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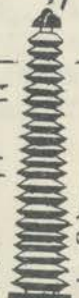
OPERATION BINGO

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MEDITERRANEAN ALLIED
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HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE

REPORT ON OPERATION "BINGO"

6 November 1944

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- A. Hq. MATAF, Operation Instruction No. 14, Operation "Bingo", 27 October 1944.
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Classification changed to **DEC** 1948
RESTRICTED
 Authority AGF Ltr 380.1 (14 Mar 47) GNGBI-4
 By *John R. Pugh*
JOHN R. PUGH
 Lt Col, Cav
 Custodian

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MEDITERRANEAN ALLIED TACTICAL AIR FORCE

REPORT ON OPERATION "BINGO"

POWER STATIONS ON THE INNSBRUCK-VERONA RAIL LINE

1. General. By October 1944, maintaining a state of interdiction on the all-important INNSBRUCK-VERONA Brenner Pass rail route had proved to be a difficult, nearly impossible, task. The absence of any great number of points vulnerable to air attack made it possible for German engineers to concentrate bridging materials near all target sites, and to repair even extensive damage in a very short time. In addition, rail diversions had been constructed, or were under construction, around most of the vulnerable points. Weather was on the side of the enemy, for during the fall and winter months there were few days when this area was not cloud obscured. It was anticipated that weeks would pass before attacks could be repeated, weeks during which the Germans would have ample time to effect complete repairs on the line, and to move great quantities of war materials south to replenish the stores of the Armies fighting south of the PO. Thus the effects of temporary interdiction would be nullified. It was believed that if a bombing program could be carried out that would permanently reduce the capacity of the Brenner line in conjunction with the program of establishing blocks, it would cause depletion of stock in dumps south of the Alps and greatly augment the administrative problems besetting the enemy. With this in view, a careful study of power stations on the INNSBRUCK-VERONA line was made.

2. The Brenner Line. As is true of most European railways, the Brenner Pass route is designed to utilize electricity for power. The capacity of the electrified line, in each direction, is reported to be 28 to 30 trains daily, with each train capable of transporting an estimated 800 tons of cargo through the Pass. Thus an estimated 24,000 tons can be moved daily when the line is fully serviceable.

3. Steam vs. Electricity. In mountainous terrain, where gradients are long and steep, electric power for locomotion is vastly more efficient than steam power. The Chief Mechanical Engineer and the Chief of Technical Services of the Italian State Railways estimated that forcing the Germans to change from electric locomotion to steam locomotion would reduce the capacity of the Brenner Pass line to eight or ten trains daily. Further, the steam powered trains would be capable of hauling only 675 ton loads. The maximum capacity of the line, using steam locomotion, was thus estimated to be 6750 tons daily, or 17,250 tons less than the capacity of the electric

17 OCT 1945

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powered system.

4. The Electrified System. There is an abundance of hydro-electric power in North ITALY, and a bombing program designed to destroy power at its source was consequently too complicated to be practical. The most vulnerable points on any electrified rail system are the power stations, transformer stations where power is stepped down from the high voltage of the long distance transmission lines to the operating voltage required for the rail system, and converter stations. There are fourteen such stations between VERONA and the Brenner Pass, spaced some twenty miles apart, where gradients are less severe, and ten miles apart in the steepest sections. These stations are designed with sufficient capacity, and are so located, that any one station can be removed from the line without causing any appreciable decrease in the operating efficiency of the system. In fact, this particular line is so well designed that even if two adjacent stations are removed from the system, limited traffic is still possible. However, if three consecutive stations are destroyed, it is impossible to use electric locomotion on the section of the line between the outer destroyed stations. Each station stocked sufficient replacement transformers and other equipment to make emergency repairs. It was consequently believed that it would be necessary to execute one repeat attack on each of the stations destroyed. Representatives of the Italian State Railways were positive that, after a second successful attack, it would be a matter of months before additional replacement equipment could be assembled or repairs made to the damaged equipment. During this period, steam power would have to be used and the capacity of the Brenner Pass route would be reduced as indicated above. An investigation was made of the availability of mobile power stations for use as replacements for the destroyed permanent stations, and it was determined that in August 1944 there were twelve mobile transformers available for emergency use on the DC, or VERONA-TRENTO, section of the line, and ten to fifteen mobile converter stations for emergency use on the AC, or TRENTO-North, section of the line. The capacities of three mobile units must be confined to equal the capacity of one permanent station. Should this employment be made of the mobile units, attacks on such installations would be necessary.

5. Power Stations as Targets. There are two principal types of power stations on the VERONA-INNSBRUCK rail line, the large transformer stations on the DC section of the line between VERONA and TRENTO, and the smaller, completely housed converter stations on the AC section from TRENTO north.

- a. Transformer Stations. The vulnerable part of such installations are the transformer units themselves. Fracture of the case of the transformer causes loss of coolant and the unit will burn out. Penetration of the coils by shell

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fragments or bullets make it necessary to rewind the coils, a major repair job. These transformer units are usually located in the open, adjacent to buildings which house the control panels. Bombs must penetrate the building, detonating at the ground floor level, to accomplish the destruction of the vulnerable equipment located in the building, while bombs should be fuzed for maximum fragmentation to destroy the transformer equipment located in the open.

- b. Converter Stations. All the vital parts of these stations are located in the buildings, usually on the ground and first floors. The converter equipment is of heavy construction and positive destruction can best be accomplished by shell fragments penetrating the casing. The buildings housing these converter stations are usually two or three storeys tall, the upper floors serving as living quarters for the station personnel. Bombs should be fuzed to penetrate to the ground floor before detonation in order to achieve the necessary destruction of the station equipment.

6. Location of Power Stations. The power stations on the VERONA-INNSBRUCK line were located as follows:

- a. Transformer station three miles SW of VERONA.
- b. Transformer station at DOMEGLIARA.
- c. Transformer station at ALA.
- d. Transformer station at TRENTO.
- e. Converter station at SALORNO.
- f. Converter station one mile north of ORA.
- g. Power station two miles SW of BOLZANO.
- h. Converter station at CALPODAZZO.
- i. Converter station at CHIUSA.
- j. Converter station at VARNA.
- k. Converter station at LE CAVE.
- l. Converter station south of VIPITENO.
- m. Converter station at COLLE ISARO.
- n. Converter station at TERME DEL BRENNERO.

OPERATION "BINGO" - INTENTIONS

7. Mediterranean Allied Tactical Air Force issued its Operational Instruction No. 14, Operation "Bingo", on 27 October 1944. Taking into consideration the facts already covered in the present report, it directed the following:

- a. Desert Air Force fighter-bombers were to destroy the transformer station three miles southwest of VERONA in co-ordination with the attacks on the three other targets.

- b. The medium bombers of the 57th Bombardment Wing and the fighter-bombers of the XXII Tactical Air Command were to destroy the following stations:
 - i. Transformer station near DOMEGLIARA.
 - ii. Transformer station at AIA.
 - iii. Transformer station at TRENTO.
 - c. The 42nd Bombardment Wing was to employ maximum effort against the VERCENA-TRENTO rail line with the object of creating as many blocks as possible between the targets at DOMEGLIARA and TRENTO.
8. These MATAF attacks were to be supported by heavy bomber attacks made by Strategic Air Force against the following targets:
- a. Converter station at SALORNO.
 - b. Converter station one mile south of CRA.
 - c. Power station two miles SW of BOLZANO.

9. In addition, MAAF directed that heavy bombers of 15th Air Force were to attack the TRENTO-INNSBRUCK section of the Brenner line with the object of creating as many blocks as possible. Target times were to be arranged so as to provide maximum diversion. It was considered desirable, if weather permitted, to carry out the heavy bomber attacks on the same day as the MATAF attacks.

10. Use of 500-lb. G.P. bombs with .1 and .01 fuzings was directed for the operation, as a result of bomb damage surveys of electric power plants previously attacked. It was believed that rocket projectiles should prove most effective against the exposed transformer units which adjoined each station.

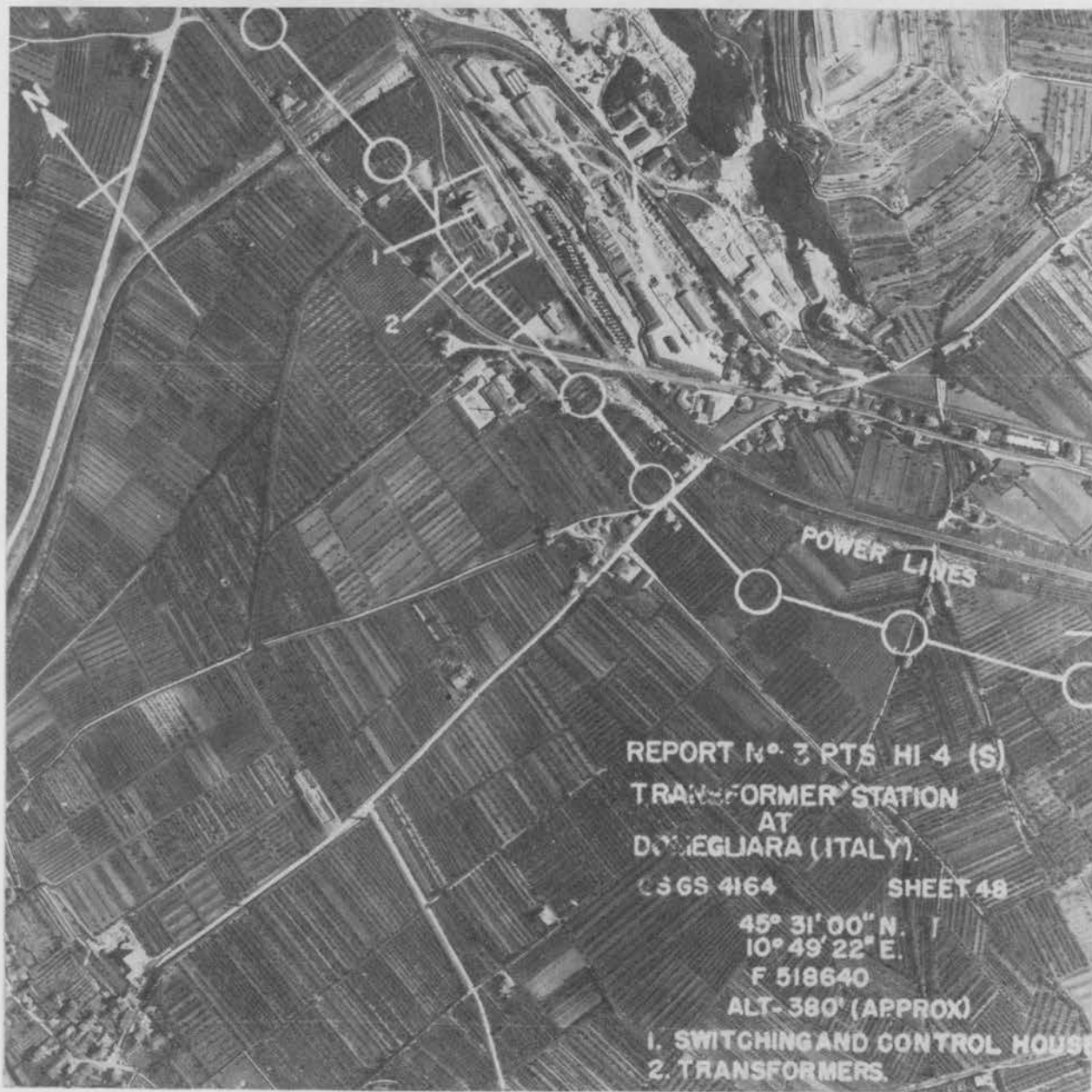
11. XXII Tactical Air Command was to furnish fighters to provide area cover for all MATAF bombing attacks.

DESCRIPTION OF THE TARGETS

12. Intelligence sources described the four targets to be destroyed by MATAF as follows:



a. The transformer station located three miles SW of VERONA (F-616518) had an elevation of approximately 200 feet. The installation was made up of two single-storey building in the shape of a "T", 230 feet by 70 feet, and 190 feet by 70 feet. There was additional building in the area 95 feet by 85 feet. The switches and transformer banks covered an area 520 feet by 220 feet. There was definitely no blast wall to protect the station, but probably a wire fence 5 to 10 feet high on the west and south sides. The target area was protected by 97 heavy flak guns and 73 light guns. Of these, all 97 heavy guns could be brought to bear in protection against attack on the transformer station, but only 9 of the light guns were located in its immediate vicinity.



b. The transformer station at DOMEGLIARA (F-518640) was located at an elevation of approximately 380 feet. It probably consisted of a two-storey building housing the control and switching units in the form of an "L", 55 feet by 80 feet. The transformer and outside switching bank covered an area 190 feet by 50 feet, and were located immediately west of the building. It had no protective blast wall, but a fence similar to the one at VERONA on the west, south, and east sides. The target was located in the immediate vicinity of the 97 heavy and 73 light guns defending the VERONA area, but was in range of only 21 heavy guns, and at the extreme deflection range from these. Three light guns were in the target area.

REPORT NO. 3PTS HI B (S)

TRANSFORMER STATION

AT

ALA (ITALY)

G.S.G.S. 4164 SHEET 36

45° 45' 45" N

11° 00' 07" E

F-670903 ALT. 490' (APPROX)

1. TRANSFORMERS
2. CONTROL HOUSE



c. The transformer station at ALA (F-670903), at an approximate elevation of 490 feet, consisted of a single-storey building 60 feet by 300 feet and a two-storey building 30 feet by 80 feet. The transformer and switching bank were located just to the east of the building. There was a wall on the west side, approximately 50 feet from the transformer, which was not, however, a blast wall, and offered no protection. There were no known flak defenses of this installation.



d. The transformer station at TRENTO (A-770225), at an elevation of approximately 650 feet, appeared to be a single-storey building 130 feet by 40 feet. The transformers and switching banks were located immediately west of the building in an area approximately 155 feet by 130 feet. It was protected neither by a blast wall nor a fence. The TRENTO area was defended by 30 heavy and 12 light guns. All 30 of the heavy guns could be brought to bear over this target, but only 5 of the light guns were in its immediate vicinity.

OPERATION "BINGO" - EXECUTION

13. A week of non-operational weather followed the publication of the "Bingo" directive. Not until 4 November were both medium wings able to resume flying (though the 42nd Wing operated on one of the intervening days). The operation finally laid on for the morning of 6 November, and MATAF's part in it was carried out exactly according to plan.

- a. The VERONA transformer station was attacked by two squadrons of 79 Fighter Group with rockets and by two squadrons of 239 Wing with 500-lb. G.P. bombs. The P-47's reported 21 hits on the transformer, and 4 hits on the buildings, while the Kittyhawks claimed 14 direct hits on the main building and 2 on the transformer.
- b. The DOMEGLIARA transformer station, attacked by two missions of the 310th Bomb Group, was covered by an excellent concentration of the 500-lb. G.P. bombs. In addition, fighter-bombers of the 57th Fighter Group scored direct hits on the transformer station with 500-lb. G.P. bombs.
- c. The AIA transformer station was attacked by two missions flown by the 321st Bomb Group, again with a good concentration in the target area. The 57th Fighter Group also attacked this target with both 500-lb. G.P. bombs and rockets.
- d. The TRENTO transformer station was assigned to the 340th Bomb Group, which dropped both 500-lb. G.P. bombs and 100-lb. phosphorus bombs, while six aircraft dispensed chaff. All bombs reached the target area, with the control tower and transformer well covered. The TRENTO station was also attacked by the 57th Fighter Group, which scored 4 direct hits with 500-lb. G.P. bombs on the transformer station, one on the southwest corner of the control house, and an additional direct hit on a factory north of the station, causing a large explosion. An anti-flak mission was flown by the 86th Fighter Group as a protective measure for the B-25's, during which 2-20 mm and 8-88 mm AA gun positions were strafed: this effort did not stop the AA fire, but caused it to be directed against the P-47's rather than against the bombers.

14. Enemy opposition did not seriously interfere with the execution of the operation. No enemy aircraft was encountered over VERONA, though one P-47 sustained Category I injuries due to flak. At DOMEGLIARA, 8 to 12 enemy planes (ME-109's, FW-190's, or MA-202's) made one unaggressive pass at the attacking formation in the target area, without success. One aircraft was holed by flak over the target. AIA was completely unprotected, either by planes or flak.

At TRENTO, the six aircraft which dispensed chaff encountered 5 or 6 FW-190's and 1 or 2 MA-202 s, and three of them were holed by flak. One FW-190 made an unaggressive pass at the attacking formation before the bombing, and 5 made an unaggressive pass afterwards.

15. Closely co-ordinated with the attacks on the four transformer stations were the efforts of the 42nd Wing on 6 November. Six missions, totalling 103 sorties, were directed against vulnerable rail targets on the line between VERONA and TRENTO. These missions created seven blocks between ROVERETO and VERONA. No enemy opposition was experienced from these targets and there were no losses. The specific railroad targets attacked were a rail cut and a rail cornice at OSSENIGO, a rail fill at SAN AMEROGIO, rail fills at DOLCE and MARCO, and the railway bridge at ALA, the north end of which was hit.

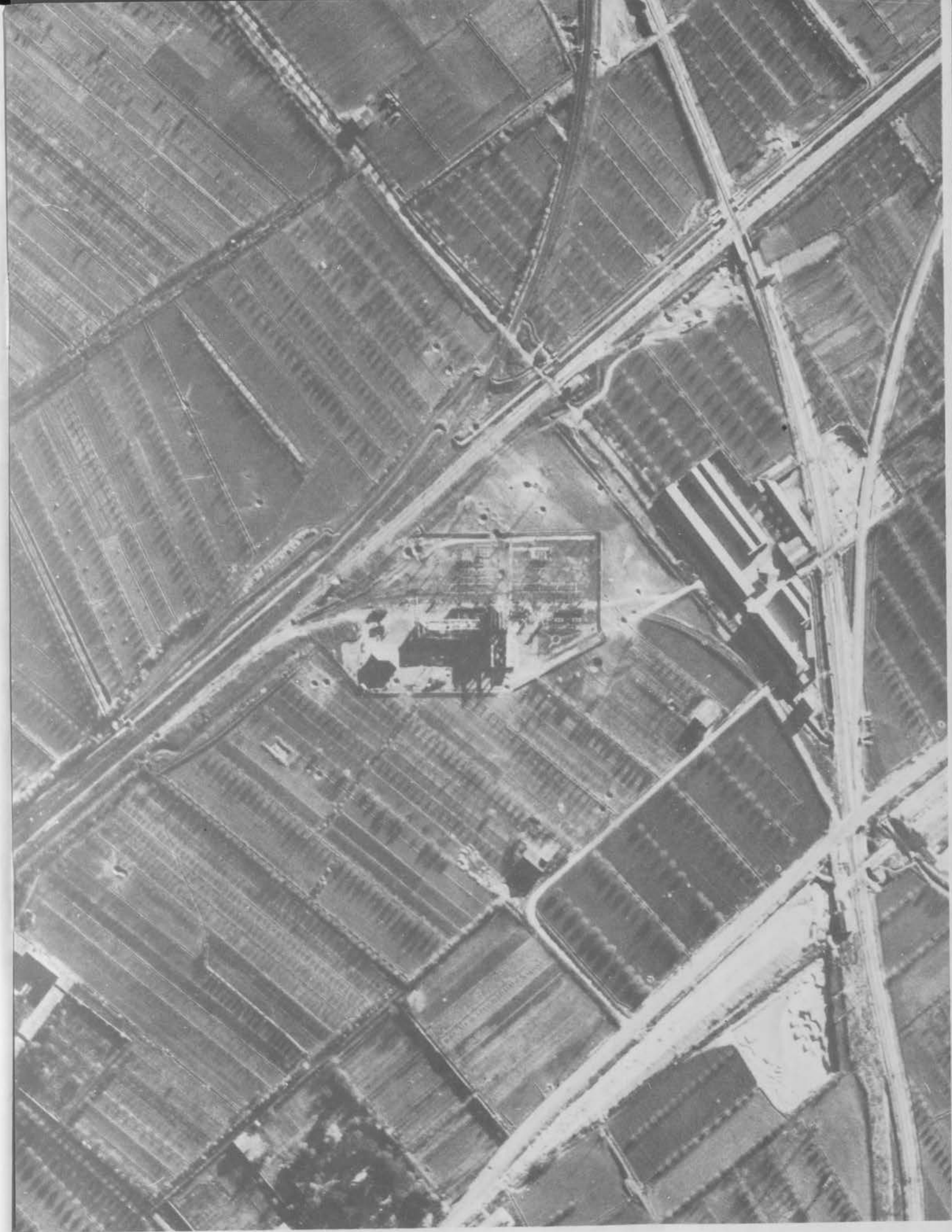
16. On the same day that MATAF carried out its part of "Bingo", the Strategic Air Force dispatched 23 B-24's with escort of 46 P-38's to attack the three targets assigned to it. The SALORNO power station was reported as covered by a closely concentrated pattern of bombs, with three near misses on the transformer house, while the highway and railway line close by were also probably cut. The CRA power station was reported as having sustained two direct hits and several near misses on the power house. The double track rail line to BOLZANO was cut by three direct hits. Intense, accurate, heavy flak was encountered by one group at the target, which, however, sustained no damage, and no enemy aircraft were observed or encountered.

17. See Annex "B" for complete details on the individual missions flown in execution of the operation.

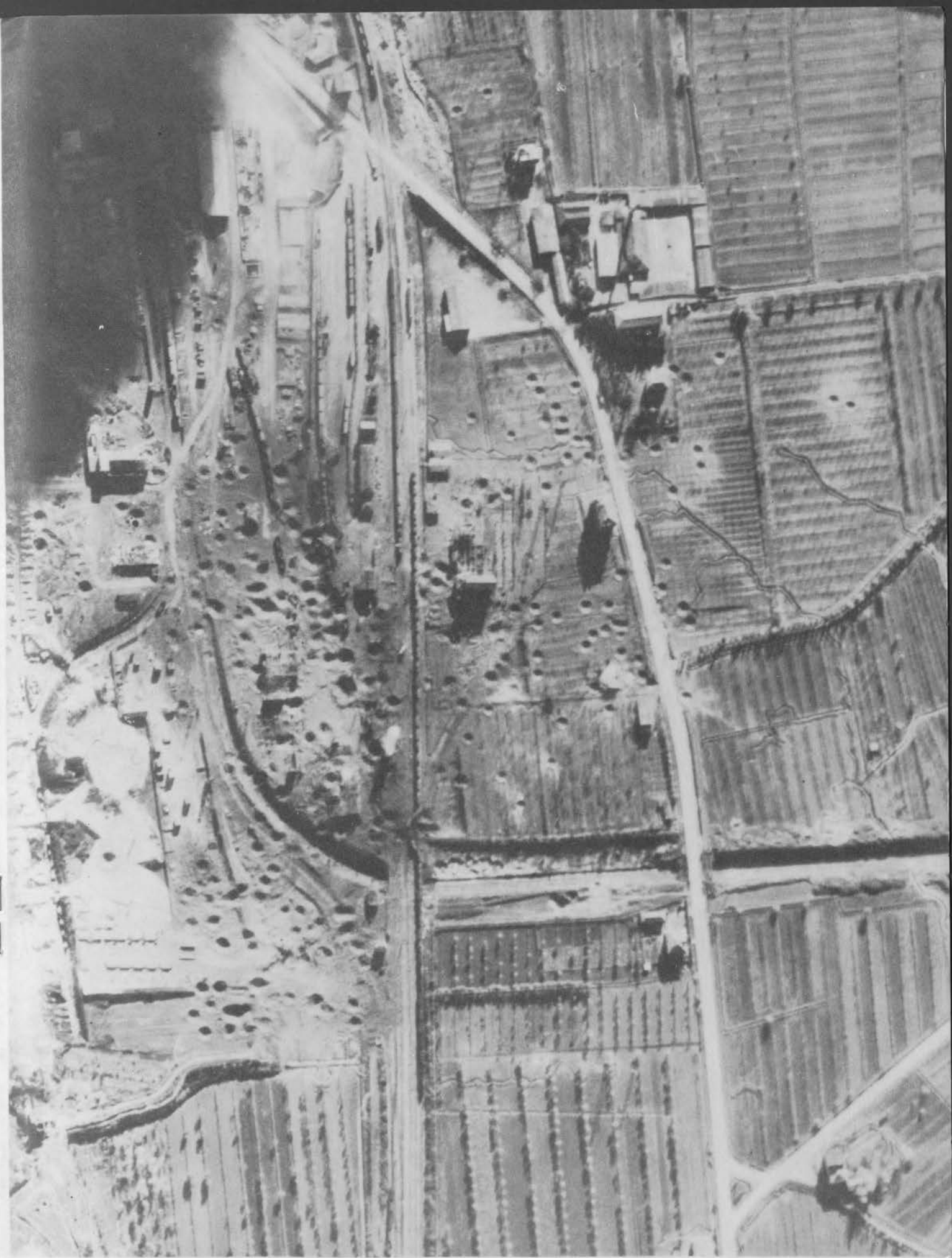
RESULTS OF THE OPERATION

18. Photo reconnaissance sorties flown on 8 and 9 November revealed that the following damage had been inflicted on the transformer stations attacked by MATAF:

- a. VERONA: the roof of the east portion of the "T" shaped control and switching building received minor damage from blast. It was probable that there was internal damage to this portion of the building as well. The roof and a portion of the west wall of the western half of the building were removed in the course of repair operations on earlier damage. Several craters were present in the transformer yard south of the control house. Not much damage was apparent in the yard. Three banks of transformer racks and wire towers had been damaged by blast.



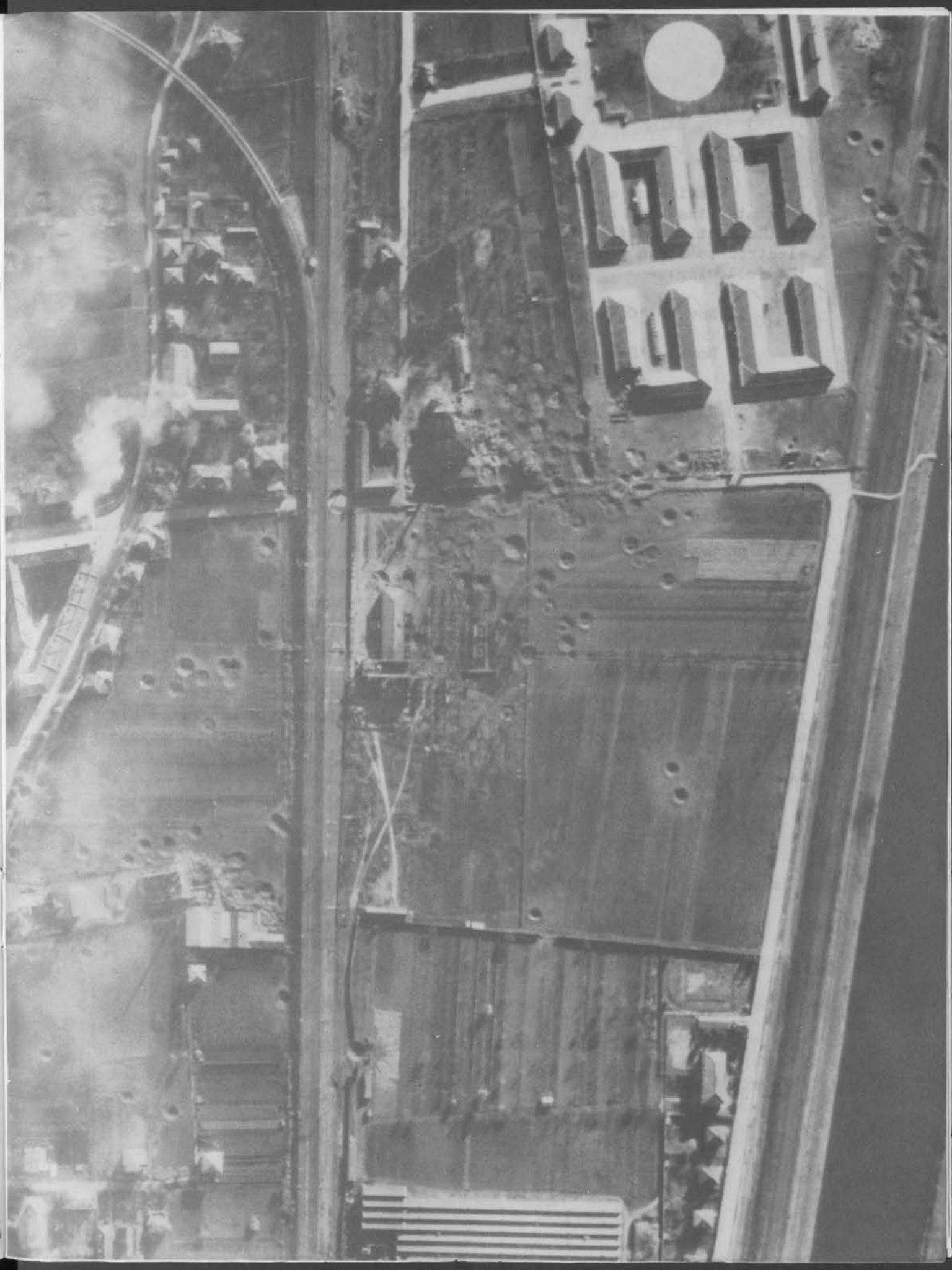
- b. **DOMEGLIARA:** three bomb hits in the south end of the transformer yard destroyed two transformers, probably with slight damage to the two high-line towers immediately west of this point. At least three near misses were scored on the generator house, causing some damage. It was possible that the low wing of this building sustained a direct hit.



c. ALA: an extremely heavy concentration of hits was seen in the target area and in the area just to the east. The control house was very heavily damaged, the roof gone, and some of the walls badly ruined. No signs of fire could be seen. The transformer yard received at least six direct hits; the transformers themselves could no longer be seen, and it was assumed they had been destroyed.



- d. TRENTO: the target area was heavily cratered, and three of the five transformers appeared to be destroyed. The remaining two were still standing, but probably were damaged. Two near misses on the control house almost certainly damaged its structure and destroyed the cabling. At least three direct hits were made on the transformers and at least six more were made within the yard.



CONCLUSIONS

19. Evidence available three weeks after the "Bingo" attacks indicates that the operation was successful in forcing the conversion of the section of the Brenner route between VERONA and TRENTO from electric to steam power. Usually reliable ground sources reported the following:

12 Nov. - "Only steam traction can be used."

17 Nov. - "Germans using M/T to move critical supplies from CRA to VERONA."

18 Nov. - "No Brenner traffic passed through the main yard at VERONA between 3 Nov. and 12 Nov."

23 Nov. - "Germans have ordered suspension of repair work on sub stations between VERONA and TRENTO. Only steam engines will be used hereafter."

25 Nov. - "Due to damage to four electric substations on the Brenner line, only steam locomotives operate between VERONA and TRENTO."

20. These agents reports are substantiated by photo reconnaissance. The section was covered on an average of three times daily except when weather prevented operations, and during this period only steam locomotive activity was recorded. Long motor convoys were photographed on several occasions paralleling apparently unserviceable sections of the rail route, indicating not only that electric locomotion was probably impossible, but also a probable shortage of steam locomotives.

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ANNEX A

~~SECRET~~
~~By _____ of _____~~
~~C. _____ MATAF:~~
~~2 _____ 10/4 _____~~
~~_____~~

HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
APO 650

27 October, 1944

OPERATION INSTRUCTION)

NUMBER 14)

OPERATION "BINGO"

INTENTION

1. Operation "BINGO" is designed to reduce the flow of supplies to the German Armies in ITALY over the INNSBRUCK - VERONA (Brenner Pass) line by the destruction of the electrical system of that line; supplemented by bomber attacks on vulnerable points on the Brenner rail line.

INFORMATION

2. Careful study of the system and appraisal by Italian State Railways indicate that three (3) consecutive power or transformer stations must be destroyed in order to effect the necessary disruption and cause a changeover to steam locomotives, thus reducing the effectiveness of the line to one quarter of its former capacity.

TARGETS

3. a. M.A.T.A.F. will attack four consecutive stations as follows:

Target No. 1 - Transformer station near VERONA at F.616518.

Target No. 2 - Transformer station near DOMEGLIARA at F.518640.

Target No. 3 - Transformer station at ALA F.670903.

Target No. 4 - Transformer station at TRENTO A.770225.

Detailed description of targets shown in M.A.T.A.F. Target Intelligence Appreciation No. 7.

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M.A.T.A.F. will also execute attacks on the VERONA - TRENTO rail line.

EXECUTION

4. a. Target No. 1 will be destroyed by Desert Air Force fighter-bombers in coordination with attacks on Targets 2, 3, and 4 by other units of this Command.

b. Target No. 2 will be destroyed by medium bombers of 57th Bombardment Wing and fighter-bombers of the XXII Tactical Air Command.

c. Target No. 3 will be destroyed by medium bombers of 57th Bombardment Wing and fighter-bombers of the XXII Tactical Air Command.

d. Target No. 4 will be destroyed by medium bombers of 57th Bombardment Wing and fighter-bombers of the XXII Tactical Air Command.

e. 42nd Bombardment Wing will employ maximum effort against VERONA - TRENTO rail line with the object of creating as many blocks as practicable between Targets No. 2 and No. 4.

f. Supporting attacks will be made by Strategic Air Force heavy bombers on Targets No. 5, 6, and 7 in the vicinity of BOLZANO, ITALY (Reference M.A.T.A.F. Target Intelligence Appreciation No.7). In addition, heavy bombers will attack the TRENTO - INNSBRUCK section of the Brenner rail line with the object of creating as many blocks as practicable. Heavy bomber target times will be arranged to provide maximum diversion. If weather permits it is considered desirable that heavy bomber attacks be accomplished on same day as M.A.T.A.F. attacks.

ARMAMENT

5. Bomb damage surveys of electric power plants previously attacked indicate best results will be obtained through use of 500 lb. G.P. with .1 and .01 fuzings. Rocket projectiles should prove most effective against the exposed transformer units which adjoin each station.

FIGHTER PROTECTION

6. Area cover will be furnished by XXII Tactical Air Command for all M.A.T.A.F. bombing attacks.

ORDER OF EXECUTION

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7. Upon receipt of signal from M.A.T.A.F. directing execution of the operation Commanding General, 57th Bombardment Wing will set time over target for medium bombers and signal this headquarters immediately in order that proper coordination of times may be made by Desert Air Force, XXII Tactical Air Command and the Strategic Air Force. Order of execution will be given not later than 1600A hours of day preceding attack.

8. ACKNOWLEDGE by signal.

By command of Major General CANNON:

RONALD B. LEES,
Air Commodore,
Chief of Staff.

OFFICIAL:

CHARLES H. POTTENGER,
Colonel, Air Corps,
Ass't. C. of S., A-3.

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ANNEX B -- ATTACKS

<u>TARGET</u>	<u>UNIT</u>	<u>SORTIES</u>	<u>IRREGULAR</u>	<u>TOT</u>	<u>BOMBS</u>	<u>ALTITUDE</u>
VERONA	86 & 87 Sq. 79 F. Gp. F-47D	12	12	1115	36 rockets HE4.5M8A1 inst.fuzing. 36 rockets HE4.5M8A1 .015 fuzing	500'
	250 Sq. 239 Wing. Kitty	12	12	1140	12 x 1400 x .5. 24 x 500 1/40 de- lay.	9000/1500'
	3 Sq. 239 Wing. Kitty	12	10	1150	24 x 500 1/40 delay.	8000/1500'
DOMAGLIARA	310 B. Gp. 57 B. Wing. B-25	18	18	1130	143 x 500 G.P. .1/.01	10,900/12,000'
	310 B. Gp. 57 B. Wing. B-25	18	18	1145	144 x 500 G.P. .01/.01	10,900/12,000'
	64 F. Sq. 57 F. Gp. F-47D	17	16	1245	30 x 500 G.P. 1-10/ .025. 2 jettisoned.	1500'
ALA	321 B. Gp. 57 B. Wing. B-25	18	18	1128	144 x 500 G.P. .1/.01	11,500/12,000'
	321 B. Gp. 57 B. Wing. B-25	18	18	1144	128 x 500 G.P. .1/.01	12,000/12,500'
	65 F. Sq. 57 F. Gp. F-47D	16	16	1245	32 x 500 G.P. 1-10/ .025. 60 x 37 rocket M8A1	1500'

ON "BINGO" TARGETS

ENEMY AIR

FLAK

RESULTS

	none	heavy and light, accurate, intense.	1 bomb returned to base. 1 aircraft Cat. I due to flak. 21 hits on transformer, 4 hits on buildings.
	none	intense, accurate	3 sets of bombs scored direct hits on main buildings causing a large fire. 1 set scored direct hit on a transformer, rest in target area.
	none	medium, inaccurate.	8 direct hits on main buildings and rest in target area. Fire appeared coming from transformers.
	none	heavy, scant, inaccurate.	1 x 500 G.P. jettisoned over water due to rack malfunction. First flight had good coverage on south half of target area, several hits on buildings. Other bombs fell over, hitting marshalling yards east of target.
	8/12 possible ME-109's, FW-190's, and MA-202's, made one unaggressive pass at 1145.	heavy, scant, inaccurate. 1 aircraft holed.	Excellent concentration in target area, explosions seen. A few bombs hit the marshalling yards.
	none	light, intense, scant.	12 bombs directly in target area. 1 aircraft landed at PISA landing ground, due to engine trouble, 2 bombs jettisoned in sea.
	none	none	All bombs in target area with good concentration. Several direct hits with a large flash coming from north of building.
	none	none	8 x 500 G.F. jettisoned and 8 x 500 G.P. returned due to electrical malfunction. 1 B-25 turned back just before reaching IP due to engine failure. All bombs in target area, concentrated on east half with several direct hits on buildings.
	none	heavy, inaccurate, scant.	Target had previously been demolished by mediums. 13 bombs and the rockets went into the target area, but results could not be determined.

<u>TARGET</u>	<u>UNIT</u>	<u>SORTIES</u>	<u>PRIMARY</u>	<u>TOT</u>	<u>BOMBS</u>	<u>ALTITUDE</u>
TRENTO	340 B. Gp. 57 B. Wing. B-25	30	30	1131	168 x 500 G.P. .1/.01. 72 x 100 phosphorus 6 a/c dis- persed chaff	11,000/11,400'
	66 F. Sq. 57 F. Gp. P-47D	16	16	1245	32 x 500 G.P. 1-10/ .025.	1000'

ENEMY AIRFLAKRESULTS

5/6 FW-190's and 1/2 MA-202's encountered by chaff element. 1 FW-190 made a pass before bombing and 5 made unaggressive pass after bombing.

6 a/c with chaff got heavy, moderate, accurate. Rest got heavy, moderate to intense, inaccurate. 3 a/c held.

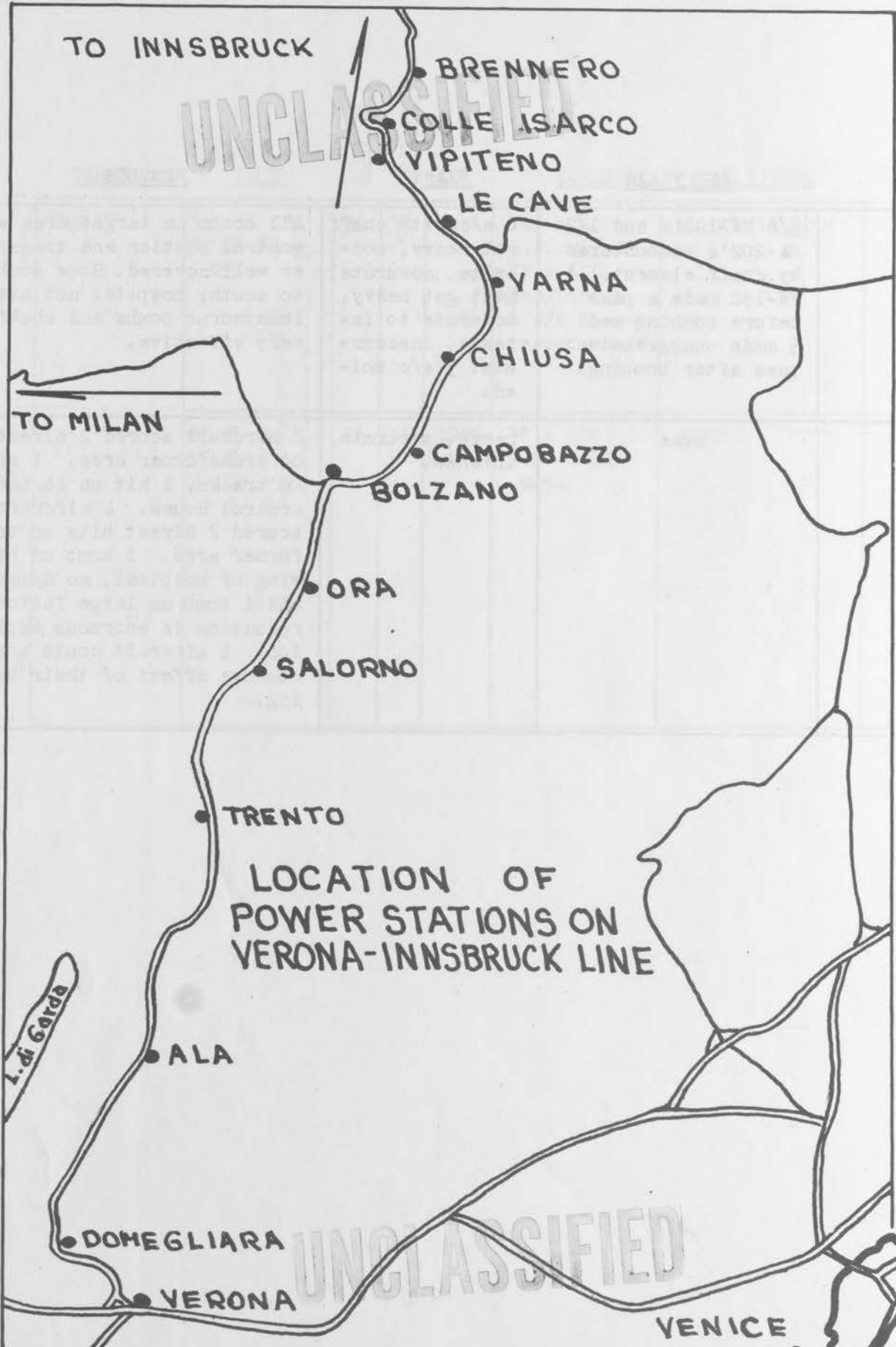
All bombs in target area with control station and transformer well covered. Some bombs to south; hospital not hit. Phosphorus bombs and chaff very effective.

none

heavy, accurate, intense.

8 aircraft scored 2 direct hits on transformer area. 1 cut in RR tracks, 1 hit on corner of control house. 4 aircraft scored 2 direct hits on transformer area. 1 bomb on NE wing of hospital, no damage, and 1 bomb on large factory, resulting in enormous explosion. 4 aircraft could not observe effect of their bombing.

ANNEX C



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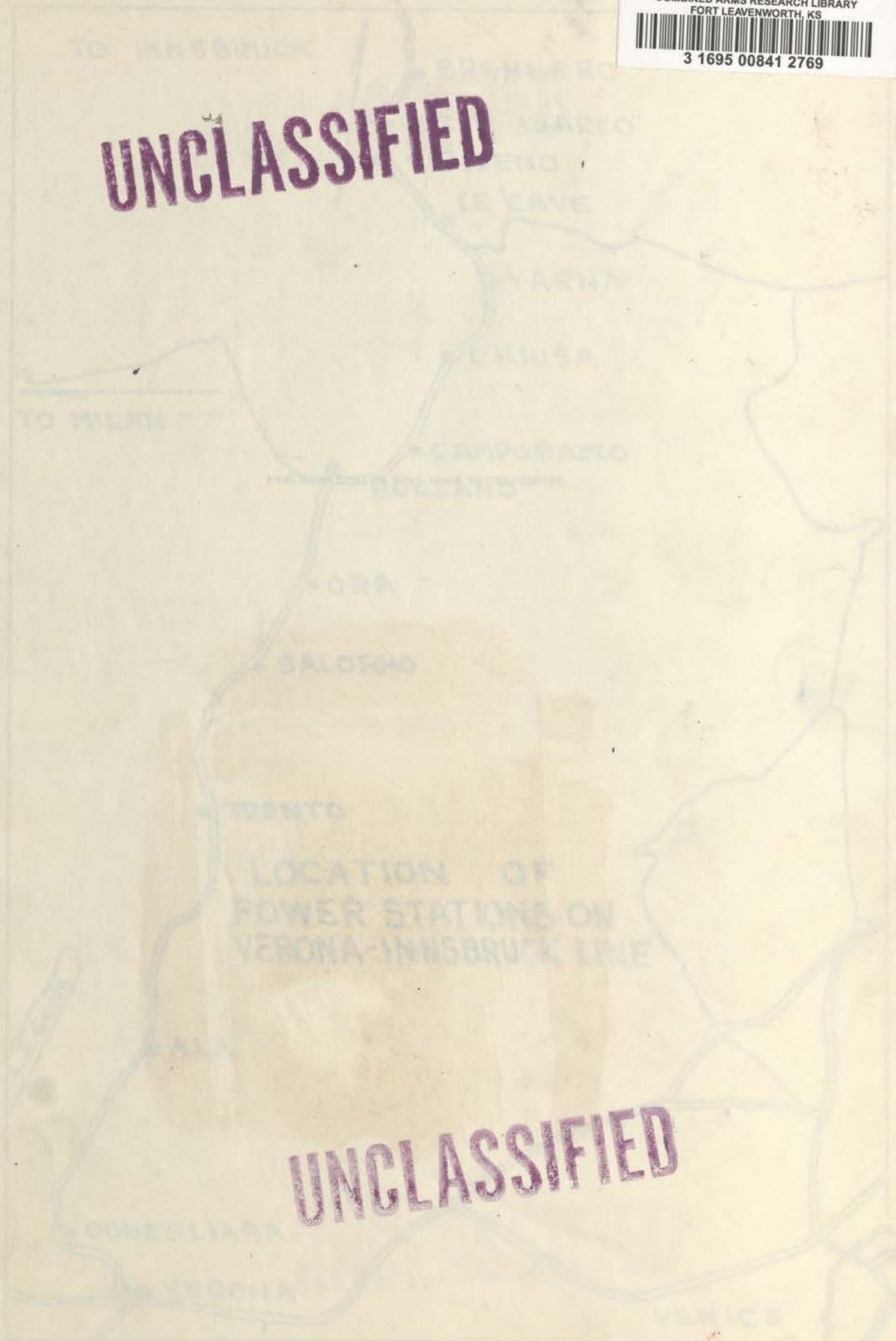
ANNEX C

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