-8000 enemy moved along the trail north by Han River in a southeasterly direction to CS7046, and then moved eastward.

DISCUSSION

Previous Intelligence Estimate of the Situation

Previous intelligence had identified elements of the CCF

42nd Corps. The increasing build-up was believed to be an additional CCF Corps, possibly the 39th or 40th, arriving in the area to assist the 42nd Corps in the offensive action against X Corps. From the locations noted, the 42nd CCF Corps was in a position to drive southeast past Chipyong-ni through a gap between the 23rd Infantry Regiment and elements of the 8th ROK Division. The enemy then had the capability of either turning southwest and enveloping the Chipyong-ni salient, or of continuing to the southeast to strike at Wonju. The 198th CCF Division south of Hongchon was in position to employ a holding attack against friendly forces as an aid to the main attack. Failure of this Division to hold the friendly forces in place would make identification of the two remaining divisions of the 66th CCF Corps, the 196th and 197th, to be either in front of the 8th ROK Division or farther to the east against the 5th ROK Division.

Recognition of the Target and Command Decision

At 101600 an urgent request was received at HQ, X Corps from 2nd US Division for air support against a target reported and confirmed of thousands of troops concentrated in the vicinity of CS8256, a known CCF location. TACP operating with X Corps informed Mosquito of the target. Mosquito landed on X Corps airfield to conserve fuel while pilots were briefed. Requests were made to JOC for air support. Commencing at 101705 with 36 bomber aircraft concentrated over the area, pilots engaged these lucrative targets. The pilots reported at least one enemy Division in the area, with strike results excellent. At 101940 a message to General Ridgway from General Almond gave the above information, adding that additional strikes with bomber aircraft were planned later on the night of 10 February by TACP control, and predicting thousands of casualties.

Actual Reported Strike Results

The following strike results were reported by Tactical Air:

101930 About 30 enemy killed vicinity of CS8055

101931 About 300 enemy troops killed and 10 buildings destroyed, one exploding, vicinity CS8855.

101935 About 50 enemy killed vicinity CS7555.

The results of other strikes with bomber aircraft made later on the night of 10 February and in early daylight of 11 February, are not known.

Situation in Target Area Subsequent to Air Strike

During the period of 102100 to 112100 the enemy concentration northeast of Chipyong-ni received further strengthening and appeared to be ready to start a drive southward. Groups of varying sizes were noted moving east and south of Piryong-ni. This may have been the first indication of a general move southeastward by the main body. It became increasingly apparent that the enemy noted the gap between the 23rd Infantry Regiment and elements of the 8th ROK Division and decided to take advantage of this situation before the gap was closed.

CONCLUSIONS

1. Agent reports for the period 7-9 February indicated heavy enemy build-up and increasing concentration in the Chipyong-ni area.

2. On 10 February nearly 7 hours elapsed between observation of enemy regiment at 100900 and follow-up observations after 101540.

3. Between 101700 and 101800, a concentrated enemy troop target suitable for atomic weapon attack existed in a circle of approximately 3 kilometers radius, center at about CS8457.

4. Had they been armed with suitable atomic weapons, a decisive attack might have been delivered by the bombers which commenced arriving in the area at 101705.

5. The coordinates of the air strike at about 101930 may indicate alternatively: a) that the enemy concentration had moved southward during two hours by 2 or more kilometers; b) that these strikes were not delivered against principal points of enemy concentration; c) that there were several troop elements not previously observed in the area.

6. Fragmentary intelligence indicated the possible presence of two CCF Armies (Corps) in the area. A more intensive and aggressive intelligence effort (by a Joint Intelligence Center, for example) would have been required to develop and analyze this possible target if more than the one atomic weapon, suggested in conclusion (3) were to have been employed effectively.

7. Intelligence appears to have reacted slowly to growing evidence of enemy build-up in the Chipyong-ni area. In direct contrast, operational coordination through JOC was excellent and attacking aircraft reached the area shortly after ground and air contact with enemy was established.

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APPENDIX E

MEANS OF DELIVERY

INTRODUCTION

1. As presently conceived, if atomic bombs are to be used in Korea delivery will be made by SAC using B-29 medium bombers. These are the only aircraft now available in this theatre for the purpose if no new means are developed for final in-flight assembly of atomic weapons. For delivery by B-29, a bomb with a 40,000-ton TNT equivalent is discussed.

2. If, as a result of new developments, the present space and weight requirements are no longer necessary, or if pre-flight assembly becomes possible, several new means of delivery would be available. These are: (a) use of Tactical Air, light bombers, or fighters; (b) use of guided missiles with atomic warheads; and (c) use of artillery shells with atomic warheads.

3. Emphasis is placed on the need for decreasing the time factors in determining the existence of a target and the recommendation to command (discussed in Appendix C) and delivery time in the case of targets of opportunity of short duration. In Appendix D, methods and procedures are suggested for improving the time factors in the intelligence-operations system. The following discussion of various means of delivery will indicate means of improving the time factors in delivery.

B-29 DELIVERY

4. Safe Dropping Heights. For either air or on-ground bursts, 15,000 feet is believed to be the minimum bomb release height to permit safe retirement of a B-29.1/ However, no full-scale tests on minimum safe dropping heights for atomic bombs have yet been made, so it is likely that at least the initial drops will be made from heights of 20,000 to 25,000 feet above ground, with some attendant losses in accuracy or impairment of target visibility which should be recognized.

1/ Estimated by calculations and from wind tunnel test data.

5. For visual bombing from 20,000 feet, a CPE 2/ of 500 yards can be expected from trained bomber crews with present equipment. In addition to minimizing the chance for a gross error, selected crews, special equipment, and precautions can probably reduce the CPE toward the 200-yard value desired in many tactical applications.

6. Advance Base Ground Crews and Equipment. The AFSWP (Armed Forces Special Weapons Project) has trained numerous USN and USAF ground crews as well as Corps of Engineers teams, at Sandia Base, New Mexico, in the final assembly and the readiness checking of atomic weapons. Complete, assembled sets of ground equipment, including shelters, for advance base operations also are available. It is understood that one week is the approximate minimum time required for air transport and assembly of an advance base in the Far East Command.

7. Delivery Time. Appendix F, Annex 1, discusses in detail the time requirement for delivery by B-29. It estimates a total time of 12 hours from location of target to delivery on target. Appendix F, Annex 3, and Appendix D discuss means for reduction in delivery time.

TACTICAL AIR DELIVERY.

8. The fighter planes F-80, F-84, and F-86 have lifting capacities of about 5,000 pounds and would therefore be capable of carrying a 2,500 pound bomb on one wing balanced by an auxiliary gas tank or two 165-gallon napalm tanks on the other. These could be jettisoned when the bomb is released.

9. Preliminary calculations indicate the feasibility of toss-bombing techniques for delivery of atomic bombs by fighter aircraft. With a release point of 10,000 feet altitude, detonation at 2,000 to 3,500 feet altitude, and speed of craft about Mach number 0.7 to 0.9, escape of plane from damaging shock wave and radioactive cloud is assured with pull-out accelerations not greater than 5g from glides between 30° and 45°.

2/ * Circular probable error, which is the radius of the circle of probable errors, called CEP by the USAF. One-half of all bombs fall inside this circle, and one-half outside. The fraction falling farther, in random directions, than 2 CPE from the ground aiming point is 1/16; than 3 CPE is 1/512; than 4 CPE is 1/65,536. Only a part of these fractions will fall in any particular direction, such as toward friendly lines (see paragraphs 18 to 20 and Table II Appendix B.)

10. Under these conditions, accuracy of delivery is especially favorable for weapon effectiveness. Whereas in the case of high level bombing, the CPE for visual bombing has been established as 500 yards, the CPE for toss-bombing has been established as 300 yards. For a large number of tactical targets, in particular most hard targets, this latter accuracy will permit realization of 95 percent effectiveness of a 40 KT weapon (see Appendix B, Annex 1).

11. Delivery time would be very greatly reduced by tactical air delivery. Bombs stockpiled in forward areas could be dropped at front lines in approximately one hour after command decision. Delegation of authority for bomb delivery to JOC also would cut delivery time. The saving of many hours will have a marked effect on the value of the atomic bomb against targets of limited duration.

GUIDED MISSILES

12. Guided missiles of various ranges and capabilities have been under development in the US since 1944. It is not the purpose of this paper, nor within its scope, to discuss these missiles except insofar as they may be used for delivery of atomic weapons, either as separate units or as warheads.

13. Delivery of an atomic weapon in the form of a bomb not an intergral part of the guided missile is wasteful. This is because its high drag coefficient necessitates great power consumption and consequent additional fuel requirement for propulsion, thus restricting the range of the missile. Design and development of a missile into which the atomic unit has been integrated as a warhead would present a better aerodynamic surface, and presumably therefore would have a longer range and/or more efficient flight characteristics.

14. Guided missiles with ranges of 500 miles could be launched from Japanese sites. When equipped with complex guiding devices, such missiles have been claimed to have a CPE of 200 yards, sufficiently small to be completely effective for all classes of targets.

Assuming a speed of flight of 1,600 feet per second, delivery to a target 500 miles away will take only 1,700 seconds, or approximately one half hour. From closer launching sites, delivery time will be proportionally less. In either case, delivery time by this method is no longer an important factor in the over-all time from target appearance to weapon delivery.

15. Everything considered, there seems to be little advantage of this method of delivery over tactical air for ranges of 200 to 500 miles. If, however, development of a simpler, shorter range guided missile (say 50-mile range) could be speeded it would have a distinct advantage. A beam-riding missile of this type requires only a fairly simple and quite mobile launcher which can be disassembled and set up very quickly. Such a device becomes, then, a real tactical weapon which could operate from corps in all weather and is not subject to the disadvantage of the artillery weapons discussed below.

An example of a situation in which such a weapon could have been very effective is presented in detail in Appendix C, Annex 1. On 31 December 1950, I Corps Headquarters was four miles north of Seoul with the front line in an arc 20 to 30 miles away. At the same time, IX Corps Headquarters was just northeast of Seoul with the front line in an arc 30 to 40 miles away. That is, the enemy was in heavy concentration along a line 20 to 40 miles from Seoul. Guided missile launchers for missiles of fifty mile range at Corps Headquarters would therefore have been in position to command the front line and immediate enemy reserves.

ARTILLERY

16. Indications from usually reliable public information sources (i.e., TIME, 5 February 1951, p. 11) point toward a high stage of development of artillery-fired atomic weapons.

17. If and when such weapons become available, together with the guns that fire them, the problem of accuracy of delivery at short range will have been solved. It is assumed that the projectiles will have approximately the same ballistic coefficient as conventional artillery shells and a range comparable with these, i.e., of the order of 10 to 20 miles.

18. Although it would appear that such a weapon is ideal for tactical purposes, closer analysis shows that this is not the case; the weapon system is not so mobile as it first seems. The gun will probably require transport vehicles comparable with the wheeled tank retriever, M-26 ("Dragon Wagon"), which has many faults that already have been demonstrated in Korea. The combination trailer and tractor has an over-all length of about 64 feet and a maximum width of 12.5 feet with a tread of about 8.5 feet. Turning radius of the tractor alone is 40 feet and loaded weight of the combination is 90 tons. The M-26 has evidenced the following limitations in Korean operations:

(1) It will overload most bridges.
(2) Its turning radius is so large that it cannot negotiate the turns on many Korean roads and in most Korean towns.
(3) Its gauge is too wide for many Korean roads.
(4) It is roadbound--if it gets off the road, it sinks down and overloads the prime mover.
(5) It cannot be used during advance or retreat because it blocks the road. Its speed on Korean roads is limited to two or three miles per hour and it may back up traffic for 30 to 50 miles.

19 An analysis, based on trials over Korean roads, gives the following list of roads on which the M-26 may be used:

(1) A short distance north of Seoul.
(2) Seoul to Suwon.
(3) Pusan to Kyongju to Yongchon to Taegu. However, difficulties were encountered: a) on a long wooden bridge three miles northwest of Kyongju, ~~and~~ a half mile by-pass was required; b) on two crossings of the Kumhogang near Yongchon; c) on turns between Waegwan and Taegu; and d) along the stretch from Kumchon to Taejon. If one or two bridges were built between Chinju and Hamyang and a few of the sharp turns on the stretch were by-passed or eliminated, this stretch could also be negotiated.

20. It therefore appears that although the artillery weapon would be feasible on well-developed road systems like those in the ETO, its mobility in Korea is so restricted that it could not be brought into satisfactory position for effective use. In perimeter defense, such as is studied in another portion of this report (Appendix B, Annex 3), the gun could be brought into no more than two or three positions, widely separated, and would therefore not be very useful. In addition, the time involved in moving it from one position to another would be excessive.

SAFETY OF FRIENDLY TROOPS

21. Accuracy of delivery (CPE) is a critical item for all problems of close support and is intimately connected with the safety of friendly troops (see Appendix B, paragraph 16-30). On the basis of requirements already set forth in the cited paragraphs, it appears that except in the case of artillery delivery some sort of ground control will be necessary in order to avoid gross errors.

APPENDIX F

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Figures

APPENDIX F

COMMAND AND LOGISTICS FOR MEDIUM AND HEAVY BOMBER DELIVERY OF ATOMIC BOMBS*

INTRODUCTION

1. The command and logistics problems for medium and heavy bomber delivery of atomic weapons in tactical support of ground operations are discussed and a command and control system for execution is outlined.

2. Discussion is limited here to bomber delivery alone since this represents the only means available for the Korean campaign 1 January 1951. The limitations of this method of delivery against many tactical targets will be pointed out and the need for alternative methods will be suggested. A detailed discussion of other means of delivery which may be available in the near future or should be developed for ground operations, including command and logistics requirements are discussed in Appendix E. Appendix D discusses some of the joint army-air force problems in intelligence, operations, organization and training which delivery by lighter (tactical) aircraft seems likely to raise.

COMMAND DECISION

Requirements

3. Any command and control system for employing the atomic bomb as a tactical weapon must meet three primary requirements.

a. First, it must be capable of rapid decisions** and transmission of instructions.

b. Second, it must have at hand all necessary intelligence upon which to base a decision as to time and location of bomb drop.

c. Finally, it must be capable of coordinating the efforts of the three interested services, Army, Navy, and

*Material prepared by Lt. Col. Chas. Billingslea
**See Annex 1

Air Force. Necessary coordination includes:

(1) Preparation and air delivery of the bomb.*

(2) Pre- and post-bombing action of friendly ground troops.

(3) Coordination of ground control stations or guide-in methods.

4. Some of these requirements are conflicting. Speed and tactical intelligence characterize operations in forward areas. Strategic intelligence and joint control are within the province of GHQ, FEC. One step seems clear, however: there are no operational requirements for timing, intelligence or coordination which demand decisions above theater headquarters if bombs and delivery means are released by departments and higher levels.

Functions of Various Headquarters

5. a. GHQ, FEC, as a joint headquarters, is the logical air-ground coordinating agency. GHQ, FEC, receives strategic and, eventually, tactical intelligence; it could determine tactical targets and direct bomb delivery.

b. GHQ, FEC, is not, however, a tactical headquarters. Its interests and organization are directed toward strategic and joint problems. Tactical target selection at theater level would add an additional step, and therefore time, in the present air-ground-JOC tactical target determining organization.

6. Most tactical targets will probably be of from 1 to 24 hours in duration. In the interest of saving time, authority for target determination should be given to field commanders. In theory, the lower the command level the better. Headquarters lower than Eighth Army, however, have a restricted view of the front, no direct access to top intelligence agencies, and limited contact with air. Army headquarters with access to tactical intelligence through a Joint Intelligence Center (JIC)** and army subordinate units, strategic intelligence from GHQ, and a close air-ground link through JOC, appears the logical headquarters to determine the time and place of atomic bomb targets. The target being selected, Army should request GHQ to deliver the bomb.

*See Annex 2
**See discussion of proposed JIC, Appendix D, pars 10-14.

7. GHQ will give final clearance for any atomic bombing, and direct FEAF to accomplish the bomb drop. Bomber command will deliver the bomb. Army and its subordinate units will control ground troop action. Appropriate Air Force agencies will control guide-in systems. Necessary coordination for delivery should be accomplished by GHQ.

8. Experience in employing atomic bombs tactically may permit reduction in the time requirement.*

ORGANIZATION

Atomic Weapons Advisory Teams (JAAG)

9. To effect necessary coordination as rapidly as possible, three atomic weapons advisory teams will be required (see figure 1).

a. Working under G-3, GHQ, a joint atomic team composed of representatives from GHQ, G-2 and G-3; FEAF, A2 and A3; Bomber Command; and Medical Service.

b. Under G-3, Eighth Army, a team composed of representatives from Army G-3 and G-2; 5th Air Force A2 and A3; JOC and JIC; and Medical Service.

c. At the headquarters of the corps of Eighth Army, teams composed of representatives from Corps G-3 and G-2 and 5th Air Force.

10. a. These teams will be advisory in nature. In addition to the recommended staff representation they should have technical personnel completely conversant with bomb effects and limitations. The teams will follow ground and air, intelligence and operations situations, will assist the JIC in recommending profitable atomic targets and will recommend operations to G-3, EUSAK, and JOC which may develop such targets. They will assist in coordinating air and ground elements responsible for safe and accurate bomb delivery.

b. To speed intelligence flow and necessary coordination, direct radio communications should be established between GHQ and Army Joint Atomic Advisory Groups (JAAG).

RESPONSIBILITY

11. Departments and higher headquarters should be

* See Annex 3.

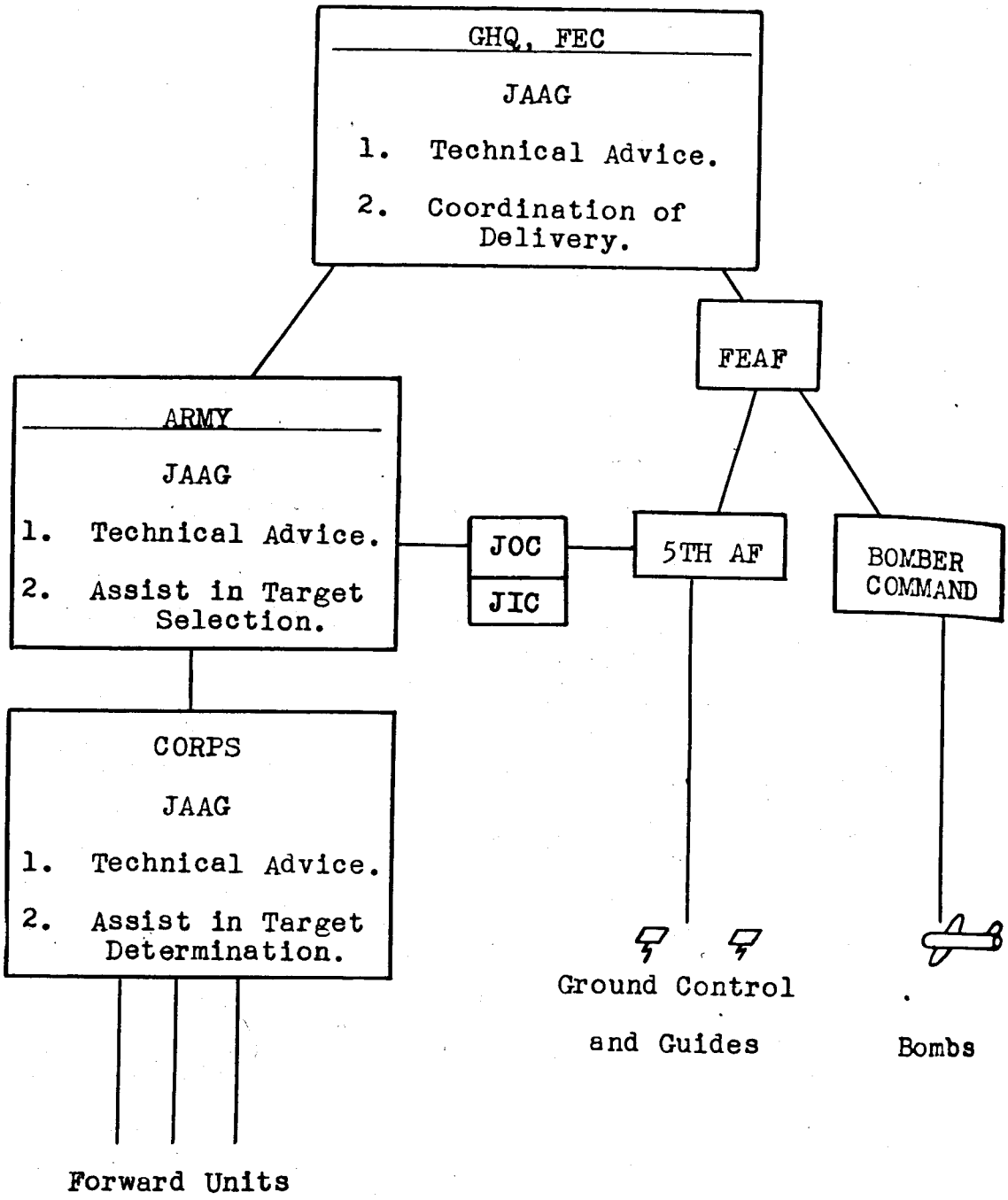

Figure 1
APPENDIX F

patched into existing CAC structure

responsible for:

a. Policy decisions on employment.

b. The allocations of necessary aircraft and AFSWP teams, necessary guide and control equipment.

c. Allocation of bombs.

d. Delegation to theater commander of authority to commit atomic bombs on tactical targets.

12. GHQ, FEC, should be responsible for:

a. Requesting atomic bombs for tactical use by number and type in advance of atomic operations phase.

b. Giving final clearance to Army requests for tactical A-bombing, and effecting necessary Army-Air coordination to insure accurate and timely bomb delivery (primary operational responsibility).

c. Using theater intelligence agencies to assist the Army in target determination.

d. Interpreting national atomic bomb policy in terms of theater conditions and restrictions.

e. Insuring inter-service coordination and atomic weapons indoctrination by publishing to appropriate headquarters the limitations on time of delivery, weapon accuracy, safety regulations and other pertinent data.

f. Protection of bases.

13. Army should be responsible for:

a. Selection of atomic bomb targets, culminating in a request to GHQ for an atomic attack which will give location of target and time of attack (primary operational responsibility).

b. Correlation of intelligence for atomic weapons employment.

c. Necessary indoctrination of commanders and troops to insure safety of friendly ground forces.

14. Air would be responsible for:

a. Timing and accuracy of drop.

BOMBER COMMAND

Bombs

b. Positioning of necessary guide equipment.

c. Maintenance and supply of aircraft and guide equipment.

d. Protection of delivery aircraft.

e. Logistics of AFSWP teams.

f. Photo and ECM reconnaissance.

g. Air intelligence to assist target selection.

15. Navy should be responsible for necessary coordination through GHQ, FEC.

Limitations

16. Many targets will be found to exist as targets of opportunity for times varying from 1 hour to several hours. The time factors required for delivery of atomic weapons by medium and heavy bombers, which include availability in the theater, assembly, preparation, briefing, and flight time, as well as the long times required for the intelligence-operations processes leading to the judgment of the existence of a target, are much too long to cope with such short-time targets.

17. The possibilities for improving the time factors in A-weapon delivery by medium bombers against short-time tactical targets are possible at this time only by the creation of a JIC to reduce the intelligence-operations-command process.*

18. To reduce the delivery process other means of delivery capable of shorter time factors, must be developed. These possibilities are discussed in detail in Appendix E.

*See Appendix D

APPENDIX F: ANNEX 1

ESTIMATE OF TIME REQUIRED FOR DECISION AND OPERATIONS

1. The following is an estimate of the time requirement for delivery of the atomic bomb on targets in Korea by medium bombers based outside the peninsula.

a. Location of target and transmission to Army via air or ground means: 30 minutes.

b. Verification of first report, check by air or ground reconnaissance and transmission of additional information; staff consideration at various levels and decision to drop by Army Headquarters; request to GHQ for drop giving target location, time of drop, and any special instructions: 2 hours, 45 minutes.

c. GHQ call to FEAF giving necessary information: 30 minutes.

d. FEAF directive to Bomber Command and necessary coordination with 5th Air Force or other agencies: 45 minutes.

e. Bomber Command alerting of crew, action by crew as outlined in Annex 2: 2 hours, 30 minutes.

f. Flight time from airfield to target: 5 hours.

g. TOTAL: 12 hours

2. Much concurrent work must be done during these steps: alert ground troops and issue post-drop instructions, prepare MPQ-2* or other guides; provide necessary air cover for bomber; alert and brief post-bombing evaluation team.

*See Appendix B, paragraphs 36-44.

APPENDIX F: ANNEX 2

CHECK LIST OF ELEMENTS IN FLIGHT PREPARATION AND DELIVERY

1. a. Preparation and delivery planning is outlined below.

b. It should be noted that these plans are based on strategic bombing requirements and do not include all safety requirements necessary for some types of close tactical support. Troop safety and accurate tactical target location would, in some cases, demand Shoran, or similar guide devices.

2. Assault:

a. Select general direction of attack based upon consideration of:

(1) Weather.

(2) Enemy defenses.

(3) Target characteristics.

b. Define axis of attack by selection of Initial Point. Selection to be based upon consideration of:

(1) Ease of identification.

(2) Distance from target.

(3) Weather.

(4) Check points into target.

(5) Location of friendly forces.

c. Select altitude of attack based upon:

(1) Weather.

(2) Target characteristics (altitude of target).

(3) Weapon to be delivered.

(4) Crew proficiency.

d. Select weapon to be used based upon consideration of:

(1) Target characteristics.

(2) Characteristics of weapons.

(3) Operational considerations.

(4) Weapons availability.

e. Calculate force required to be dispatched from bases in order to achieve desired target destruction. Calculation will be based on.

(1) Force available.

(2) Enemy defenses.

(3) Contemplated tactics.

(4) Bombing accuracy.

(5) Contemplated weapons.

3. Flight Plan: Determine route and altitude from base--Assembly--Rendezvous--Turning Point(s)--Initial Point--Target--Rally Point--Turning Point(s)--Rendezvous--Base, based upon consideration of:

a. Aircraft characteristics.

b. Enemy defenses.

c. Crew proficiency.

d. Navigational aids.

e. Geography.

f. Weather.

g. Emergency facilities.

h. Rescue facilities.

4. Reconnaissance:

a. Suitable aids:

(1) Navigation charts, visual and radar.

(2) Briefing charts, visual and radar.

(3) Approach charts, visual and radar.

(4) Target charts, visual and radar.

(5) Synoptic weather data for weather forecasting.

(6) Data on enemy's electronic installations and activities.

b. Pre-strike reconnaissance:

(1) Current antiaircraft disposition.

(2) Current target conditions.

(3) Route weather.

c. Post-strike reconnaissance: bomb damage assessment.

5. Electronics:

a. Countermeasures against enemy:

(1) Early warning radar.

(2) Ground control intercept radar.

(3) Fighter control radio.

(4) Radar directed antiaircraft.

(5) Other vulnerable parts in enemy electronics system.

b. In-flight communications:

(1) Air-to-air.

(2) Air-to-ground.

(3) Ground-to-air.

c. Security measures:

(1) IFF plan.

(2) Radio silence.

(3) Deceptive transmissions.

(4) Emergency transmissions for rescue service.

6. Diversionary Plan:

a. Determine force available.

b. Select targets based upon consideration of:

(1) Plan for main attack.

(2) Capabilities of force available.

(3) Capabilities of enemy.

c. Determine flight plan to include timing, route, and altitude, based upon consideration of:

(1) Plan for main attack.

(2) Enemy defenses.

7. Security of Force at Take-off Bases:

a. Determine fighter force required for defense.

b. Integrate fighters available into local defense system.

c. Determine ground troops required for base defense and protection against sabotage.

d. Prepare plan for emergency action in the event of enemy attack, sabotage, or accidental detonation of weapons.

APPENDIX F: ANNEX 3

POSSIBLE REDUCTION IN DELIVERY TIME

1. When confidence in tactical atomic bombing has grown through experience, short-cut methods may be instituted. As an example, the bomber aircraft with fighter cover might orbit over forward areas. Reconnaissance planes, operating beyond the bombline, could determine and mark targets of opportunity. Necessary coordination between fighters and the bomber could be effected through JOC.

2. By delegating authority for bomb delivery to JOC or the bomb commander, delivery time could probably be reduced to one or two hours.

3. With new developments in atomic warheads and means of delivering them, an integrated system of tactical employment of atomic weapons will be possible. The subject of means of delivery, including medium and light bombers, fighter aircraft, guided missiles and artillery is discussed in detail in Appendix E. The joint problems in intelligence, operations, and training are discussed in Appendix D.

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APPENDIX G

CONTENTS

Tables and Figures

APPENDIX G

VUNERABILITY OF UN GROUND FORCES IN KOREA TO ASSAULT BY ATOMIC WEAPONS

INTRODUCTION

1. The Korean War has offered an excellent opportunity for the study of the tactical employment of atomic bombs in support of ground forces. It has been possible to consider the war a kind of laboratory within which everything needed for an experiment or test was at hand in most realistic proportions, except the bomb itself and the means to deliver it. First-hand studies have been made of some significant situations, to see what physical and military effects might have been produced had the bomb been used. From these studies it may be possible to deduce an effective tactical doctrine both for employment of the bomb and for defense against it in ground operations.

2. In the problem of employment an important question is whether the enemy disposes his forces in such a manner as to make him vulnerable to atomic bombs. In the problem of defense, on the other hand, there is the question as to whether one's own forces and installations are so disposed as to be vulnerable and, if so, what more suitable dispositions and defenses are possible. The question of vulnerability involves the question of whether assailable targets, of such scope and value as to justify their assault by means of atomic bombs, do exist among ground forces and their supporting installations. The following study deals with this question with respect to UN Forces in Korea. It is a matter which can be studied readily by examining daily records of operation and observing the operations themselves.

3. Four significantly different situations are studied as follows:

Annex I: Combat Forces in Defensive Operations, The I and IX US Corps, on 31 December 1950.

Annex II: Army and Air Force Headquarters, EUSAK and 5th Air Force at Taegu, 31 December 1950.

Annex III: UN Air Fields in Korea, 31 December 1950.

Annex IV: An Important Logistical Target, The Port of Pusan, 16 October 1950.

VULNERABILITY

Existence of Targets

4. Being vulnerable to a given weapon in warfare, a military target or target system will be characterized in the three following ways:

a. Its composition, dimensions, configuration, destructibility and military value must combine in any one of many possible ways to match, to a greater or lesser extent, the capabilities of destruction and the military cost of the given weapon delivered on the target.

b. It must be discoverable and identifiable by the enemy.

c. Its defenses must be such as to offer the enemy a possibility of waging a sucessful assault against it with the given weapon.

5. If these three conditions are met, the target must be presumed to be vulnerable, since exact and completely reliable information may never be available concerning the enemy's capability of employing any given weapon.

6. This appendix is primarily but not exclusively concerned with the first of these different aspects of military vulnerability. The second and third aspects are noted in those situations where their contribution to vulnerability seems fairly obvious.

7. Hence, this study concentrates on the question of whether tactical targets physically exploitable by means of atomic bombs, actually exist among the combat forces of a modern, mechanized army at war Consideration of actual disposition of friendly UN Forces engaged in the Korean War during the later months of 1950 permits a realistic analysis of the situation.

Combat Forces as Targets

8. Annex I shows that a minimum of 16 air-burst atomic bombs of 40 KT equivalent each would have sufficed

to destroy the combat effectiveness of both the I and IX US Corps on 31 December 1950, had they been delivered accurately and reliably. The total frontage of the two corps was about 52 miles, giving 3¼ miles per bomb. If this same range per bomb could have been used successfully along the whole 8th Army frontage of 130 miles, 40 bombs would have been required to destroy the combat effectiveness of the whole UN army in Korea. The casualty rate derived for the I and IX Corps front is 2360 casualties per bomb.

Army and Air Force Headquarters as Targets

9. Annex II shows that the whole complex of buildings occupied by both the 5th Air Force and the 8th Army Headquarters at Taegu, Korea, on 31 December 1950, was within easy range for complete destruction by one 40 KT airburst atomic bomb. The Tactical Air Control Center and the Joint Operations Center were important components of the target system. The K-37 airfield, within range of a bomb directed at the two headquarters, was an added component.

UN Airfields in Korea as Targets

10. Annex III presents somewhat detailed information describing the Korean-based facilities of the 5th Air Force on 31 December 1950. Only five air-burst 40 KT atomic bombs delivered at night would have been required to destroy almost 99 percent of all aircraft based in Korea on that date.

An Important Logistical Target

11. Annex IV describes in considerable detail the target system presented by the Port of Pusan on 16 October 1950. On that date the target system was composed of three principal components: (1) the logistical base of the 8th Army and 5th Air Force; (2) the port facilities; and (3) a fleet of 112 vessels in the anchorage, carrying not only cargo but also a large part of the X Corps with its equipment and supplies. Three different bombing patterns are described employing from one to five bombs each. A composite of the first and third patterns using about six bombs, would have destroyed or done serious damage to all three target components.

CONCLUSIONS

12. These are as follows:

a. Studies of the UN Forces and their deployments

in Korea on particular dates, 16 October and 31 December, 1950, show that these forces have been highly vulnerable to atomic bomb attacks.

b. UN tactics in Korea have been such as to present many targets physically and militarily exploitable by atomic bombs. Such targets have existed among ground forces; division, corps, army, and air force headquarters; airfields; logistical bases; ports; and naval fleets.

c. The studies presented in this appendix give a realistic definition of targets and target systems existing within a modern army at war which may be attacked profitably by means of atomic bombs.

d. The studies may suggest ways in which US military forces must deploy and fight in the future in order to avoid serious military losses through atomic bombing.

APPENDIX G

ANNEX 1

COMBAT FORCES IN DEFENSIVE OPERATIONS: THE I AND IX US CORPS IN KOREA ON 31 DECEMBER 1950

INTRODUCTION

1. The study of the deployment of friendly combat forces in actual war is a ready and effective way of determining to what extent and in what ways ground forces may present targets suitable for attack with atomic bombs. This annex studies in some detail the positions and the deployment of the I and IX US Corps in Korea on 31 December 1950. These positions had been occupied on 13 December 1950 upon retirement from a line farther north. Between the two dates, the UN Forces and, particularly for the purposes of this study, the I and IX US Corps, had ample time to build up a strong defensive line. On the night of the 31st the enemy's expected general offensive began against the established line.*

2. Numerous official US Army records have been consulted for this study. Chief among these were the UNC G-3 Operations Reports, the EUSAK CG Briefing Notes with overlays, the EUSAK Periodic Intelligence Reports, the EUSAK G-3 Section Journal, and official internal records of the EUSAK G-1 Section. Further information was obtained by personal observation in the field in the I and IX Corps sectors during a period encompassing the target date.

3. Among important questions examined in this study are the following:

a. What kind of bombing pattern would have been effective against the UN combat forces?

b. How many atomic bombs would have been required to destroy the Corps fronts?

c. What friendly tactics and operations favored the enemy's intelligence on the given date?

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* See also Appendix C, Annex 1, for a description of this attack.

d. How could the enemy have exploited the atomic attack?

PHYSICAL DESCRIPTION OF TARGET SYSTEM

Troop Deployment

4. Figure 1 (envelope, inside back cover) shows the deployment of I and IX Corps units on 31 December 1950. Positions are indicated on Army maps of the series AMS L551, scale 1:250,000. The front line lay along an arc about 25 to 30 miles north of Seoul, the old Korean capital. I Corps, holding the left flank of the Eighth Army, had the Turkish Brigade, the 25th US Infantry Division, and the 1st ROK Division on the line and the 29th British Brigade in reserve. IX Corps on I Corps' right, had the 6th ROK Division and the 24th US Infantry Division on the line. IX Corps reserves on 31 December consisted of the 27th British Brigade, the 7th and 8th Regiments of the 1st US Cavalry Division, and the 72nd Tank Battalion. All brigade, division, and corps headquarters positions are given. Combat units are shown generally in regimental size.

5. Regimental frontages along the front line averaged about 8500 yards. This was about twice the normal defensive SOP frontage for a US regiment in the kind of terrain occupied by the I and IX Corps. A regimental depth of about 3000 yards is assumed for this study, although the results obtained depend little on the exact depth chosen.

6. The unit strengths are given in Table I. These data apply to 31 December and were provided by G-1 Section, EUSAK. The distribution of Corps troops was also given by G-1 as determined by ration distribution, as follows:

Distribution	Percent
Corps headquarters area	35%
Division areas	42%
Forward of divisions	23%

7. The following distribution of division troops is assumed in this study:

Distribution	Percent
Division headquarters area	50%
Forward of division	50%

These distributions and the data of Table I are adequate for evaluating the personnel strength of each unit designated on Figure 1 .

APPENDIX G

TABLE I

UNIT STRENGTHS AND CASUALTIES ~~CASUALTIES~~ DERIVED FROM PERSONNEL EFFECTS PRODUCED BY 40 KT. BOMBS BURST AT 3000 TO 3,500 FEET HEIGHTS

Unit	Number of Personnel	Area Covered	Troop Density	Casualties	
		Sq. Mi.	Number/ Sq. Mi.	Total Number	Percent of Whole
Turkish Brigade	4154	28.0	150		0
25th Div Hq	3438	0.25	6876	2470	72
24th Regt, 25th Div	3083	7.5	410	1850	60
27th Regt, 25th Div	2893	5.0	579	1446	50
35th Regt, 25th Div	2907	7.5	388	1600	55
1st ROK Div Hq	1909	0.25	3818	1362	72
11th Regt, 1st ROK Div	3081	7.0	440	1356	44
12th Regt, 1st ROK Div	2910	7.5	388	1600	55
15th Regt, 1st ROK Div	2924	12.0	244	1462	50
29th British Brig Hq	3000	0.25	6000	3000	100
29th British Brig	6337	10.0	634	3168	50
I Corps Hq	3279	0.25	4580	2850	87
24th Div Hq	2945	0.25	5890	2120	72
5th Regt, 24th Div	2715	5.0	543	0	0
19th Regt, 24th Div	2676	5.5	486	1202	45
21st Regt, 24th Div	3121	5.5	568	1560	50
6th ROK Div Hq	1657	0.25	3314	185	11
2nd Regt, 6th ROK Div	2833	5.0	567	850	30
7th Regt, 6th ROK Div	2815	4.0	704	1546	55
19th Regt, 6th ROK Div	2909	6.0	485	727	25
27th British Brig	2937	5.0	587	2200	75
1st Cav Div Hq	2797	0.25	5594	2010	72
7th Regt, 1st Cav Div	3056	5.0	611	0	0
8th Regt, 1st Cav Div	3009	5.0	602	0	0
72nd Tank Bn	750	3.0	250	262	35
IX Corps Hq	4558	0.25	6390	3010	66

Terrain

8. The terrain occupied by the I and IX Corps on 31 December 1950 was hilly and sparsely wooded. The highest hill along the front was Hill 589 behind the 19th ROK Regiment. Using burst heights of about 3500 feet this type of terrain would not have reduced casualties, generally, by more than a few percent below what would have occurred on level ground.*

Weather

9. The weather on the chosen date was favorable to the employment of atomic bombs as antipersonnel weapons. At 1000 I on 31 December the weather was clear, and the visibility was about ten to twelve miles.**

Cover

10. The cover used by the UN Forces, generally, was inadequate to afford much protection against air-burst atomic bombs. Foxholes and gun emplacements were shallow. Command posts were not dug in. The forest cover in December would have given little shielding against thermal radiation, whereas it would have represented a blast hazard. The native Korean huts and other buildings widely used for cover also would have represented blast hazards. On the whole, therefore, such cover as existed will be taken as a negligible factor either in decreasing or increasing the casualty rate of weapons considered in this study.

ENEMY INTELLIGENCE

Front Lines

11. There were two or three important factors which favored the enemy's intelligence regarding the front line positions of the I and IX US Corps. First, the static situation existing for two weeks before the drive on 31 December gave the enemy's intelligence agents, such as patrols and spies, an excellent opportunity to feel out the UN lines. Second, it is a matter of common observation that UN Forces in the front lines have not sought concealment through dug-in positions, camouflage, and stealth. They have been discernible from the ground through open gun positions, uncovered movement of soldiers, camp fires, and camp noises. Third, the Imjin River line itself was used as a natural barrier by the I and IX Corps and, hence,

* See Appendix A, Paragraph 24 et seq.
** See Appendix A, Paragraph 15 et seq.

helped to disclose to the enemy the probable forward extremity of the line.

Headquarters Areas

12. In the reserve areas, divisional and corps headquarters were in the open with no effort made to scatter or conceal them. They constituted open targets for any kind of aerial attack by the enemy. Moreover, their positions could have been known to the enemy with the accuracy required for atomic attack, through radio interception, photo reconnaissance, and perhaps other means.

13. So far as assailability was concerned, the I and IX Corps forces were conspicuously vulnerable.

METHOD OF ATTACK: PERSONNEL EFFECTS

Front Lines

14. Possessing atomic bombs, the enemy could probably have made an atomic assault on the front line forces of the I and IX Corps with the intelligence available to him as already indicated. A pattern bombing scheme would have suggested itself, covering a wide strip along the front lines and defined along its outer edge by the enemy's probable knowledge of our front line boundary. Back of this the pattern would have extended to a sufficient depth to cover most of the reserve regiments in their triangular positions.

15. Such a pattern is indicated on Figure 1 where twelve 40 KT bombs air burst at 3500 feet have been used to cover the two-Corps front, excepting that portion held by the Turkish Brigade. Not every unit is covered with maximum effectiveness with the pattern shown. In fact, no effort was made to work out such a precise pattern; such effort would have been spent at the cost of realism. The circles show the limit of effectiveness of the chosen weapons, against personnel (5000 yards,), under the given conditions of weather and employment.

16. The casualties among personnel inflicted by this pattern of bombing are shown in Tables I and II. These casualties are based on weapons effects for personnel in Class A vulnerability targets* with negligible protection by terrain. Hence, they do not reflect the small advantage offered by terrain already described, or the advantage in cover which the remaining UN Forces might have sought after the first units were hit in the initial attacks. If these

* See Appendix A, paragraph 84.

TABLE II

SUMMARY OF CASUALTIES 40 KT. BOMBS BURST AT 3500 FEET; PERSONNEL EFFECTS CORRESPONDING TO THOSE OCCURRING AGAINST TROOPS IN THE OPEN

	Total Personnel	Total Casualties	Percent Casualties
I and IX Corps Forces (less artillery forces, special forces, and 5th Cav Regt)	78,693	37,836	48.1
Front Line Forces & Hq			
8 Regts plus 1 Bn of 15th ROK	24,502	11,928	48.7
4 Regts in reserve	10,365	3,271	31.6
4 Div Hq	9,949	6,137	61.7
Totals	44,816*	21,336 (aver)	47.6
Corps Reserves & Hq			
2 British Brigades plus 72nd Tank Bn	13,024	8,630	66.2
1st Cav Hq plus 7th and 8th Regts	8,862	2,010	22.7
I and IX Corps Hq	7,837	5,860	74.9
Totals	29,723	16,500 (aver)	55.5

* Does not include Turkish Brigade

two factors were taken into account the percentage of casualties for the front line forces and divisional headquarters would probably be reduced by about 10 percent, making a total loss of about 42 percent among units in the combat areas.

Reserve Areas

17. In this study the divisional headquarters located in reserve areas, the corps headquarters, and the contiguous reserves were assumed to be hit squarely. On the basis of this assumption and the assumptions already given concerning the distribution and location of headquarters forces, the losses among headquarters units are determined as shown in Tables I and II. Four bombs are indicated in Figure 1 for these targets.

Special Units and Artillery Forces

18. No record is given in the tables concerning the fate of special units assigned to each division and each corps. However, since these represent a small percentage of each major unit and since they were scattered among the units appearing on Figure 1 , it is believed their casualty rates would not have departed, on the whole, very widely from those given for the identified units.

19. Artillery units are treated in the same way and with equal justification. Artillery positions were located within both the combat and reserve areas.

20. Regiments of the 1st Cavalry Division in IX Corps reserve were assumed not to be sought out and hit by the enemy. Similarly, the 5th Regiment of the 24th US Division was assumed untouched because it was safely behind the combat area swept by the pattern bombing.

Military Effects of Attack

21. As indicated, sixteen bombs would have wiped out about 43 to 48 percent of the entire two-corps front. This would have left intact the Turkish Brigade, three US regiments, and the 6th ROK Division Headquarters. All other units would have been destroyed as effective military forces. The left flank of the 8th Army undoubtedly would have been broken; ground forces of the enemy could have moved readily through the break.

CONCLUSIONS

22. a. The high over-all casualty rate derived in

this study, 43 to 48 percent, would have destroyed the I and IX Corps as effective military forces.

b. An actual bombing attack with sixteen weapons might not have resulted in such destruction of UN personnel, because of bombing inaccuracies, but even if the bombs were only 80 percent effective, only twenty bombs would be required to produce the result indicated. The casualty rate in this study was 2360 casualties per bomb.

c. Higher rates would have been achieved in this situation had regimental frontages been of normal extent. Roughly, the figure would have been 4500 casualties per bomb.

d. The given situation was one in which enemy intelligence probably could have defined the UN target within the accuracy needed for effective atomic attack.

ANNEX 2

ARMY AND AIR FORCE HEADQUARTERS, EUSAK AND FIFTH AIR FORCE, AT TAEGU, 31 DECEMBER 1950

INTRODUCTION

1. On 31 December 1950, the ground action within the combat areas of the Korean War involved principally, although not exclusively, the Eighth Army and the Fifth Air Force. The headquarters and nerve centers for both these organizations including their JOC (Joint Operations Center), were located in Taegu, Korea, within less than a mile of each other. Any attack which could have destroyed these headquarters, their personnel, and their facilities would have seriously impaired the entire UN war potential in Korea.

PHYSICAL DESCRIPTION OF TARGET SYSTEM

2. Figure 1 is a map of Taegu, Korea, and the immediately surrounding country. The locations of the Fifth Air Force and Eighth Army Headquarters and the JOC are indicated thereon. Their close proximity is clearly revealed. Buildings occupied by the Fifth Air Force and the JOC were of multi-story, brick construction. Those of the Eighth Army were of wood-frame, stucco, and brick construction. Buildings in the area were of the load-bearing-wall type and would have been susceptible to destruction by blast overpressures of about 6 to 10 psi.* The area between the two headquarters was heavily built up with native wooden huts and other structures which, of course, would have added to the general fire hazard following the air burst of an atomic bomb.

3. A very complex system of communications lines and radio facilities terminated immediately within the Fifth Air Force compound. These facilities supported the Tactical Air Control Center at Taegu and the Command and Administration Communication System of the Fifth Air Force. A similar command and administration communication system supported

* See Table IX, Appendix A.

Eighth Army Headquarters and terminated within the headquarters compound.

4. An added component for the target system would have been the airfield, K-37, lying close to the Eighth Army Headquarters compound. Annex III of this appendix gives a description of this airfield and the number of planes based there on 31 December 1950, four L-5's and two T-6's.

METHOD AND EFFECTS OF ATOMIC ATTACK

5. One 40 KT atomic bomb air burst at 3,000-3,500 feet height above the ground zero shown on Figure 1 would have destroyed completely the great majority of all buildings at both headquarters. The circles drawn about ground zero show the ranges at which overpressures of 6 psi and 10 psi would occur.

6. By reference to Figure 20 of Appendix A, it is seen that within the outermost circle of Figure 1 (2,600 yards radius) about 50 percent of all personnel would have been killed and most of the survivors would have been incapacitated. It also may be seen by reference to Figure 1 of this annex that an actual ground zero within 1,000 yards of the aiming point would not have materially lessened damage within the headquarters area, so the delivery accuracy would not have had to be high.

7. The communications hubs at the two headquarters would have been destroyed, eliminating a great deal of essential communications equipment. The Fifth Air Force Headquarters alone utilized about 3,000 tons of such equipment, a good part of which was set up in the immediate vicinity of the headquarters buildings.

MILITARY EFFECTS OF ATOMIC ATTACK

8. Several thousands of military personnel at the two headquarters would have been casualties of the single-bomb attack described above.* Included in the fatalities would have been a majority of the upper echelon staffs of Fifth Air Force and Eighth Army.

9. The nerve centers and communications hubs for central command and administration of the UN ground and air forces in Korea would have been destroyed. Aircraft and all

* The Eighth Army alone had about 18,200 men based at Taegu. Not all of these would have been in or near the Eighth Army compound.

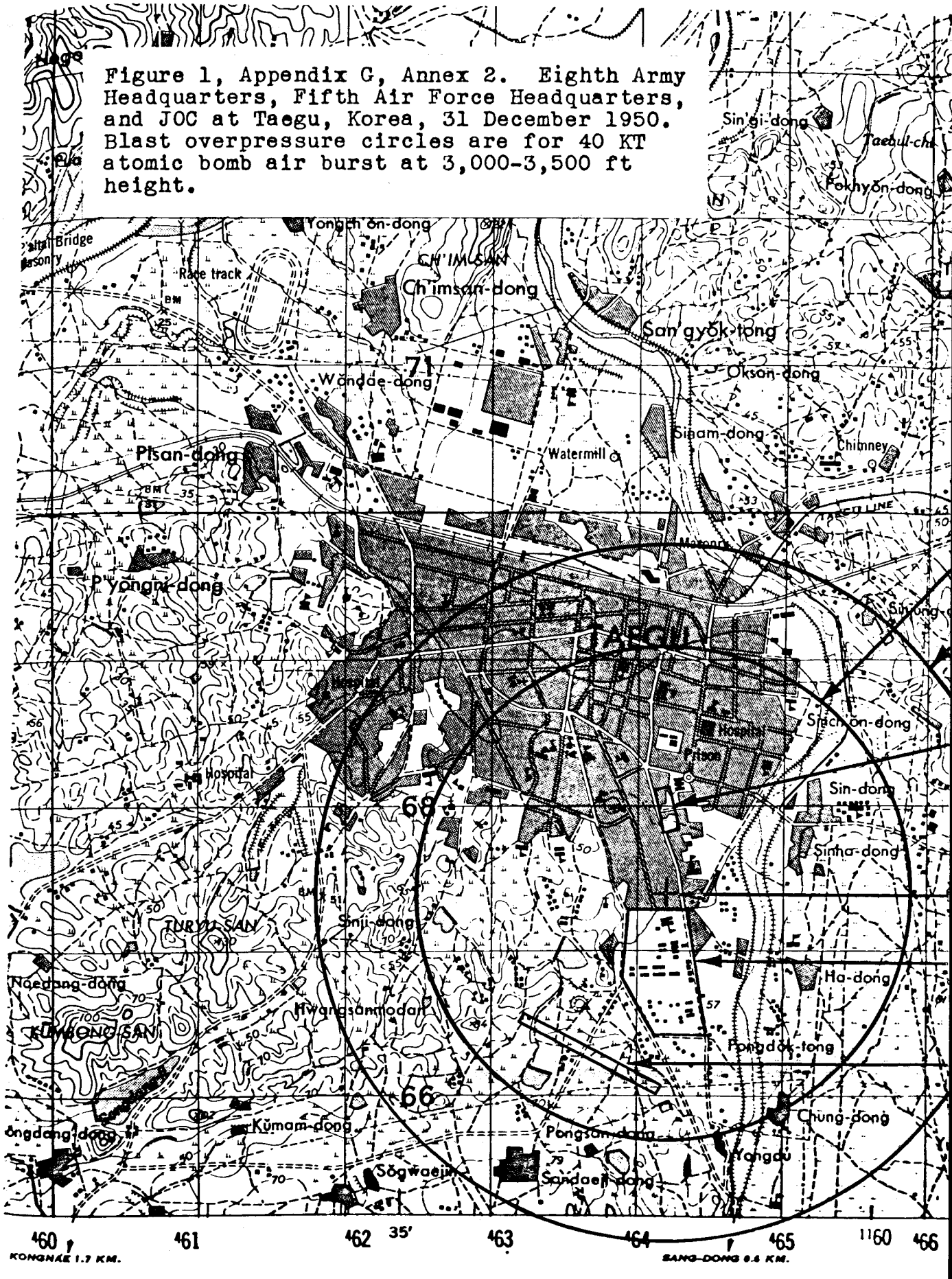
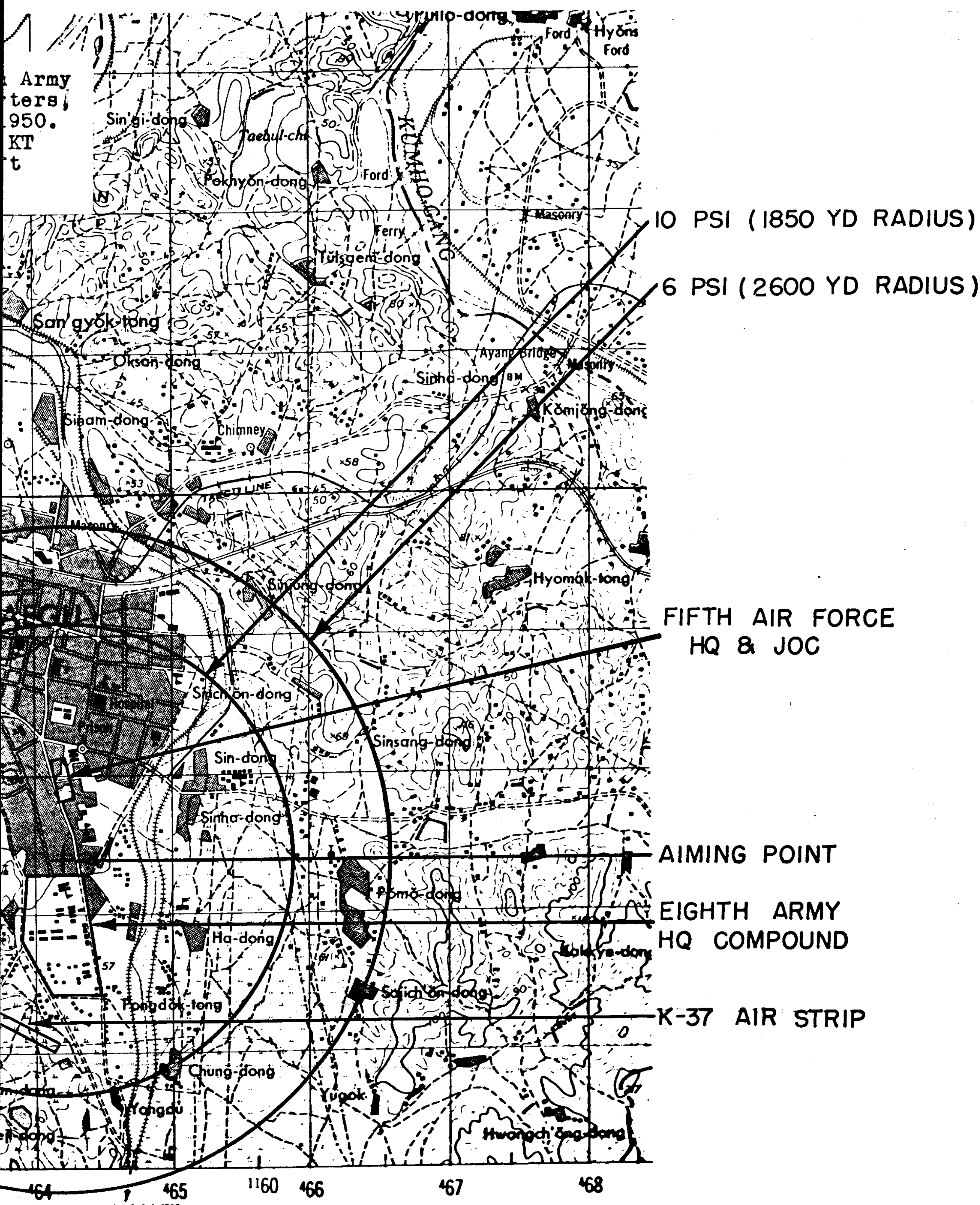


Figure 1, Appendix G, Annex 2. Eighth Army Headquarters, Fifth Air Force Headquarters, and JOC at Taegu, Korea, 31 December 1950. Blast overpressure circles are for 40 KT atomic bomb air burst at 3,000-3,500 ft height.



Army
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950.
KT
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10 PSI (1850 YD RADIUS)
6 PSI (2600 YD RADIUS)
FIFTH AIR FORCE
HQ & JOC
AIMING POINT
EIGHTH ARMY
HQ COMPOUND
K-37 AIR STRIP
Sin'gi-dong
Pokhyŏn-dong
Tulsgem-dong
San'gyŏk-tong
Oksan-dong
Sinam-dong
Chimney
Sinho-dong
Ayang Bridge
Kŏmjŏng-dong
Hyomok-tong
Sinch'ŏn-dong
Sinsang-dong
Sin-dong
Sinha-dong
Pŏmŏ-dong
Ha-dong
Pongdŏk-tong
Chung-dong
Yangdu
Yugok
Hwangch'ŏng-dong
Ford
Ferry
Masonry
Hospital
Prison
464
465
1160
466
467
468
SANG-DONG 9.6 KM.

surface facilities at the K-37 airfield would have been destroyed or heavily damaged.

CONCLUSIONS

10. a. Radio transmitters serving a headquarters area are generally not located immediately in the area and may not, therefore, be used through radio direction-finding to locate the area accurately. However, the heavy radio traffic handled at Taegu by the Fifth Air Force and the Eighth Army would undoubtedly have made the area recognizable to the enemy as a most important military headquarters.

b. The enemy's certain knowledge of the city's structure and his use of clandestine agents and photo reconnaissance could have enabled him to locate EUSAK and Fifth Air Force headquarters within the Taegu area with the accuracy required to direct an atomic attack against them on 31 December.

c. Had an attack like the one described been successful, an immediate advantage of considerable consequence could have been seized by the enemy's combat forces. The temporary lack of central command and communications would have put the UN Forces at a grave disadvantage in the face of a large-scale concerted enemy attack which started on 31 December.

ANNEX 3

UN AIRFIELDS IN KOREA, 31 DECEMBER 1950

INTRODUCTION

1. Atomic bombs are capable of destroying airfields and the planes and facilities located upon them. Air bursts may be used to destroy planes and facilities alone, or underground bursts may be used to destroy the fields, themselves, as well as the planes and facilities.

2. Eighteen South Korean airfields with differing capacities and characteristics and in different states of repair were available to the 5th Air Force on 31 December 1950. Six of these were in use on this date in direct support of 8th Army combat operations. It is useful to consider what the military effects might have been had atomic attacks been made by the enemy against some or all of these fields. A study of this question may indicate how vulnerable the UN Forces were to a serious military reversal resulting from a destruction of their Korean airfields and Korean-based aircraft.

3. This study will not include an analysis of the probable results of atomic attacks against UN airfields in Japan even though such attacks might have been more profitable to the enemy in eliminating UN air potential than attacks against the Korean bases.

4. No consideration is given herein to the means the enemy may or may not have had to deliver atomic attacks on the day to which the study applies; likewise, no consideration is given to the specific defenses of UN Forces against such attacks.

AIRFIELD AND AIRCRAFT

Airfields

5. The airfields available to the UN Forces on 31 December 1950 are shown on Figure 1; they lie south of the designated UN front of that date, Line Baker. The six fields in use by combat operations were, reading from north to south:

APPENDIX G

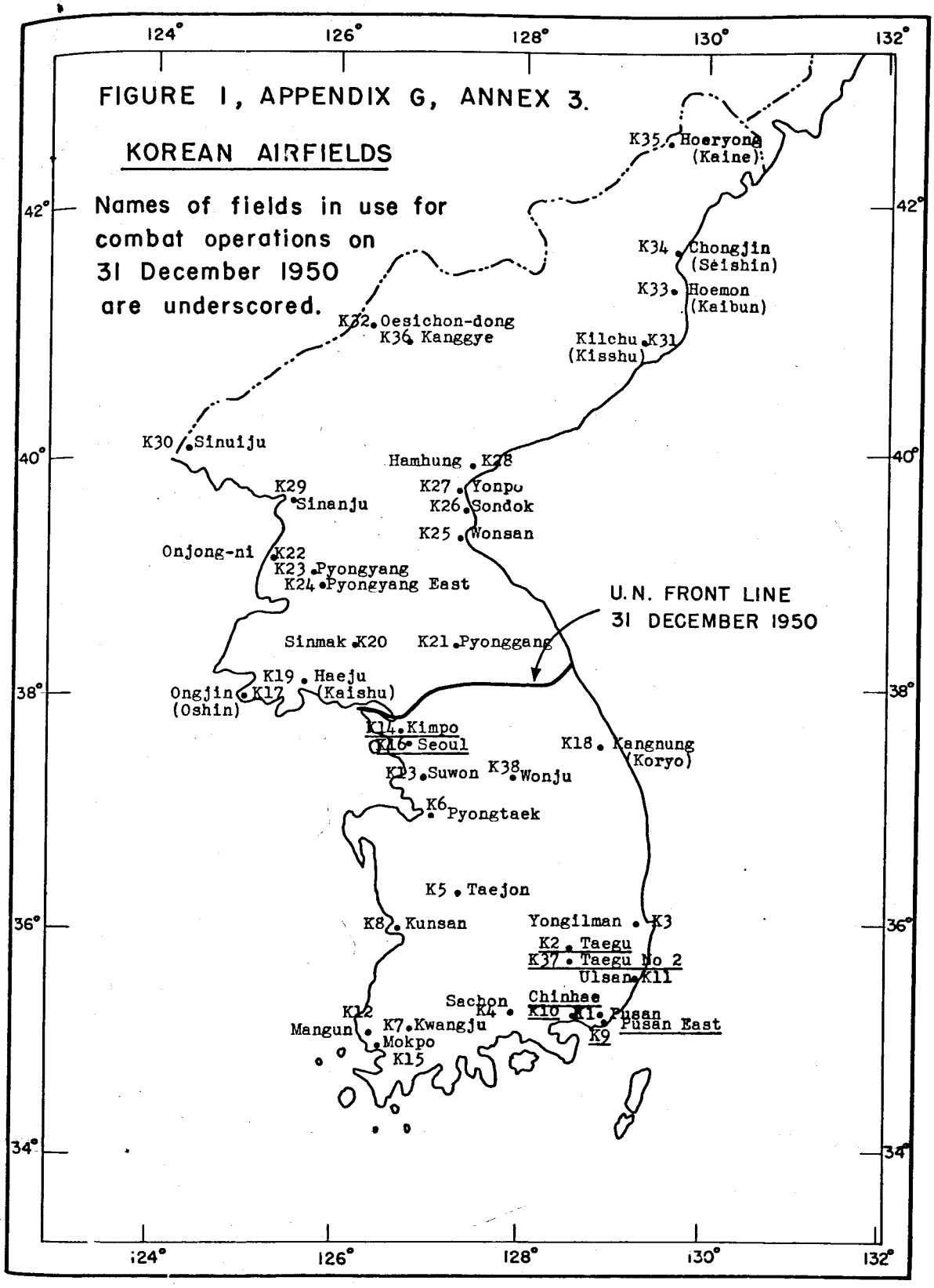
FIGURE 1, APPENDIX G, ANNEX 3.
KOREAN AIRFIELDS
Names of fields in use for combat operations on 31 December 1950 are underscored.
124°
126°
128°
130°
132°
42°
40°
38°
36°
34°
K35 Hoeryong (Kaine)
K34 Chongjin (Seishin)
K33 Hoemon (Kaibun)
K32 Oesichon-dong
K36 Kanggye
Kilchu K31 (Kisshu)
K30 Sinuiju
Hamhung K28
K29 Sinanju
K27 Yonpo
K26 Sondok
K25 Wonsan
Onjong-ni K22
K23 Pyongyang
K24 Pyongyang East
U.N. FRONT LINE
31 DECEMBER 1950
Sinmak K20
K21 Pyonggang
K19 Haeju
Ongjin K17 (Kaishu)
(Oshin)
K14 Kimpo
K16 Seoul
K18 Kangnung (Koryo)
K13 Suwon
K38 Wonju
K6 Pyongtaek
K5 Taejon
K8 Kunsan
Yongilman K3
K2 Taegu
K37 Taegu No 2
Ulsan K11
Sachon
Chinhae
K12
K4
K10
K1 Pusan
Mangun
K7 Kwangju
K9 Pusan East
Mokpo
K15