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DIRECT PRODUCTION LOSS

Table 1

Estimates of Industrial Employment and Plant Vulnerability to Fire Spread

Target No.	Identified Priority Plants	Estimated Employment	Vulnerability to Fire Spread
	Shipbuilding and Ship Repair		
90.36-543	Mitsubishi Dockyard	10,000	Moderate
90.36-544	Tategami Shipyard	20,000	Moderate
90.36-860	Kawanami Industry Co. Shipyard 1/	10,000	None
90.36-542	Akunoura Engine Works	10,000	Moderate
90.36-828	Hayashi Commercial Co., Engine Works	2,000	Moderate
	Ordnance		
90.36-546	Mitsubishi Steel and Arms Works	6,000	Slight
90.36-2022	Mitsubishi-Urakami Ordnance Plant	8,000	None
	Machinery, Tools and Instruments		
90.36-829	Mitsubishi Electric Mfg. Co.	4,000	Moderate
	Chemicals and Oil		
90.36-545	Kozaki Point Oil Storages	300	None
90.36-832	Megami Point Oil Storages	100	None
	Transportation, Communication, Wharf Activities		
90.36-1842	Nagasaki & Dejima Wharves and RR Yards	5,000	Moderate
	Unidentified Priority Plants		
	Shipbuilding and Ship Repair		
	Small boat yards	8,000	None
	Chemicals and Oil		
	Small chemical and oil plants	600	High
	Non-Priority Plants		
	Clothing	500	High
	Construction	2,000	High
	Food Products	2,000	High
	Gas and Electricity	1,000	High
	Lumber, Woodenware	2,000	High
	Printing	500	High
	Textiles	500	High
	Other Manufacturing	1,500	High

Production loss of identified priority plants, including transportation and wharf installations, attributable to damage to structures and equipment alone is 71 percent of total loss; of unidentified priority plants 16 percent; and of non-priority plants 65 percent. Of a total production loss of 166,000 man-months 67 percent consists of damage to industrial structures and equipment.

1/ Located south of city, outside of area covered by mosaics.

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Major concentration of loss is against the shipbuilding and ship repair industry which out-ranks all other industry in Nagasaki in importance. The two ordnance plants will incur production loss only through absenteeism; transportation and wharf installations through damage to buildings and equipment; and electrical equipment manufacturing by damage to buildings and equipment, and absenteeism in equal proportions.

The relationship between direct production loss and annual industrial production for Nagasaki is as follows:

Table 2

Direct Production Loss as Proportion of Annual Industrial Production*

Industry	Loss in Months	Production Loss - Percent Annual Prod.
Shipbuilding and Ship Repair	1.8	15
Ordnance	1.0	8
Machinery, Tools, Instruments	2.0	17
Chemicals and Oils	2.4	20
Transportation, Communications, Wharf Activities	2.5	20
AVERAGE	1.7	14
Non-Priority Industry	2.4	20
AVERAGE	1.8	15

* See LEVEL OF DAMAGE for assumptions as to physical damage.

Photographic cover reveals little in the way of barracks adjacent to industrial plants for worker housing. It is probable, therefore, that the bulk of industrial workers are housed in the city proper. Nagasaki has long been an important industrial city in Japan. The war does not appear to have caused any significant change in the city's industry, population, or the residential location of industrial workers.

INDIRECT PRODUCTION LOSS

For purposes of this pre-attack assessment, certain factors are used to indicate the general magnitude of the cost of repair and replacement. This cost is a legitimate addition to direct production loss, as indicated above. The cost of repair and replacement, however, has an impact on final output which is delayed and uncertain in point of time.

The overall cost of repair and replacement of damaged industrial plants is estimated at 195,000 man-months.

The cost of repair and replacement of industrial loss, as estimated above, does not include any allowance for the cost of repair and replacement of (1) buildings, equipment, and stocks of non-priority industries, (2) stocks in warehouses, stores, or in transit, (3) raw material stocks in factories, and (4) damaged and destroyed residential buildings.

The total estimated direct and indirect production loss is 361,000 man-months.

Replacement of industrial equipment and stocks is a task of priority industries. Restoration of building damage is a charge against the construction industry and producers of building materials. Much of this indirect loss will be burden to other areas rather than to industry in Nagasaki.

On the basis of the assumed level of damage, a substantial order of loss is imposed on industrial production in Nagasaki. This loss concentrates against two

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major functions - shipbuilding and transportation. The cost of repair and replacement, although causing an additional strain on Japanese industry, will be diffused. This burden, of itself, should not create a condition of significant industrial unbalance or strain.

ESTIMATED PRODUCTION LOSS FROM A REDUCED LEVEL OF DAMAGE

A reduction in the level of damage by some 50 percent, both to industrial plants and housing (destruction of 50 percent of housing in zones R_1 and R_2) would cause direct production loss to decrease somewhat more than a proportionate amount. As the level of damage is still substantial, the effect of the declining rate of absenteeism is not significant. Direct production loss as a proportion of annual industrial production declines from 1.8 months' loss to .85 months' loss.

TARGETS AND OTHER SIGNIFICANT INSTALLATIONS

SIGNIFICANT INSTALLATIONS

(See _____)

Reference Number	Name	Comment
1	* TARGET 2022 - Mitsubishi-Urakami Ordnance Plant (Mitsubishi-Urakami Heiki Seisakusho)	Branch of Mitsubishi Steel and Arms Works (TARGET 546); unconfirmed production of ship fittings and naval ordnance.
2	Unidentified Industry	
3	Urakami Branch Gas Works	
4	Barracks	
5	Prison	
6	Unidentified Industry	
7	Several small unidentified factories	
8	Medical School & Hospital	Camouflaged, but no other evidence of conversion to other use.
9	Probable Barracks or School	
10	* TARGET 546 - Mitsubishi Steel and Arms Works (Mitsubishi Heiki Seisakusho)	Integrated steel ingot/rolling/casting works, producing ship plate and shapes, as well as naval ordnance (principally torpedoes).
11	Casting Plant of Mitsubishi Steel and Arms Works	Castings for (TARGET 1795 - Mitsubishi Steel Rolling Mill has been cancelled) Mitsubishi Steel and Arms Works (TARGET 546).

* Installations for which Target Information sheets have been completed or are scheduled.

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Reference Number	Name	Comment
12	Mitsubishi Woodworking Plant	Produces wooden fittings and cuts lumber for Nagasaki's shipyards.
13	Steam Power Plant	Small standby plant.
14	Unidentified Small Industry	
15	Unidentified Small Industry	
16	TARGET 828 - Hayashi Commercial Co. Engine Works (Hayashi Kane Shoten KK)	Reported producer of marine engines.
17	(Part of TARGET 1842) - Nagasaki Station and Freight Yard	
18	Kyushu Gas Works	
19	TARGET 1842 - Nagasaki and Dejima Wharves and RR Yards	
20	* TARGET 829 - Mitsubishi Electric Mfg. Co. (Mitsubishi Denki KK)	Produces heavy turbo-generators and other electrical equipment.
21	* TARGET 542 - Akunoura Engine Works (Mitsubishi Jukogyo KK)	Major producer of marine engines, boilers, etc.
22	* TARGET 543 - Mitsubishi Dockyard	Repairs all types of merchant and naval craft.
23	* TARGET 544 - Tategami Shipyard (Mitsubishi Jukogyo KK)	Builds all types of merchant and naval ships.
24	Small Industrial Plant	Reported flour mill and grain storage.
25	TARGET 545 - Kozaki Point Oil Storages	In aggregate, comprises large oil bunkering storage.
26	New Shipyard	Probable producer of small standardized cargo vessels.
27	Small Industrial Plant	Reported chemical plant, products unknown.
28	Small-boat Yard	
29	Barracks and Storage	
30	Small-boat Yards	Build small fishing and patrol craft, lifeboats, etc.
31	Unidentified Industry and Storage	Reported operated by Navy.

* Installations for which Target Information sheets have been completed or are scheduled.

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TARGET INFORMATION SHEET *(Contd.)*

Reference Number	Name	Comment
32	TARGET 832 - Megami Point Oil Storages	Oil storage and unidentified naval storage.
33	Military Barracks and Storehouses	
34	Kamigo Reservoir	
35	Water Filtration Plant	
36	Nishiyama Reservoirs and Filtration Beds	
37	Ogakura Reservoir and Filtration Beds	

NOTE: Schools, public buildings, and small military barracks or stores are not annotated.

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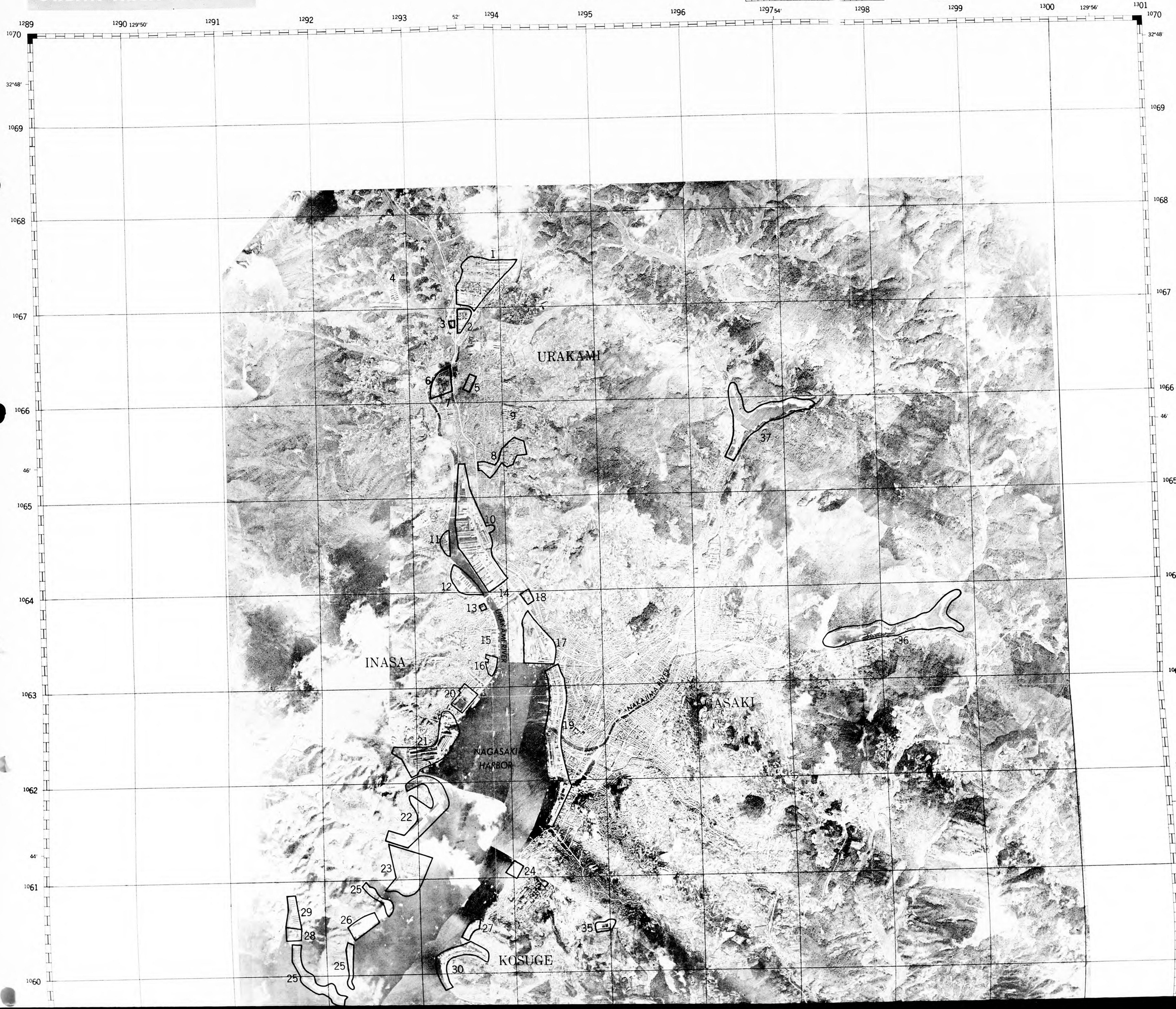
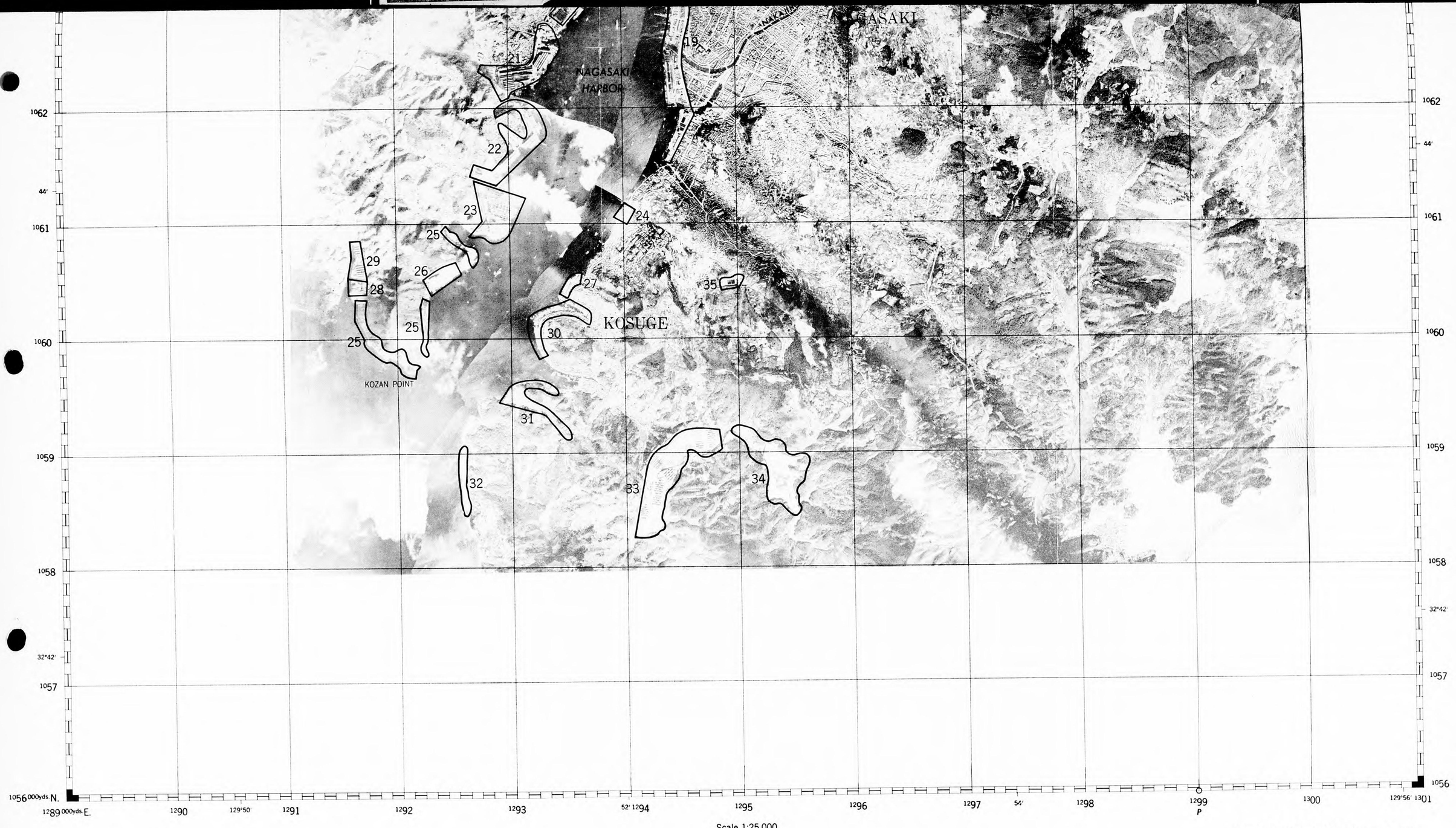
URBAN AREA MOSAIC

CONFIDENTIAL

NAGASAKI

Illustration No. Nagasaki/PA
Issued 21 March, 1945





Scale 1:25,000

1/2 0 1 Mile

500 0 1000 2000 Meters

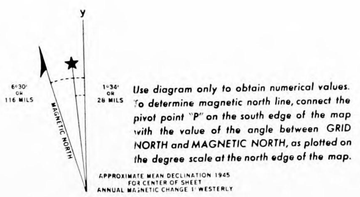
500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIn, ZONE "C"
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

POLYCONIC PROJECTION

Prepared under the direction of the Chief of Engineers by the Army Map Service (AAA), U. S. Army, Washington, D. C. 1945
Mosaic controlled by average fit to best available map source.
Aerial photographs flown by U.S.A.A.F., Oct.-Nov. 1944.
(Sorties) 4MR-9 12 V
4MR-22 24 V

Reliability of grid uncertain due to local minor disagreement between photo map and topographic map



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APPROXIMATE MEAN DECLINATION 1945
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RESTRICTED

NAGASAKI

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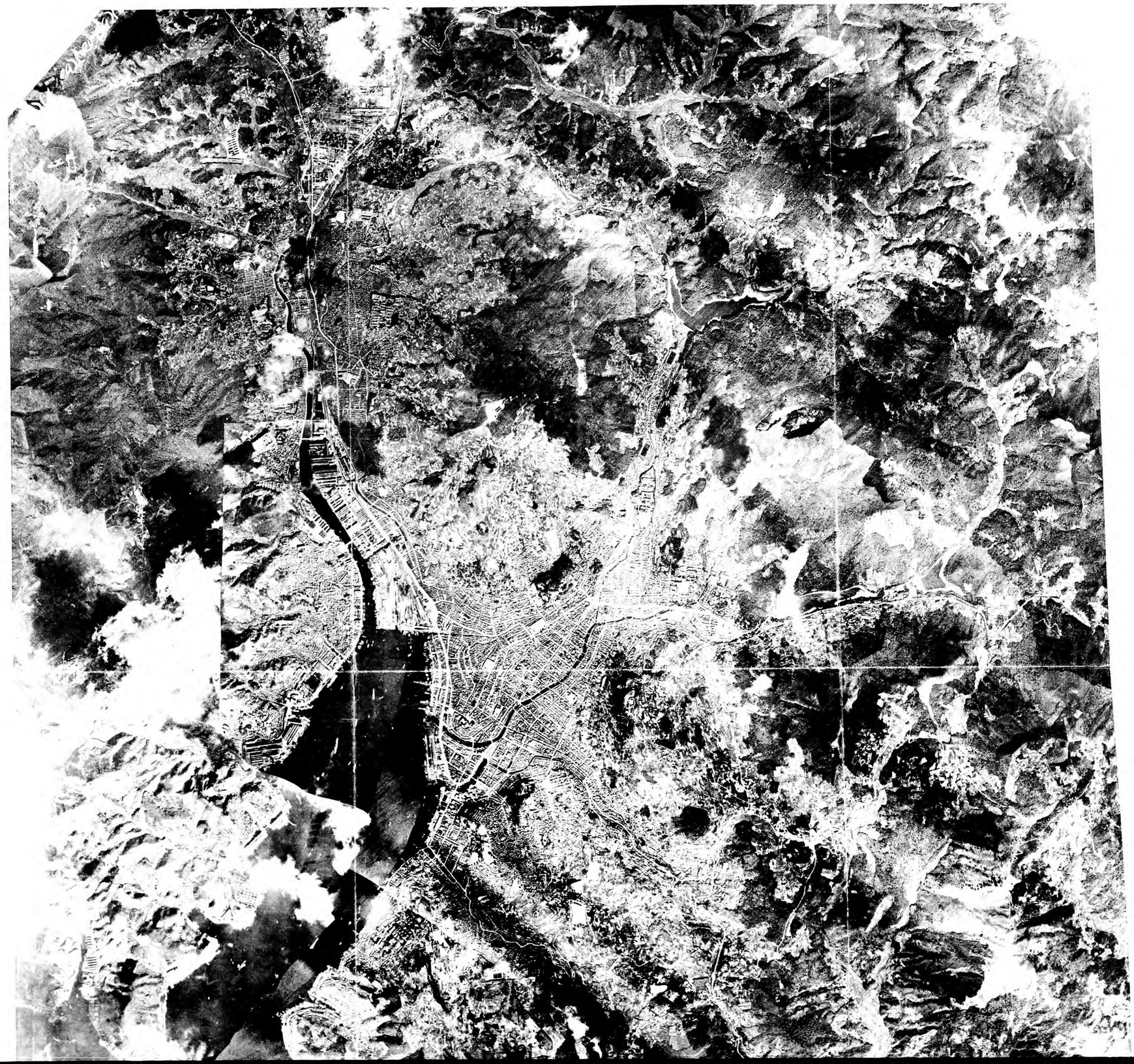
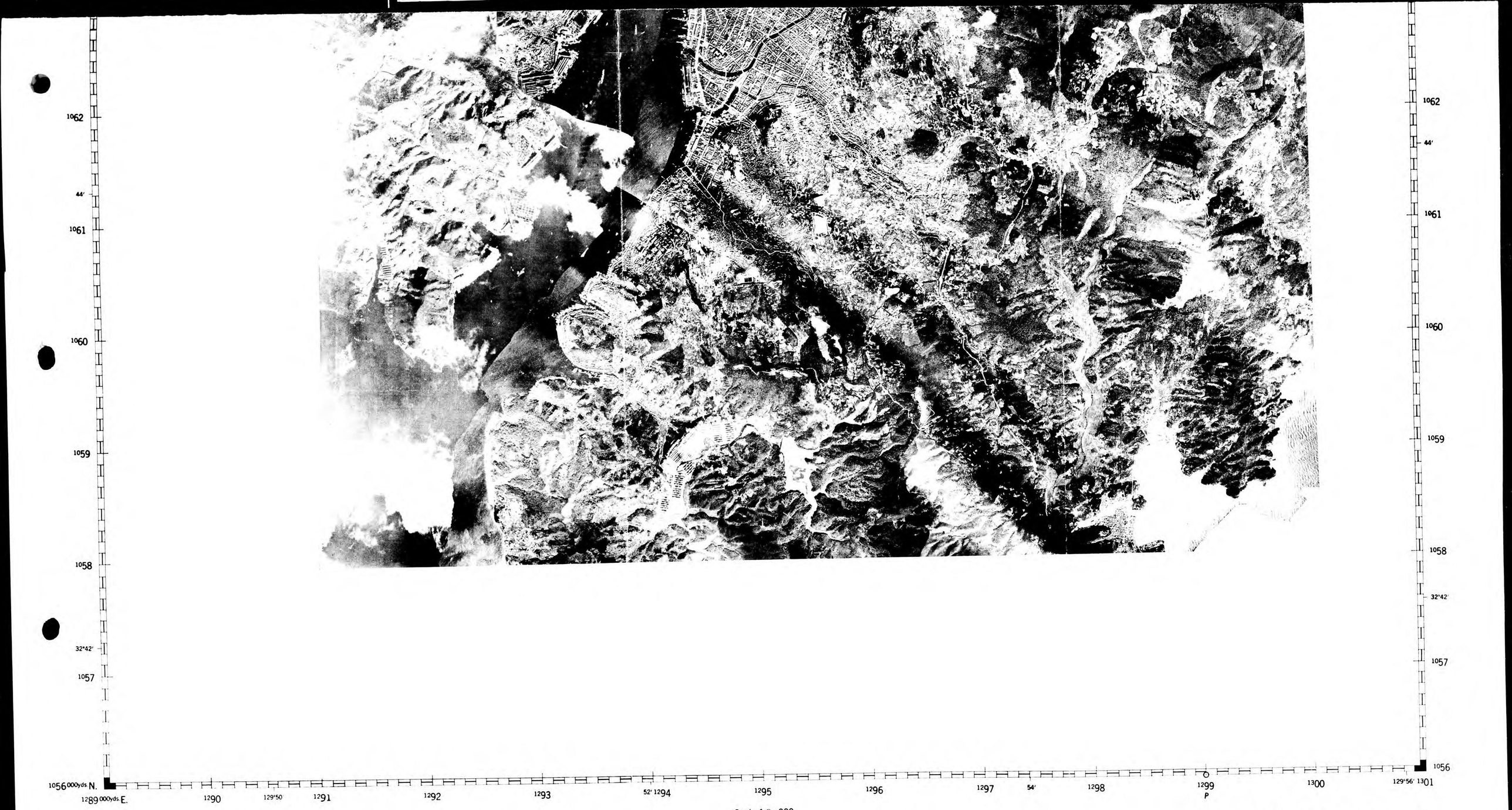
Issued 21 March, 1945





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½ 0 1 Mile

500 0 1000 2000 Meters

500 0 1000 2000 Yards

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POLYCONIC PROJECTION

RESTRICTED

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6°30' OR 116 MILS

1°34' OR 28 MILS

MAGNETIC NORTH

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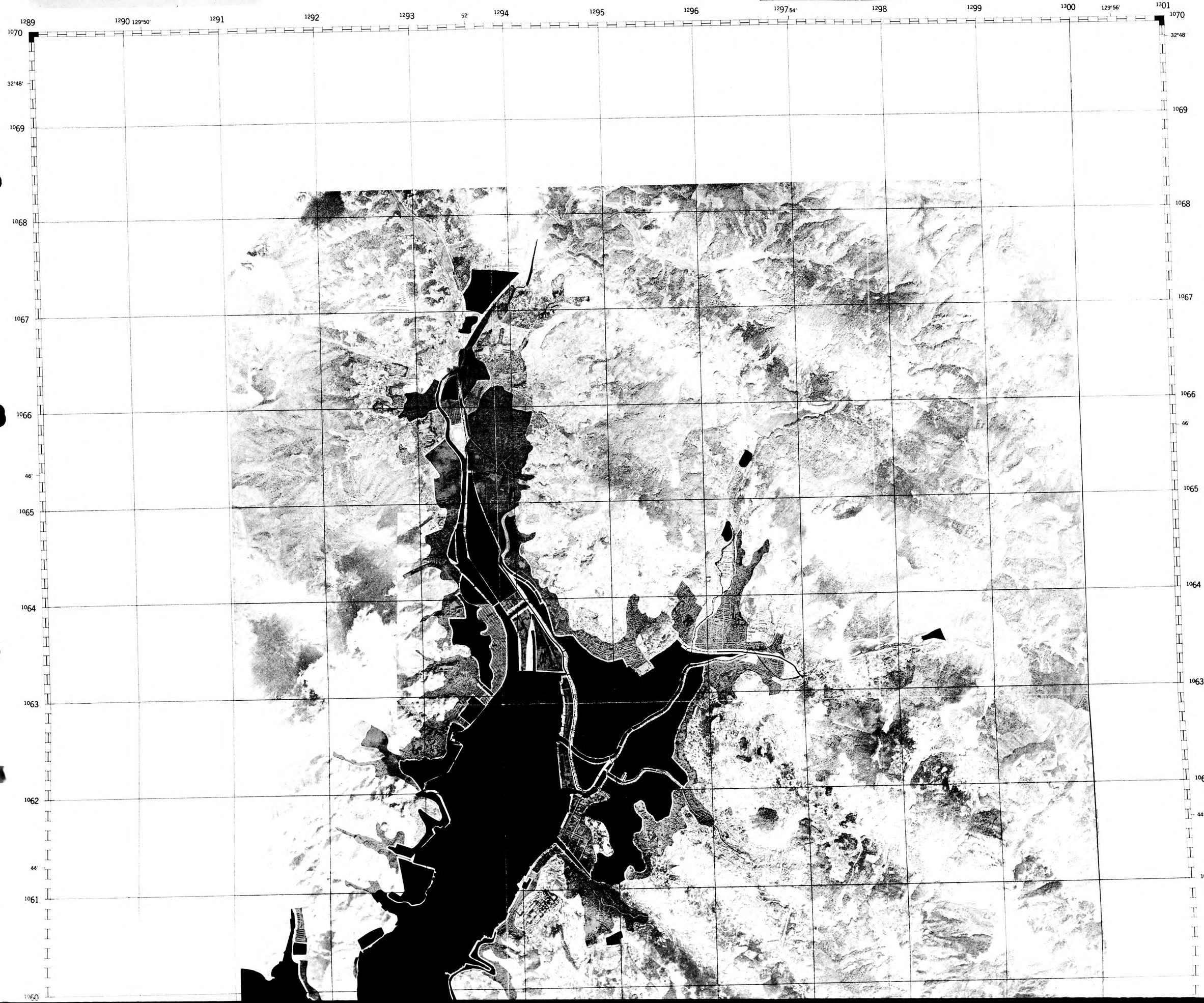

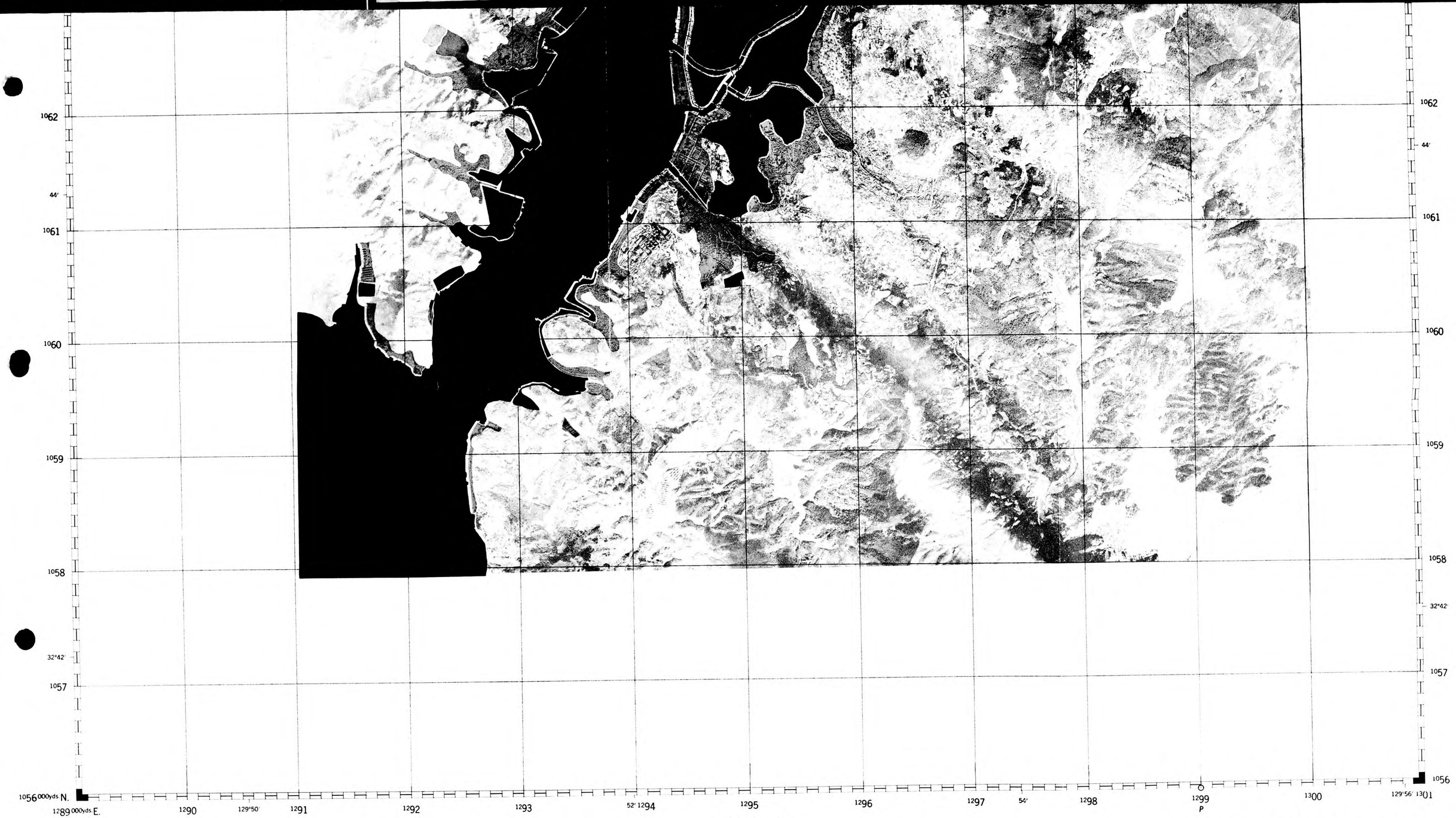

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(Sorties) 4MR 9-12 V
4MR 22-24 V

Reliability of grid uncertain due to local minor disagreement between photo map and topographic map

- RESIDENTIAL (FULLY BUILT UP: 40%
- RESIDENTIAL (MODERATELY BUILT UP: 20%–40%)
- RESIDENTIAL (SPARSELY BUILT UP: 5%–20%)
- MANUFACTURING
- MIXED (INDUSTRIAL AND RESIDENTIAL)
- TRANSPORTATION
- STORAGE
- PRIMARY FIRE BREAK
- SECONDARY FIRE BREAK

½ 0 1 Mile
500 0 1000 2000 Meters
500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIn, ZONE "C"
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED
POLYCONIC PROJECTION

6-30' OR 116 MILS
1-34' OR 26 MILS
MAGNETIC NORTH

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URBAN INFORMATION SHEET

SHEET No. . . . . Nagoya/TI
DATE . . . . . 22 May 1945
PAGE 1

OBJ. AREA 90:20
OBJ. FOLDER No. New Target
CATEGORY . . . . . Mixed Ind. Conc. Urban Area

LAT. . . . . 35° 08′ N
LONG. . . . . 136° 55′ E
ALT. . . . . .

NAGOYA CITY
JAPAN
PRE-ATTACK ASSESSMENT

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other UA Nagoya material.

SIGNIFICANCE

Prefecture capital and a leading industrial city, Nagoya has a population of about 1,400,000. It is a key communications center with a well developed harbor, now largely unused because of Japan's tight shipping position, and an extensive rail network. The city is an important station on the Tokaido Main Line and the terminus of the Kansai (alternate route to Osaka) and Chuo (alternate route to Tokyo) lines.

While smaller in volume and less diversified than that of Tokyo or Osaka, Nagoya's industry is noteworthy for its specialization in military end-products or materials directly associated with such production. With its satellite industrial communities, it ranks among Japan's four primary industrial centers. Nagoya is estimated to account for over 4% of Japan's total industrial employment, with approximately 380,000 industrial workers. Pre-war Nagoya's principal industries were light engineering (machine tools, electrical equipment, bicycles, auto parts, automatic looms, watches and clocks, etc.), textiles, industrial ceramics and foodstuffs as well as aircraft and ground ordnance and railroad equipment. The city is reported to have had about 5000 industrial establishments in 1938, of which the great bulk employed 5 to 30 persons. Many of these small shops participated in a highly developed system of sub-contracting, serving the city's engineering and textile industry.

Post-war conversion and expansion have made the city particularly important as a producer of aircraft engines (approximately 42% of Japan's total) and completed planes (approximately 25% of Japan's total), ground ordnance (5-7%), machine tools (over 7%), light electrical equipment, special steel alloys and industrial chemicals. The satellite industrial communities, such as Yokkaichi, Kagamigahara, Kariya and Koromo, have become important centers for the production of synthetic oil, anti-friction bearings, electrical equipment, autos and trucks and aircraft. While representing in part dispersed war production centers, these communities depend largely on Nagoya for machine tools and components.

The incendiary attacks of March and May 1945 have done extensive damage throughout the city. As of this date photo cover for recent attacks is not yet available and it is not possible to determine the city's current target value. It is believed, however, that further attacks should be directed against the less heavily damaged Urban Industrial Concentrations.

DESCRIPTION AND LAYOUT

Nagoya lies at the head of Ise Bay and on the southern extremity of the Nobi Plain, one of Japan's chief agricultural districts. A wide delta formed by the estuaries of the Kiso, Ibi and Shonai rivers extends southwestward from the city. Agricultural land and low hills extend to the north and east respectively.

The city is low-lying with few buildings exceeding three or four stories in height. Building density is high in the residential/commercial center just south of Nagoya Castle. In general, however, the city's houses are better spaced than are those of Tokyo, Osaka or Kobe and small parks, canals, railroad lines and a few wide streets provide firebreaks. The principal industrial districts are located in the NE, south-central and SE parts of the city. Other industrial districts extend along the SW and NW outskirts.

Incendiary attacks to date have virtually wiped out the central residential/commercial section and have done extensive damage to the industrial/residential districts in the north and south-central parts of the city.

TARGET INFORMATION

Following is a summary of available information concerning industrial plants in Nagoya. The annotated installations shown on the Nagoya/PA mosaics and listed in the table below represent all identifiable factories in the city. The information given under "Description and Product" is pre-attack data and no attempt has been made to indicate damage. Latest available intelligence regarding production has been used, but in many cases the information is of pre-war origin—particularly for the secondary, smaller installations. It is felt that information regarding pre-war production is useful in pointing up the possibilities of war-time conversion.

Nagoya's textile industry has become particularly significant as a source of convertible floorspace for aircraft and ordnance components production. The following summary includes a substantial number of converted mills, information concerning which is generally fragmentary. In the aggregate these plants represent a substantial amount of newly dispersed capacity for components production.

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NAGOYA URBAN AREA

Annotated Installations

Reference No.	Target No.	Name	Pre-attack Description and Product
1	—	Storage area	Military storage.
2	90:20-1691	Takaki Factory, Nagoya Arsenal	One of five plants of Japan's third largest army arsenal. This plant is believed to manufacture ammunition and possibly small arms.
3	90:20- 200	Toriimatsu Factory, Nagoya Arsenal	One of five plants of Japan's third ranking army arsenal. This plant has been reported producing medium tanks and heavy field artillery. At present time may be engaged in repair and modification of heavy ordnance and in production of lighter weapons.
4	90:20-1806	Okuma Iron Works, Kachikawa Plant (Okuma Tekko Sho)	One of secondary plants of leading machine tool producer. Probably working for adjacent Toriimatsu Arsenal (No. 3).
5	—	Probable storage area	Probable military storage.
6	—	Kachikawa Electric Power Sub-station	Large power switching station.
7	—	Unidentified Industry	– – – – –
8	—	Unidentified Industry	– – – – –
9	—	Auto Inspection Station	Municipal auto/truck inspection station and test tracks.
10	—	Unidentified Industry	– – – – –
11	—	Unidentified Industry	– – – – –
12	—	Yatakawa Cotton Mill	Textile plant.
13	90:20-1827	Dai Nippen Cellophane Co.	Reported producer of camouflage materials, anit-gas coverings and aircraft equipment.
14	—	Possible expansion of Target 1146	(See Ref. Number 27).
15	—	3rd Cavalry Post	Barracks and military stores.
16	90:20-2157	Nagoya Aircraft Co. (Nagoya Kokuki KK)	Manufactures gliders; repairs trainer aircraft.
17	—	North Nagoya Gas Works	Branch gas works.
18	90:20-2158	Toyo Cotton Mill (Mitsubishi Aircraft)	Former cotton mill converted to production of engine components for Mitsubishi aircraft
19	90:20-1797	Okuma Iron Works, Kami Iida Cho Plant	One of plants of leading machine tool producer. This plant makes grinding machines.
20	—	Komatsu Silk Mill	Textile plant.
21	—	Unidentified Industry	– – – – –
22	—	Daido Electric Transformer	Transformer station.
23	90:00-2159	Tokyo Muslin Mill (Mitsubishi Aircraft)	Former textile mill, converted to production of engine components for Mitsubishi aircraft.
24	—	Kawakami Silk Mill	Textiles.
25	—	Probable Extension of Target 1146 (Okuma Tekkosho)	Probable boiler plant and/or shops for Okuma Iron Wks., Hagino Plant.
26	90:20-1146	Okuma Iron Works, Hagino Plant (Okuma Tekkosho and Okuma Chuko KK)	Machine tool priority target. Most important plant of company. Produces lathes, milling and grinding machines, and internal borers.
27	—	Castings Plant for Okuma Iron Works (see Ref. No. 26)	Variously reported as Kobe Steel Works or expansion of Okuma Iron Works noted under No. 14. (Unverified POW Reports). Believed to be reported castings plant for Okuma.
28	—	Unidentified Industry	– – – – –

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URBAN INFORMATION SHEET

SHEET No. . . . . **Nagoya/TI**
DATE . . . . . **22 May 1945**
PAGE **3**

Reference No.	Target No.	Name	Pre-attack Description and Product
29	—	Manmo Woolen Mill (Manmo Keori)	Textile mill.
30	90:20-1753	Kobe Steel Works, Nagoya Plant (Kobe Seisakusho)	An important new plant of the Kobe Steel Works; manufactures fuselage parts for Mitsubishi Aircraft (possibly also aircraft engine components, crankshafts, etc.).
31	—	Storage Area	Military storage.
32	—	Paper Products Factory	Reported producer of heavy paper trays and packaging material.
33	—	Asahi Ceramics Factory (Mitsubishi Aircraft)	Former ceramics factory converted to production of fuselage parts by Mitsubishi Aircraft.
33A	—	Owari Clock Factory (Owari Tokei)	Variously reported producing clocks or sparkplugs.
33B	—	Nagoya Pottery Works (Nagoya Seito)	Ceramics.
34	—	Saji Pottery Works (Saji Seito)	Ceramics and tiles.
35	—	Industrial District	Mixed industrial/residential district with small shops producing and selling glass products, farm tools, clocks, textiles, hand printing presses, low-grade ball bearings.
36	—	Hara Silk Mill	Textiles.
37	—	Unidentified Industry	– – – – –
38	90:20-193	Mitsubishi Aircraft Engine Works (Mitsubishi Hatsudoki)	Prior to attack one of two largest Jap producers of combat aero-engines, manufacturing both Army and Navy types. Probably turns out more than 1600 operational engines per month, or 40% of Jap total. Both the older types under 1500 HP engines made here. Plant has not yet reached maximum production.
39	—	Nagoya Filtering Plant	Water filtering plant.
40	—	Unidentified Industry	Probably aircraft engine components.
41	—	Inagaki Bicycle Factory (Inagaki Nitsukeru)	Bicycles.
42	—	Kondo Silk Mill	Textiles. Plant reported disbanded. Probably converted.
43	90:20-254	Mitsubishi Electric Mfg. Co., Ltd. (Mitsubishi Denki)	Leading producer of machine tools and light electrical equipment. Machine tools: turret lathes, horizontal grinders. Electrical equipment: small motors and generators, ground radios, aircraft indicating instruments.
44	—	Ozone RR Station	Passenger and freight station.
45	90:20-461	Okuma Iron Works, Ltd., Ozone Plant (Okuma Tekkosho)	Reported making parts for other machine tool plants of this company.
45A	—	Industrial District	Mixed industrial/residential district including (in addition to Ref. 45—Target 461) a number of small shops producing electrical appliances and fixtures, bicycle parts and ceramics.
46	—	Unidentified Industry	– – – – –
47	—	Industrial District	Mixed industrial/residential district with many small shops producing ceramics, electrical fixtures, glassware, tiles, paper products, building hardware, clocks and miscellaneous metal products.
48	—	Hiramatsu Glass Works	Glass products including chemical plant equipment.
49	—	Industrial District	Mixed industrial/residential district with many small shops producing building hardware and electrical fixtures, glassware, and miscellaneous metal products.
50	—	Power Sub-station	Small transformer station.
51	—	Nagoya Army H.Q.	Divisional H.Q. with numerous barracks and storage sheds.
52	—	Nagoya Water Works	Principal reservoirs of city's water system (reservoirs are covered).
53	90:20-196	Chigusa Factory, Nagoya Arsenal	Second or third most important of 5 plants forming the Nagoya Arsenal, Japan's third most important army arsenal. The Chigusa Factory is believed to specialize in manufacture of ammunition components and in fabrication and repair of medium ordnance, including AA guns. Plant also contains small-scale ammunition loading facilities and a storage area for finished munitions. Former pottery plant in NW corner of compound, now producing machine guns and rifles.
54	—	Industrial District	Mixed industrial/residential district containing small shops and a few sizeable factories producing machinery and simple machine tools, metal shafts and other metal products, ceramics and textiles.

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Reference No.	Target No.	Name	Pre-attack Description and Product
55	—	Industrial District	Mixed industrial/residential district containing small shops and a few sizeable factories producing machine tools, pumps, textiles and other machinery and ceramics.
56	—	Industrial District	Mixed industrial/residential district containing small shops producing textile machinery, electrical and other household fixtures, clocks, small electrical appliances and wooden household furnishings.
57	—	Fukagawa Iron Works (Fukagawa Tekkosho)	Machinery and machine tool parts.
57A	90:20-1147	Okuma Iron Works, Nunoike Plant (Okuma Tekkosho)	Secondary plant of leading machine tool producer. Makes lathes.
58	—	Industrial/Commerical District	Mixed industrial/commercial district containing many wholesale distributors and small shops handling wide variety of consumer durables. District also includes most of city's principal government offices.
59	—	Nagoya City Hall	City government center.
60	—	Prefecture Hall	Aichi prefecture government center.
61	—	Tashiro Reservoir	New water reservoir under construction.
62	—	Kureha Textile Mill (Chigusa Arsenal)	Former textile plant converted to shell factory by Chigusa Factory of Nagoya Arsenal (see Ref. No. 53 above).
63	—	Ozeki Woolen Mill (Ozeki Keori)	Textiles.
64	—	Industrial District	Mixed industrial/residential district containing small shops producing textile machinery, clocks, rubber products and auto parts.
65	—	Toto Hospital	Hospital (not an industrial plant as previously reported).
66	—	Chigusa RR Station	Local freight station.
67	—	Aichi Bussan Mill (Aichi Bussan Gumi)	Weaving and dyeing plant.
68	—	Dai Nippon Brewery	Brewery.
69	—	Industrial District	Mixed industrial/residential district containing a large number of small shops and several sizable factories producing small boat propellers, precision machinery, binoculars, fireproof doors, tin cans, and a varlety of consumer goods.
70	—	Unidentified Industry	- - - - -
71	—	Nagoya Prison	- - - - -
72	—	Technical College	Technical College and Government research laboratory under supervision of Nagoya Arsenal.
73	—	Chukyo Commercial School	Business college.
74	—	Medical School and Hospital	- - - - -
75	—	Riken Optical Goods (Riken Kogaku Kogyo)	Precision optical equipment and cameras.
76	—	Industrial District	Mixed industrial/residential district including many small shops and several sizable factories producing plumbing equipment, hand tools, boilers, precision measuring tools, hand pumps, bearings, light electrical equipment, pins and needles, household metal hardware and other furnishings.
77	—	Industrial District	Mixed industrial/residential district including small shops producing small-boat engines and propellers, light electrical equipment, paper products and household utensils.
78	—	Industrial District	Mixed industrial/residential district including many small to medium size factories producing ordnance and aircraft parts, machinery and machine tools, screws, bicycles, matches, leather products and textiles.
79	—	Storage Area	Probable military storage area.
80	—	Industrial District	Mixed industrial/residential district including small shops producing textile machinery, tiles, bicycles, clocks, auto parts and rubber products.
81	—	Kubota Machinery Co. (Kubota Seisakusho)	Small precision machinery works reported producing tools and munitions.
82	90:20-242	Okamoto Aircraft Works, Showa Plant (Okamoto Kokuki)	Secondary plant of large aircraft parts concern. This plant reported specializing in landing gear.

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Reference No.	Target No.	Name	Pre-attack Description and Product
83	—	Probable Okamoto Aircraft Works, Showa Plant	Probable expansion of Target 242 (above).
84	90:20-1823	Tokai Electrode Co., Nagoya No. 1 Plant (Tokai Denkyoku Seizo)	Produces electrodes; supplies Daido Steel plants in Nagoya.
85	—	Nippon Chemical Plant (Nippon Rikwa Kogyo)	Oxygen producing and bottling works; also produces other chemicals.
86	—	Toho Gas Works	Nagoya's principal gas works, with small chemical and possibly very small oil by-products plant. Target 90:20-456—Toho Gas Works Synthetic Oil Plant, formerly spotted here, now known to be located in SW Nagoya (see Ref. No. 177).
87	—	Nogami Loom Works (Nogami Jido Shokki)	Foundry, castings and machining plant, producing automatic looms for textile industry.
88	—	Fujita Iron Works (Fujita Tekkosho)	Small plant producing second grade lathes and gear shapers.
89	—	Kubota Machinery Co. (Kubota Seisakusho)	Large precision machinery works, reported producing machine tools and munitions.
90	—	Koa Textile Mill (Toyowa Heavy Industry)	Former textile plant converted to production of aircraft parts by Toyowa Heavy Industry. (Also reported as Kobayashi Seisakusho, producing hydraulic equipment for aircraft).
91	90:20-2117	Shinogawa Mfg. Co., Nagoya Plant (Shinogawa Seisakusho)	Small plant producing air craft indicating instruments.
92	—	Industrial District	Mixed industrial/residential district containing numerous small shops producing simple tools, textile machinery, bicycles, hardware and paper products.
93	—	Industrial District	Mixed industrial/residential district containing small shops producing magnetos, simple tools, auto parts, household utensils and various metal products.
94	—	Government Warehouses	Government tobacco storage.
95	—	Toyo Textile Mill	Textile plant; conversion to war production reported, but considered doubtful.
96	—	Industrial District	Mixed industrial/residential district containing several small factories and many shops producing small pumps, household hardware, carpenters' tools, textile machinery, furniture, small leather belting, and sheet metal products.
97	90:20-1809	Hokoku Machinery Co., Atsuta Plant (Hikoku Kikai Kogyo)	Medium size plant of concern which specializes in aircraft machine tools. This plant reported to produce munitions.
98	—	Industrial District	Mixed industrial/residential district containing many small shops producing plywood, household hardware and electrical fixtures, bicycle parts, small metal containers and miscellaneous metal products.
99	—	Nagoya Textile Mill (also known as Nitta Textile Mill)	Cotton textile plant, reported operated by ANRYU Wireless Co.
100	—	Industrial District	Mixed industrial/residential district containing several sizable factories and numerous small shops producing aircraft parts, gunny sacks, tin cans, metal shafts, etc.
101	—	Goto Woodworking Plant (Goto Gohan) and Goshi Metal Works (Goshi Kaisha)	Two plants reported on this site, producing wood veneers and sheet metal products.
102	—	Power Sub-station	Local power transformer station.
103	—	Industrial District	Group of unidentified small factories, probably producing textile machinery, small hand pumps and wooden products.
104	—	Industrial District	Group of small factories reported producing small machine tools and wooden products.
105	—	Municipal Garbage Incinerator	– – – – –
106	—	Unidentified Plant	– – – – –
107	—	Hatta Oil Storage	Small local oil and gasoline storage and distribution center.
108	—	Hospital	– – – – –
109	—	Industrial District	Mixed industrial/residential district including a large number of small to medium size factories and small shops (in addition to the specifically annotated installations). Among the products manufactured are castings and miscelloneous machined metal products, glass products, cardboard boxes, etc.

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Reference No.	Target No.	Name	Pre-attack Description and Product
110	—	Chukyo Machinery Works (Chukyo Kikai Seisosho)	Reported producing aircraft parts.
111	—	Unidentified Industry	– – – – –
112	90:20-1171	Nippon Insulator Co. (Nippon Gaisha Kaisha)	One of Japan's leading producers of all types of electrical insulators. Also produces sparkplugs and various industrial ceramics.
113	90:20-199	Aichi Aircraft Works, Mizuho Branch (Aichi Tokei Denki)	Parts factory of Aichi Aircraft, producing tail sections and other parts.
114	—	Industrial District	Group of small factories producing simple tools, boilers and oil drums, metal shafts and textile machinery.
115	90:20-197	Atsuta Factory, Nagoya Arsenal	Main factory of Japan's third most important Army arsenal, believed to specialize in manufacture of medium to heavy field artillery. Also produces heavy AA guns, flexible aircraft guns and shell cases. Reported production of aircraft components believed largely discontinued.
116	—	Fujita Loom Works (Fujita Seisakusho)	Former automatic loom works, now producing gear shapers and lathes, reported supplying Nagoya Arsenal.
117	—	Industrial District	Mixed industrial/residential district containing (in addition to annotated installations) a number of small shops producing textile machinery, boilers, brushes, auto parts, etc.
118	—	Toyo Textiles, Owari Plant (Mitsubishi Aircraft)	Former textile plant converted to production of aircraft parts by Mitsubishi Aircraft (probably engine components).
119	—	Woodworking Plant	Largest of several woodworking and veneer plants located near mill pond (to south).
120	—	Sugimoto Iron Works (Sugimoto Tekkosho)	Fabricates sections for oil tanks and boilers.
121	—	Nittei Bicycle Works (Nittei Kogyo Kaisha), and Tanaka Woodworking Plant	Two plants reported at this site, producing bicycle frames and veneer board.
122	—	Sakai Glass Works (Sakai Garasu Seizosho)	Plate glass.
123	—	Unidentified Factory	– – – – –
124	—	Unidentified Storage	– – – – –
125	—	Hospital	– – – – –
126	—	Nihon Vehicle Mfg. Co., Branch Plant (Nippon Sharyo)	Branch plant of Target 241—Nihon Vehicle Mfg. Co., (see Ref. No. 127) probably producing ordnance parts.
127	90:20-241	Nippon Vehicle Manufacturing Co. (Nippon Sharyo)	Important pre-war producer of RR rolling stock, reported partly converted to production of armored cars, tanks and gun mounts, but direct evidence is lacking. Reported affiliated with Atsuta Arsenal (Target 90:20-197).
128	—	Atsuta RR Station	Important local freight siding for complex of armament and aircraft industries in central Nagoya.
129	—	Industrial District	Group of small to medium size factories producing plywood, wooden products and textiles.
130	90:20-2160	Toyoda Automobile Co., Nagoya Plant. (Toyoda Jidosha Kogyo)	Probable producer of auto and truck parts (possibly bodies) and large auto repair center.
131	—	Takigawa Iron Works (Takigawa Tekkosho)	Produces water tanks and boilers.
132	—	Industrial District	Group of small plants producing cutlery, boilers, hack saws, bicycle tires and tubes.
133	—	Textile Machinery Works	Reported producing parts for looms.
134	—	Chuo Roller Works (Chuo Chinrora)	Large metal rollers.
135	—	Gomei and Kinzokuhin Tool Works	Two small plants producing hand-operated tools.
136	—	Usami Bicycle Factory	Produces bicycles.
137	—	Nitta Plywood Works	Plywood products.
138	—	Kubota Machinery Works, Nakagawa Plant (Kubota Seisakusho)	Small machinery plant reported producing tools and munitions.

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Reference No.	Target No.	Name	Pre-attack Description and Product
139	—	Unidentified Factory	– – – – –
140	—	Unidentified Factory	– – – – –
141	—	Nagoya Aluminum Mfg. Co.	Aluminum utensils.
142	—	Tokyo Shearing Co.	Textile machinery.
143	—	Higashiyama Machinery Co. (Higashiyama Mukkojo)	Sizable textile machinery works.
144	—	Mihuzo Transformer Station	Large local transformer station.
145	—	Industrial District	Mixed industrial/residential district containing a number of small plants producing sewing machines, textile machinery, castings and simple tools.
146	—	Hattori Textile Mill	Large textile plant. No information available to indicate that plant has been converted.
147	—	Unidentified Storage	Former site of cement plant, now probable storage sheds.
148	—	Higuchi Machinery Co. (Higuchi Seisakusho)	Sizable plant producing agricultural machinery and farm tools.
149	90:20-247B	Daido Electric Steel, Atsuta Plant (Daido Seiki)	Third smallest of five Nagoya plants of Japan's largest electric and alloy steel concern. This plant has an estimated annual capacity of 35,000 tons of steel and 6,000 tons of castings; also manufactures electric furnaces.
149A	—	Atsuta Steam Power Plant	10,000 KW standby station; supplies Target 247B (see Ref. No. 149 above).
150	—	Industrial District	Mixed industrial/residential district including a number of small plants producing lighters and other small boats, textiles, and metal hardware.
151	90:20-1798	Osaka Machinery Plant (Osaka Kikai Seisakusho)	Former producer of oil drilling and pumping equipment, now reported producing machine tools, aircraft and ordnance parts.
152	—	Lumber Mill	Supplies boatyards adjoining to south. (See Ref. No. 173).
153	90:20-198	Aichi Ordnance Plant (Aichi Tokei Denki) (formerly designated as Aichi Aircraft Works, Atsuta Plant)	Former naval ordnance and aircraft assembly and engine works of Aichi Aircraft, this plant is now reported concentrating on the production of components for torpedoes and shells, magnetic mines, directors for 120 mm. dual purpose AA guns and other electrical components for ordnance. Current production of aircraft parts here is uncertain.
154	90:20-2010	Aichi Aircraft Engine Works, Nagoya Plant (Aichi Tokei Denki)	Aero-engine works of Aichi Aircraft, producing 1200 HP "Atsuta" engines for JUDY and SEIREN. Shop and assembly type structures extending along canal to west of broken line may be part of this plant, but information is lacking regarding their function.
155	—	Aichi Chemical Works (Aichi Kokaku Kogyo)	Reported chemicals plant. Unconfirmed report of drugs production.
156	—	Industrial District	Group of small factories manufacturing air compressors, drills and textile machinery.
157	—	Sumitomo Light Metals Mfg. Co. (Sumitomo Keikinzoku)	Sizable plant reported producing dural plates, rivets and other aircraft parts for Mitsubishi Aircraft.
157A	—	Teikoku Factory (Teikoku Seibyo)	Small plant, manufacturing frames and bodies for three-wheeled motor delivery cars; now reported producing small motorized pumpers and unspecified munitions components.
158	90:20-1831	Hirano Loom Works, Nakagawa Plant (KK Hirano Seisakusho)	Former textile machinery producer, now reported producing shells for Model 38 field artillery guns.
159	—	Industrial District	Group of small plants reported producing mining machinery and farm tools.
160	—	Ishida Iron Works (Ishida Tekkosho)	Manufactures hand pumps.
161	—	Takasago Iron Works (Takasago Tekkosho)	Manufactures hand pumps.
162	—	Unidentified Industry	New factory, products unknown. Possible producer of aircraft or armament parts.
163	—	Transformer Station	Local power transformer station.
164	90:20-2161	Kondo Cotton Mill (Kondo Boseki) (Okamoto Aircraft)	Sizable cotton textile plant. Addition of small shop and storage type buildings to N and W of main plant confirms reported conversion to landing gear and other parts for Okamoto Aircraft.
165	—	Cotton Mill (Probable Chugai Boseki)	Sizable cotton mill. New shop-type buildings suggest probable conversion; reported producing aircraft parts.
166	—	Industrial District	Group of small factories including a reported "Mizuho Branch" of Mitsubishi Aircraft and a textile machinery plant.

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Reference No.	Target No.	Name	Pre-attack Description and Product
167	—	Yoshido Iron Works (Yoshido Tekkosho)	Reported producer of small-arms ammunition.
168	—	Industrial District	Mixed industrial/residential district including small factories manufacturing rock drills, textile machinery and miscellaneous metal products.
169	—	Kinjo Drill Works (Kinjo Sakuganki)	Large plant producing drills.
170	—	Industrial District	Mixed industrial/residential district including small factories producing clocks, oil burners and metal hardware.
171	—	Unidentified Industry	Possible electric clock and instruments plant.
172	—	Glass Factory	Glass products.
173	—	Small Boatyards	Group of small-boat and lighter building and repair yards.
174	90:20-2040	Sumitomo Duralumin Mill, Nagoya Plant (Sumitomo Kinzoku)	Large dural sheet rolling mill and aircraft parts plant, supplying principally Mitsubishi Aircraft. Believed to be the rolling mill which was to have been constructed at Kuwana (former Target 90:20-1639, which is now Cancelled).
175	—	Unidentified Industry and Storage	– – – – –
176	—	Probable Toho Chemical Plant	Reported branch "chemical" works of Toho Co. (See Ref. No. 177 below). POW reports plant as "closely guarded".
177	90:20-456	Toho Gas Works Synthetic Oil Plant	Probable hydrogenation of L.T.C. tar type of plant with an estimated annual capacity of 200,000 bbls.
178	—	Nippon Aircraft Machinery Co. (Nippon Kokuki)	Sizable producer of aircraft parts and possibly also machine tools.
179	—	Unidentified Industry	– – – – –
180	—	Araya Works (Araya Kogyo)	Reported producer of bicycles and machinery.
181	90:20-1825	Tokai Electrode Co. Nagoya No. 3 Plant (Tokai Denkyoku Seizo)	Produces synthetic graphite for electrodes.
182	90:20-1824	Tokai Electrode Co., Nagoya No. 2 Plant (Tokai Denkyoku Seizo)	Largest of company's electrode plants in Nagoya.
183	90:20-2162	Nisshin Textile Mill (Mitsubishi Aircraft)	Medium size textile plant with additional shop and storage type structures to N suggesting conversion. Reported operated by Mitsubishi Aircraft.
183A	90:20-1825	Tokai Electrode Co., Nagoya No. 3 Plant (Tokai Denkyoku)	Produces synthetic graphite for other plants of Co.
184	—	Transformer Station	Local power transformer station.
185	—	Woodworking Plant	– – – – –
186	—	Plywood Plant	– – – – –
187	—	Unidentified Industry	– – – – –
188	—	Imperial Bolt Factory	Produces nuts and bolts for Nagoya industries.
189	—	Unidentified Industry and Storage	– – – – –
190	—	Nagoya Harbor RR Station	Rail siding serving Nagoya Harbor; also equipped with gantry crane for handling trans-shipment from Naka Canal barges.
191	—	Naka Canal Locks	Tidal gate and locks for Naka Canal.
192	—	Kawada Animal Food Co. (Kawada Shiro)	Produces and distributes poultry and cattle feed.
193	—	Unidentified Industry	New Plant, still under construction in March, 1945.
194	—	Transformer Station	Local power transformer station.
195	—	Unidentified Industry	– – – – –
196	—	Toyo Radiator Works (Toyo Seisakusho)	Produces radiators for Toyoda Automobile Co.; also reported producing radiators for aircraft engines.
197	—	Takano Machinery Co. (Takano Seimitsu Kogyo)	Reported producing precision components for armament and aircraft.

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Reference No.	Target No.	Name	Pre-attack Description and Product
198	90:20-1129	Okamoto Aircraft Works, Kasadera Plant (Okamoto Kokuki)	Large aircraft parts plant producing landing gear, fuel equipment and probably variety of other parts. Supplies several aircraft plants outside Nagoya as well as Mitsubishi in city.
199	—	Araya Industry (Araya Kogyo)	Former producer of auto and bicycle parts, now producing aircraft parts. Compound probably also includes small nut and bolt factory.
200	90:20-1799	Hokoku Machinery Co., Kasadera Plant (Hokoku Kikai Kogyo)	Important machine tool plant; supplies Nagoya aircraft factories with heavy milling machines and slotters. Compound probably also includes small branch plant of same concern reported producing aircraft components.
201	—	Beimatsu Woodworking Plants	Manufacture plywood fittings for aircraft, including flaps, wing tips, pilot seats, etc. (Compound includes 3 plywood plants.)
202	90:20-247C	Daido Electric Steel, Tsukiji Plant (Daido Seiko)	Second largest of Nagoya plants of leading special steel producer. This plant has an estimated annual capacity of about 36,000 tons of electric steel and 136,000 tons of open-hearth steel. Also produces springs, forgings and castings.
203	90:20-1829	Yahagi Steel Works (Yahagi Seitetsu)	Sizable electric steel producer. Present location doubtful, but former location near Target 90:20-255 (see Ref. No. 277 below) now believed to be incorrect.
204	—	Unidentified Storage	- - - - -
205	—	Nippon Flour Mill	Large flour mill and storage.
206	—	Industrial District	Group of food processing, storage and distributing establishments.
207	—	Tokai Soda Co. (Tokai Kogyo)	Small chemical plant producing soda.
208	90:20-1828	Aichi Aircraft Works, Tsukiji Plant	Small group of engine test cells and shops for Aichi Aircraft.
209	—	Kato Iron Works (Kato Tekkosho)	Small plant producing water tanks and other sheet metal products.
210	—	Probable Woodworking Plant	- - - - -
211	—	Daido Electric Steel, Takarao Plant (Daido Seiko)	Probably casts and machines aircraft and ordnance parts.
212	90:20-194	Mitsubishi Aircraft Works, Nagoya Airframe Plant (Mitsubishi Jukogyo, Nagoya Kokuki)	Prior to attack principal assembly plant of one of Japan's two leading aircraft concerns. Plant has produced a large proportion of newest combat types (fighters, bombers and reconnaissance) for both Army and Navy.
213	90:20-1818	Tokushu Light Metals Co., Atsuta Plant (Tokushu Kei Gokin KK)	Produces castings for adjacent Mitsubishi Aircraft (see Ref. No. 212).
214	90:20-195	Nagoya Steam Power Plant #1.	Nagoya's second largest steam power plant and fourth largest in Central Honshu power network. 144,000 KW capacity.
215	—	Rice Storage	Government rice warehouses.
216	90:20-251	Nagoya Harbor	Storehouses and trans-shipment facilities for Nagoya Harbor. Current importance greatly reduced as result of tight shipping position.
217	90:20-253	Nissan Chemical Plant (Nissan Kagaku Kogyo)	Formerly produced about 25,000 tons of contact sulphuric acid annually; now reported producing nitric acid and other chemicals for explosives.
218	—	Showa Chemical Co. (Showa Kogyo)	Reported producing aluminum sulphate.
219	90:20-1598	Nagoya #2 Steam Power Plant	Largest steam plant in Nagoya and third largest of 5 principal plants in Central Honshu power network. 159,000 KW capacity.
220	—	Washino Machinery Co. (Washino Seiki Shoji)	Former Narumi Seiki Seisakusho, now controlled by Washino concern, which produces machine tools.
221	90:20-247D	Daido Electric Steel, Minami Plant (Daido Seiko)	Largest of five Nagoya plants of Japan's leading electric steel concern. This plant is the company's principal steel producer, but it probably has a sizable capacity for intermediate products as well.
222	90:20-247A	Daido Electric Steel, Oe Plant (Daido Seiko)	Believed to be the correct location of the Oe Plant, formerly reported located on some compound with Target 90:20-194. This is probably a casting and forging plant, producing aircraft parts for Mitsubishi Aircraft.
223	—	Mitsubishi Aircraft, Oe Plant (Mitsubishi Jukogyo)	Probable site of Mitsubishi's reported Oe Plant, producing airframe parts. (Identification is doubtful).
224	90:20-467	Showa Soda Plant	Reported one of Japan's largest chlorine producers, also produces caustic soda, oxygen and hydrogen.

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225	90:20-1800	Daido Machinery Co., Showa Plant (Daido Kikai Seisakusho)	Reported main plant of secondary machine tool concern, which produces lathes and drilling machines; may also manufacture aero-engine starting equipment and do machining of crankshafts.
226	90:20-2163	Nagoya Yard of Uraga Dock Co. (Nagoya Zosen)	Sizable shipyard, with four shipways (capable of building steel ships up to 4-5,000 tons) and two graving docks. Reported manufacturing marine engines.
227	90:20-255	Yahagi Electro Chemical Plant (Yahagi Suiryoku)	One of Japan's large nitrogen works, produces substantial amounts of nitrogen, nitric acid, ammonium sulphate, and sulphuric acid.
228	—	Unidentified Open Storage	Possible military storage.
229	—	Kinjo Machinery Co. (Kinjo Kogyo KK)	Possible site of Kinjo plant producing machinery and tools
230	90:20-1729	Aichi Aircraft Works, Eitoku Plant (Aichi Kokuki)	Largest Aichi plant, believed to manufacture major frame parts and assemble all Aichi aircraft (principally JUDY).
231	—	Nippon Vehicle Mfg. Co. Narumi Plant (Nippon Sharyo Seizo)	Narumi branch of Target 90:20-241. Reported as the "tool" plant of the concern, but appears also to do some repairs to electric locomotives.
232	—	Unidentified Plant	– – – – –
233	—	Unidentified Plant	– – – – –
234	—	Unidentified Tanks	Group of partly buried tanks; probably not oil tanks.
235	—	Oji Paper Pulp Mill	Medium size pulp mill, large mill pond to south.
236	—	Nagoya Cardboard Box Works (Nagoya Gohan)	Manufactures cardboard boxes and other packaging materials.
237	90:20-2152	Nagoya Breakwater Tank Farm	Several medium size and a number of small oil tanks. Two other tanks either dismantled or buried.
238	—	Nagoya Airport	Hangars, shops and administration buildings for Nagoya Airport; possible small air depot plant.
239	—	Possible Underground Plant	Possible underground plant or storage in connection with adjoining plant of Nakajima Aircraft. (See Ref. No. 240 below.)
240	90:20-2164	Japan Textile Co., Okata Plant (Nakajima Aircraft) (Dai Nippon Boseki)	Former textile mill, converted to aircraft parts by Nakajima Aircraft Co.
241	—	Cannery	Food canning plant.
242	—	Unidentified Plant	– – – – –
243	90:20-1830	Toyoda Steel Works (Toyoda Seiko)	Sizable scrap remelt and open-hearth steel works. Also reported to produce electric steel for Toyoda Automobile Co.
244	—	Probable Woolen Mill	Reported woolen mill; no direct evidence of conversion, but new shop-type buildings suggest possible conversion.
245	—	Unidentified Factory	– – – – –
246	90:20-1133	Inasawa Shunting Yards	Principal marshalling yard on Tokaido RR in Nagoya region.
247	—	Moribayashi Textile Mill (Nakajima Aircraft)	Former site of textile plant reported converted to aircraft parts by Nakajima Aircraft. Main plant appears to have been dismantled; only miscellaneous structures remain.
248	90:20-1820	Tokushu Light Metals Co., Inasawa Plant (Tokushu Kei Goken)	Probable site of plant manufacturing light alloy parts for aircraft.
249	—	Unidentified Factory	– – – – –
250	—	Unidentified Factory	– – – – –
251	—	Probable Textile Mill	– – – – –
252	90:20-1821	Riken Alunite Plant (Riken Alunite Kogyo)	Probable location of plant producing light alloy castings for aero-engine parts.
253	—	Transformer Station	Electric power transforming station.
254	—	Ishihara Knitting Mill	Knitted woolen goods.
255	—	Daido Electric Steel, Nishi Plant (Daido Seiko)	Reported sixth Nagoya plant of Daido Co., probably a casting and machining works. (Identification is doubtful.)
256	—	Unidentified Factory	Probable textile mill.

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257	—	Hishibumi Textile Mill	Textiles.
258	—	Kinjo Knitting Mill	Knitted goods.
259	—	Miyuki Woolen Mill	Wool weaving mill.
260	—	Industrial District	Mixed industrial/residential district, including a number of small factories and many very small shops producing machinery, small ordnance components, drafting instruments, household furnishings and hardware, and clothing.
261	—	Shonaigawa Rayon Co. (now Toyo Rayon KK)	Reported in 1943 to be producing high quality fats and lubricating oils for aircraft.
262	90:20-1808	Meidensha Electric Mfg. Co., Nishi Biwajima Plant (Meidensha Denki)	Important electrical equipment works, manufacturing D.C. and A.C. generators, rotary converters, transformers, etc.
263	90:20-1141	Toyowa Heavy Industry Co., Shinkawa Plant (formerly Toyoda Shikki Shokki, now Toyowa Jukogyo, also read as "Howa" Ju Kogyo)	Large integrated machinery, machine tool, ordnance and aircraft parts plant. Company is affiliated with Nakajima Aircraft. The machine tool unit occupies SE part of compound. (Aircraft gun mounts known to be produced here.)
264	—	Teikoku Cotton Mill	Cotton textile plant; addition of small shop-type structures suggests probable conversion. Possible aircraft parts production.
265	—	Streetcar Barns	Central streetcar barns for Nagoya trolley system.
265A	—	Toho Electric Transformer Station	Power transformer station.
266	—	Garbage Incinerator Plant	– – – – –
267	—	Unidentified Plant	– – – – –
268	—	RR Repair Shops	Repair shops for inter-urban electric RR.
269	90:20-2140	Mitsubishi Aircraft, Fuji Textile Plant (formerly Fuji Gas Boseki KK)	Former Fuji Textile plant, converted to production of aircraft engine parts (including cylinders) for Mitsubishi Aircraft; an important unit in the Mitsubishi dispersal program.
270	—	Nitto Woolen Mill (Nitto Keito Boseki)	Wool weaving plant.
271	—	Probable Textile Mill	– – – – –
272	—	Nagoya Army Divisional H.Q.	– – – – –
273	—	Nagoya Garrison Hospital	– – – – –
274	—	Industrial District	Mixed industrial/residential district including several small shops producing farm tools, textiles, textile machinery parts and musical instruments.
275	—	Nitto Flour Mill	Flour mill and storage.
276	—	Streetcar Repair Shops	Maintenance shops for Nagoya trolley system.
277	—	Yamamoto Ink Works	Reported ink plant.
278	90:20-1153	Japan Porcelain Co. (Nippon Toki KK)	One of Japan's largest and best equipped industrial ceramics plants, producing firebrick, grinding stones, etc. According to unverified POW report, at least part of plant has been converted to production of shells for small arms and medium artillery.
279	—	Toyoda Textile, Main Plant (Tokai Aircraft)	Former Toyoda Textile Mill, now operated by Chuo Boseki and converted to aircraft parts; under supervision of Tokai Aircraft Co.
280	—	Industrial District	Mixed industrial/residential district, including a number of small factories and numerous small shops producing auto parts, machine tools, RR maintenance tools, machinery, furnaces, household hardware and razor blades.
281	—	Unidentified Factory	– – – – –
282	—	Unidentified Factory	– – – – –
283	—	Probable Water Purification Plant	Probable new water purification plant; still under construction as of 25 April 1945.
284	—	Toyoda Textiles, Oshikiri Plant (now Chuo Boseki) (Tokyo Shibaura Electric Co.)	Textile mill; reported trasnsferred to Tokyo-Shibaura Electric Co.
285	—	Nippon Yusen Kaisha Warehouses	Office and storage terminal for NYK Trading Co.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after UA Nagoya TI page 10.

JOINT TARGET GROUP, WASHINGTON, D. C.

URBAN INFORMATION SHEET

SHEET No. . . . . **Nagoya/TI**
DATE . . . . . **22 May 1945**
PAGE **12**

Reference Number	Target Number	Name	Pre-attack Description and Product
286	—	Nagoya Central Food Market	Principal food storage and distribution center for Nagoya.
287	—	Industrial District	Mixed industrial/residential district containing numerous small factories and shops producing household furnishings, burlap sacks, textiles, textile machinery, rubber products and tin cans.
288	90:20-250C	Nagoya Station	Nagoya's principal passenger station; on Tokaido RR.
289	—	Industrial District	Mixed industrial/residential district containing (in addition to annotated installations) a number of small factories and shops producing leather belting, weighing scales, cutlery, tiles, household furnishings; and food processing plants.
290	—	Transformer Station	Local power transformer station.
291	—	Toyo Textiles, Aichi Plant (Sumitomo Heavy Industries)	Former textile mill, converted by Sumitomo to production of aircraft parts. (Also reported operated by Aichi Aircraft Co.)
292	—	Chuo Electrical Equipment Co. (Chuo Denki Kogyo)	Light electrical equipment including small motors.
293	90:20-250A	Nagoya Freight Yards	One of Japan's important urban freight terminals, with extensive storage facilities and shunting yard.
294	—	West Nagoya Gas Works	Local gas storage.
295	90:20-2129	Mitsubishi Aircraft, Keorimono Plant (see Ref. No. 302 for other part of same target)	New Mitsubishi Aircraft plant, still under construction as of about 1 April 1945. Together with the converted and expanded textile mills directly to S (see Ref. No. 302) constitutes probable site for dispersal of engine production from the main engine works (Target 194) which has been almost completely destroyed. This new plant has been manufacturing engine components.
296	—	S.V.O. Oil Storage	Local drum storage and distributing station.
297	—	Industrial District	Mixed industrial/residential district containing several plants producing aluminum utensils, textile machinery, wax, etc.
298	—	Probable Sewage Disposal Plant	- - - - -
299	—	Toyoda Textiles, Minami Plant (Toyoda Boshoku) (now Chuo Boseki)	One of several mills of company which has converted other plants to aircraft parts. No direct evidence regarding conversion of this plant.
300	—	Flour Mill	Flour mill and grain storage.
301	90:20-250B	Nagoya Repair Shops	One of Japan's principal RR car repair shops.
302	90:20-2129	Mitsubishi Aircraft, Keorimono Plant (see also Ref. No. 295).	Southern part of Target 2129. Former Nippon Keori (woolen) Mill and 2 adjoining textile plants, now converted to engine components for Mitsubishi Aircraft. (See Ref. No. 295 for description.)
303	90:20-3613	Nagoya UIC/5	This area contains several of the principl components plants of the Mitsubishi Aircraft Co., as well as machine tool and textile plants.
304	90:20-3610	Nagoya UIC/2	Site of the key Mitsubishi Aircraft Engine Works, the Mitsubishi Electric Mfg. Co. and the Chigusa factory of the Nagoya Arsenal, this area also includes machine tool and ordnance parts plants and the Nagoya water filtering plant.
305	90:20-3609	Nagoya UIC/1	Principally important as the site of the largest (Atsuta) factory of the Nagoya Arsenal, this area also includes several aircraft components and instrument plants, one large and several small ordnance plants, an alloy steel works, a sizeable electrical equipment factory and several medium size machinery and machine tool plants.
306	90:20-3614	Nagoya UIC/6	In addition to the large Okamoto Aircraft parts factory, this area contains several aircraft machine tool plants and general machinery factories.
307	90:20-3611	Nagoya UIC/3	In addition to the great Mitsubishi Aircraft Works Assembly plant, this area includes the two largest factories of the Daido Electric Steel Co., a large steam power plant, electro-chemical plants, a medium size shipyard and several small machinery and machine tool factories.
308	90:20-3612	Nagoya UIC/4	In addition to the Aichi Aircraft Engine Works, the large Sumitomo Duralumin Mill and the Toho Synthetic Oil Plant, this area contains aircraft parts factories, and numerous small machinery and machine tool plants.
309	90:20-3615	Nagoya UIC/7	This area covers the Nagoya RR Station, freight yard and repair shop, as well as aircraft parts plants and ordnance factories.
310	90:20-3616	Nagoya UIC/8	This area includes one of Mitsubishi's largest aircraft parts works, a very large integrated aircraft and ordnance parts plant, electrical equipment and liquid fuel plants.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after UA Nagoya TI page 11.

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TARGET INFORMATION SHEET

SHEET No. **90:20-3609—TI**
DATE . . . . . **23 May 1945**
PAGE **1**

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 1

NAGOYA **JAPAN**

TARGET No. . **90:20-3609**
OBJ. No. **90:20**
OBJ. FOLDER No. **New Target**
CATEGORY . . . . . **Mxt. Ind. Conc.—Urban Ind. Conc.**

LAT. . . . . **35°08'N**
LONG. . . . . **136°55'E**
ALT. . . . . **10 feet**

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90:20-3609 material.

SIGNIFICANCE

One of Nagoya's principal industrial districts, this concentration includes a large number of factories important for the production of medium to heavy artillery and heavy AA guns, flexible aircraft guns, tanks and locomotives, shell cases, miscellaneous ordnance components, a wide variety of aircraft fuselage parts and instruments, machine tools, alloy steel, numerous other metal products and textiles. The outstanding target in the concentration is TARGET 197—Atsuta Factory, Nagoya Arsenal, largest plant of Japan's third most important army arsenal, together with the affiliated Nippon Vehicle Mfg. Co.—TARGET 241. Although incendiary attacks conducted prior to April 20, 1945, destroyed a considerable part of the target area, its industrial target value is not seriously impaired.

LOCATION

In S central part of Nagoya City, about 2.5 miles NE of Nagoya Harbor piers and 2 miles S of Nagoya Castle. The target area is bounded on the S by the fork of the Hori River, on the W by the W branch of the Hori River, on the N by the Y-shaped junction of the Tokaido and Chuo railways and on the E by a wide N-S avenue.

DESCRIPTION AND LAYOUT

(Refer to Illustration No. 90:20-3609 P4). The total target area measures roughly 2 miles N-S by 1 mile E-W. Heavily built-up, the area is divided into two fairly distinct districts by the multi-track Tokaido RR. The western half is predominantly residential, with comparatively few factories, and it is cut up by several wide roads and open temple grounds which serve as firebreaks. The eastern half is predominantly industrial with a fairly uniform distribution of factories throughout and it is divided by the eastern branch of the Hori River.

Incendiary attacks conducted prior to April 20, 1945, have destroyed most of the northern third of the area and a small part of the southwestern edge. As of that date, TARGETS 242 and 2117 and annotated installations B, C, and G had already been seriously damaged or destroyed. Slight damage had been done to TARGET 197 and annotated installations D and F.

CONSTRUCTION AND VULNERABILITY

(Refer to Illustrations No. 90:20-3609 P4 and P5.)

The following table lists characteristics of the target prior to any attack. For approximate extent of destruction up to 19 March 1945 refer to Illustration No. 90:20-3609 P5.

	Principal Targets								Other industrial areas*	Total industrial areas*
	90:20-197 Armament	90:20-199* Aircraft	90:20-241 Armament	90:20-242* Aircraft	90:20-247B Coke-Iron-Steel	90:20-1171* Elec. Equipment	G* Aircraft	B* Machinery/ Armament		
Site area, 1000's of square feet. . . .	5750	390	1568	200	573	440	270	310	3485	12986
Percent of site area built up.	39%	40%	51%	50%	36%	60%	40%	30%	30%	38%
Total plan area of bldgs., 1000's of sq. feet.	2229	160	797	100	206	260	110	909	980	4932
*HE vulnerability:***										
V1 (least vulnerable).	1%	10%	....	....	....	30%	....	10%	....	3%
V2	12%	....	22%	10%	48%	....	10%	10%	10%	14%
V3	21%	....	....	10%	3%	....	....	20%	20%	14%
V4	66%	90%	78%	80%	49%	70%	90%	60%	70%	69%
V5 (most vulnerable).	....	....	....	....	....	....	....	....	....	....
IB vulnerability:										
Combustibility of bldgs.:										
Fire resistant (R).	1%	10%	....	....	3%	30%	....	10%	5%	3%
Non-combustible (N).	46%	60%	47%	60%	67%	60%	10%	10%	45%	47%
Combustible (C).	53%	30%	53%	40%	30%	10%	90%	80%	50%	50%
Combustible portion of target (bldgs. & contents).	65%	50%	65%	65%	40%	35%	95%	85%	65%	63%
Susceptibility to incendiary attack:										
Contents only.	Poor	Fair	Poor	Poor	Poor	Fair	Poor	Poor	Poor	Poor
Buildings and contents.	Good	Good	Good	Good	Fair	Fair	Good	Good	Good	Good

*For targets so marked, all data are preliminary estimates only. Detailed structural analyses if prepared later may vary considerably from these preliminary estimates.

**For explanation of HE vulnerability classifications refer to JTG Memorandum No. JTG/M-3/1 dated 26 March 1945.

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90:20-3609—TI**
DATE . . . . . **23 May 1945**
PAGE **2**

WEAPON RECOMMENDATIONS

Reference should be made to Weapon Recommendations Sheet No. 90:20-3609 WR1.

TARGET INFORMATION

Target or Reference No.	Name	Description and Product
197*	Atsuta Factory, Nagoya Arsenal	Main factory of Japan's third most important Army arsenal, believed to specialize in manufacture of medium to heavy field artillery. Also produces heavy AA guns, flexible aircraft guns and shell cases. Reported production of aircraft engine components for Mitsubishi, believed largely discontinued now.
241*	Nippon Vehicle Manufacturing Co. (Nippon Sharyo KK)	Important pre-war producer of RR rolling stock, reported partially converted to armored cars, tanks and gun mounts, but direct evidence is lacking. Reported affiliated with Atsuta Arsenal (Target 197). Pre-war products included steam and electric locomotives, freight and passenger cars and boilers.
199	Aichi Aircraft Works, Mizuko Branch (Aichi Tokei Denki)	Parts plant of Aichi aircraft, producing tail sections and other parts.
247B*	Daido Electric Steel, Atsuta Plant (Daido Seiko KK)	Third smallest of four plants in Nagoya of Company which has Japan's largest output of electric and alloy steel. This plant has an estimated capacity of 35,000 metric tons of steel, and about 6,000 tons of steel castings. Also reported to manufacture electric-arc furnaces.
1798	Osaka Machinery Works (Osaka Kikai Seisakusho)	Small plant of important machine tool concern, formerly produced textile machinery, and drills and pumps for petroleum industry. Now reported manufacturing general purpose tools, aircraft and ordnance parts.
242	Okamoto Aircraft Works, Showa Plant (Okamoto Kokuki)	Secondary plant of large aircraft parts concern. This plant specializes in landing gear.
1823	Tokai Electrode Co., Nagoya #1 Plant (Tokai Denkyoku Seizo)	One of three Nagoya plants of Japan's third largest electrode producer. Probably supplies electrodes to Daido Electric Steel plants in city.
1171	Nippon Insulator Co. (Nippon Gaisha KK)	One of Japan's leading producers of electrical insulators of all types. Also produces spark plugs and various industrial ceramics.
2117	Shinogawa Manufacturing Co., Nagoya Plant	Small factory producing aircraft indicating instruments.
A	Kubota Machinery Co. (Kubota Seisakusho)	Small precision machinery works reported producing tools and munitions.
B	Kubota Machinery Co. (Kubota Seisakusho)	Medium size precision machinery works, reported producing machine tools and munitions.
C	Koa Textile Mill (Toyowa Heavy Industry)	Former textile mill converted by Toyowa Heavy Industry to production of aircraft parts.
D	Toho Gas Works	Nagoya's principal gas works, with small chemical and possibly oil by-products plant. Target 456—Toho Gas Works Synthetic Oil Plant, formerly spotted here, is now known to be located in SW Nagoya on east bank of Naka Canal.
E	Nippon Vehicle Co. Branch Plant (Nippon Sharyo)	Branch of Target 241—Nihon Vehicle Co. Probable producer of ordnance parts.
F	Hattori Textile Mill	Large textile plant. No information available to indicate that plant has been converted.
G	Toyo Textiles, Owari Plant (Mitsubishi Aircraft)	Former textile mill, converted to production of aircraft parts by Mitsubishi.
H	Kodata Factory (Kodata Shoten)	Small plant reported producing automobile motor components and machine tools.

NOTE: Not spotted, but included within target area, are a number of small plants reported producing aircraft and ordnance parts, simple tools, chemicals and textiles; also small stand-by power stations and transformers.

* See Target Information Sheet on this target for additional details.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90:20-3609 TI page 1.

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WEAPON RECOMMENDATIONS SHEET

SHEET No. 90.20-3609 WR1
DATE . . . . . 10 May 1945
PAGE 1

TARGET No. . 90.20-3609
OBJ. AREA 90.20
OBJ. FOLDER No. New Target
AIR TARGET SYSTEM Urban Areas

LAT. . . . . 35°08'N
LONG. . . . . 136°55'E
ALT. . . . . 10 feet

NAGOYA URBAN INDUSTRIAL CONCENTRATION No. 1

NAGOYA JAPAN

HIGH AND MEDIUM ALTITUDE ATTACK

(See also 90.20-3609-TI and associated target illustrations.)

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90.20-3601 material.

INTRODUCTION

This Weapon Recommendations Sheet applies to a high or medium altitude attack against designated industrial plants (see Table II at the right) within Nagoya Urban Industrial Concentration No. 1 (see Illustrations No. 90.20-3609 P4, P5). The sheet is based on photography of 24 March 1945.

An estimated 65 percent of the total floor area of the industrial plants can be destroyed by fire. For levels of damage up to 60 percent the recommended attack is primarily with incendiary bombs, with a minimum of high explosive to support the incendiary effort.

The ground densities recommended (see Table I) against the target area are believed sufficient to destroy residential and mixed zones surrounding the industrial plants.

WEAPONS AND FUZING

Incendiaries:

The preferred incendiary bombs are the AN-M69 6-lb, AN-M74 10-lb, or AN-M50 4-lb (all in aimable clusters). The AN-M47 70-lb incendiary is an alternative selection, and the AN-M76 500-lb bomb is not recommended.

High Explosives.

In support of an incendiary attack the most effective device is an explosive charge and/or white phosphorus cup incorporated in the incendiary bomb. If these are available, no auxiliary HE or fragmentation bombs will be worth the weight of incendiaries displaced.

HE or fragmentation bombs used in support of an incendiary attack should *in no case exceed 10 to 20 percent* of the total load.

As a major weapon. Incendiary attacks are expected to cause serious damage to about 60 percent of the area of industrial plants in the concentration. If it is desired to achieve percentages of serious damage above this level, the use of a combination of HE and IB is necessary (see Table I). The preferred HE weapon in this case is the 1000-lb GP, fuzed 0.01 N/ND T*. The 2000-lb and 500-lb GP, similarly fuzed, are alternatives. The 1000-lb GP is selected, on a weight for weight basis, due to the preponderance of V4** buildings in the principal targets least susceptible to fire damage (see Table II below). Large blast bombs (4000-lb LC) probably would be equally or more effective against the targets in this concentration, and could be used if operational considerations permit.

* Use 0.1 N fuzes if 0.01 N fuzes are not available, and 0.01 T fuzes if ND T fuzes are not available. ND tail fuzing is recommended since most of the buildings have light roof material and are best destroyed by blast effects.

** For a definition of V4 buildings see JTG/M-3/1 (non-technical) or JTG/M/8 (technical).

ATTACK DATA

Thirteen (13) per cent of the area of industrial plants in Nagoya Urban Industrial Concentration No. 1 has been seriously damaged as of 24 March 1945.

Table I below gives the ground densities required to raise this level of serious damage to the industrial plants in the target area to the percentages indicated.

TABLE I

Ground Density in Tons/Million Sq. Ft.		Per cent Serious Damage To Industrial Plants
HE	IB	
Damage observed to 24 March 1945		13
***	1.5	30
***	2.5	40
***	4.5	50
***	8.5	60
16.0	13.0	70

*** Not to exceed 10-20 percent of the total load.

Table II below lists the principal plants in the Nagoya Urban Industrial Concentration No. 1, the percent of serious damage to each as of 24 March 1945, and the estimated percent of each subject to fire damage.

TABLE II

Industrial Plants			Percent Serious Damage as of 24 March 1945	Estimated Percent subject to fire damage #
Name	Number	Class		
Nagoya Arsenal, Atsuta	90.20-197	Armament	8	70
Aichi Aircraft Works, Mizuho	90.20-199	Aircraft	—	50
Nippon Vehicle Mfg. Co.	90.20-241	Armament	—	70
Okamoto Aircraft Wks., Showa	90.20-242	Aircraft	38	65
Daido Elec. Steel, Atsuta	90.20-247B	Coke-Iron-Steel	—	45
Nippin Insulator Co.	90.20-1171	Electrical Equip.	5	25
Kubota Machinery Co.	B	Mach./Armt.	75	75
Toyo Textiles, Owari	G	Aircraft	90	95
Average Other Industrial Plants			26	70
AVERAGE ALL INDUSTRIAL PLANTS			13	65

#Revised 3 May 1945

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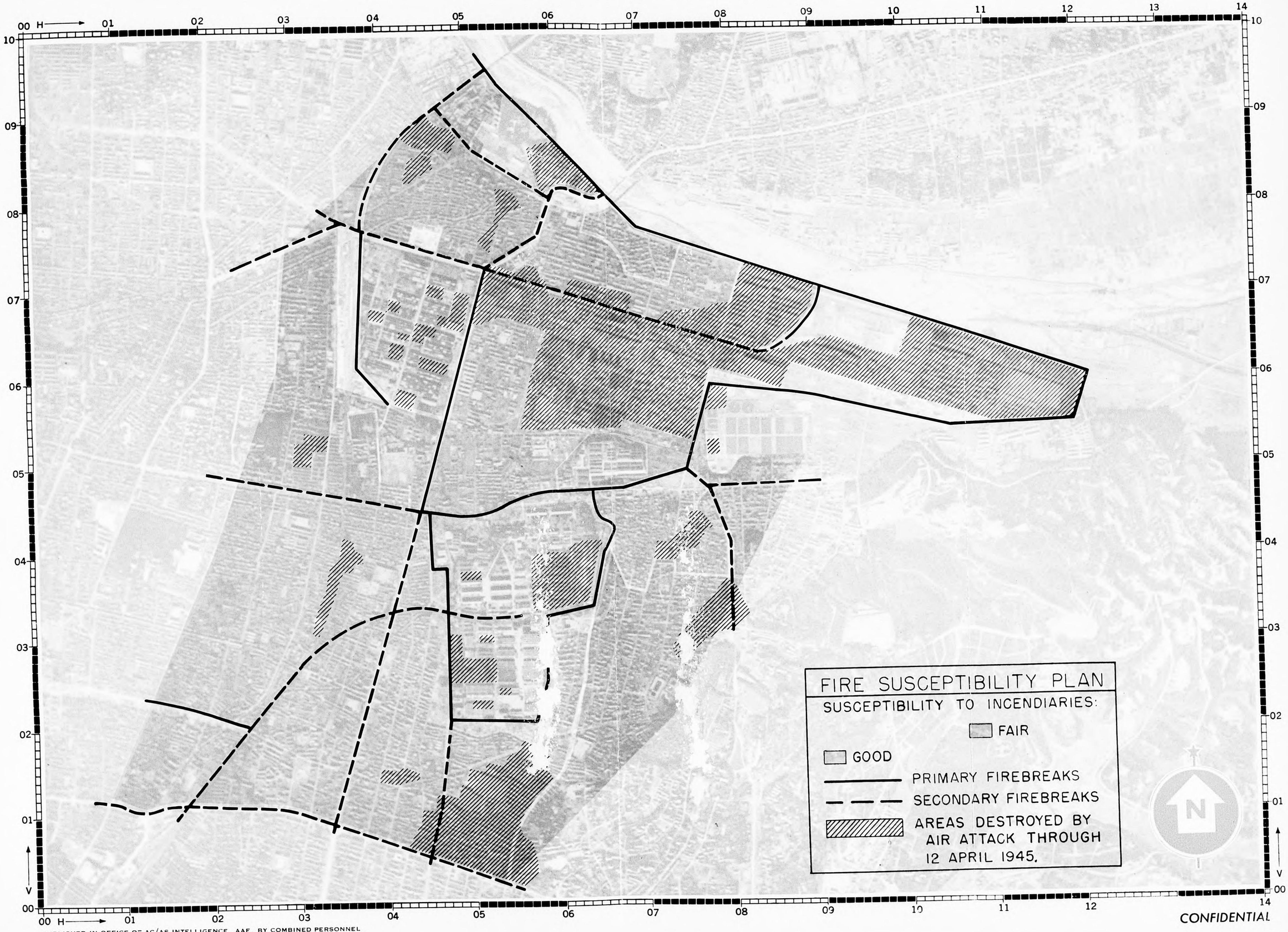
FIRE SUSCEPTIBILITY PLAN

NAGOYA, U.I.C.—2, JAPAN
URBAN INDUSTRIAL CONCENTRATION

ILLUSTRATION No.	90.20-3610 P5
DATE	20 May 1945
TARGET No.	90.20-3610
COORDINATES	35°10'N 136°57'E
PHOTOGRAPHED	23 November 1944

0 1000 2000 3000 4000 5000 6000 7000 FEET

0 ½ 1:15,000 APPROX 1 MILE



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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90.20-3610-TI**
DATE. . . . . **9 May 1945**
PAGE **1**

TARGET No. . **90.20-3610**
OBJ. No. **90.20**
OBJ. FOLDER No. **New Target**
CATEGORY. . **Urban Areas**

LAT. . . . . **35°10'N**
LONG. . . . . **136°57'E**
ALT. . . . . **62 feet**

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 2

NAGOYA **JAPAN**

SIGNIFICANCE

The area is one of Nagoya's prime industrial districts. It centers largely around the Chigusa Factory of the Nagoya Arsenal, an important manufacturer of ground armament. Of major importance is the key Mitsubishi Aircraft Engine Works estimated to be one of the two largest producers of combat aero-engines. Also within the area is the important Mitsubishi Electric Manufacturing Co. (machine tools and aircraft and ordnance components), the Okuma Iron Works, Ozone Plant, the Kureha Spinning Mill (converted to shell manufacturing), the Asahi Ceramics Plant (converted to aircraft parts), the Kondo Silk Mill, the Nagoya Water System Filtration Plant, and the Inagaki Bicycle Factory.

This urban industrial concentration has been heavily damaged by the attacks of 15 February and 7 April 1945. The Mitsubishi Aircraft Engine Works, the Kureha Spinning Mill, and the Asahi Ceramics Plant have no future target value because of virtually complete destruction. In addition, the Chigusa Factory of the Nagoya Arsenal and the Mitsubishi Electric Manufacturing Co. Plant have been moderately damaged. There are scattered areas of housing destruction.

The target value of this urban industrial concentration for future area IB attack has substantially decreased.

LOCATION

This selected area is approximately two miles, directly E of Nagoya Castle in the NE quarter of Nagoya City. It is bounded on the E by a N-S street which parallels the Chuo RR, on the N by the Yata-kawa (river), on the S by a wide E-W roadway, and on the E by wooded hills. The area is roughly rectangular being approximately 1.3 miles by 2 miles or 2.6 square miles.

DESCRIPTION AND LAYOUT

The most important concentration of industry lies in the E half of the area in which are located the Mitsubishi Aircraft Engine Works, the Chigusa Factory of the Nagoya Arsenal, and the Kureha Spinning Mill. In the NW quarter of the area are the Mitsubishi Electric Manufacturing Co. Plant, the Okuma Iron Works, Ozone Plant, the Asahi Ceramics Plant, the Kondo Silk Mill, and small miscellaneous manufacturing plants. The SW quarter consists principally of housing.

The more important firebreaks are a wide N-S roadway running through the area centrally, a wide firebreak adjacent to and E of the Mitsubishi Electric Manufacturing Co. Plant, and a wide firebreak largely surrounding the Chigusa Factory of the Nagoya Arsenal.

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TARGET INFORMATION SHEET

SHEET No. **90.20-3610-TI**
DATE . . . . . **9 May 1945**
PAGE **1**

TARGET No. . **90.20-3610**
OBJ. No. **90.20**
OBJ. FOLDER No. **New Target**
CATEGORY . . **Urban Areas**

LAT. . . . . **35°10'N**
LONG. . . . . **136°57'E**
ALT. . . . . **62 feet**

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 2

NAGOYA JAPAN

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SIGNIFICANCE

The area is one of Nagoya's prime industrial districts. It centers largely around the Chigusa Factory of the Nagoya Arsenal, an important manufacturer of ground armament. Of major importance is the key Mitsubishi Aircraft Engine Works estimated to be one of the two largest producers of combat aero-engines. Also within the area is the important Mitsubishi Electric Manufacturing Co. (machine tools and aircraft and ordnance components), the Okuma Iron Works, Ozone Plant, the Kureha Spinning Mill (converted to shell manufacturing), the Asahi Ceramics Plant (converted to aircraft parts), the Kondo Silk Mill, the Nagoya Water System Filtration Plant, and the Inagaki Bicycle Factory.

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TARGET INFORMATION SHEET

CONSTRUCTION AND VULNERABILITY

(Refer to Illustrations No. 90.20-3610 P3, P5.)

The following table lists characteristics of the target prior to any attack. For approximate extent of destruction through 12 April 1945 refer to Illustration No. 90.20-3610 P5.

	Principal Targets						
	90.20-193	90.20-196	90.20-254	90.20-461*	D* Nagoya Water System Filtration Plant	Other Industrial Areas*	Total Industrial Areas
Site area, 1000's of sq. feet	8421	4705	3132	180	1260	750	18450
Percent of site area built up	47%	26%	44%	40%	60%	68%	43%
Total plan area of buildings, 1000's of square feet	3931	1241	1375	70	760	510	7887
HE vulnerability:**							
V1 (least vulnerable)	1%	3%	1%	....	....	....	1%
V2	9%	9%	7%	20%	....	2%	8%
V3	....	20%	2%	....	....	6%	4%
V4	87%	68%	90%	80%	....	92%	76%
V5	....	....	....	....	....	....	....
Special (Test cells and water filtration plant)	3%	....	....	....	100%	....	11%
IB vulnerability:							
Combustibility of buildings:							
Fire resistant (R)	3%	4%	1%	....	100%	....	12%
Noncombustible (N)	74%	43%	79%	60%	....	10%	58%
Combustible (C)	23%	53%	20%	40%	....	90%	30%
Portion of target (buildings and contents) susceptible to fire damage.	40%	70%	50%	65%	....	95%	45%
Susceptibility to incendiary attack:							
Contents only	Fair	Fair	Fair	Fair	None	Fair	Fair
Buildings and contents	Fair	Good	Good	Good	None	Good	Good

* For targets so marked, all data are preliminary estimates only. Detailed structural analyses if prepared later may vary considerably from these preliminary estimates.

** For explanation of HE vulnerability classifications refer to Joint Target Group Memorandum No. JTG/M-3/1 dated 26 March 1945 (non-technical), or JTG/M-8 (technical).

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90.20-3610 TI page 1.

WEAPON RECOMMENDATIONS

Reference should be made to Weapon Recommendations Sheet No. 90.20-3610 WRI.

TARGET INFORMATION

Target or Reference No.	Name	Description and Product
193*	Mitsubishi Aircraft Engine Works (Mitsubishi Jukogyo K.K.; Nagoya Hatsudoki Seisakusho)	One of the two largest producers of combat aero-engines. Manufactures both Army and Navy types. Estimated to produce 1600 operational engines per month or 40 percent of Japanese total. Has no present target value as 82.5 percent of built-up area (as of 12 April 1945) destroyed by 7 April 1945 and preceding attacks.
196*	Chigusa Factory of Nagoya Arsenal (Nagoya Zoheisho, Chigusa Kojo)	One of 5 plants forming the Nagoya Arsenal. Is second or third among these plants in importance. Believed to specialize in the manufacture of ammunition components and in the fabrication and repair of medium ordnance, including AA guns. Contains small scale ammunition loading facilities and storage area for finished munitions. Facilities such as to permit integrated production; some 1.6 million sq. ft. of floorspace. Target value currently impaired because of moderate damage to plant.
254*	Mitsubishi Electric Mfg. Co. (Mitsubishi Denki K.K.)	A leading producer of light electrical equipment; key components producer for Nagoya's aircraft and munitions industries. Manufactures electric motors to 100 HP, ground radios, etc.; also such aircraft equipment as small motors, lights, switches, fuel pumps, fuse boxes, rheostats, etc. Since 1937 plant has gone increasingly into production of machine tools as turret lathes and horizontal grinders. Target value of plant currently impaired as plant has suffered moderate damage.
461	Okuma Iron Works, Ozone Plant (Okuma Tekkosho, Ozone Kojo)	Medium size plant of one of leading machine tool concerns. Reported supplying parts to other machine tool plants.
A	Asahi Ceramics (Asahi Toki K.K.)	Converted to aircraft parts by Mitsubishi Aircraft Works. No present target value as plant completely destroyed.
B	Kondo Silk Mill (Kondo Seishijo)	
C	Inagaki Bicycle Factory (Inagaki Jitensha Seizosho)	Bicycles; possibly converted to aircraft parts.
D	Nagoya Water System Filtration Plant (Nagoya Suido Roka Kojo)	Minor damage to plant.
E	Kureha Spinning Mill (Kureha Boseki Kogyo K.K.)	Converted to shell manufacturing by Nagoya Arsenal. No present target value as plant completely destroyed.

NOTE: Not spotted but included within target area are a number of small miscellaneous industrial plants.

* See Target Information Sheet on this target for additional details.

Illus no.
90.20-3610 P3
is out of folder
[1-b(13)] Entry 47
for conservation

Illus. no.
90.20-3610 P4
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folder [1-b(13)]
Entry 47 for
Conservation

Illus no.
90.20-3610 P5
is out of folder
[1-b(13)] Entry 47
for conservation

JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90:20-3611—TI**
DATE . . . . . **19 May 1945**
PAGE **1**

TARGET No. . . **90:20-3611**
OBJ. AREA **90:20**
OBJ. FOLDER No.
New Target
CATEGORY . . **Mixed Industrial Conc.—Urban Ind. Conc.**

LAT. . . . . **35°05'N**
LONG. . . . . **136°54'E**
ALT. . . . . **15 feet**

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 3

NAGOYA JAPAN

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90:20-3611 material.

SIGNIFICANCE

One of Nagoya's very important industrial districts. This target area includes a major producer of combat aircraft, important plants producing electric steel and steel alloys and fabricating intermediate steel products, large chemical installations producing nitrogen, nitric acid, ammonium sulphate, chlorine, and caustic soda, a machine tool plant, a plant manufacturing non-ferrous castings for aircraft, and the second largest steam electric power plant in the Nagoya city region.

This urban industrial concentration has been moderately damaged by air attacks up to 12 March 1945. The target value of the Mitsubishi Aircraft Works, the most important plant in the target area, has decreased substantially because of attack damage and/or dispersal of some 30 percent of original building area. Minor impairment of target value has occurred through attack damage to the Daido Electric Steel, Oe Plant; the Tokushu Light Metals Co., Atsuta Plant; the Nagoya Yard of Uraga Dock Company; and the Mitsubishi Aircraft, Oe Plant.

LOCATION

The target area comprises virtually the entire industrial district which extends along the northern two of the three reclaimed plots of land at the NE side of Nagoya harbor.

DESCRIPTION AND LAYOUT

Roughly triangular in shape, the target area extends E from Nagoya harbor for about 2 miles. It contains approximately 1.7 square miles. The area is very highly industrialized, with small housing developments alongside the larger factories. It is surrounded by open land, water or mill pond timber storages.

The target area is cut up into about five built-up segments by small river estuaries and connecting canals.

CONSTRUCTION AND VULNERABILITY

(Refer to Illustrations No. 90:20-3611 P4 and P5.)

The following table lists characteristics of the target prior to any attack. For approximate extent of destruction through 12 March 1945 refer to Illustration No. 90:20-3611 P5.

	Principal Targets								Other industrial areas*	Total industrial areas*
	90:20-194	90:20-195*	90:20-247A*	90:20-247C*	90:20-247D*	90:20-255*	90:20-467*	C*		
Site area, 1000's of square feet	10570	480	980	1700	6510	1870	1910	2220	2520	28760
Percent of site area built up	52%	20%	20%	30%	40%	40%	40%	20%	36%	41%
Total plan area of buildings, 1000's of square feet	5481	100	200	510	2600	750	760	440	900	11741
*HE vulnerability:***										
V1 (least vulnerable)	3%	....	....	....	....	....	....	....	....	1%
V2	2%	....	....	40%	30%	....	....	30%	7%	11%
V3	10%	....	....	....	....	....	....	10%	13%	6%
V4	82%	20%	100%	60%	70%	100%	100%	60%	80%	80%
V5 (most vulnerable)	3%	....	....	....	....	....	....	....	....	1%
Special (power plants)	....	80%	....	....	....	....	....	....	....	1%
IB vulnerability:										
Combustibility of buildings:										
Fire resistant (R)	4%	....	....	....	....	....	....	....	....	2%
Noncombustible (N)	74%	80%	80%	90%	70%	60%	30%	70%	42%	68%
Combustible (C)	22%	20%	20%	10%	30%	40%	70%	30%	58%	30%
Portion of target (buildings and contents) susceptible to fire damage	45%	20%	40%	25%	40%	50%	80%	45%	70%	45%
Susceptibility to incendiary attack:										
Contents only	Fair	None	Fair	Poor	Poor	Poor	Fair	Poor	Fair	Fair
Building and contents	Good	Poor	Fair	Poor	Fair	Good	Good	Good	Good	Good

*For targets so marked, all data are preliminary estimates only. Detailed structural analyses if prepared later may vary considerably from these preliminary estimates.

**For explanation of HE vulnerability classifications refer to JTG Memorandum No. JTG/M-3/1 dated 26 March 1945 (nontechnical) or JTG/M-8 (technical).

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90:20-3611—TI**
DATE . . . . . **19 May 1945**
PAGE **2**

WEAPON RECOMMENDATIONS

Reference should be made to Weapon Recommendations Sheet No. 90:20-3611 WR1.

TARGET INFORMATION

Target No. or Reference	Name	Description and Product
194	Mitsubishi Aircraft Works, (Mitsubishi Jukogyo, Nagoya Kokuki)	Principal aircraft assembly plant of Mitsubishi Aircraft Works. One of the two largest aircraft manufacturers in Japan. Produces all three types of combat planes—fighters, bombers, and reconnaissance for both Army and Navy. Target value sharply decreased because of attack damage and/or dispersal of approximately 30 percent of original building area. Probably still making some components and sub-assemblies, and may be turning out some completed aircraft.
195	Nagoya Steam Power Plant No. 1	Second largest steam electric power plant in Nagoya city region. Particularly important in the provision of power supply during dry season. Capacity 144,000 KW.
247A	Daido Electric Steel, Oe Plant (Daido Seiko KK)	Believed manufacturing special steel castings for aircraft exclusively; alloys supplied by other plants of Co. Only negligible damage. Target value not significantly impaired.
247C	Daido Electric Steel, Tsukiji Plant (Daido Seiko, KK)	Electric steel production and fabrication of intermediate products. Capacity 36,000 metric tons of electric and alloy steel and 136,000 metric tons of open hearth steel per year. Manufactures some finished steel products.
247D	Daido Electric Steel, Minami Plant (Daido Seiko, KK)	Electric steel plant. This plant is Japan's largest producer of electric and alloy steel. Estimated minimum capacity of 160,000 metric tons annually, or 7 percent of total Empire capacity. Produces rolled and sheet steel; also rods and castings.
255	Yahagi Electro-Chemical Plant (Yahagi Suiryoku)	Large chemical plant. Produces nitrogen, nitric acid, ammonium sulphate, and other chemicals. Ranks as 7th largest sulphuric acid plant; important ammonia plant.
467	Showa Soda Plant	Among largest chlorine and caustic soda plants in Japan.
1800	Daido Machinery Plant, Showa Plant (Daido Kikai Seisakusho)	Principal machine tool plant of the Daido Co. Produces engine lathes, and horizontal and vertical drilling machines. Reported manufacturing starting equipment and crankshafts for aero-engines.
1818	Tokushu Light Metals Co., Atsuta Plant (Tokushu Keigokin KK)	Non-ferrous plant producing light alloy castings and performing machining operations for Mitsubishi Aircraft Works. Moderate damage; target value somwhat impaired.
1829	Yahagi Steel Plant (Yahagi Seitetsu)	Reported electric steel plant.
A	Government Rice Storehouses	– – – – –
B	Probable Daido Electric Steel, Takarao Plant	Believed to be producing castings for Mitsubishi Aircraft Works.
C	Nagoya Yard of Uraga Dock Company	Shipbuilding and ship repair; 4 ways and 1 dock. Is one of the more important smaller shipyards. Not seriously damaged. Target value not significantly impaired.
D	Mitsubishi Aircraft, Oe Plant (Probable location)	Small aircraft parts plant supplying Mitsubishi Aircraft Works. Moderate damage; target value somewhat impaired.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90:20-3611 TI page 1.

JOINT TARGET GROUP, WASHINGTON, D. C.
WEAPON RECOMMENDATIONS SHEET

SHEET . 90:20-3611—WR1
DATE . . . . . 26 May 1945
PAGE 1

TARGET 90:20-3611
OBJ. AREA 90:20
OBJ. FOLDER . . New Target
CATEGORY . . . . Mixed Ind. Conc., Urban Ind. Conc.

LAT. . . . . 35° 05′ N
LONG. . . . . 136° 54′ E
ALTITUDE. . . . . 15 feet

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 3

NAGOYA JAPAN

HIGH AND MEDIUM ALTITUDE ATTACK

(See also 90:20-3611—TI and associated target illustrations.)

INTRODUCTION

This Weapon Recommendations Sheet applies to a high or medium altitude attack against designated industrial plants (see Table II below) within Nagoya Urban Industrial Concentration No. 3 (see Illustrations No. 90:20-3611 P4, P5). The sheet is based on photography through 12 March 1945.

Sixteen (16) percent of the total area of the industrial plants has been damaged, primarily by high explosive bombs, as of 12 March 1945. An estimated 45 percent of the total remaining floor area can be destroyed by fire. Therefore for levels of damage up to 53 percent to the original target, or approximately 37 percent additional damage to the industrial plants as a whole, an incendiary attack is recommended with a minimum of high explosives to support the incendiary effort.

The ground densities recommended (see Table I) against the target area are believed sufficient to destroy residential and mixed zones surrounding the industrial plants.

WEAPONS AND FUZING

Incendiaries

The preferred incendiary bombs are the AN-M69 6-lb, AN-M74 10-lb, or AN-M50 4-lb (all in aimable clusters). The AN-M47 70-lb incendiary is an alternative selection, and the AN-M76 500-lb bomb is not recommended.

High Explosives

In support of an incendiary attack the most effective device is an explosive charge and/or white phosphorus cup incorporated in the incendiary bomb. If these are available, no auxiliary HE or fragmentation bombs will be worth the weight of incendiaries displaced.

HE or fragmentation bombs used in support of an incendiary attack should *in no case exceed 10 to 20 percent* of the total load.

As a Major Weapon

Incendiary attacks are expected to cause between 35 and 40 percent additional damage to the industrial plants in the concentration. If it is desired to achieve additional percentages of serious damage (over 53 percent to the original target), the use of a combination of HE and IB is necessary (see Table I). The preferred HE weapons in this case are the 500-lb, 1000-lb, and 2000-lb GP, fuzed 0.01 N/ND T[1]. These bombs are approximately equal in effectiveness, on a weight for weight basis, against the V4[2] buildings which are predominant in the principal targets least susceptible to fire damage (see Table II below). Large blast bombs (e.g. 4000-lb LC) probably would be equally or more effective against the targets in this concentration, and could be used if operational considerations permit.

[1] Use 0.025 N or 0.1 N fuzes if 0.01 N fuzes are not available, and 0.01 T fuzes if ND T fuzes are not available. ND tail fuzing is recommended since most of the buildings have light roof material and are best destroyed by blast effects.

[2] For a definition of V4 buildings see JTG/M-3/1 (nontechnical) or JTG/M8 (technical).

ATTACK DATA

Table I below gives the ground densities required to raise the level of serious damage to industrial plants in the target area from 16 percent to the percentages indicated.

If further damage to the concentration has been achieved since 12 March 1945, the table may be revised in accordance with Urban Areas, General Analysis, Annex I, Appendix A.

TABLE I

Ground Density in Tons/Million Sq. Ft.		Percent Serious Damage to Industrial Plants
HE	IB	
Damage observed to 12 March 1945		16%
*	2.0	30%
*	4.0	40%
*	10.0	50%
14.5	11.0	60%

* HE or fragmentation bombs in support of the incendiary attack as specified at the left under "WEAPONS AND FUZING."

Table II below lists the principal plants in Nagoya Urban Industrial Concentration No. 3, the percent of serious damage to each as of 12 March 1945, and the estimated percent of each subject to fire damage.

TABLE II

Industrial Plants			Percent Serious Damage as of 12 March 1945	Estimated Percent Subject to fire damage
Name	Number	Class		
Mitsubishi Aircraft Works	90:20-194	Aircraft	32%	45%
Nagoya Steam Power Plant No. 1	90:20-195	Power	5%	20%
Daido Elec. Steel, Oe Plant	90:20-247A	Coke-Iron-Steel	10%	40%
Daido Elec. Steel, Tsukiji Plant	90:20-247C	Coke-Iron-Steel	5%	25%
Daido Elec. Steel, Minami Plant	90:20-247D	Coke-Iron-Steel	(Negligible)	40%
Yahagi Electro-Chemical Plant	90:20-255	Chemical	0%	50%
Showa Soda Plant	90:20-467	Chemical	0%	80%
Nagoya Yard of Uraga Dock Co.	C	Shipping	0%	45%
Average Other Industrial Plants			6%	70%
AVERAGE ALL INDUSTRIAL PLANTS			16%	45%

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File No. 574,611.4

JOINT TARGET GROUP, WASHINGTON, D. C.

TARGET INFORMATION SHEET

SHEET No. **90:20-3612–TI**
DATE . . . . . **22 May 1945**
PAGE **1**

TARGET No. . . **90:20-3612**
OBJ. No. **90:20**
OBJ. FOLDER No. . . . **90:20**
CATEGORY . . . . **Mxd. Ind. Conc.–Urban Ind. Conc.**

LAT. . . **35°07′N (Approx.)**
LONG. **136°53′E (Approx.)**
ALT. . . . . **15 feet**

NAGOYA URBAN INDUSTRIAL CONCENTRATION No. 4

NAGOYA JAPAN

SIGNIFICANCE

An important industrial district in Nagoya. Industrial output within the target area consists of significant dural sheet and aircraft and ordnance parts production; also aero-engines, synthetic oil, automotive parts, and miscellaneous small metal products.

Damage from air attack to this urban industrial concentration up through 12 April 1945 is not of particular significance as it is limited to few installations, e.g., the Aichi Aircraft Engine Works, Nagoya Plant (moderate damage), the Hirano Loom Works, Nakagawa Plant (serious damage), and to a small industrial district (moderate damage). There are some small scattered areas of housing damage.

LOCATION

The target area comprises the industrial district abutting the Nagoya Harbor area and extending N between the Naka Canal and the Hori River.

DESCRIPTION AND LAYOUT

Somewhat oval in shape the target area extends N along the Naka Canal for some 2.7 miles. The bulk of the area lies E of the Naka Canal with a small section of the N half of the area situated W of the Canal. On the E the target area is bounded by the Hori River for about ⅔ of its length. It contains approximately 3.2 square miles. Industrial plants are dispersed throughout the area with the greater concentration in the S half. Considerable housing, particularly in the E half of area, is inter-mixed with industrial plants.

Principal firebreaks are the Naka Canal N-S, several wide roadways extending N-S and E-W, a canal E-W centrally located, and scattered areas of unoccupied land.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90:20-3612 material.

CONSTRUCTION AND VULNERABILITY

(Refer to Illustration No. 90:20-3612 P4, 5.)

The following table lists characteristics of the target prior to any attack. For approximate extent of destruction up to 12 April 1945 refer to Illustration No. 90:20-3612 P5.

	Principal Targets					Other industrial areas*	Total industrial areas*
	90:20-198*	90:20-456*	90:20-2010	90:20-2040*	G*		
Site area, 1000's of square feet	1560	3230	1750	5020	630	3420	15610
Percent of site area built up	50%	10%	26%	30%	40%	30%	28%
Total plan area of buildings, 1000's of square feet	780	320	458	1510	250	1030	4348
*HE vulnerability:***							
V1 (least vulnerable)	....	....	2%	....	....	2%	1%
V2	30%	....	....	30%	....	10%	18%
V3	....	....	13%	10%	....	14%	8%
V4	70%	60%	85%	60%	100%	74%	70%
V5 (most vulnerable)	....	....	....	....	....	....	....
Special: tanks and gasholders	....	40%	....	....	....	....	3%
IB vulnerability:							
Combustibility of buildings:							
Fire resistant (R)	....	....	2%	....	....	2%	1%
Noncombustible (N)	90%	50%	75%	80%	60%	37%	68%
Combustible (C)	10%	50%	23%	20%	40%	61%	31%
Portion of target (buildings and contents) susceptible to fire damage	35%	60%	45%	40%	55%	70%	50%
Susceptibility to incendiary attack:							
Contents only	Fair	Poor	Fair	Poor	Fair	Fair	Fair
Buildings and contents	Fair	Good	Good	Fair	Good	Good	Good

*For targets so marked, all data are preliminary estimates only. Detailed structural analyses if prepared later may vary considerably from these preliminary estimates.

**For explanation of HE vulnerability classifications refer to JTG Memorandum No. JTG/M-3/1 dated 26 March 1945 (nontechnical) or JTG/M-8 (technical).

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90:20-3612—TI**
DATE . . . . . **22 May 1945**
PAGE **2**

WEAPON RECOMMENDATIONS

Reference should be made to Weapon Recommendations Sheet No. 90:20-3612 WR1

TARGET INFORMATION

Target No. or Reference	Name	Description and Product
2040	Sumitomo Duralumin Mill, Nagoya Plant (Sumitomo Kinzoku)	Large dural sheet rolling mill and aircraft parts plant. Supplies Nagoya aircraft industries with bulk of sheet and substantial amount of aircraft parts.
198	Aichi Ordnance Plant	Former naval ordnance and aircraft works. Now produces components for torpedoes, shells and magnetic mines, also important production of directors for heavy AA guns.
2010	Aichi Aircraft Engine Works, Nagoya Plant	Aero-engine works producing 1200 HP engines. One of four most important aero-engine plants currently. Estimated to produce 250-300 aero-engines per month. Shop and assembly type structures to W of broken line may be part of this plant, but information lacking regarding their function. Moderate damage. Target value somewhat impaired.
1831	Hirano Loom Works, Nakagawa Plant (KK Hirano Seisakusho)	Former producer of textile machinery. Now reported producing shells for medium field artillery. Serious damage. Target value substantially impaired.
456	Toho Gas Works Synthetic Oil Plant	Hydrogenation-type oil plant with estimated 200,000 bbls. annual capacity; also coke production (64 ovens, capacity of 130,000 metric tons of metallurgical coke.)
A	Kubota Machinery Works, Nakagawa Plant (Kubota Seisakusho)	Medium size factory reported producing machine tools and "munitions."
B	Industrial District	Group of 3 or 4 small factories manufacturing small hand pumps, mining machinery, and ordnance components. Moderate damage. Target value somewhat impaired.
C	Unidentified Factory	Identity of plant unknown. Appearance suggests possible aircraft plant.
D	Nippon Aircraft Machinery Co. (Nippon Koki KK)	Manufactures aircraft parts; possibly also machine tools for aircraft plants.
E	Takigawa Iron Works (Takigawa Tekkosho)	Manufactures boilers and large water tanks.
F	Toyoda Automobile Co., Nagoya Plant (Toyoda Jidosho Kogyo)	Probable producer of auto and truck parts (possibly bodies).
G	Sumitomo Light Metals Mfg., Co. (Sumitomo Keikinzoku)	Manufactures dural plates, rivets, and other airframe parts for Mitsubishi Aircraft Co.
H	Imperial Bolt Factory	Nuts and bolts for Nagoya's aircraft and armament factories.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90:20-3612 TI page 1.

JOINT TARGET GROUP, WASHINGTON, D. C.

WEAPON RECOMMENDATIONS SHEET

SHEET . **90:20-3612—WR1**
DATE . . . . . **26 May 1945**
PAGE **1**

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 4

NAGOYA **JAPAN**

TARGET **90:20-3612**
OBJ. AREA **90:20**
OBJ. FOLDER . . **New Target**
CATEGORY . . . . **Mixed Ind. Conc., Urban Ind. Conc.**

LAT. . . . . **35° 07′ N**
LONG. . . . . **136° 53′ E**
ALTITUDE . . . . . **15 feet**

HIGH AND MEDIUM ALTITUDE ATTACK

(See also 90:20-3612—TI and associated target illustrations.)

INTRODUCTION

This Weapon Recommendations Sheet applies to a high or medium altitude attack against designated industrial plants (see Table II below) within Nagoya Urban Industrial Concentration No. 4 (see Illustrations No. 90:20-3612 P4, P5). The sheet is based on photography through 12 April 1945.

An estimated 50 percent of the total floor area of the industrial plants can be destroyed by fire. For levels of damage up to 45 percent the recommended attack is primarily with incendiary bombs, with a minimum of high explosive to support the incendiary effort.

The ground densities recommended (see Table I) against the target area are believed sufficient to destroy residential and mixed zones surrounding the industrial plants.

WEAPONS AND FUZING

Incendiaries

The preferred incendiary bombs are the AN-M69 6-lb, AN-M74 10-lb, or AN-M50 4-lb (all in aimable clusters). The AN-M47 70-lb incendiary is an alternative selection, and the AN-M76 500-lb bomb is not recommended.

High Explosives

In support of an incendiary attack the most effective device is an explosive charge and/or white phosphorus cup incorporated in the incendiary bomb. If these are available, no auxiliary HE or fragmentation bombs will be worth the weight of incendiaries displaced.

HE or fragmentation bombs used in support of an incendiary attack should *in no case exceed 10 to 20 percent* of the total load.

As a Major Weapon

Incendiary attacks are expected to cause serious damage to about 45 percent of the area of industrial plants in the concentration. If it is desired to achieve percentages of serious damage above this level, the use of a combination of HE and IB is necessary (see Table I). The preferred HE weapons in this case are the 500-lb, 1000-lb, and 2000-lb GP, fuzed 0.01 N/ND T[1]. These bombs are approximately equal in effectiveness, on a weight for weight basis, against the V4[2] buildings which are predominant in the principal targets least susceptible to fire damage (see Table II below). Large blast bombs (e.g., 4000-lb LC) probably would be equally or more effective against the targets in this concentration, and could be used if operational considerations permit.

[1] Use 0.025 N or 0.1 N fuzes if 0.01 N fuzes are not available, and 0.01 T fuzes if ND T fuzes are not available. ND tail fuzing is recommended since most of the buildings have light roof material and are best destroyed by blast effects.

[2] For a definition of V4 buildings see JTG/M-3/1 (nontechnical) or JTG/M8 (technical).

ATTACK DATA

Three (3) percent of the area of industrial plants in Nagoya Urban Industrial Concentration No. 4 has been seriously damaged as of 12 April 1945.

Table I below gives the ground densities required to raise this level of serious damage to industrial plants in the target area to the percentages indicated.

If further damage to the concentration has been achieved since 12 April 1945, the table may be revised in accordance with Urban Areas General Analysis, Annex I, Appendix A.

TABLE I

Ground Density in Tons/Million Sq. Ft.		Percent Serious Damage to Industrial Plants
HE	IB	
Damage observed to 12 April 1945		3%
*	3.5	30%
*	6.0	40%
4.0	12.0	50%
21.0	12.0	60%

* HE or fragmentation bombs in support of the incendiary attack as specified above under "WEAPONS AND FUZING."

Table II below lists the principal plants in Nagoya Urban Industrial Concentration No. 4, the percent of serious damage to each as of 12 April 1945, and the estimated percent of each subject to fire damage.

TABLE II

Industrial Plants			Percent Serious Damage as of 12 April 1945	Estimated Percent Subject to Fire Damage
Name	Number	Class		
Aichi Ordnance Plant	90:20-198	Aircraft	(Negligible)	35%
Toho Gas Works Synthetic Oil Plant	90:20-456	Petroleum	0%	60%
Aichi Aircraft Engine Works, Nagoya Plant	90:20-2010	Aircraft	8%	45%
Sumitomo Duralumin Mill Nagoya Plant	90:20-2040	Aircraft	0%	40%
Sumitomo Light Metals Mfg. Co.	G	Aircraft	0%	55%
Average Other Industrial Plants			9%	70%
AVERAGE ALL INDUSTRIAL PLANTS			3%	50%

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET LOCATION SHEET

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 6

NAGOYA JAPAN

SHEET	90:20-3614—TL
DATE	31 May 1945
TARGET	90:20-3614
CATEGORY	Mxt. Ind. Conc.—UIC
COORDINATES	35°06'N 136°55'E
ALTITUDE	10 feet

SIGNIFICANCE:
In addition to the large Okamoto Aircraft parts factory, this area contains several aircraft machine tool plants, general machinery factories, and a textile mill converted to aircraft parts production.

SCALE APPROX.: 1:32,380

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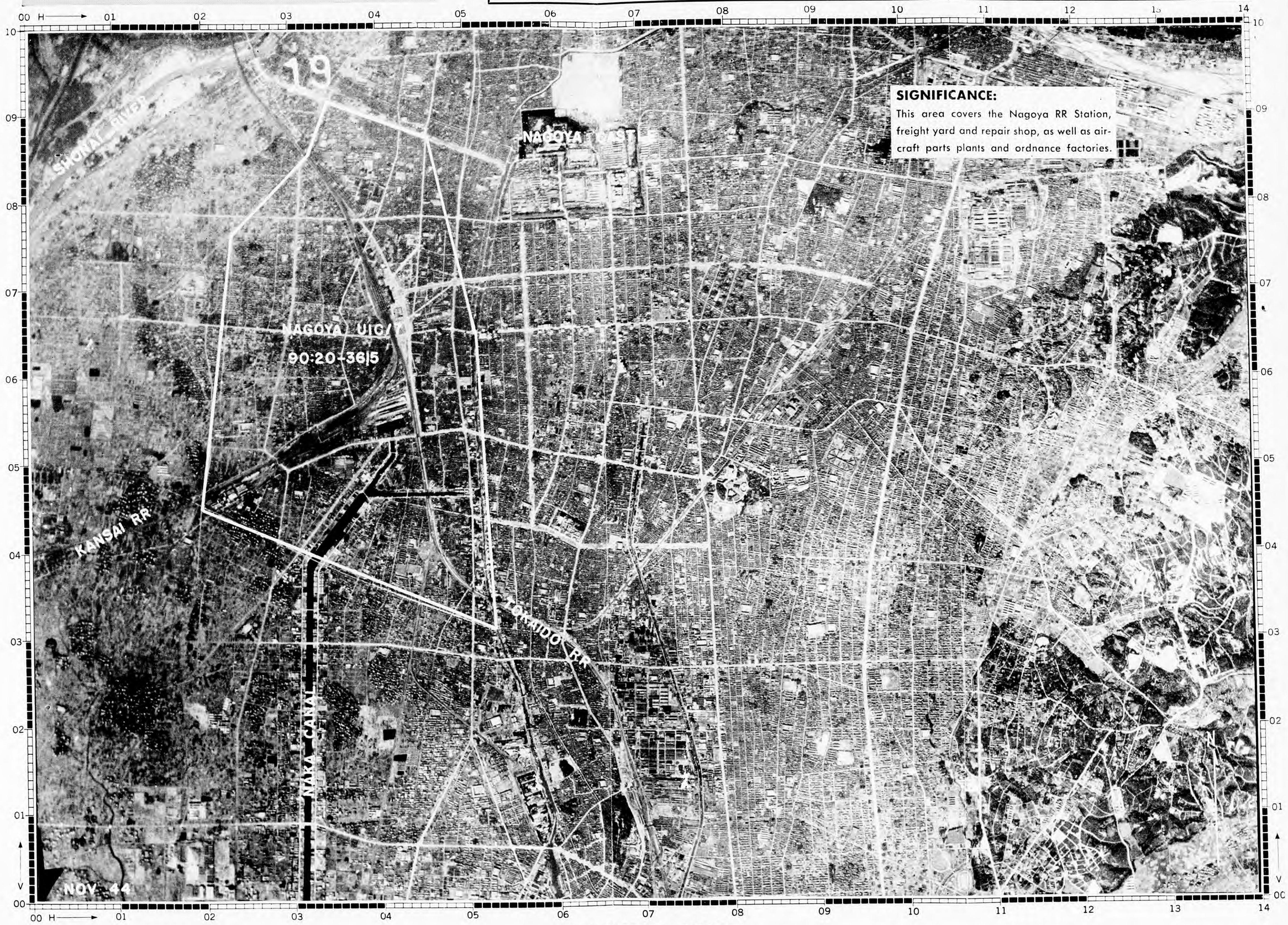
File No. 574,614.1

JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET LOCATION SHEET

NAGOYA URBAN INDUSTRIAL CONCENTRATION NO. 7

NAGOYA — JAPAN

SHEET	90:20-3615—TL
DATE	31 May 1945
TARGET	90:20-3615
CATEGORY	Mxt. Ind. Conc.—UIC
COORDINATES	35° 10'N 136° 53'E
ALTITUDE	20 feet



SCALE APPROX.: 1:32,380

PUBLISHED IN OFFICE OF AC/AS INTELLIGENCE, A.A.F., BY COMBINED PERSONNEL OF UNITED STATES AND BRITISH SERVICES FOR THE USE OF ALLIED FORCES.

File No. 574,615.1

JOINT TARGET GROUP, WASHINGTON, D. C.

TARGET INFORMATION SHEET

SHEET No. **90:33-1308—TI**
DATE . . . . . **May 1945**
PAGE **1**

TARGET No. . **90:33-1308**
OBJ. AREA **90:33**
OBJ. FOLDER No. **90:33, 37, 38**
CATEGORY . . . **End. Prdt. Ind. Aircraft**

LAT. . . . . **33°15'N**
LONG. . . . . **131°37'E**
ALT. . . . . **13 feet**

OITA NAVAL AIR STATION

OITA JAPAN

NOTE: This Target Information Sheet is issued to show the status and importance of the target following serious damage by air attack.

SIGNIFICANCE

Prior to attack Oita Naval Air Station together with Oita Naval Air Depot, Airframe Section and Engine Section (TARGETS 90:33-2081 and 2080) constituted the headquarters of the 12th Naval Air Depot engaged in modification, repair and maintenance of naval aircraft. It was also a major combat base, training school, and replacement center.

The Air Station and both sections of the Air Depot have been attacked by both B-29's and carrier-based aircraft. Photography of 11 May shows all three targets heavily damaged and probably no longer performing significant repair or modification functions. At the Air Station 24 of the 35 buildings sustained major damage, and those remaining apparently undamaged, although including two shops and one hangar, have little target value. The airfield was probably still operational on 11 May, however, and together with extensive storage areas in the hills to the SE, may continue to have tactical importance.

For location and other details refer to Target Information Sheets and Illustrations 90:33-2080 and 90:33-2081. No illustrations will be issued for this target unless warranted by new construction.

Published in Office of AC/AS Intelligence, A. A. F., by Combined Personnel of U. S. and British Services for the use of Allied Forces

NOT TO BE TAKEN INTO THE AIR ON COMBAT MISSIONS

TARGET NO: Omuta City

OBJECTIVE AREA: 90.35-KURUME

T A R G E T I N F O R M A T I O N S H E E T

TARGET 90.35

Omuta City

Latitude: 33° 02' N
Longitude: 130° 27' E
Elevation: 10-80 Feet

1. SUMMARY COMMENT: Omuta, a city manufacturing technically complicated chemicals, coke and such allied products as synthetic oil, makes an excellent target. With its adjacent coal fields and important harbor facilities it represents the most important concentration in the Kurume Area, and one of the most important in Kyushu.

2. LOCATION AND IDENTIFICATION: Omuta is located in the southern end of the Saga-Kurume-Omuta plain on the northeast coast of the Shimabara Gulf. The city itself is crossed by two rivers, the Omuta through the northern section and the Suwa through the southern section. The village of Miike which lies across the Domen River about a mile to the northeast of Omuta has given its name to the coal fields, and the port in the southwest section. Conspicuous landmarks are the Omuta breakwaters, forming the largest artificial harbor in Japan. Two jetties 450 feet apart are on each side of the 6000 foot long channel leading into the Miike Harbor. The inner and outer harbors are separated by locks and also make prominent landmarks.

3. TARGET DESCRIPTION: (1) The city is roughly 5 miles long along the waterfront in a north-south direction and 2½ miles wide. (2) Population 177,000. (3) The principal industrial plants are of steelframe construction with sheet iron or asbestos roofing. Predominant construction materials are wood and plaster. The homes of the workers are typical of Japanese old style industrial-workers' dwellings, highly inflammable and closely packed together around the plants. The Mitsui interests control the mines, the port, and the factories; the community is a company town. The industrial targets are clustered at three points: (1) Miike Harbor, (2) Omuta River Mouth, and (3) East Omuta. These are connected by the Mitsui Mines RR which swings in a loop southward from Omuta then westward from the Manda Mines (TARGET 1278).

However, the whole concentration of targets except at Miike lies within an area of one square mile.

The population density is about 65,000 per sq. mile. The two rivers running through the city form fairly effective fire-breaks, dividing the city into three sections. The main railroad covering all Kyushu from Moji to Kagoshima passes through the center of the city.

The industries represented in Omuta are chemicals, synthetic oil, coal, coke and by-products, electric power, land and sea transportation, and zinc.

4. IMPORTANCE: Omuta with the adjacent coal port of Miike and the underlying coal fields, is one of the most important chemical centers of the Empire, producing such things as coke by products, acids, explosives, and fertilizers. Wet coal mines make power, furnished by four plants in and around the city, of vital importance, as constant pumping is required. The flooded mines would take months to get back into operation. As a shipping port for coal, Omuta is one of the first in Japan Proper. As the site of one of their 10 largest synthetic oil refineries, a major source of Empire zinc refining, it stands out as one of the top concentrations in Kyushu. Coal represents 90% of its exports; most of its imports are raw materials for the significant Mitsui processing plants.

List of targets inside the fire zone (Ref. sketch)

ZONE 1:

1249 - OMUTA No. 1 Steam Power Plant - 34,000 KW supplying power for coal loading equipment, pumping mines, etc. See above, Section 4, for strategic value of these power plants.

ZONE II:

- RR Station

Kanegafuchi Spinning Mill (perhaps converted to war industry)

ZONE III:

1256 - Miike Machinery Works - Large plant manufacturing and repairing vital colliery machinery, pumps, etc. Loss of this plant would have an inevitable effect on the ability of the community to make a comeback after an attack.

The following targets are outside of the fire zones, though they abut so closely on their edges that for purposes of illustration they are listed according to the Incendiary Zones which they border.

TARGETS ADJACENT TO ZONE I:

1254 - Miike Harbor - Extremely important coal exporting port with excellent facilities. Even its temporary loss would cause the gravest shortage.

1595 - Omuta No. 2 Steam Power Plant - 162,000 KW, serving the Wet Dock lock gate electric rail and loading equipment as well as varied industrial installations. See above, Section 4, for strategic value of these power plants.

1268 - Mitsui RR Workshops - Repair and maintenance of the mines' RR equipment. A highly critical installation whose loss would be immediately felt.

1279 - Yotsuyama Mine - Largest coal mine in Miike Colliery Co. network. Attack on surface installations and by flooding are the only possible methods of damaging it.

1278 - Manda Mine - Very large wet mine, where attack on the power pumping facilities would result in flooding.

TARGETS ADJACENT TO ZONE II:

1262 - Mitsui Coal Liquefaction Plant - Large synthetic oil plant making gasoline, diesel oil, lubricating oil, some aviation gasoline. 80,000 barrels per year, about 5% of Jap total.

1260 - Mitsui Zinc Distillery - The largest high grade zinc plant in the Empire, it has an estimated annual capacity of 31,000 tons. Very large secondary production of sulphuric acid. This considerable zinc processing is a valuable asset not only to the chemical industries of Omuta but to all Japan.

1246 - Electro Chemical Industry - Carbide, cyanamide, metallic silicon, small coke output. An important series of installations whose machinery and equipment would be difficult to replace.

1261 - Mitsui Electrolytic Zinc Refinery - Very important refinery producing 6,000 tons of high grade zinc and a large quantity of sulphuric acid. Its elimination would lower total Jap capacity by some 11%.

1243 - Miike Dyestuffs - All types of chemicals produced from coal tar derivatives. The coke ovens here supply not only this plant but also the two Oriental High Pressure plants nearby. Loss of these ovens would close down all three factories, reduce much of the town's usefulness to the Japs.

TARGETS FARTHER REMOVED FROM ZONE II:

1245 - Oriental High Pressure, Plant B - Large production of sulphuric acid, ammonium sulphate. Destruction of the synthetic ammonia plant alone would greatly impair use of the whole installation.

1244 - Oriental High Pressure, Plant A - An estimated 1943 production of 37,500 tons of ammonia. Also nitric acid and other nitrogen products. Water gas plant, gas holders, and boilers are particularly vulnerable, and, destroyed, would go far to closing down this valuable plant.

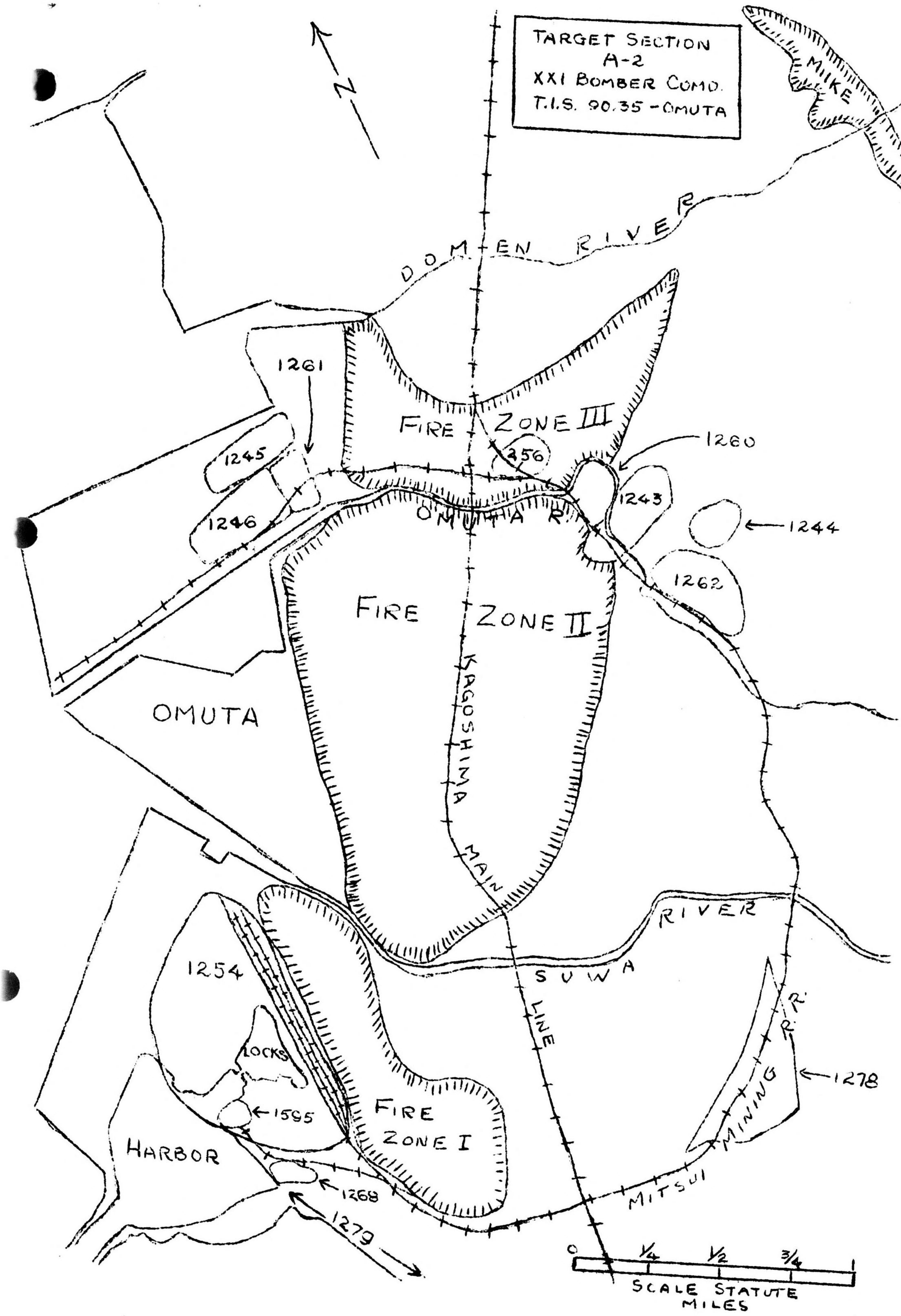
PERHAPS OUT OF CITY PROPER, BUT IN CITY GENERAL AREA:

1877 - Toyo Aluminum Co. - Little known but apparently sizeable alumina plant. Present shortage indicates extra importance, and its loss would be far reaching.

2093 - East Omuta Munitions Storage - Large stores in eastern outskirts.

13 June 1945.

Target Section, A-2
XXI Bomber Command


TARGET SECTION
A-2
XXI BOMBER COMD.
T.I.S. 90.35 - OMUTA
N
MIKE
DOMEN RIVER
1261
1245
1246
FIRE ZONE III
256
1260
1243
1244
1262
OMUTA R.
FIRE ZONE II
OMUTA
KAGOSHIMA MAIN
1254
LOCKS
1595
FIRE ZONE I
HARBOR
1268
1279
SUWA RIVER
SUWA LINE
MINING R.
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SCALE STATUTE MILES

By HR-87 NARA Date 1/10/91

JOINT TARGET GRP. WASHINGTON, D. C.
URBAN AREA MOSAIC

OMUTA — JAPAN

Clear Mosaic

RESTRICTED

ILLUSTRATION No. . . . . OMUTA—PM
DATE . . . . . 21 May 1945

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Omuta material.

Scale 1:25,000

1/2 0 1 Statute Mile

1/2 0 1 Nautical Mile

500 0 1000 2000 Meters

500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIn, ZONE "C"
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

POLYCONIC PROJECTION

RESTRICTED

Prepared under the direction of the Aeronautical Chart Service by Aero Service Corp., Phila., Pa. 1945
Mosaic Controlled by average fit to best available map source.
Aerial photographs flown by U.S.A.A.F., June 1944-Jan. 1945 (Sorties): 5MF 8 12"V, 5MF 8 24"V, 4MR 15 24"V

Reliability of grid pinpoints due to local minor disagreement between photo map and topographic map.

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Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point "P" on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH, as plotted on the degree scale at the north edge of the map.

APPROXIMATE MEAN DECLINATION 1945 FOR CENTER OF SHEET
ANNUAL MAGNETIC CHANGE: WESTERLY

OMUTA — PM

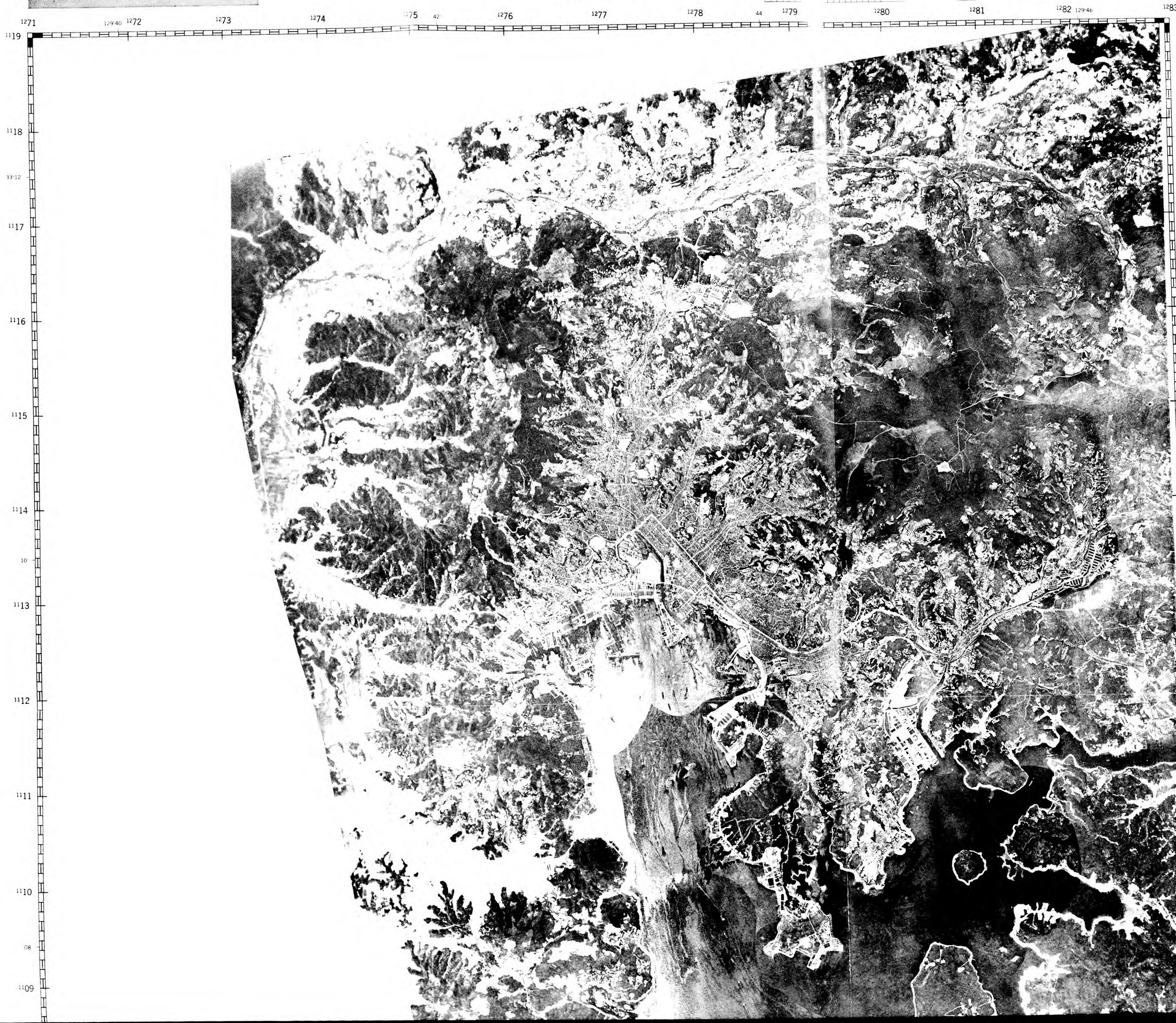
RESTRICTED

JOINT TARGET GROUP, WASHINGTON, D. C.
URBAN AREA MOSAIC

SASEBO — JAPAN

Clear Mosaic

ILLUSTRATION No. . . . . **SASEBO—PM**
DATE . . . . . **21 May 1945**



Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Sasebo material.

Scale 1:25,000

½ 0 1 Statute Mile

½ 0 1 Nautical Mile

500 0 1000 2000 Meters

500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIn, ZONE C
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

POLYCONIC PROJECTION

Prepared under the direction of the Aeronautical Chart Service by Aero Service Corp., Phila., Pa. 1945
Mosaic Controlled by average fit to best available map source.
Aerial photographs flown by A.S.A.A.F., June 1944.
(Sorties) 4MC-39 24"V, 4MC-39 6"V.

Reliability of grid uncertain due to local minor discrepancy between photo map and topographic map.

Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point 'P' on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH as plotted on the degree scale at the north edge of the map.

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SASEBO — PM

JOINT TARGET GROUP, WASHINGTON, D. C.

URBAN INFORMATION SHEET

Sheet No. Shimizu/TI
Date 2 March 1945
Page No. 1

Objective Folder 90.16, 18, 21
Objective Area 90.18
Air Target System: Urban Area

Lat.: 35°00'N
Long.: 138°31'E

SHIMIZU

JAPAN

(Pre-Attack Assessment)

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET SYSTEM FOLDER—JAPANESE URBAN AREAS

SIGNIFICANCE

Shimizu is the only deep-water harbor between Tokyo and Nagoya. With a pre-war population of 68,000 and ranking seventh among Japanese ports in value of overseas trade, Shimizu also handled, by way of the double-track Tokaido RR, a considerable volume of coal and other coastwise traffic for Hamamatsu, Shizuoka, and Numazu—all now war industry centers.

Shimizu is the site of a sizeable steam power station and Japan's largest alumina plant, which uses imported bauxite and primarily supplies Target 90.18–1177* (Japan Light Metals, Aluminum Plant) at Kambara, 10 miles NE. Aircraft components plants, boat-building and repair yards, minor oil refining facilities, lumber mills and food-packing plants constitute the other industry. Reconnaissance has confirmed reports that fleet units use Shimizu at intervals.

DESCRIPTION AND LAY-OUT

Shimizu is located at the head of Suruga Bay, midway between Tokyo and Nagoya on the main railroad and highway connecting these centers. To the E, Miho Point (site of the alumina plant, power station and boatyards) protects the harbor and extensive anchorage area, which can accommodate vessels drawing 30 feet. The town proper extends along the Tomoye River, the Tokaido RR and the wharves on the western edge of the harbor. In addition to the rail sidings and handling facilities near the station, a spur leads around the shallow southern end of the bay to industries and military storage areas on Miho Point. Dockside warehouses are also served by rail. An electric line and improved highway as well as the Tokaido RR lead to Shizuoka city 8 miles SW.

TARGETS AND OTHER SIGNIFICANT INSTALLATIONS

(See Shimizu/PA)

Reference No.	Name	Comment
1	Revetted storage area.	
2	Barracks.	
3	Boat-building yard.	
4	Small seaplane hangar and ramp.	
5	Target 90.18-1176*—Japan Light Metals Alumina Plant.	No evidence of conversion to processing of non-bauxite ores.
6	Shimizu Steam Power Plant	Reported 30,000 KW Capacity.
7	Kamazashi boat-building and repair yard.	Small drydock.
8	Boat-building yard.	
9	Ito Seisakusho	Iron works for nearby boat-building and repair yards.
10	Small shipyard	4 slipways, 270 to 400 feet long.
11	Military camp.	
12	Boat-building yard	7 slipways up to 250 feet long.
13	Log-pond, sawmill and lumber storage.	
14	Target 90.18-2023—Sumitomo Light Metals, Shimizu Plant.	New plant reported producing plywood and alloy aircraft components.
15	Barracks.	
16	Unidentified	Reported related to No. 14.
17	Canneries and other small plants.	
18	Warehouse and dock area	Docks N of Tomoye River and at Target 90.18-1176 have electric cranes and can accommodate vessels drawing 30 feet. Wharfage S of River reported dredged to 23 feet. Boat basin at N end of area has bulk coal-transferring facilities. Extensive lighterage facilities available.
19	Honan Vegetable Oil Plant	Sizeable output of edible oils and substitute lubricants.
20	Toa Refinery	Small oil refinery; limited storage.
21	Tokai Boatyard	Builds and repairs steel and wooden boats.
22	Small machine shops and woodworking plants.	
23	Shimizu plant of Fuji Engineering Co.	
24	Shimizu RR Station and Yards	Freight sheds and transshipping facilities.
25	Oriental Can Co, Shimizu Plant	Supplies local vegatable and fish canneries.
26	Unidentified light industries	
27	Koito Engineering Works	Produces starters and other light electrical equipment for Nakajima A/C Co.
28	Reported infantry workshops.	

*Installations for which Target Information Sheets have been completed or are scheduled.

NOTE.—Schools, public buildings, and minor military storage or barracks areas have not been annotated.

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192-T

JOINT
TARGET GROUP
WASHINGTON, D. C.
URBAN AREA MOSAIC

SHIMIZU — JAPAN

Clear Mosaic (Uncontrolled)

0 1500 3000 4500 6000 ft.

1:25000 Approx.

RESTRICTED

ILLUSTRATION No. . . . . **SHIMIZU/PM**

ISSUED . . . . . **26 April 1945**

PHOTOGRAPHED . **5 November 1944**

Holders of Joint Target Group folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Shimizu material.

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RESTRICTE

CONFIDENTIAL

JOINT TARGET GROUP
WASHINGTON, D. C.
URBAN AREA MOSAIC

SHIMIZU — JAPAN

Annotated Mosaic (Uncontrolled)

0 1500 3000 4500 6000 ft.

1:25000 Approx.

ILLUSTRATION No. . . . . **SHIMIZU/PA**

ISSUED . . . . . **26 April 1945**

PHOTOGRAPHED . **5 November 1944**

Holders of Joint Target Group folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Shimizu material.

Reference No.	Name	Comment
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2	Barracks.	
3	Boat-building yard.	
4	Small seaplane hangar and ramp.	
5	Target 90.18-1176*—Japan Light Metals Alumina Plant.	No evidence of conversion to treatment of non-bauxite ores.
6	Shimizu Steam Power Plant.	Reported 30,000 KW capacity.
7	Kamazashi boat-building and repair yard.	Small drydock.
8	Boat-building yard.	
9	Ito Seisakusho.	Iron works for nearby boat-building [illegible] yards.
10	Small shipyard.	4 slipways, 270 to 400 feet long.
11	Military camp.	
12	Boat-building yard.	7 slipways to get 250 feet long.
13	Log-pond, sawmill and lumber storage.	
14	Target 90.18-2023—Sumitomo Light Metals, Shimizu Plant.	New plant reported producing plywood [illegible] alloy aircraft components.
15	Barracks.	
16	Unidentified.	Reported related to No. 14.
17	Canneries and other small plants.	
18	Warehouse and dock area.	Docks on Tomoye River and at Target 90.18-1176 have electric cranes and can accommodate vessels drawing 30 feet. Entrance channel S of River is dredged to 25 feet. Boat basin at head of area has bulk coal-transferring facilities. Extensive lighterage [illegible] available.
19	Honan Vegetable Oil Plant.	Sizeable output of edible oils and [illegible] lubricants.
20	Toa Refinery.	Small oil refinery; limited storage.
21	Takai Boatyard.	Builds and repairs steel and wooden boats.
22	Small machine shops and woodworking plants.	
23	Shimizu plant of Fuji Engineering Co.	
24	Shimizu RR Station and Yards.	Freight sheds and transshipping facilities.
25	Oriental Can Co., Shimizu Plant.	Supplies local vegetable and fish canneries.
26	Unidentified light industries.	
27	Kaita Engineering Works.	Produces starters and [illegible] light electrical equipment for Nakajima A/C.
28	Reported infantry workshops.	

*Installations for which Target Information Sheets have been completed or are scheduled.

NOTE:—Schools, public buildings, and minor military storage or barracks areas have not been annotated.

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JOINT TARGET GROUP
WASHINGTON, D. C.
URBAN AREA MOSAIC

SHIMIZU — JAPAN

Clear Mosaic (Uncontrolled)

0 1500 3000 4500 6000 ft.

1:25000 Approx.

ILLUSTRATION No. . . . . **SHIMIZU/PM**

ISSUED . . . . . **26 April 1945**

PHOTOGRAPHED . **5 November 1944**

Holders of Joint Target Group folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Shimizu material.

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NOT TO BE TAKEN INTO THE AIR ON COMBAT MISSIONS

TARGET: 90.18 - Shizuoka City

OBJECTIVE AREA: 90.18 - SHIZUOKA

T A R G E T I N F O R M A T I O N S H E E T

SHIZUOKA CITY

Latitude: 34° 59' N
Longitude: 138° 23' E
Elevation: 65 Feet

1. SUMMARY COMMENT: A trading and marketing center of an agricultural area, Shizuoka has become more and more industrialized. The city is on the main Tokaido line and has some small railroad shops. It produces aircraft parts, paper, machinery, power and textiles.

2. LOCATION AND IDENTIFICATION: About 85 miles southwest of Tokyo, Shizuoka is nearly halfway down the west side of Suruga Bay, three miles inland from the coast. The Abe River flows through the western outskirts of the town to empty into the bay at a point south of Shizuoka. To the east a range of hills sets it off from Shimizu, the port that serves it. Irregular in outline, measuring about 2½ miles north to south, and 1½ miles east to west, Shizuoka occupies ground around the foot of two ridges of hills. The old castle grounds in the center provide the most notable feature of the city plan.

3. TARGET DESCRIPTION: Though not highly industrialized, Shizuoka is a compact city of 212,198 population in an area of about 3½ square miles. Most of the town lies north of the Tokaido railroad line, clustered about the castle grounds, now occupied by governmental and military offices. The Shizuoka Aircraft Engine Plant (TARGET 2011), formerly the most important objective in the city, was 86% destroyed on the strike of 12 April. Remaining industries include the Sumitomo Light Metals Co. Plant (TARGET 2024), slightly damaged, railroad shops, iron works, a power plant, paper mill and two spinning mills. An interesting and recent proof of its inflammability was furnished in 1940, when a fire starting in a bakery spread rapidly and destroyed 6,000 houses. The average population density is about 60,000 per square mile.

4. IMPORTANCE: The largest city on the south coast of Honshu between Yokohama and Nagoya, Shizuoka processed much of Japan's tea output in peacetime. Situated on the Tokaido line, it has attracted some war industry:

2011 - SHIZUOKA AIRCRAFT ENGINE PLANT - 86% destroyed or damaged; no apparent effort to repair or replace facilities.

2024 - SUMITOMO LIGHT METALS CO. PLANT - No exact information available on products; may be aircraft parts, sheet aluminum. There are large sources of alumina produced nearby, at Shimizu and Kambara.

TOYO SPINNING MILL
SANKO SPINNING MILL - These plants may have been converted.

OGURO AMMUNITION STORAGE DEPOT

PAPER MILL

MARAKURI IRON WORKS

SHIZUOKA RAILROAD SHOPS

GAS WORKS

POWER PLANT

5. AIMING POINTS: Aiming points will be specified in the Field Order.

14 June 1945

TARGET SECTION, A-2,
XXI BOMBER COMMAND.

CONFIDENTIAL

Sheet No. Shizuoka-TI
Date 5 March 1945
Page No. 1

Obj. Folder 90.16, 18, 21
Obj. Area 90.18
Air Target System Urban Area

Lat.: 35°57′N
Long.: 138°24′E

SHIZUOKA CITY

JAPAN

(Pre-Attack Assessment)

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET SYSTEM FOLDER JAPANESE URBAN AREAS

SIGNIFICANCE

Shizuoka City, prefectural capital and tea-packing center, had a pre-war population of 212,000. An old-time infantry training center, its strategic importance is focussed on two new war plants located directly east of the city—a Mitsubishi aircraft engine works and a related Sumitomo components plant. One of the city's textile mills along with small iron works, etc., are reported now devoted to war production.

DESCRIPTION AND LAYOUT

Shizuoka is located midway between Tokyo and Nagoya on the narrow coastal plain west of Suruga Bay. The broad Abe River which borders Shizuoka on the west is not suitable for navigation, but the city is served by the double-track Tokaido railroad and a trunk highway, both of which lead through the deep-water port of Shimizu, located 8 miles northeast. In addition to the barracks in the former Castle grounds, new military installations have been constructed northeast of the city.

The textile mills and new aircraft plants are located outside the city proper to the east, but considerable warehousing and light industry is intermixed with residences in the west section of the built-up area and adjacent to the railroad. A sizeable part of the central residential/commercial section was burned out in 1940. As rebuilt, this area—extending from the railroad to the Castle grounds—is considerably less congested than adjoining sections of the city.

TARGETS AND OTHER SIGNIFICANT INSTALLATIONS

(See Shizuoka/PA)

Reference No.	Name	Comment
1	Unidentified industry	Annotated as No. 28 on Shimizu mosaic.
2	Infantry workshops and loose stores.	Reported serving Shizuoka infantry barracks.
3	New railroad spur	Possibly leading underground.
4	Barracks	
5	Sanko textile mill	No evidence of conversion.
6	Marukuni Iron Works	Reported making castings for Nakajima Aircraft Co.
7	Transformer station	
8	New gas works	Serving target 90.18-2011.
9	Toyo textile mill	Report of conversion by Army to unidentified war production.
10	New construction	Adjoining former Toyo textile mill.
11	Target 90.18-2011*—Shizuoka Aircraft Engine Works.	New Mitsubishi plant. Estimated ultimate production rate of 500/600 engines per month.
12	Target 90.18-2024—Sumitomo Light Metals, Shizuoka Plant.	Unidentified aircraft components.
13	Ogura ammunition storage	
14	Gas works	
15	Shizuoka railroad yards and shops.	
16	Shizuoka Castle Infantry Barracks.	
17	Drill field	
18	Light industry district	Predominantly tea and vegetable packing plants.
19	Waterworks	
20	Probable textile mill	
21	New residential/commercial construction.	Rebuilt after destruction by fire in 1940.

*Installations for which Target Information Sheets have been completed or are scheduled.

NOTE.—Schools, public buildings, and minor military storage or barracks areas have not been annotated.

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159-T—178-T

RESTRICTED

SHIZUOKA — JAPAN

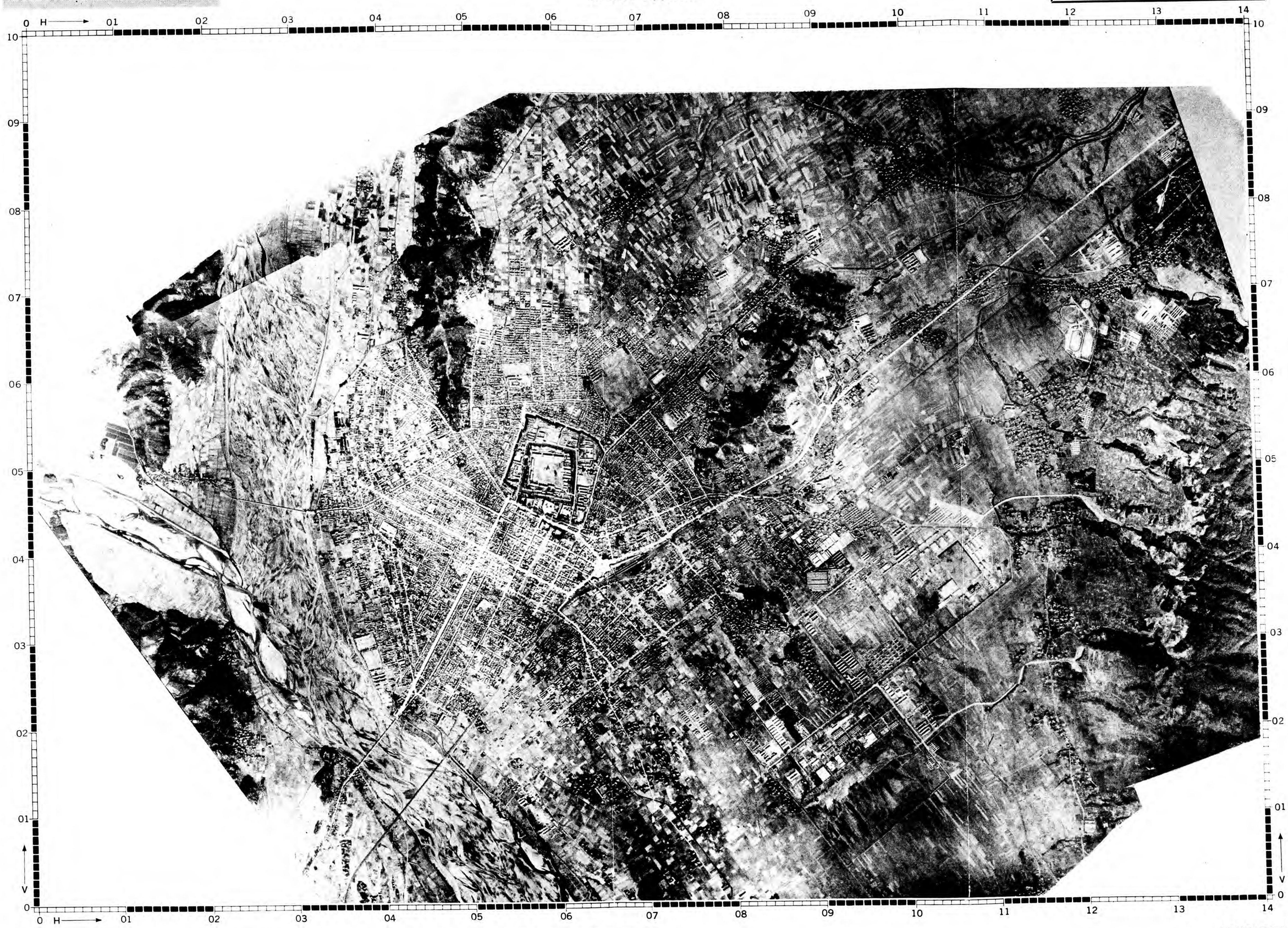
Clear Mosaic (Uncontrolled)

0 1500 3000 4500 6000 ft.

1:25000 Approx.

JOINT TARGET GROUP
WASHINGTON, D. C.
URBAN AREA MOSAIC

ILLUSTRATION No. . . . SHIZUOKA/PM
ISSUED . . . . . 26 April 1945
PHOTOGRAPHED . 5 November 1944



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JOINT TARGET GROUP
WASHINGTON, D. C.
URBAN AREA MOSAIC

SHIZUOKA — JAPAN

Annotated Mosaic (Uncontrolled)

0 1500 3000 4500 6000 ft.

1:25000 Approx.

ILLUSTRATION No.... **SHIZUOKA/PA**

ISSUED..... **26 April 1945**

PHOTOGRAPHED. **5 November 1944**

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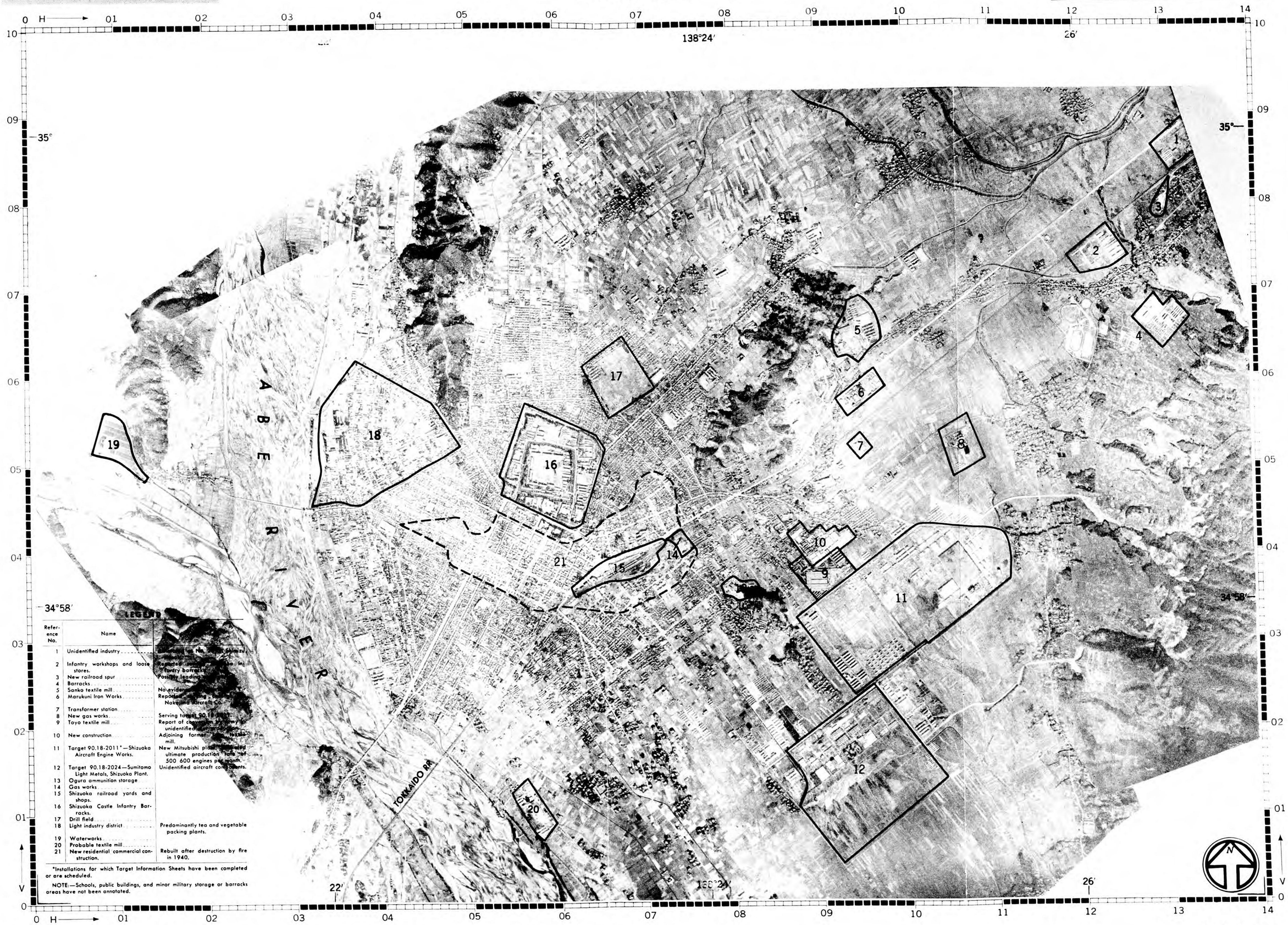

Reference No.	Name	
1	Unidentified industry	[illegible]
2	Infantry workshops and loose stores.	Reported [illegible] infantry barracks.
3	New railroad spur	Possibly leading to [illegible]
4	Barracks	
5	Sanko textile mill	No evidence [illegible]
6	Marukuni Iron Works	Reported [illegible] Nakajima Aircraft Co.
7	Transformer station	
8	New gas works	Serving target 90.18-2011
9	Toyo textile mill	Report of conversion [illegible] unidentified [illegible]
10	New construction	Adjoining former [illegible] mill.
11	Target 90.18-2011*—Shizuoka Aircraft Engine Works.	New Mitsubishi plant [illegible] ultimate production rate of 500 600 engines per month.
12	Target 90.18-2024—Sumitomo Light Metals, Shizuoka Plant.	Unidentified aircraft components.
13	Ogura ammunition storage	
14	Gas works	
15	Shizuoka railroad yards and shops.	
16	Shizuoka Castle Infantry Barracks.	
17	Drill field	
18	Light industry district	Predominantly tea and vegetable packing plants.
19	Waterworks	
20	Probable textile mill	
21	New residential commercial construction.	Rebuilt after destruction by fire in 1940.

*Installations for which Target Information Sheets have been completed or are scheduled.

NOTE.—Schools, public buildings, and minor military storage or barracks areas have not been annotated.

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90:17-3600—TI**
DATE . . . . . **19 May 1945**
PAGE **1**

TARGET No. . . **90:17-3600**
OBJ. AREA **90:17**
OBJ. FOLDER No. **New Target**
CATEGORY . . **Urban Industrial Concentration**

LAT. . . . . **35°45'N**
LONG. . . . . **139°44'E**
ALT. . . . . **15 to 82 feet**

TOKYO URBAN INDUSTRIAL CONCENTRATION No. 1

TOKYO **JAPAN**

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90:17-3600 material.

SIGNIFICANCE

This industrial concentration contains the Tokyo Arsenal complex, which centers about Target 206, specializing in the production of light automatic weapons and fire control apparatus and Target 205, specializing in the manufacture of explosives. The complex contains installations for the production of ammonium nitrate, army field radio and communications equipment, shell loading and storage facilities for munitions, clothing and other military supplies. The selected area contains the Tokyo Optical Instrument Co. (Target F) an important producer of lenses and precision equipment used in automatic weapon fire control. Small capacity for production of aircraft components and specialty steels exists in the selected target area.

A damage assessment has not been made for the area attack of 14 April directed against this concentration. A tentative examination of partial post-attack cover indicates that damage from the attack was concentrated mainly in the lower two-thirds of the target area and west of the main arsenal buildings. References to damage shown under "Description and Product" on pages 3, 4, 5, 6 and 7 are based on inadequate cover and incomplete study of damage photography.

LOCATION

The selected area is bounded on the south by a double track rail line entering the Tobata-Nippori RR Yards near their southern limit. The eastern boundary extends from this point almost due north to the Ara River. From here the limits extend along the Ara River to the Akabane RR Bridge across the Ara River. At this point the northern limits follow generally the Ara River to a wide highway which marks the western limits of the selected area. The area contains 10.6 square miles.

DESCRIPTION AND LAYOUT

The greatest industrial concentration lies in the upper two-thirds of the target area and in that section east of the rail line bisecting the area from north to south. The area west of the rail line and in the southern part of the concentration consists mainly of dwellings. Large areas of residential structures are also to be found in the north-central portion of the target area and around the western boundary.

Primary firebreaks include a double track rail line running northwest bisecting the area, the Sumida River which cuts off a small section on the east, and many firebreaks around industrial installations. The western half of the area has an elevation approximately 50 feet above the average elevation of the eastern half, which difference reduces the vulnerability of the area as a whole to conflagration.

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90:17-3600—TI**
DATE . . . . . **19 May 1945**
PAGE **2**

CONSTRUCTION AND VULNERABILITY

(Refer to Illustrations No. 90:17-3600 P4 and P5). The following table lists characteristics of the target prior to any attack. For approximate extent of destruction through 16 April 1945 refer to Illustration No. 90:17-3600 P5.

	Principal Targets										Other industrial areas*	Total industrial areas*
	90:17-201*	90:17-204*	90:17-205*	90:17-206*	90:17-217*	90:17-1358*	E*	F*	J*	AV*		
Site area, 1000's of sq. ft.	2290	2670	6450	4060	1510	450	520	570	690	1090	44010	64310
Percent of site area built up	10%	40%	20%	30%	20%	50%	20%	30%	20%	30%	27%	25%
Total plan area of buildings, 1000's of square feet	229	1066	1290	418	302	225	104	171	138	327	11692	15962
*HE vulnerability:***												
V1 (least vulnerable)	....	....	....	....	....	....	....	....	....	....	....	....
V2	....	10%	....	20%	....	....	....	....	....	60%	....	2%
V3	....	....	....	....	....	....	....	....	....	....	....	....
V4	100%	60%	100%	50%	100%	100%	100%	100%	100%	40%	90%	88%
V5 (most vulnerable)	....	30%	....	30%	....	....	....	....	....	....	10%	10%
IB vulnerability:												
Combustibility of buildings:												
Fire resistant (R)	....	10%	....	....	....	....	....	....	....	....	....	1%
Noncombustible (N)	....	50%	20%	40%	60%	40%	60%	40%	30%	80%	40%	40%
Combustible (C)	100%	40%	80%	60%	40%	60%	40%	60%	70%	20%	60%	59%
Portion of target (bldgs., and contents) susceptible to fire damage	100%	60%	95%	80%	75%	75%	65%	80%	90%	45%	80%	80%
Susceptibility to incendiary attack:												
Contents only	Good	Good	Good	Fair	Good	Fair	Fair	Fair	Good	Poor	Good	Good
Buildings & contents	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

*For targets so marked, all data are preliminary estimates only. Detailed structural analyses if prepared later may vary considerably from these preliminary estimates.

**For explanation of HE vulnerability classifications refer to JTG Memorandum No. JTG/M-3/1 dated 26 March 1945 (nontechnical) or JTG/M-8 (technical).

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90:17-3600 TI page 1.

WEAPON RECOMMENDATIONS

Reference should be made to Weapon Recommendations Sheet No. 90:17-3600 WR-1.

TARGET INFORMATION

Target No. or Reference	Name	Description and Product
90:17- 201	Ordnance Storehouse Ammunition	Shell loading and storage. Also possible manufacture of initiators.
90:17- 202	Army Central Clothing Depot	Military stores of clothing and other military goods. Believed damaged in area attack of 14 April.
90:17- 203	Ordnance Supply Depots	Possible non-HE ammunition or propellant powder storage.
90:17- 204	Japan Artificial Fertilizer Co. (now Nissan Kagaku Kogyo)	Large producer of phosphate fertilizers, sulphuric acid and ammonium nitrate used in the manufacture of amatol HE.
90:17- 205	Army Arsenal and Military Gunpowder Wks.	Believed main plant of Tokyo No. 2 Arsenal which is believed to be a principal producer of wide variety of explosives. Target 205 devoted primarily to manufacture of black powder and the loading of fuses, primers and initiators. Administrative headquarters for N Tokyo Arsenal Complex.
90:17- 206	Army Arsenal	Main factory of Tokyo No. 1 Arsenal. Target 206 believed to manufacture light automatic weapons, barrage mortars, fuses, primers, gunsight finders, and Army field radio and communications equipment on a small scale. Moderate damage to secondary buildings in area attack of 14 April.
90:17- 207	Military Gunpowder Works	Probable storage and light manufacture related to Target 206. HE or propellants production unlikely.
90:17- 208	Army Branch Powder Factory	Probable light manufacture related to Target 206. Heavily damaged in area attack of 14 April.
90:17- 209	Military Works	Ordnance manufacture related to Target 206. Damaged in area attack of 14 April.
90:17- 217	Powder Factory (Oji Plant of Nippon Kwayaku Seizo)	Probable fabrication of fuse and other ordnance components. Powder manufacture unlikely.
90:17- 218	Ordnance Storehouse	Storage of ordnance items.
90:17- 224	Tobata-Nippori RR Yards	Large marshalling yards serving main N Japan routes. Shop facilities and several factories located within yard area. Damaged in area attack of 14 April.

JOINT TARGET GROUP, WASHINGTON, D. C.

TARGET INFORMATION SHEET

SHEET No. 90:17-3600—TI
DATE . . . . . 19 May 1945
PAGE 3

Target No. or Reference	Name	Description and Product
90:17- 228	Government Steam Power Station	Secondary, standby generating station.
90:17-1358	Riken Heavy Industry Co. (Riken Kogyo)	Precision machinery.
90:17-1368	Akabane RR Bridge and Junction	Controls N bound traffic from Target 224, and from the through line by-passing central Tokyo.
A, B	Manufacturing Installations	– – – – – *
C	Toyo Magnesium Mfg. Co. (Toyo *Magnesium* Kogyo)	Powdered magnesium and castings.
D	Japan Celluloid Co., Tokyo Plant (Dai Nippon Celluloid)	One of five company plants producing nitro-cellulose for celluloid plastics.
E	Tokyo Machine Tool Co. (Tokyo Seiki Kosakusho)	General purpose machine tools.
F	Tokyo Optical Instrument Co. (Tokyo Kogaku Kikai)	Important producer of lenses and precision fire-control instruments.
G, H	Manufacturing Installations	– – – – – *
J	Chuo Manufacturing Co., Oji Plant (Chuo Kogyo)	One of four company plants producing automatic weapons and other ordnance items.
K through P	Manufacturing Installations	– – – – – *
Q	Kayabe Engineering Co.	Aircraft components including landing gear.
R	Gas Holder and Pumping Station	– – – – –
S	Manufacturing Installation	Damaged in area attack of 14 April.*
T	Car Barns	Damaged in area attack of 14 April.
U	Japan Plywood Co.	Damaged in area attack of 14 April.
V	RR Freight Station	– – – – –
W	Manufacturing Installation	Possibly an extension of Target X.
X	Hattori Co., Toshima Plant (Hattori Seisakusho)	One of three company plants producing fire-control and other precision ordnance equipment. Report of production of special high speed drills unconfirmed. Damaged in area attack of 14 April.
Y	Nagata Precision Co. (Nagata Seiki)	Precision light metal components for aircraft.
Z	Pilot Fountain Pen Co.	Aircraft components.
AA	Imperial Hemp Co., Oji Plant (Teikoku Seima)	Rope and burlap. Damaged in area attack of 14 April.
AB through AG	Manufacturing Installations	– – – – – *
AH	Rangi Spring Works	– – – – –
AJ, AK	Manufacturing Installations	– – – – – *
AL	Hodogaya Chemical Co., Oji Plant (Hodogaya Kagaku Kogyo)	– – – – –
AM through AU	Manufacturing Installations	– – – – – *
AV	Toho Steel Fabricating Co. (Toho Kogyo)	– – – – –
AW	Tokushu Light Metals Co. (Tokushu Gokin)	Special alloy castings and forgings.
AX	Japan Felt Co. (Nippon *Felt*)	Large producer of specialized felt products.
AY	Glycerine Works	– – – – –
AZ	Toyo Spinning Mill	– – – – –

*Products as yet unidentified.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90:17-3600 TI page 2.

JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

Target No. or Reference	Name	Description and Product
BA	RR Car Shops	Maintenance facilities for inter-urban cars. Damaged in area attack of 14 April.
BB	Japan Artificial Leather Co. (Nippon Gikwa Seizo)	– – – – –
BC	Oji Paper Co., Jugo Plant	Bond paper.
BD	Japan Oil and Fat Co. (Nippon Yushi)	Important producer of glycerine and special lubricants. Damaged in area attack of 14 April.
BE	Manufacturing Installation	– – – – – – *
BF	Riken Mfg. Co., Arakawa Plant (Riken Jukogyo)	Precision fabricating for Tokyo Arsenal. Damaged in area attack of 14 April.
BG	Kyoyo Abrasives Co.	Damaged in area attack of 14 April.
BH through BL	Manufacturing Installations	Damaged in area attack of 14 April.*
BM	Oji Paper Co., Oji Mill	Special papers for government securities and paper money. Damaged in area attack 14 April.
BN	Manufacturing Installation	Damaged in area attack of 14 April.*
BO	Toyo Spinning Co., Oji Mill	Cotton Mill. No evidence of conversion.
BP through BR	Manufacturing Installations	Damaged in area attack of 14 April.*
BS	Car Barns	Damaged in area attack of 14 April.
BT BU	Manufacturing Installations	Damaged in area attack of 14 April.*
BV	Steel Fabricating Works	Damaged in area attack of 14 April.
BX through BZ	Manufacturing Installations.	Damaged in area attack of 14 April.*
CA	Manufacturing Installation	– – – – – *
CB	Government Printing Works	Damaged in area attack of 14 April.
CE	Manufacturing Installation	Damaged in area attack of 14 April.*
CF	Car Barns	Damaged in area attack of 14 April.
CG	Car Barns	Damaged in area attack of 14 April.

*Products as yet unidentified.

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90:17-3600 TI page 3.

JOINT TARGET GROUP, WASHINGTON, D. C.
WEAPON RECOMMENDATIONS SHEET

SHEET No. **90.17-3600-WR1**
DATE . . . . . **19 May 1945**
PAGE **1**

TARGET No. . . **90.17-3600**
OBJ. AREA **90.17**
OBJ. FOLDER No. **New Target**
CATEGORY . . . **Mixed Ind. Concentration, Urban Industrial Concentration**

LAT. . . . . **35° 45′ N**
LONG. . . . . **139° 44′ E**
ALT. . . . . **50 to 82 feet**

TOKYO URBAN INDUSTRIAL CONCENTRATION NO. 1

TOKYO JAPAN

HIGH AND MEDIUM ALTITUDE ATTACK

(See also 90.17-3600-TI and associated target illustrations.)

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90.17-3600 material.

INTRODUCTION

This Weapon Recommendations Sheet applies to a high or medium altitude attack against designated industrial plants (see Table II below) within Tokyo Urban Industrial Concentration No. 1 (see Illustrations No. 90.17-3600 P4, P5). The sheet is based on photography through 17 April 1945.

An estimated 80 percent of the total floor area of the industrial plants can be destroyed by fire. For levels of damage up to 75 percent the recommended attack is primarily with incendiary bombs, with a minimum of high explosive to support the incendiary effort.

The ground densities recommended (see Table I) against the target area are believed sufficient to destroy residential and mixed zones surrounding the industrial plants.

WEAPONS AND FUZING

Incendiaries

The preferred incendiary bombs are the AN-M69 6-lb, AN-M74 10-lb, or AN-M50 4-lb (all in aimable clusters). The AN-M47 70-lb incendiary is an alternative selection, and the AN-M76 500-lb bomb is not recommended.

High Explosives

In support of an incendiary attack the most effective device is an explosive charge and/or white phosphorus cup incorporated in the incendiary bomb. If these are available, no auxiliary HE or fragmentation bombs will be worth the weight of incendiaries displaced.

HE or fragmentation bombs used in support of an incendiary attack should *in no case exceed 10 to 20 percent* of the total load.

As a major weapon. Incendiary attacks are expected to cause serious damage to about 75 percent of the area of industrial plants in the concentration. If it is desired to achieve percentages of serious damage above this level, the use of a combination of HE and IB is necessary (See Table I). The preferred HE weapons in this case are the 500-lb, 1000-lb, and 2000-lb GP, fuzed 0.01 N/ND T.[1] These bombs are approximately equal in effectiveness, on a weight for weight basis, against the V4[2] buildings which are predominant in the principal targets least susceptible to fire damage (see Table II on page 2). Large blast bombs (e.g. 4000-lb LC) probably would be equally or more effective against the targets in this concentration, and could be used if operational considerations permit.

[1] Use 0.1 N fuzes if 0.01 N fuzes are not available, and 0.01 T fuzes if ND tail fuzes are not available. The use of 0.01 N/ND T fuzing is recommended since most of the buildings have light roof material and are best destroyed by blast effects.

[2] For a definition of V4 buildings see JTG/M-3/1 (nontechnical) or JTG/M8 (technical).

ATTACK DATA

Nineteen (19) percent of the area of industrial plants in Tokyo Urban Industrial Concentration No. 1 has been seriously damaged as of 17 April 1945.

Table I below gives the ground densities required to raise this level of serious damage to industrial plants in the target area to the percentages indicated.

TABLE I

Ground Density in Tons/Million Sq. Ft.		Percent Serious Damage to Industrial Plants
HE	IB	
Damage Observed to 17 April 1945		19%
***	1.0	30%
***	2.0	40%
***	3.0	50%
***	4.5	60%
***	7.0	70%
4.0	16.0	80%

*** HE or fragmentation bombs in support of the incendiary attack as specified above under "WEAPONS AND FUZING."

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WEAPON RECOMMENDATIONS SHEET

SHEET No. 90.17-3600-WR1
DATE.....19 May 1945
PAGE 2

Table II below lists the principal plants in Tokyo Urban Industrial Concentration No. 1, the percent of serious damage to each as of 17 April 1945, and the estimated percent of each subject to fire damage.

TABLE II

Industrial Plants			Percent Serious Damage as of 17 April 1945	Estimated percent subject to fire damage (3)
Name	Number	Class		
Army Arsenal and Military Gunpowder Wks.	90.17-205	Armament	0%	90%
Ordnance Storehouse Ammunition	90.17-201	Armament	0%	100%
Japan Artificial Fertilizer Co.	90.17-204	Chemical	0%	55%
Army Arsenal	90.17-206	Armament	10%	70%
Powder Factory	90.17-217	Armament	0%	70%
Tokyo Machine Tool Co.	E	Machine Tools	0%	60%
Tokyo Optical Instrument Co.	F	.....	0%	75%
Chuo Mfg. Co.	K	.....	0%	85%
Riken Heavy Industry Co.	O	Machine Tools	0%	70%
Toho Fabricating Co.	W	Coke-Iron-Steel	0%	40%
Average Other Industrial Plants			26%	80%
AVERAGE ALL INDUSTRIAL PLANTS			19%	80%

(3) Revised 10 May 1945.

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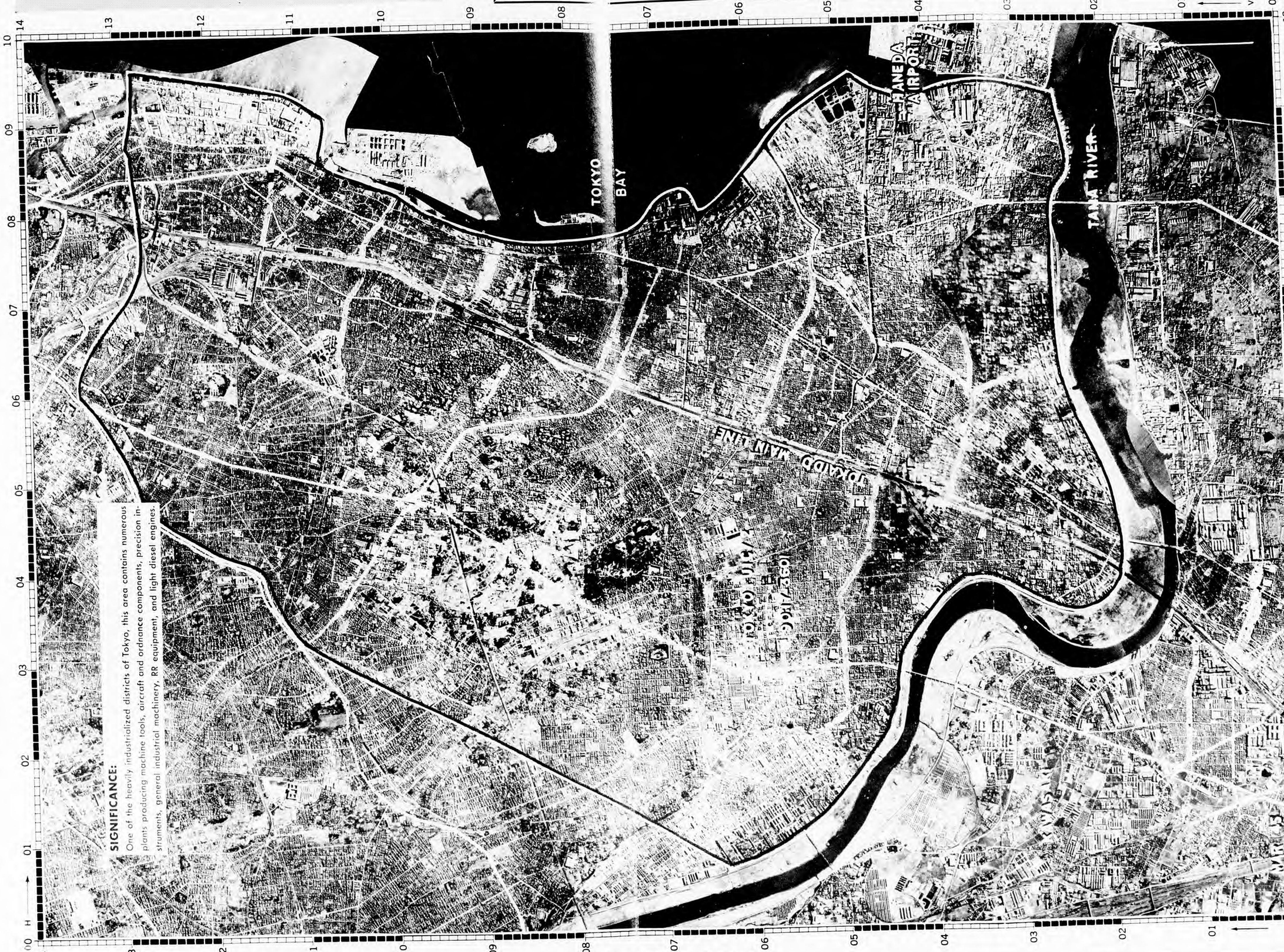
JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET LOCATION SHEET

TOKYO URBAN INDUSTRIAL CONCENTRATION NO 2

TOKYO

JAPAN

SHEET	90:17-3601—TL
DATE	31 May 1945
TARGET	90:17-3601
CATEGORY	Mxt. Ind. Conc.—UIC
COORDINATES	35 34′N 139 43′E
ALTITUDE	10-20 feet



SIGNIFICANCE: One of the heavily industrialized districts of Tokyo, this area contains numerous plants producing machine tools, aircraft and ordnance components, precision instruments, general industrial machinery, RR equipment, and light diesel engines.

SCALE APPROX.: 1:32,000

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By HR-M NARA, Date 1/10/11

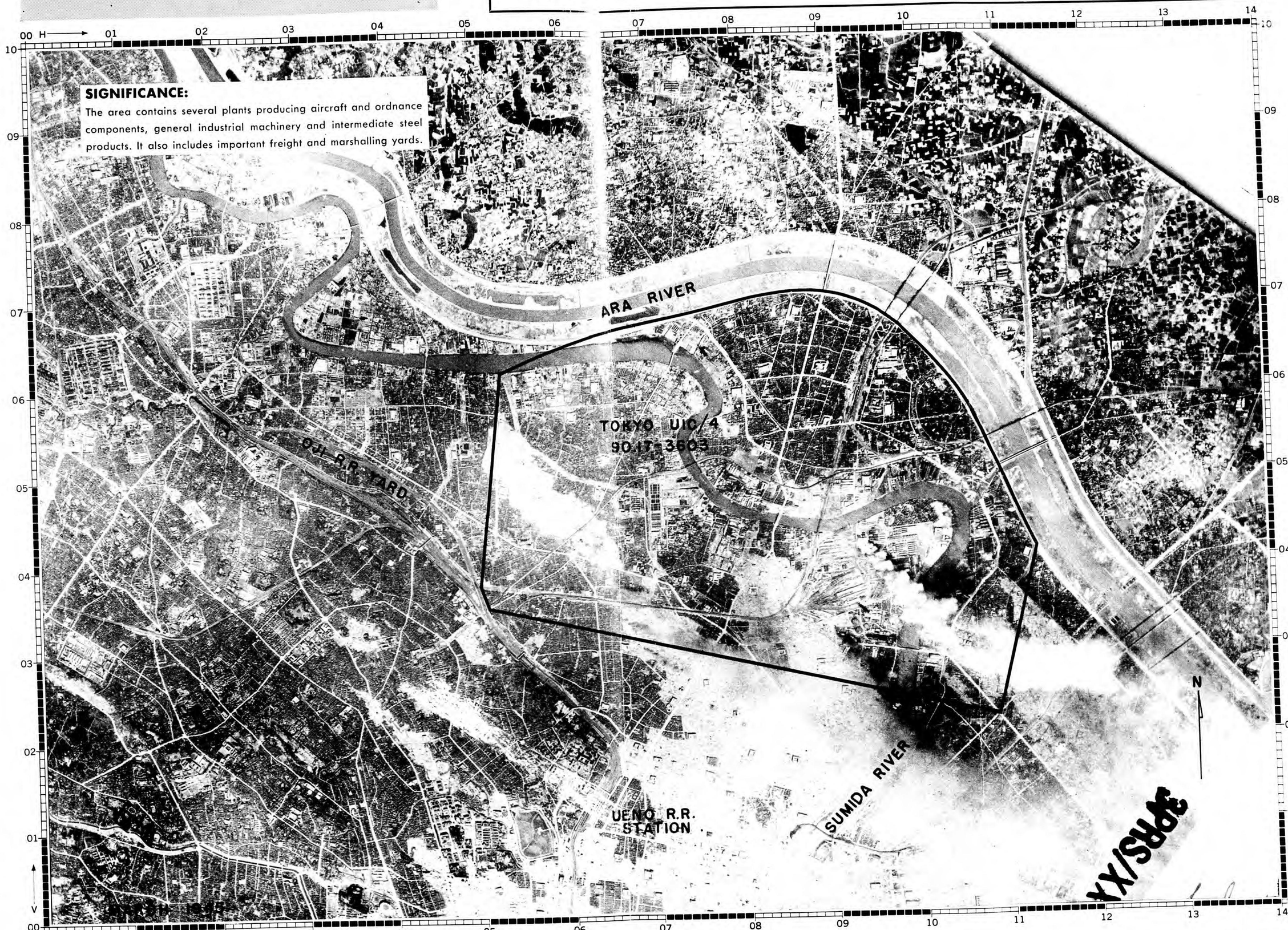
JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET LOCATION SHEET

TOKYO URBAN INDUSTRIAL CONCENTRATION NO. 4

TOKYO JAPAN

SHEET	90:17-3603—TL
DATE	31 May 1945
TARGET	90:17-3603
CATEGORY	Mxt. Ind. Conc.—UIC
COORDINATES	35°44'N 139°48'E
ALTITUDE	10-30 feet

SIGNIFICANCE:
The area contains several plants producing aircraft and ordnance components, general industrial machinery and intermediate steel products. It also includes important freight and marshalling yards.



SCALE APPROX.: 1:29,600

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By NARA. Date

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FIRE SUSCEPTIBILITY PLAN

KOBE, U.I.C.—1, JAPAN
URBAN INDUSTRIAL CONCENTRATION

ILLUSTRATION No.	90.25-3628 P5
DATE	22 May 1945
TARGET No.	90.25-3628
COORDINATES	34°39'N 135°10'E
PHOTOGRAPHED	5 February 1945

0 1000 2000 3000 4000 5000 6000 7000 FEET

0 1/2 1:15,000 APPROX 1 MILE

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Urban Areas with other 90.25-3628 material.

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KOBE, U.I.C.—1, JAPAN
URBAN INDUSTRIAL CONCENTRATION

ILLUSTRATION No.	90.25-3628 P3
DATE	22 May 1945
TARGET No.	90.25-3628
COORDINATES	34°39'N 135°10'E
PHOTOGRAPHED	5 February 1945

0 1000 2000 3000 4000 5000 6000 7000 FEET
0 1/2 1:15,000 APPROX 1 MILE

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Urban Areas with other 90.25-3628 material.

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JOINT TARGET GROUP, WASHINGTON, D. C.

URBAN INFORMATION SHEET

SHEET No. **Tokyo No. 7/TI**
DATE. . . . . **24 April 1945**
PAGE No. **1**

OBJ. FOLDER. **90.17**
OBJ. AREA. **90.17**
AIR TARGET SYSTEM
Urban Area

LAT. . . . . **35°40'N**
LONG. . . . . **139°45'E**

TOKYO No. 7, JAPAN
(PROVISIONAL EDITION)

The Tokyo No. 7 annotated mosaic is the first in a series covering the Tokyo Urban Area. This mosaic covers that part of central Tokyo adjacent to the Imperial Palace and E of the Sumida River, including most of the area subjected to incendiary attack on 10 March 1945. A plot of the destroyed area together with a Damage Assessment Report is in process. Limits of the main area of damage resulting from the 10 March attack extend roughly 5 miles E from the Imperial Palace to the Ara River and approximately 6 miles N from Tokyo Bay to industries around the Sumida RR Yards (Mosaic Reference No. 78). The main burned-out area penetrates marginal sections in the modern public building and commercial district NE and E of the Palace and sporadic residential damage was effected S of the Palace. The attached mosaic does not cover other areas of damage to the W and NW. After elimination of unoccupied land and water areas and undamaged segments, the total area of damage approximates 13.2 square miles.

Only the larger and more important installations have been annotated on the attached mosaic. With a few exceptions, schools, public buildings, military barracks, storage areas, lumber mills, etc. have not been listed. The sections NW and SW of the Palace are predominantly residential but include military establishments and many public buildings. Japan's principal business and financial concerns have their headquarters directly E of the government offices surrounding the Palace, and the main retail and commercial district occupies the area extending E to the Sumida River. Bordering Tokyo Bay S of the central business and commercial district is an industrial zone important for machinery and machine tools, communications equipment, optical and precision instruments, aircraft and ordnance components, as well as trans-shipment and storage facilities.

Prior to 10 March 1945, the area extending N from the main commercial district was one of Tokyo's most congested residential sections and included a large number of small plants engaged primarily in making consumers' goods and a few significant producers of aircraft, ordnance components and precision instruments. The area E of the Sumida River was also heavily built-up but primarily industrial. In addition to the large plants making electrical equipment, ordnance, aircraft parts, machine tools, marine engines, special steel products, and industrial leather and rubber goods, this area contained many sizeable chemical plants, lumber mills and producers of consumers' goods, and hundreds of small machine shops and ironworks, many of which have been identified as supplying castings, forgings, and machined parts to shipyards and large producers of end-military products located in this district and elsewhere in the Tokyo Area.

Holders of Joint Target Group folders should insert this sheet in Air Target System Folder—Japanese Urban Areas —with other Tokyo No. 7 materials

ANNOTATED INSTALLATIONS

Ref. No.	Target No.	Name	Comment
1		Tokyo Prison	
2		Nagata Precision Co.	Small plant; alloy castings for aircraft
3		Pilot Fountain Pen Co.	
4	90.17-1364	Physical-chemical Industries, Ltd.	Research Headquarters for "RIKEN"—major government-sponsored producer of alloy steel, machine tools, aircraft and ordnance components. Precision instruments and apparatus for metallurgical testing also manufactured here
5		Komegome Hospital	
6a,b,c		Street Car and Bus Terminals	
7	90.17-*224	Tobata—Nippori RR Yards	Key classification yard for trunk lines running north from Tokyo. Serves NW Tokyo industrial districts. Yard area includes warehouses and two ironworks
8	90.17-214	Koishikawa Armory	Barracks and secondary army headquarters
9		Kyodo Printing Co.	Large printing works
10		Japan Printing Co.	Large printing works
11		Toppan Printing Co., Koishikawa Plant.	Engraving and printing
12	90.17-352	Army Engineering School	Former arsenal site; now headquarters Army Engineering School
13		Imperial University	Largest Japanese university
14	90.17-369	Ueno RR Station	One of 3 principal Tokyo passenger stations
15		School	
16		Hongo Waterworks	Secondary distributing station

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Ref. No.	Target No.	Name	Comment
17	90.17-1449	Kanda Market and Station	Principal food storage and distribution center
18		Toppan Printing Co., Shitaya Plant	Large engraving plant
19		RR Transformer Stations	
20		Telephone exchange	Local exchange
21		Military Police Hq.	
22		Imperial Guards HQ. and Barracks: Inspectorate General of Military Training	
23		Iida RR Yards	Local freight yards and shops
24		Ice Plant	
25		Yasukuni Shrine and Park	
26		Japan Printing Co.	
27		Imperial GHQ; Inspectorate General of Aviation	
28		Schools and Public Buildings	
29		Meteorological Center	Headquarters for Empire weather reporting system
30		Japan Paper Co.	Printing and bookbinding
31		Army Barracks and Supply Center	
32		Imperial Guards Barracks	
33		Parliament Building	
34		Hq., Munitions and Aviation Depts.	
35		War Department, Army General Staff	
36		Government Departments a. Metropolitan Police Hq. b. Home Office c. Foreign Office d. Minor Civil Departments e. Courts and Justice Depts.	
37		US Embassy and minor public buildings	
38	90.17-1419	Navy Department Hq.	
39	90.17-363	JOAK Broadcasting Center	
40		Business and Financial District a. Marunouchi Building b. Central Post Office c. City Hall d. Municipal Electric Bureau e. Imperial Hotel f. 4 principal banking institutions.	Modern multi-story buildings containing head offices of practically all large industrial concerns and government-sponsored economic control associations
41	90.17-367	Tokyo Central Station	One of 3 principal passenger stations. Station building also houses chief administrative offices for Japanese railway system
42		Public Buildings and Utilities. a. Tax Office b. Treasury c. Government Printing Office. d. Communications Department	
	90.17-1418	e. Marunouchi Telephone Exchange.	
43		Numerous machine shops and precision instrument plants	Reported making chemical machinery, lathes, optical instruments and machined parts for AA fire control apparatus
44	90.17-1448	Tsukiji Market and Wholesale Warehouses	One of Tokyo's 3 principal food storage and distribution centers
45	90.17-*365	Shiodome Freight Yards	Key trans-shipment point for central Tokyo. Extensive freight handling and storage facilities
46		Shiba carbarns and bus terminal	Several small optical equipment plants are located directly N and W
47	90.17-885	Takeshiba Pier	Extensive wharfage, warehousing and cold storage facilities

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Ref. No.	Target No.	Name	Comment
48	90.17-1331	Kayaba Engineering Works and Kunifuji Steelworks	Hydraulic equipment and A/C components. One of principal sources of landing gear for navy planes Unconfirmed production of ordnance components and A/C instruments
49	90.17-886	Hinode-cho Piers	Trans-shipping facilities, warehousing, and open stores, Repair shops for ship machinery
50	90.17-*327	Mitsubishi A-C, Shibaura Plant	Machine tools and precision aircraft components
51	90.17-1345	Tokyo Municipality Steam Plant & Shiba Gas Works	One of principal Tokyo Gas Works. Small standby power plant
52	90.17-*882	Ikegai Machine Foundry	Original Ikegai machine tool plant. Unconfirmed report that this plant now specializes in milling machines
53	90.17-*326	Factory No. 2 of Nippon Electric Co.	One of principal plants for radar and radio components
54		Mita Carbarns	
55	90.17-883	Ikegai Motor Plant	Semi-diesel truck and barge engines, final assembly of which is probably now concentrated at new Ikegai plant in Kawasaki TARGET 883, finishes and assembles parts supplied by small nearby machine shops and foundries
56	90.17-2082	Japan Optical Mfg. Co.	One of company's four plants reported producing range-finders, optical instruments and other precision equipment. A number of related components shops are located in the immediate vicinity
57		Municipal Electric Bureau	Supply warehouses. Army warehouse directly S
58		Schools and Public Buildings, including Keio University and National Insurance Hq.	
59		Imperial Mint	
60		District of small machine shops, including	Producing A/C instruments and electrical equipment, small marine engines, vehicle wheels
	90.17-889	Factory No. 3 of Nippon Electric	Small research lab reported operating under navy jurisdiction
61	90.17-887	Shibaura Wharf.	Docks warehouses and administrative Hq. for navy construction and pioneer units
62		Municipal Electric Bureau, Shiba Workshops	Construction and major repair center for Tokyo street car system
63	90.17-2083	Small casting and machine shops	Producing RR car springs, automotive castings and forgings, steel pipe and oil pressure regulators
64		Tokyo Structural Steel Co.	Bridge and building steel
65		Small ironworks and machine shops	Producing small gas engines, lathes, drills, building hardware and switchboards
66	90.17-888	Oki Electric Co. Ltd., Plant No. 1	Secondary plant of major producer of telephonic and radio equipment
67		Ensuiko Sugar Co. and Kinuta Electric Co.	Small producer of electrical equipment for army aircraft
68		Yokogawa Bridge Co.	Structural Steel
69	90.17-*364	Shinagawa RR Yards	One of two principal Tokyo classification yards
70		Shibaura Sewage Disposal Plant	
71		New warehouse area	
72		Military storage and trans-shipment area	
73		Small precision machinery plants	Over 40 identified machine shops producing small springs, valves, gears, switches, optical equipment, meters, gauges and similar precision items. 3 sizeable plants reported producing machine tools, ordnance and marine engine components
74		Precision Parts Plants	Over 20 identified workshops producing plating and machining small parts and electrical equipment
75		Former Senju Woolen Mill	Large plant converted to production of unspecified ordnance components
76		South Senju Engineering Works	Produces paper mill equipment and other specialized machinery

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Ref. No.	Target No.	Name	Comments
77		Ishimura Factory	
78	90.17-1370	Sumida River Bridge & RR Yard	Large freight yard and storage depot on Joban RR Line leading NE out of Tokyo
79		Kanegafuchi Spinning Co., Senju Mill	Large textile plant. Unconfirmed report of conversion to producing aircraft parts for Nakajima
80	90.17-1366	Nippon Oil Co.	Local storage, and distribution
81		Former Japan Spinning Co., Senju Mill	Now producing machined components for Hitachi
82	90.17-2084	Tokyo Gas Co., Senju Works	Large gas works
83		Machinists School	Training school for textile mill operatives
84		Yaegushi Works	Electrical fittings
85		Oana Mfg. Co., Senju Plant	Sumitomo affiliate making small motors and generators for A/C
86		Dye Works	Chemical dye products
87		Minawa Street Car Barns	
88		Bus Terminal	Urban bus terminal and garage
89		N Senju RR Yards	Local shunting yard
90		Showa Rubber Co.	Industrial rubber products
91		Warehouses	Unidentified storage sheds
92		Japan Concrete Pole Co.	Large producer of concrete piles, poles and pipes Used as steel substitutes
93		Tokyo Iron Works	Small alloy steel and auto parts plant
94		Azuma Steel Works	Medium size steel mill producing plate, bars and drawn products
95	90.17-1394	Kanegafuchi A/C Parts Plant	Reported machining of A/C engine components; no evidence of assembly
96		Asakusa Telephone Exchange	Large branch telephone exchange
97		Kubota Machinery Works, Sumida Plant	Sizeable casting plant
98	90.17-1365	Japan Bakelite Co.	Japan's largest "bakelite" plant, producing many items for aircraft and ordnance factories
99	90.17-*2106	Oana Mfg. Co., Mukojima Plant	Sumitomo affiliate reported producing constant-speed governor assemblies for A/C propellers
100		Telephone Exchange	Local telephone exchange
101		Choseki Cord Mfg. Co.	Cord plant
102		Terajima Transformer Station	Electric Transformer station
103		Kanegafuchi Iron Works	Small castings and forgings
104		Daido Aluminum Products Co.	Small aluminum plant; possible production of aircraft parts
105		Marumiya Rubber Works	Small rubber products plant
106		Kyowa Leather Co.	Various leather products for industrial use
107		Rubber Works	Rubber products
108		Haneda Belt Co.	Industrial belting
109		Lion Soap Co.	Fats and glycerine
110	90.17-1430	Nippon Electric Wire and Cable Co.	Large-scale producer of wire and cable for electric power and communications
111		Soap Works	Soap
112		Kyowa Leather Co.	Leather products for industrial use
113		Tokyo Iron Works	Small metal products
114		Royal Celluloid Co.	Celluloid products
115		Tokyo Cork Co.	Cork products
116		Daido Rubber Works	Rubber Products
117		Japan Brewery Co.	Large brewery
118		Komiai Alcohol Co.	Alcohol distillery
119		Narihira Station & Yards	Local freight and shunting yard; freight sheds and small shops
120		Ito Dye Works	Chemical dye works
121		Toyo Textiles, Mukojima Plant	Textile mill
122		Japan Military Goods Co. No. 1 Plant	Large textile mill converted for Navy ordnance program by largest private producer of light AA and other automatic weapons

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Ref. No.	Target No.	Name	Comment
123		Japan Machinery Co., Azuma Branch	Important producer of aircraft parts (landing gear, etc.)
124		Japan Fat and Soap Co.	Large glycerol plant
125		Glass Works	Glass products
126		Tokyo Chemical Works	Unidentified chemicals production
127		Miyoshi Chemical Products Co.	Unidentified chemicals production
128		Cork Products Co.	Cork products
129		Toyo Drug Co.	Drugs
130		Meiji Leather Co.	Leather products for navy
131		Chiyoda Mfg. Co.	Leather boots
132		Nissan Chemical Mfg. Co., Kinoshita Plant	By products plant for sulphuric acid producer
133		Uno Ironworks	Castings
134		Nakayama Steel Co., Tokyo Plant	Large-scale production of galvanized sheet and plate
135		Lion Soap Co. Hirai Plant	Soap works
136		Felt works	Industrial felt products
137		Azuma Steel Works	Sizeable steel ingot, casting and rolling works
138		Dye Works	Dye plant
139		Japan Military Goods Co. No. 2 Plant	Textile mill converted for navy ordnance program by largest private producer of light AA and other automatic weapons
140		Ishibara Steel Works, Mukajima Plant	Rolled steel products, wire and nails
141		Daido Steel Co., Teihatsu Plant	Alloy steel ingots and springs; ordnance forgings
142	90.17-*916	Hitachi Engineering, Kameido Plant	Several other related ironworks and machine shops Major producer of heavy electrical equipment and industrial machinery; reported truck production
143		Ishii Ironworks	Industrial chemical equipment
144		Oriental Steel Works	Thin steel plate.
145		Mitado Rubber Products Co.	Rubber products
146		Taisai Chemical Mfg. Co.	Chemicals
147		Nitto Soda Works	Chemical fertilizers
148		Yanagishima Drug Co.	Drugs
149		Riken Steel Products Company	Special steel ingots and rolled products, including tubes
150		Tawara Engineering Works	Sizeable machinery plant
151		Japan Chemical Equipment Co.	One of two company plants producing liquid oxygen and oxygen welding equipment
152		Shimizu Oxygen Equipment Co.	A C oxygen equipment
153	90.17-914 & 915	Oriental Weaving Co.	Two adjacent woolen mills, at least one of which has been converted to fabrication of unspecified munitions components
154		Japan Cast Steel Co., Oshima Tool Plant	Machine tools and second grade bearings
155	90.17-911	Ogura Oil Co.	Minor refining capacity; local distribution and storage point
156	90.17-1350 & 157	Tokyo Kozai (Steel Products) Co.	Two related plants: alloy and bearing steel; steel springs (156). Precision instruments, fire-control apparatus; searchlights (157)
158	90.17-2126	Hattori Co., Otsuki Branch	Precision ordnance components
159		Takasago Iron Works	Boilers and strip steel
160		Hamada Printing Machinery Co., Plant No. 1	Reported now producing grinding machines and machine tools
161		Kameido Station and Yards	Local freight station
162		Hamada Printing Machinery Co., Plant No. 2	General purpose machine tools
163	90.17-910	Rising Sun Petroleum Terminal	Small tank farm
164		Kameido Coke Co., Joto Plant	Charcoal storage and distribution center
165		Unidentified industry	
166		Japan Ford Products Co.	Auto parts
167	90.17-912	Nisshin Spinning Mill	Possible conversion to aircraft parts or ordnance; large plant

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Ref. No.	Target No.	Name	Comment
168	90.17-913	Hattori Co.	Large plant producing chronometers, AA fire-control equipment and other precision ordnance
169		Aoki Dyeworks	Chemical dye works
170		Japan Acetic Acid Co.	Acetic Acid, formalin, etc.
171		Nisshin Dyeing Co.	Cloth dyeing
172		Kurihara Woolen Mill	"Rubberized" balloon fabric
173		Tobacco Monopoly, Honjo Plant	Tobacco warehouses
174		Mitado Rubber Products	Rubber products
175		Tokyo Gas Co. Branch	Gas storage
176	90.17-1342	Japan Machine Industry	Aircraft parts and ordnance components
177		Marine Products Co.	Fish cannery
178		Kamezawa Lathe Co.	General purpose lathes
179		Kinshi-cho Freight Yards	Local freight yards and storage depot
180		Tajiro Industrial Co.	Precision machinery
181		Shinohara Machinery Co., Honjo Plant	Small producer of high-quality machine tools
182	90.17-1372	Sumida River Bridge Ryogoku Station and RR Yard	Local freight yard and storage depot
183		Toppan Printing Co., Honjo Plant	Manufactures type metal and type
184		Lion Toothpaste Co.	Soap and toothpaste
185		Tobacco Monopoly, Asakusa Plant	Tobacco warehouses
186	90.17-1450	Koto Market	Central food market and storage. Directly N is memorial for 1923 conflagration victims
187		Toppan Printing Co.	Printing
188		Okada Manufacturing Co.	
189		Municipal Utility Workshops	
190		Tokyo Belting Co.	
191		Yamato Rubber Works	Rubber products
192		Unidentified Industry	
193		Warehouses	
194		Takasaki Paper Machinery Co.	
195		Ito Machine Shop	Chemical and mining machinery
196		Takasaki Paper Co.	
197		Yokoyama Equipment Co.	Structural steel; frames for machine tools and other machinery
198		Hirasawa Iron Works	Building hardware
199		Ironworks	Affiliated with No. 239 (Rolling Stock Mfg. Co.)
200		Tokushima Machinery Co.	Internal combustion engines
201		Asano Warehouses	Reported storage for naval ordnance components produced in locality
202		Tokyo Rice Co.	Storage and packing
203		Asano Cement Co.	Cement works with 4 rotary kilns
204		Imperial Warehouses	
205		Yusen Warehouses	
206		Shibusawa Warehouses	
207		Kiyosumi Lumber Mill	
208		Mitsubishi Warehouses	
209		Kicho Copper Works	Small alloy metal-working plant with foundry equipment
210		Nitta Veneer Mfg. Co.	Veneer for aircraft
211		Kyodo Printing Co.	
212		Toyo Lumber Co.	
213		Lumber Mill	
214	90.17-355	Army Provisions Depot	Army receiving and shipping point for ordnance and other equipment manufactured nearby. Additional warehousing has been constructed on newly reclaimed land to the SE and S
215		Unidentified industry	
216	90.17-826	Fujikura Electric Cable Works	Sumitomo plant producing about 10% of Japanese insulated wire and cable; all types of wire and cable
217		Bus barns	

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Ref. No.	Target No.	Name	Comment
218		Unidentified industry	On reclaimed land
219		Unidentified	
220		Unidentified industry	Unidentified storage
221		Warehouse	Special steel: estimated annual ingot capacity 6000 metric tons. Malleable iron and steel castings 5-10,000 tons per year
222	90.17-2085	Hitachi Engineering Works, Fukagawa Plant	Large lumber mill
223		Teikoku Lumber Co.	Training school for engineering and deck officers
224		Merchant marine school	Exact function unknown
225		Aircraft Experimental Station	
226		Unidentified industry	
227		Government Grain Warehouses	Probable marine engine production truck assembly also reported. Under navy supervision
228	90.17-2086	Probable new Fukagawa plant of Mitsubishi Heavy Industry.	Medium size shipyard, building small naval and merchant vessels. Drydock for 20,000 ton vessels
229	90.17-1459	Susaki Dockyard of Ishikawajima Shipbuilding and Engineering Corp.	
230		Unidentified Industry	
231		Unidentified Industry	
232		Unidentified Industry	
233		Unidentified Industry	Large storage area on reclaimed land
234		Hitachi Warehouse Area	
235		Unidentified	
236		Sunamachi Sewage Disposal Plant	
237	90.17-1349	Japan Special Steel Works	Special steel tubes, forgings and rolled products
238		Tsukijima Ironworks, Sunamachi Branch	General purpose machine tools
239	90.17-366	Steam Engineering and Rolling Stock Mfg. Co.	Rolling stock, manufacture and repair. Reports of armament manufacture
240		Unidentified	
241		Hasegawa Steel Works, Plant No. 2	Small fabricating plant
242		Asahi Steel Works	Formerly produced heavy building hardware. Reported conversion to ordnance parts
243		Nakajima Iron Works	Iron frames for machinery
244		Hasegawa Steel Works, Plant No. 1	Cast steel
245		Azuma Steel Works, Sunamachi Plant	Steel ingots, castings and rolled products
246		Miya Steel Works	Steel ingots, rolled products
247		Saito Iron Works	Small machine shop
248		Japan Manufacturing Co.	Machinery, automobile parts
249		Tokyo Heavy Industry	Electrical machinery
250	90.17-904	Sakurada Engineering Works	Industrial machinery plant converted to aircraft parts, including carburetors
251		Showa Feed Co.	Flour, feed, fertilizer
252		Yokoyama Mfg. Co., Plant No. 2	Structural steel
253		Japan Sugar Co.	Warehousing and packaging
254		Asahi Steel Works, Sunamachi Plant	Reported production of aircraft and ordnance components
255		Nasu Aluminum Products Co.	Aluminum plate and other products
256		Kameido Coke Co., Sunamachi Briquette Works	
257	90.17-907	Tokyo Gas Co., Sunamachi Branch	Gas works and coke plant
258	90.17-907	Tokyo Gas Co., Sunamachi Branch	Gas storage
259		Unidentified Industry	
260		Japan Steel Wire Co.	Special drawn wire
261	90.17-334	Nisso Steel Mfg. Co.	Special steel forgings for roller and thrust bearings; lathes and drill presses
262		Hasegawa Steel Works, Plant No. 3	Castings
263		Sunamachi Freight Yards	Local freight yards

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Ref. No.	Target No.	Name	Comment
264		Japan Flour Co., Tokyo Mill	Large flour mill
265	90.17-*330	Ishikawajima Shipbuilding Co., Marine Engine Works	Major producer of heavy marine engines. Many small parts obtained from nearby foundries and machine shops
266		Toshin Warehouses	Extensive storage and trans-shipping facilities
267		Japan Ebonite	Plastics
268		Sumida Boatyard	Repair and construction of tugs and small boats
269		Nakayama Machine Co.	Under navy supervision; special metal working machinery
270		Maruboshi Mfg. Co., Suna Works	Navy contractors; marine machinery
271		Suction Gas Engine Co.	Diesel engines up to 800 HP for coastal boats and landing barges

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NOTE: An asterisk adjoining target numbers listed above indicates targets for which Target Information Sheets have been distributed or are in process.

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TARGET NO: YAWATA URBAN INDUSTRIAL AREA

OBJECTIVE AREA: 90.34-SHIMONOSEKI

T A R G E T I N F O R M A T I O N S H E E T

YAWATA URBAN IIDUSTRIAL AREA

(Including Wakamatsu, Tobata, Kurosaki, and Kokura, and incorporating:

Target No. 90.34 - 3630; Yawata U/A 1
Target No. 90.34 - 3631; Yawata U/A 2
Target No. 90.34 - 3632, Yawata U/A 3

Latitude: 33° 53' N
Longitude: 130° 50' E
Elevation: Sea Level to 300' (approx.)

1. SUMMARY COMMENT: One of the four ranking urban industrial concentrations in Japan, the Yawata area takes shape as a narrow fringe along the north Kyushu coast extending south and west of the Shimonoseki Straits. The region, a complex of five industrial cities, contains the largest single iron and steel plant in Japan; important chemical plants associated with the coal carbonizing facilities of the steel mills; an extensive development of steam power supplying this area and the north Kyushu power grid; one of the most important Jap arsenals; and vital railroad and shipping transportation facilities.

2. LOCATION AND IDENTIFICATION: (A). This industrial complex of five cities grouped closely together is situated on a narrow stretch of flat coast land rising to hilly contours a short distance in from the sea, approximately 15 miles southwest of the Shimonoseki Straits. The most outstanding single landmark is the narrow, crooked Dokai bay indenting the north Kyushu coast, the principal harbor for the greater portion of the Yawata Area. The only bay of its size on the north Kyushu coast, it has a completely artificial appearance, with a narrow entrance ¼ of a mile wide, and extends from the open sea in a southwesterly direction for 1½ miles, then bends sharply to the west for about 3 miles.

Around Kokai Bay are clustered four of the five cities in the urban area. Two cities lie face to face at the entrance - Wakamatsu on the west, and Tobata on the east. To the south of Tobata, where the bay bends sharply to the west, lie the cities of Yawata and, further to the west, Kurosaki - the latter at the end of the bay. Kokura, the fifth of the cities concerned, is

separated a little from the others, lying about 3 miles to the east along the shore from the Tobata entrance of Dokai Bay, in the direction of Moji and the Shimonoseki Straits. The Murasaki river flowing to the north passes approximately through the center of Kokura to enter the sea.

(B) Three urban industrial concentrations have been selected within the Yawata Urban Industrial Area as the most important target areas. For location and identification of these target areas, see Annotated TARGET CHARTS JAPAN 168, 1113, and 28, Third Edition - attached to New AAF Target Number/Name Assignment Report No. 9, 14 April 1945. These Target Charts received Wing and Group distribution.

3. TARGET DESCRIPTION: (A) Target 90.34-3630. Occupying a large portion of industrially built-up Kokura, this target area presents something of a heart-shaped appearance, with a flat base to the south, and a rounded top reaching almost to the shore and the port facilities of Kokura. The greater part of the residential district of Kokura lies outside of the target area to the east. The Murasaki river, running north passes straight through TARGET 3630 near its eastern border; the much smaller Itabitsu river forms part of its western edge. The target area covers about $1\frac{1}{2}$ square miles. To the east and west are hills, the highest being slightly under 1000'. The Kokura Arsenal occupies at least a third of the target, its entire eastern boundary bordered by the Murasaki river. (See Target Information Sheet, Target 90.34-168, Kokura Arsenal, 10 June 1945).

To the north, the main double track coastal railroad lines cross the target at right angles, like the top line of the letter T. A pattern of railroad tracks branches south and leads to the large Kokura Railroad Shops in the southwest corner. A wide, prominent road slants past the southeast corner of the Arsenal, and then turns to the north toward the shore. The XX Bomber Command strike on this area in June, 1944, damaged some of the workers' quarters along the SW edge of the Arsenal; these have now been levelled to form the firebreak described in TIS 90.34-168, cited above.

Target 90.34-3631. This area is dominated by the huge, sprawling Japan Iron Works, Target 28, which occupies 90% of the land space within TARGET 3631. (See JTG TIS 90.34-28). It is situated on the south side of Dokai Bay, where it bends sharply to the west. An indentation of the Bay, known as Maeda Anchorage, has the appearance of a fish hook with the pointed end slightly straightened. Some reclaimed land, with a pronounced diamond head shape, juts out toward the entrance of Maeda Anchorage. A short distance from here lies small Katsura Island. The main railroad lines from Fukuoka to Moji parallel the southern border of the area, pass around its southern corner, shaped like a bend in an elbow, and cross into the NE section of the target. The built-up areas of Yawata City and the congested workers' quarters

lie immediately to the south, across the railroad tracks. The large steel plant, which dominates the industrial area with its tall chimneys and characteristic blast furnaces, is in itself an unmistakeable landmark. The smoke, reported reduced since the partial substitution of electric power, may tend to obscure but not to hide the industrial area.

Target 90.34-3632. This target area is roughly rectangular in shape, and lies just to the west of Target 90.34-3631, described above. The part of the area bordering the SW edge of Dokai Bay consists largely of reclaimed land. The former water area of the bay has been reduced one-half of reclaiming operations. This particular target area occupies a little more than one square mile.

The Fukuoka-Moji railroad lines pass along the southern border of TARGET 3632, with the congested, built-up portion of Kurosaki City located on their south side. The area contains only industrial installations - an important aluminum plant, a synthetic chemical industry, and an electric motor plant. The aluminum plant, TARGET 1108, has in its southwest corner a large, almost square, red, mud-filled pond - slag from the Bayer process used at the plant.

(B). Since the cities of Wakamatsu and Tobata lie almost entirely outside of the urban target concentrations, 90.34-3630, 3631, and 3632, just described, they will therefore be treated separately. Besides a considerable number of industrial targets, they contain an important series of congested, compactly built-up areas suitable for incendiary attack. Wakamatsu's port, at the western entrance to Dokai Bay, is built up from reclaimed land. Wakamatsu's port is Japan's most important coal port, both for export of steam coal and import of coking coal. The city has a highly congested, inflammable residential area spreading to the west about 1 mile, and tapering into wooded hills, which rise to some 1000'. Other built-up portions of the town spread out in a narrow strip along the NW shore of Dokai Bay, following the railroads servicing the Wakamatsu area.

Tobata occupies the land at the eastern side of the entrance channel to Dokai Bay. The northern half of the city is given over to the plant area of Japan Iron Works, Tobata Branch, Target 29. The remaining residential portion of the city is congested and compactly built-up.

While the geographical features of the terrain have compressed these five cities into a relatively small area of flat land along the north coast of Kyushu, functionally serving as one continuous industrial area, actually they are not contiguous and possess some inherent features which act as firebreaks, such as the channel of Dokai Bay between Wakamatsu and Tobata, sparsely settled areas

between the congested areas of the four cities to the east of Dokai Bay, railroad yards and tracks, areas of heavy industry, and isolated open spots such as reservoirs, ball parks, etc.

Wakamatsu, separated from the four other cities, presents an excellent incendiary target in itself. Yawata and Kurosaki are virtually one fire zone, while Tobata and Kokura each has its individual congested area. The cities exist to serve the industrial areas, and are jam-packed with the typical flimsy structures that are Jap workers' homes. In general, the heavy industry of Tobata, Yawata and Kurosaki is located near the bay and is clearly separated from their heavily congested workers' quarters and urban areas by the main railroad lines. The water supply for all the cities is adequate, but little is definitely known of their fire fighting equipment, which can be expected by now to be good.

4. IMPORTANCE: The Yawata area ranks as one of the four most important industrial concentrations within Japan proper, and has been referred to as the "Pittsburg of Japan" and the "little Ruhr of Japan". It is one of the largest iron and steel centers in Japan, and furnishes large quantities of pig iron, ingot and rolled steel products to satellite areas. An extensive development of heavy industrial chemicals, important to Jap war production and to sustained agricultural production results from by-products of the coking and coal treatment plants.

Strategically located near the Shimonoseki Straits, the area of greatest shipping concentration in the Far East, the Yawata area has well developed port and railway facilities. The Kammon Tunnel underneath the Straits provides a link between Honshu and N Kyushu. The Yawata area is close to the Chikuho coal fields, and the heavily used N Kyushu railway net hauls an estimated 20 million tons of coal annually. The Yawata area develops its own electric power through steam power plants, and contributes to the N Kyushu power grid.

The total population of this area is approximately 650,000. The destruction by IB attacks of the residential annexes to the great industrial complex should cause considerable absenteeism and social disorder. Substantial loss of production at the Japan Iron Works would affect numerous satellite plants in the other cities, and the rest of the Empire. Elimination of the important steam power plants would practically stop all production in the area. Although secondary sources of power exist, much of it is 60 cycle, whereas the Yawata urban area operates largely on 25 and 50 cycle current, with little conversion equipment available. There is practically no non-essential industry in the area where

power could be shut down and diverted to essential industry. Interference with the transportation lines of the N Kyushu network would halt the flow of finished and semi-finished products and by-products. Damage to important railroad repair shops would severely strain an already over- burdened land transportation system, and have its effect on future mobility of troops and supplies in the event of a campaign on Kyushu. Damage to the important Arsenal at Kokura would cut into the nearest available production source of armament and ammunition for Kyushu. Destruction or damage to port facilities and associated small boat building yards would hurt Jap efforts to relieve land transportation burdens by increased use of shipping. Some types of coal and ore loading and bunkering equipment are vulnerable to damage and difficult to replace.

Numbered targets within Urban Area Target 3630 follow:

168 - KOKURA ARSENAL - One of the largest, if not the largest at the present time in Japan. Some production possibly shifted from Tokyo arsenal here. Has advantage of "on the spot" production of armament and ammunition in the event of a landing on Kyushu. Loss of this arsenal would mean bringing in replacement supplies, adding to logistic difficultics and transportation burdens.

184 - KOKURA RAILROAD SHOPS - Vital railroad shops, with the largest repair shops west of Kobe. Repair rolling stock and locomotives, including some electric locomotives, and considerable construction of freight cars is carried on. With Kyushu facing the possibility of steady air attacks and with European records as a criterion, the loss of these repair shops would overburden the smaller available railroad shops.

2173 - EAST KOKURA RR YARDS - Located in Akasaki district of East Kokura serving port and city. Effects of loss would be similar to those for main Kokura RR yards, and together would be cumulative in effect.

1127 - KOKURA STEAM POWER PLANT NO. 1 -
188 - KOKURA STEAM POWER PLANT NO. 2 - There are five principal generating plants in the Yawata area estimated to supply as high as 85% of the electric power available to the N Kyushu industrial zone. Kokura Plant No. 1 ranks 4th among these generating stations, with a capacity of 45,000 KW, and the Kokura Plant No. 2 ranks 3rd with 78,000 KW. While these plants are substantially smaller than the Tobata and Yawata plants ranking 1st and 2nd, their loss would have a serious effect on Kokura's industry.

165 - KOKURA STEEL WORKS - Probably the only iron and steel plant in the area not largely dependent upon the Yawata Japan Iron Works plant for raw materials. Elimination of this would take out one of the more important independent producers.

1856 - KYUSHU SPECIAL STEEL CO. (Kokura) Tungsten steel a specialty; products used for precision tools, cutters, reamers, high speed steel products. Loss of these facilities would be extremely difficult for the Japs to replace at this time.

28 - JAPAN IRON WORKS (Yawata - The "eye of the needle" of this area. The largest single iron and steel plant in the home islands - feeds several satellite companies pig iron and steel ingots. Includes two very large steam power plants developing electric power; a mill producing an estimated 60% of the steel rails used in Jap railroads; produces extensive chemical by-products in the coking process. Loss of a plant of this size - with its relation to satellite plants, electric power development, chemical by-products industries would be irreplacable at the present time in Jap economy.

28A - JAPAN IRON WORKS, STEAM POWER PLANTS - No. 3 & 5, cap. 72,000 KW.

28B - JAPAN IRON WORKS, STEAM POWER PLANTS - No. 4, cap. 75,000 KW These plants furnish electric power for Japan Iron Works, Target 28; surplus power supplied to plants in Yawata Urban Area. Loss of the power plants would considerably interrupt the operations of the main Japan Iron Works plant, and reduce the power within the north Kyushu power grid.

569 - KYUSHU CHEMICAL INDUSTRY (Yawata) - Engaged in purification of naphthalene, one of materials used in manufacture of explosives. Capacity believed expanded over 1937 figures of 500 metric tons annually.

567 - ASAHI GLASS CO. (Yawata) - Reported largest producer of soda ash and caustic soda in Japan. The basic alkalies produced by Asahi can be used in many industries.

1851 - Nippon Synthetic Industry (Yawata) - Produces naphthalene, dyestuffs, fertilizers and coke from carbonizing an average of 111,000 tons of coal a year. Much of its products used in manufacture for Jap armament and fertilizers related to steadily worsening Jap food situation

2169 - YAWATA RAILROAD YARDS - Yards servicing Yawata City. Destruction would cause severe interruption of normal transportation functions.

Numbered targets within Urban Area Target 3632 follow:

1108 - NIPPON ALUMINUM CO. (Kurosaki) - Alumina production from bauxite ore, estimated 28,000 metric tons annual capacity. Has advantageous position for short shipping hauls of raw materials and its loss would be felt correspondingly.

1113 - NIPPON SYNTHETIC INDUSTRY (Kurosaki) - Produces chemicals and non-ferrous metals; chemical products directly related to explosives. Japs could ill afford to lose the varied chemical products from this plant.

1126 - YASUKAWA ELECTRIC CO. (Kurosaki) - Produces electric motors, mostly small ones.

Unnumbered targets outside Urban Area Targets 3630, 3631, and 3632 follow:

1866 - KOKURA HARBOR INSTALLATIONS - Important for imports of coal and iron ore, trans-shipment of coal not suitable for coking purposes. Port for traffic may be assuming added importance as trans-shipment to northwest Honshu ports, due to mining of Shimonoseki Straits. Damage would add to Jap transportation problems.

1860 - ORIENTAL SPECIAL CASTING CO. (Kokura) - Makes special castings, possibly aircraft components. Probably occupies small place in Jap production, but loss would be felt on long term basis.

177 - OSAKA SODA CO. (Kokura) - Produces caustic soda and some chlorine, used in many war industries as a basic material. Related to reported poison gas production in this region.

1857 - OKUMA IRON WORKS (Kokura) - Comparatively little known of this plant - factory of an established machine tool manufacturer and capable of making these products, difficul to replace at present time.

1859 - TOKYO ROPE MFG. CO. (Kokura) - Important manufacturer of wire and steel cables. A specialized products plant, not easily replaced.

2170 - TOBATA RAILROAD YARDS - Servicing Tobata port area; important for transportation of raw materials, etc. Loss or damage would interfere with functioning of industries in this area.

33 - TOBATA PORT FACILITIES - Important for import of raw materials, as trans-shipment center; and as fishing center. Damage would upset normal functioning of area, reduce fish intake, important part of Jap food supply.

29 - JAPAN IRON WORKS, TOBATA BRANCH - One of largest steel rolling mills within Japan proper. Target 28 in Yawata turns over most of its steel ingots for rolling here. Loss of this plant would severely upset the functioning of the main plant, TARGET 28, and force the overloading of satellite plants.

1594 - TOBATA STEAM POWER PLANT - Capacity 160,000 KW. Largest in Kyushu. Key plant in supplying large portion of power for Yawata urban area and north Kyushu grid. Japs have very little non-essential production in this area which they could shut down to cushion the loss of a key power plant.

1853 - ORIENTAL CAN MFG. CO. (Tobata) - Believed converted to small armament production - hand grenade casings, bomb casings, etc. Loss would probably affect production at Kokura Arsenal, Target 168.

1852 - HITACHI MACHINE WORKS (Tobata) - Machine shops and forging facilities for manufacture of castings used in railroad rolling stock, combat vehicles, shells, etc., important for war production in area.

2171 - WAKAMATSU RAILROAD YARDS -
561 - WAKAMATSU RAILROAD SHOPS - Located together. Servicing Wakamatsu port area. Railroad shops are important subsidiary to Kokura railroad repair shops. Loss would additionally strain transportation and repair problems.

1672 - WAKAMATSU SHIPYARD -
558 - TOCHIGO SHIPYARD - Located together - engaged in producing small ships, up to approximately 3,500 tons. Loss would add to Jap shipping problems, especially as they are concentrating on quicker production of a greater number of small, wooden ships instead of a fewer large ships.

32 - WAKAMATSU PORT - Principal coal port, both for export from the Kyushu coal fields, and for import of coking coal from China and Manchuria. Effects of mining on Shimonoseki Straits on this port uncertain; may have decreased its importance, or increased it as trans-shipment point to northwest Honshu ports.

1123 - NISSAN LIQUID FUEL CO. (Wakamatsu) - Coal liquefaction plant, produces synthetic gas and oil, vitally needed by Japs at present time.

1864 - TOKAI STEEL MFG. CO. (Wakamatsu) - Produces electrodes, essential in plants using electrolysis processes in this area.

555 - TOKAI STEEL MFG. CO. (Wakamatsu) - Small plant doing some of the rolling of steel ingots for TARGET 28.

1861 - HITACHI MACHINE WORKS (Wakamatsu) - Produces rolls used in steel rolling mills; heavy, specialized equipment to manufacture, difficult to replace.

Numerous unnumbered targets outside Urban Area Targets 3630, 3631 and 3632 include gas tanks, lumber yards and mills, docks, warehouses and wharves, paper mill, radio towers, cold storage plant, cotton mill, sugar refinery, transformer station, casting works.

5. AIMING POINTS: Aiming points will be specified in the Field Order.

TARGET SECTION, A-2
XXI Bomber Command

20 June 1945.

RESTRICTED

JOINT TARGET GROUP
WASHINGTON, D. C.

KOBE, U.I.C.—2, JAPAN
URBAN INDUSTRIAL CONCENTRATION

0 1000 2000 3000 4000 5000 6000 7000 FEET
0 ½ 1:15,000 APPROX 1 MILE

ILLUSTRATION No.	90.25-3629 P3
DATE	20 May 1945
TARGET No.	90.25-3629
COORDINATES	34°41'N 135°13'E
PHOTOGRAPHED	19 January 1945

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Urban Areas with other 90.25-3629 material.

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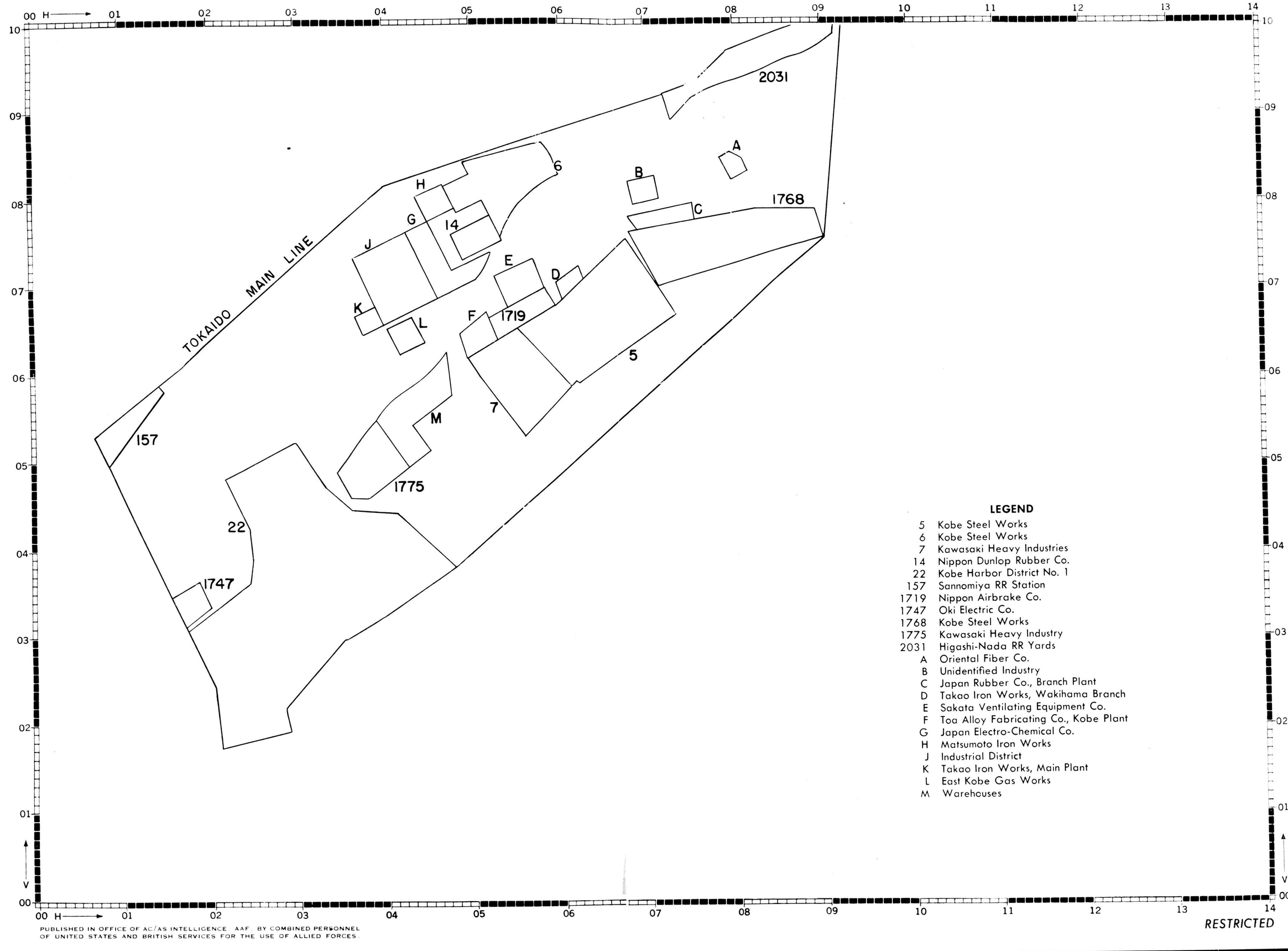
RESTRICTED

JOINT TARGET GROUP
WASHINGTON, D. C.

KOBE, U.I.C.—2, JAPAN
URBAN INDUSTRIAL CONCENTRATION

ILLUSTRATION No.	90.25-3629 P4
DATE	20 May 1945
TARGET No.	90.25-3629
COORDINATES	34°41'N 135°13'E
PHOTOGRAPHED	19 January 1945

0 1000 2000 3000 4000 5000 6000 7000 FEET
0 ½ 1:15,000 APPROX 1 MILE



LEGEND

5	Kobe Steel Works
6	Kobe Steel Works
7	Kawasaki Heavy Industries
14	Nippon Dunlop Rubber Co.
22	Kobe Harbor District No. 1
157	Sannomiya RR Station
1719	Nippon Airbrake Co.
1747	Oki Electric Co.
1768	Kobe Steel Works
1775	Kawasaki Heavy Industry
2031	Higashi-Nada RR Yards
A	Oriental Fiber Co.
B	Unidentified Industry
C	Japan Rubber Co., Branch Plant
D	Takao Iron Works, Wakihama Branch
E	Sakata Ventilating Equipment Co.
F	Toa Alloy Fabricating Co., Kobe Plant
G	Japan Electro-Chemical Co.
H	Matsumoto Iron Works
J	Industrial District
K	Takao Iron Works, Main Plant
L	East Kobe Gas Works
M	Warehouses

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RESTRICTED

JOINT TARGET GROUP, WASHINGTON, D. C.
URBAN AREA MOSAIC

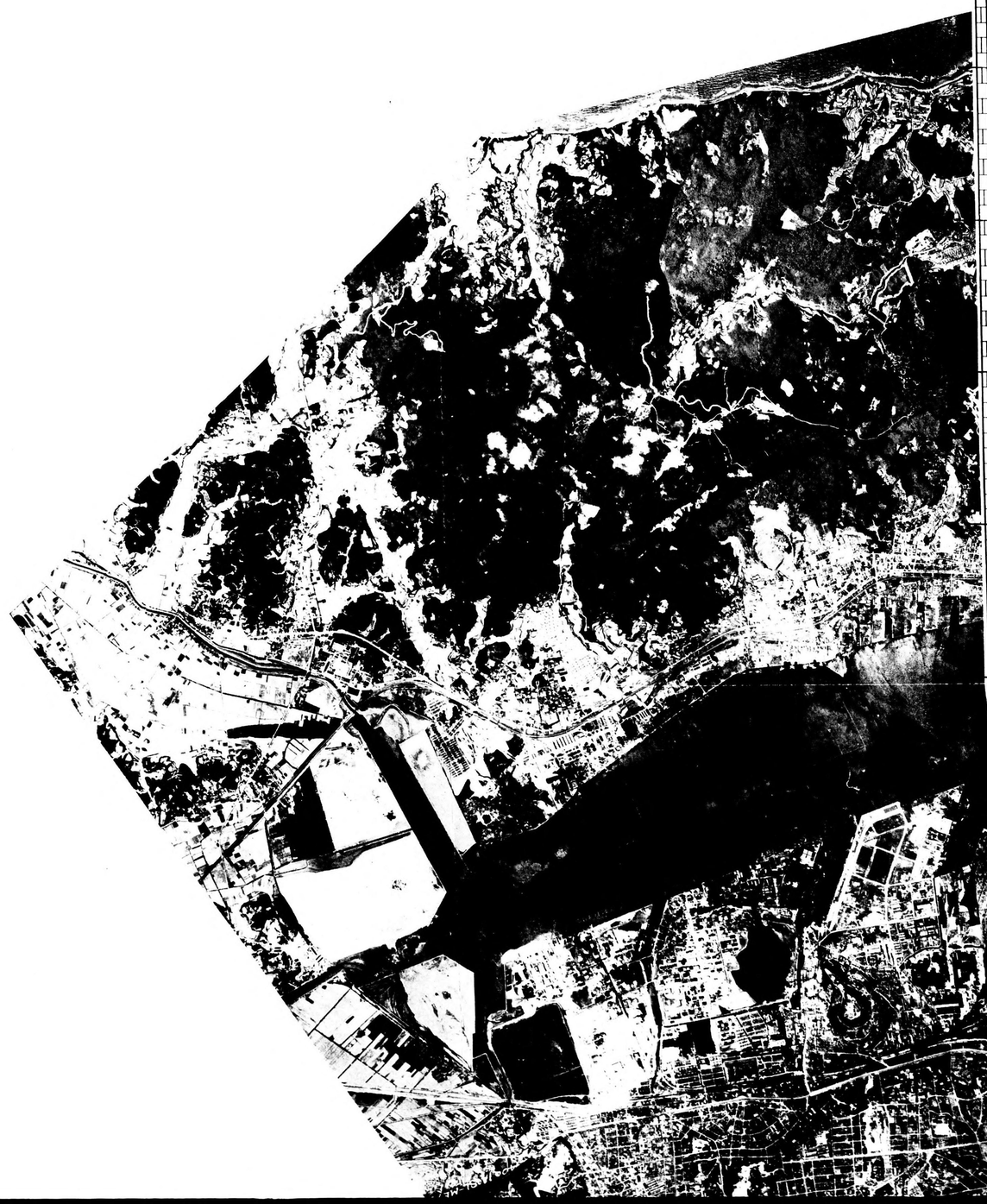
YAWATA No. 1 — JAPAN

Clear Mosaic

ILLUSTRATION No.
YAWATA No. 1—PM
DATE.....**21 May 1945**

1371 1372 1373 1374 130°42' 1375 1376 1377 44' 1378 1379 1380 130°46' 1381 1382 1383

1211 1210 33°56' 1209 1208 1207 1206 54' 1205 1204 1203 1202 52' 1201



1211 33°56' 1210 1209 1208 1207 54' 1206 1205 1204 1203 1202 52' 1201

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Yawata material.

1203
1202
52'
1201
1200
1199
1198
33°50'
1197 000yds N.
1371 000yds E. 130°40'
1372
1373
1374
42'
1375
1376
1377
44'
1378
1379
1380
P
1381
130°46'
1382
1383
1203
1202
52
1201
1200
1199
1198
33'50
1197

Scale 1:25,000

½ 0 1 Statute Mile

½ 0 1 Nautical Mile

500 0 1000 2000 Meters

500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIn, ZONE "C"
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

POLYCONIC PROJECTION

RESTRICTED

Prepared under the direction of the Chief of Engineers by the Army Map Service (AM), U.S. Army, Washington, D.C., 1945. Mosaic Controlled by average fit to best available map source. Aerial photographs flown by U.S.A.A.F. (Sorties): 4MC 39 24 V, June '44.

Reliability of grid uncertain due to local minor disagreement between photo map and topographic map

7°30' OR 133 MILS — MAGNETIC NORTH — 2°05' OR 37 MILS

Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point 'P' on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH, as plotted on the degree scale at the north edge of the map

APPROXIMATE MEAN DECLINATION 1945
FOR CENTER OF SHEET
ANN. A. MINUTE CHANGE IS WESTERLY

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YAWATA No. 1—PM

JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. **90.34-3630-TI**
DATE. . . . . **3 May 1945**
PAGE **1**

YAWATA URBAN INDUSTRIAL CONCENTRATION NO. 1

YAWATA JAPAN

TARGET No.. **90.34-3630**
OBJ. AREA. **90.34**
OBJ. FOLDER No. **New Target**
AIR TARGET SYSTEM **Urban Areas**

LAT. . . . . **33° 53′ N**
LONG. . . . . **130° 52′ E**
ALT. . . . . **25 feet**

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90.34-3630 material.

SIGNIFICANCE

This is primarily an area of heavy industry, containing the Kokura arsenal producing 6.5 mm and 7.7 mm HME's, 20 mm AT guns, and ammunition. It is also reported to be equipped to mix poison gas and load gas shells. The arsenal is one of two or three most important Japanese Army arsenals. Included in the area are the Kokura RR shops with elaborate repair facilities for locomotives and cars. Two large power plants supply the area as well as some power for steel and other industries in north Kyushu. The large Kokura steel works, a smaller specialty steel concern, a large ceramics plant formerly producing pottery, now possibly converted, and a paper mill complete the major industrial enterprises in the area.

LOCATION

The selected area extends southward from Kokura harbor for approximately 1.5 miles, has a width at the northern or harbor end of about .7 mile, and has at the southern boundary a width of approximately 1.3 miles. It is bounded on the W by the Itabitsu River, on the N by Kokura Harbor and on the E by a road approximately 500 yards E of the Murasaki River and by another wide road to the S.

DESCRIPTION AND LAYOUT

The area is highly industrialized, only a narrow strip extending for about 500 yards from the Murasaki River to the eastern boundary of the area containing residential and possibly commercial structures. The NW and SW sides of the arsenal compound have firebreaks averaging about a block in width. A second possible firebreak is the Murasaki River which extends through the area from N to S near the eastern boundary.

CONSTRUCTION AND VULNERABILITY

(Refer to Illustrations No. 90.34-3630, P4, 5.)

The following table lists characteristics of the target prior to any attack.

	Principal Targets						Other Industrial areas*	Total industrial areas*
	90.34-165* Coke-Iron-Steel	90.34-168 Armament	90.34-184* Rail Transport.	90.34-188* Electric Power	90.34-1127* Electric Power	90.34-1856* Coke-Iron-Steel		
Site area, 1000's of square feet	2340	7057	1940	430	210	980	2960	15917
Percent of site area built up	10%	33%	20%	30%	30%	10%	30%	26%
Total plan area of buildings, 1000's of square feet	230	2329	390	130	60	100	950	4189
HE vulnerability:**								
V1 (least vulnerable)	....	15%	....	....	....	10%	10%	10%
V2	50%	12%	40%	50%	100%	60%	....	18%
V3	....	2%	....	....	....	....	10%	3%
V4	50%	71%	60%	50%	....	30%	80%	69%
V5 (most vulnerable)	....	....	....	....	....	....	....	....
IB vulnerability:								
Combustibility of buildings:								
Fire resistant (R)	20%	17%	....	10%	10%	10%	10%	13%
Noncombustible (N)	70%	51%	70%	90%	90%	80%	50%	57%
Combustible (C)	10%	32%	30%	....	....	10%	40%	30%
Combustible portion of target (buildings and contents)	15%	35%	40%	5%	5%	25%	50%	36%
Susceptibility to incendiary attack:								
Contents only	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Poor
Buildings and contents	Poor	Fair	Fair	Poor	Poor	Poor	Good	Fair

* For targets so marked, all data are preliminary estimates only. Detailed structural analyses if prepared later may vary considerably from these preliminary estimates.

** For explanation of HE vulnerability classifications refer to Joint Target Group Memorandum No. JTG/M-3/1 dated 26 March 1945.

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JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET INFORMATION SHEET

SHEET No. . 90.34-3630-TI
DATE . . . . . 3 May 1945
PAGE 2

WEAPON RECOMMENDATIONS:

See Weapon Recommendations Sheet No. 90.34-3628 WR1

Target Number or Reference	Name	Description and Product
1856	Kyushu Special Steel Co. (Kyushu Tokushu Ko KK)	Believed to be a small producer of high speed steel.
165	Kokura Steel Works (Kokura Seiko KK)	Capacity for 218,000 m. t. of pig iron, 256,000 m. t. of steel ingots and approximately 250,000 m. t. of rolled products. In recent cover there is little indication that production is now being carried on.
188	Kokura Steam Power Plant No. 2	Ranks second among five principal generating stations supplying approximately 85 per cent of the total electric power available to industrial north Kyushu. Capacity 78,000 KW.
1127	Kokura Steam Power Plant No. 1	Capacity 40,000 KW. Fifth of the 5 plants referred to under Target 188.
168	Kokura Arsenal	One of the two or three largest Japanese arsenals and probably the most important in Japan for the manufacture of light automatic weapons and smaller types of AA and AT guns. Reported to mix poison gas, load and store gas shells underground. Unconfirmed reports of production of tanks and/or armored cars.
184	Kokura Rail Road Shops (Toyo Sharyo Kaisha)	Has large and elaborate facilities for all kinds of repair of locomotives and rolling stock. Believed to repair electric locomotives used on Kammon tunnel traffic. This shop is strategically located in a locality which not only generates much of Kyushu's RR traffic but also serves as a corridor for Kyushu-Honshu traffic via the Kammon Tunnel.
A	Ceramics Plant	Known formerly to have produced pottery, china and porcelain. No current intelligence on present product. Conversion of similarly equipped plant in Nagoya to shell turning facilities suggests possibility of similar conversion for this plant.
B	Ceramics Plant	Formerly producing pottery, china and porcelain. Possibly converted to war products.
C	Unidentified Industry	
D	Gas Works	
E	Gas Works	
F	Ice Plant	

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas after 90.34-3630-TI, sheet 1.

JOINT TARGET GROUP, WASHINGTON, D. C.
WEAPON RECOMMENDATIONS SHEET

SHEET No. 90.34-3630 WR1
DATE..... 3 May 1945
PAGE 1

TARGET No.. 90.34-3630
OBJ. AREA.....90.34
OBJ. FOLDER No. New Target
AIR TARGET SYSTEM Urban Areas

LAT.....33°53'N
LONG..... 130°52'E
ALT..... 25 feet

YAWATA URBAN INDUSTRIAL CONCENTRATION No. 1

YAWATA JAPAN

HIGH AND MEDIUM ALTITUDE ATTACKS

(See also 90.34-3630-TI and associated target illustrations.)

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90.34-3630 material.

INTRODUCTION

This Weapon Recommendations Sheet applies to a high or medium altitude attack against designated industrial plants (see Table II at the right) within the Yawata Urban Industrial Concentration No. 1 (see Illustrations No. 90.34-3630 P4, P5). The sheet is based on photography of June 1944.

An estimated 40 percent of the total floor area of the industrial plants can be destroyed by fire. For levels of damage up to 35 percent the recommended attack is primarily with incendiary bombs, with a minimum of high explosive to support the incendiary effort.

The ground densities recommended (see Table I) against the target area are believed sufficient to destroy residential and mixed zones surrounding the industrial plants.

WEAPONS AND FUZING

Incendiaries.

The preferred incendiary bombs are the AN-M69 6-lb, AN-M74 10-lb, or AN-M50 4-lb (all in aimable clusters). The AN-M47 70-lb incendiary is an alternative selection, and the AN-M76 500-lb bomb is not recommended.

High Explosives.

In support of an incendiary attack the most effective device is an explosive charge and/or white phosphorus cup incorporated in the incendiary bomb. If these are available, no auxiliary HE or fragmentation bombs will be worth the weight of incendiaries displaced.

HE or fragmentation bombs used in support of an incendiary attack should *in no case exceed 10 to 20 percent* of the total load.

As a major weapon. Incendiary attacks are expected to cause serious damage to about 35 percent of the area of industrial plants in the concentration. If it is desired to achieve percentages of serious damage above this level, the use of a combination of HE and IB is necessary (see Table I). The preferred HE weapon in this case is the 2000-lb GP, fuzed 0.1 N/0.1 T. The 1000-lb and 500-lb GP, similarly fuzed, are alternatives. The 2000-lb GP is selected due to the preponderance of V2* buildings in the principal targets least susceptible to fire damage (see Table II below).

* For a definition of V2 buildings see JTG/M-3/1 (non-technical) or JTG/M/8 (technical).

ATTACK DATA

Table I below gives the ground densities required to achieve up to 60 percent serious damage to the industrial plants in the target area.

TABLE I

Ground Density in Tons/Million Sq. Ft.		Percent Serious Damage to Industrial Plants
HE	IB	
**	3	20
**	6	30
5	10	40
22	10	50
42	10	60

** Not to exceed 10 to 20 percent of the total load.

Table II below lists the principal plants in the Yawata Urban Industrial Concentration No. 1 and the estimated percent of each subject to fire damage.

TABLE II

Industrial Plants			Estimated percent subject to fire damage
Name	Number	Class	
Kokura Steel Works	90.34-165	Coke-Iron-Steel	15
Kokura Arsenal	90.34-168	Armament	40
Kokura R.R. Shops	90.34-184	Rail Transport.	40
Kokura Steam Power Plant No. 2	90.34-188	Electric Power	5
Kokura Steam Power Plant No. 1	90.34-1127	Electric Power	5
Kyushu Special Steel Co.	90.34-1856	Coke-Iron-Steel	25
Average, Other Industrial Plants			55
Average, All Industrial Plants			40

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YAWATA, U.I.C.—1, JAPAN
URBAN INDUSTRIAL CONCENTRATION

RESTRICTED

ILLUSTRATION No.	90.34-3630 P3
DATE	20 May 1945
TARGET No.	90.34-3630
COORDINATES	33 53'N 130 52'E
PHOTOGRAPHED	18 June 1944

0 1000 2000 3000 4000 5000 6000 7000 FEET
0 1/2 1:15,000 APPROX 1 MILE

Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other 90.34-3630 material.

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JOINT TARGET GROUP, WASHINGTON, D. C.
FIRE SUSCEPTIBILITY PLAN

YAWATA, U.I.C.—1, JAPAN
URBAN INDUSTRIAL CONCENTRATION

CONFIDENTIAL

ILLUSTRATION No.	90.34-3630 P4
DATE	20 May 1945
TARGET No.	90.34-3630
COORDINATES	33°53'N 130°52'E
PHOTOGRAPHED	18 June 1944

0 1000 2000 3000 4000 5000 6000 7000 FEET
0 ½ 1:15,000 APPROX 1 MILE

TOBATA

KOKURA

NISHI-YAWATA
(EAST-YAWATA)

ITABITSU GAWA (R.)

MURASAKI-GAWA (R.)

TO MOJI

1856
188
E
1127
165
F
168
D
184
C
B
A

LEGEND

90.34-165		Kokura Steel Works
90.34-168		Kokura Arsenal
90.34-184		Kokura RR Shops
90.34-188		Kokura Steam Power Plant No. 2
90.34-1127		Kokura Steam Power Plant No. 1
90.34-1856		Kyushu Special Steel Co.
	A	Ceramics Plant
	B	Ceramics Plant
	C	Unidentified Industry
	D	Gas Works
	E	Gas Works
	F	Ice Plant

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JOINT TARGET GROUP, WASHINGTON, D. C.

FIRE SUSCEPTIBILITY PLAN

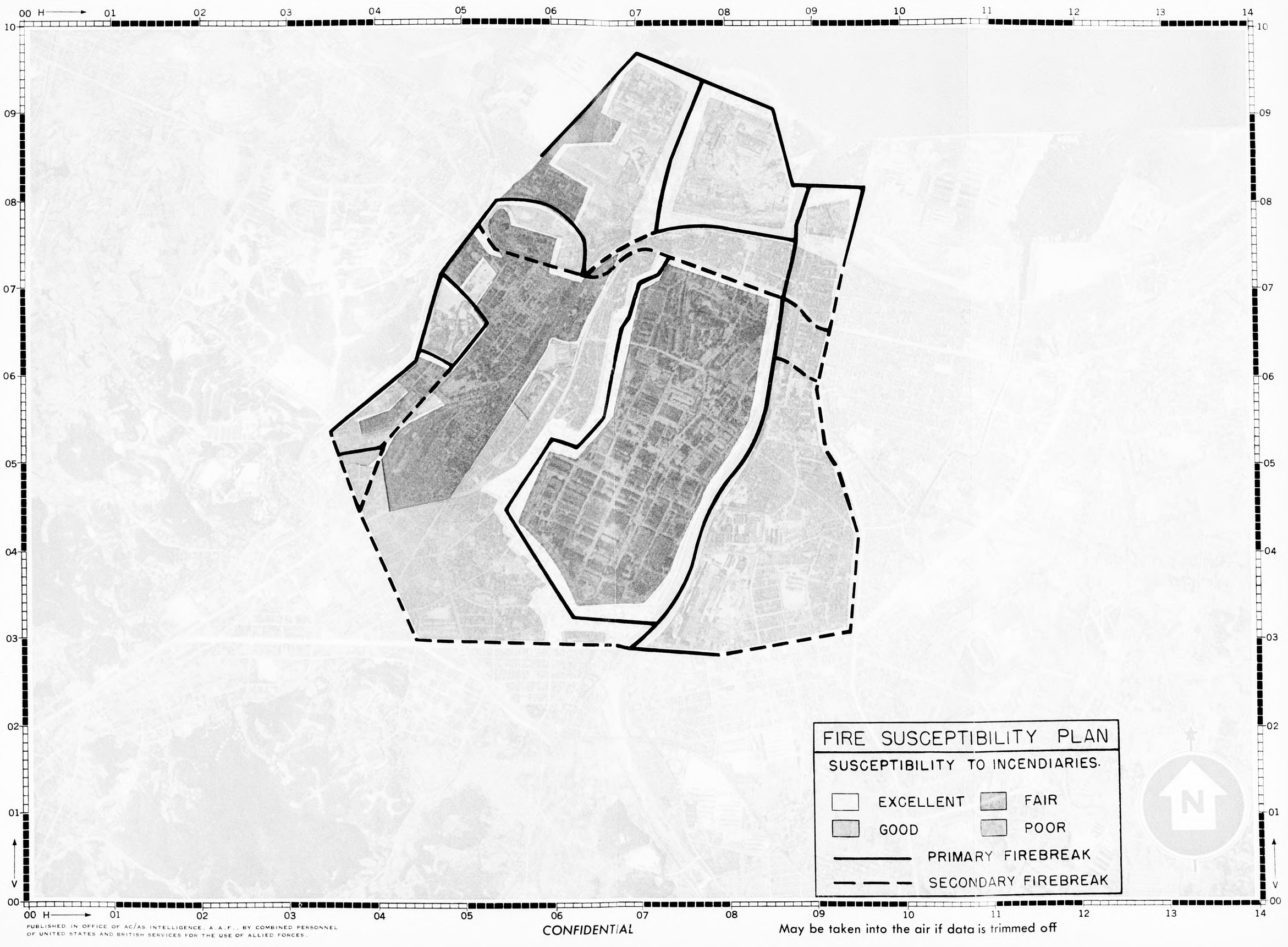
YAWATA, U.I.C.—1, JAPAN
URBAN INDUSTRIAL CONCENTRATION

CONFIDENTIAL

ILLUSTRATION No.	90.34-3630 P5
DATE	20 May 1945
TARGET No.	90.34-3630
COORDINATES	33°53'N 130°52'E
PHOTOGRAPHED	18 June 1944

0 1000 2000 3000 4000 5000 6000 7000 FEET

0 ½ 1:15,000 APPROX 1 MILE



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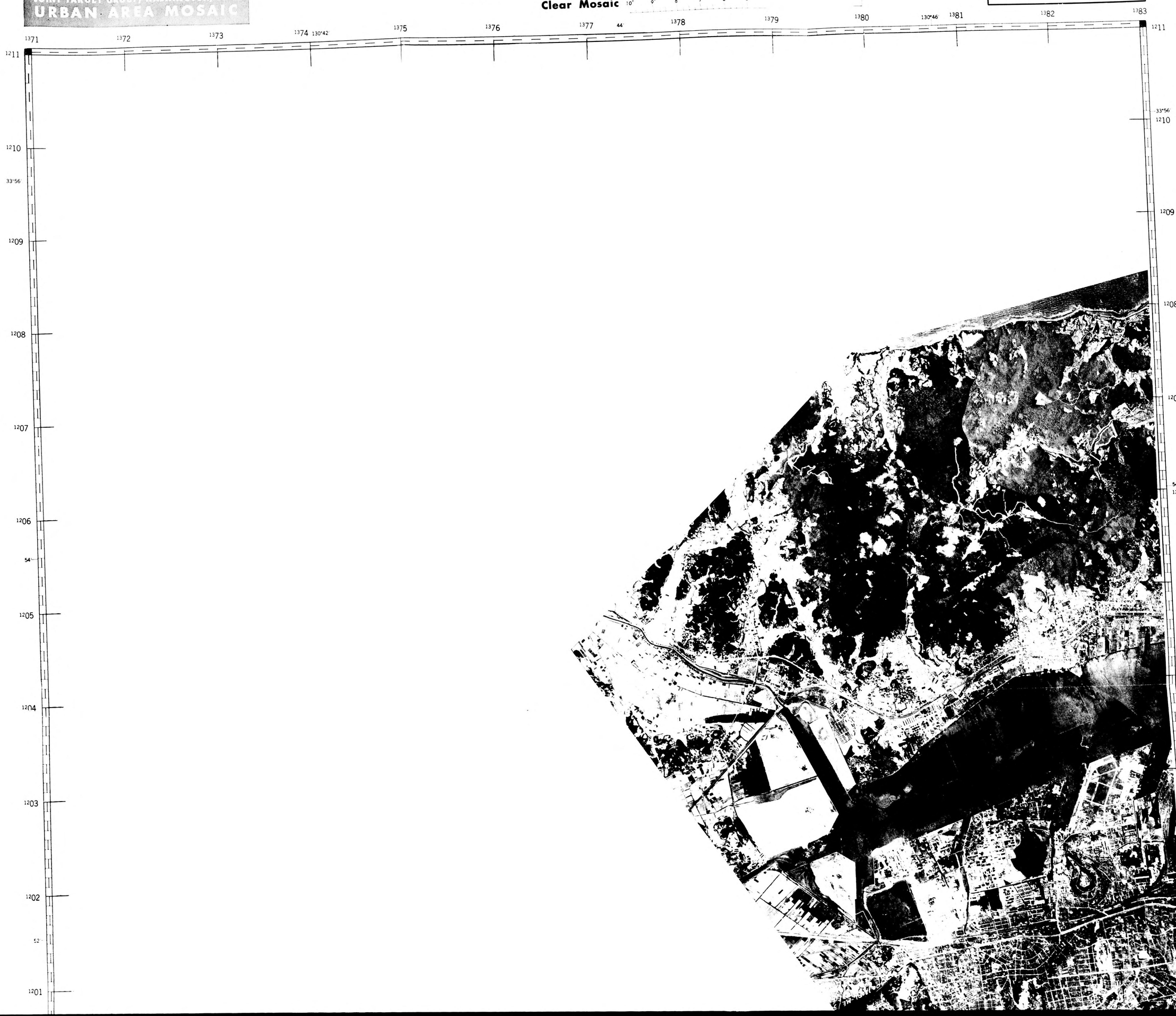
RESTRICTED

JOINT TARGET GROUP, WASHINGTON, D. C.
URBAN AREA MOSAIC

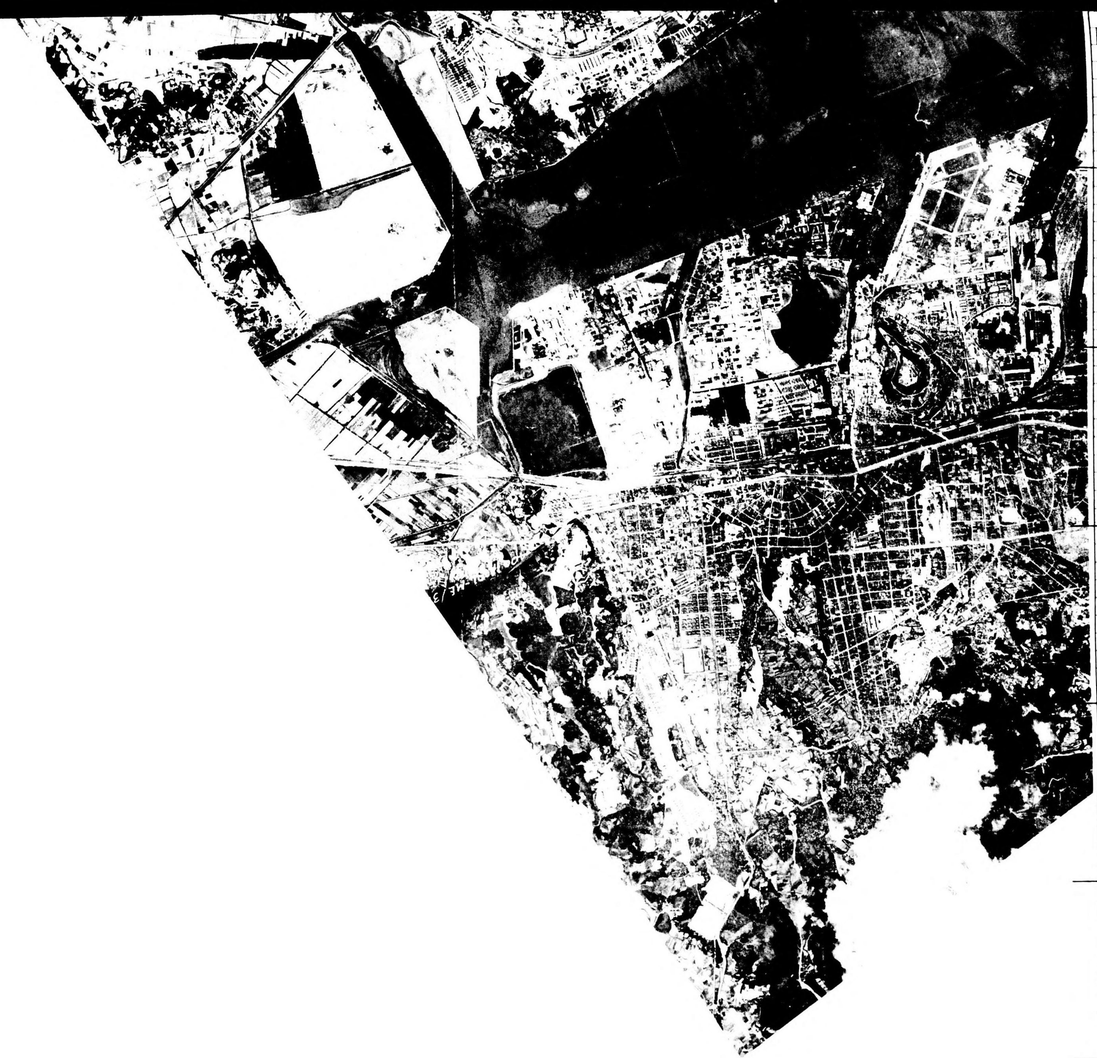
YAWATA No. 1 — JAPAN

Clear Mosaic

ILLUSTRATION No.
YAWATA No. 1—PM
DATE.....21 May 1945



Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Yawata material.



1203
1202
52'
1201
1200
1199
1198
33°50
1197 000yds N.
1371 000yds E. 130°40'
1372
1373
1374
42'
1375
1376
1377
44' 1378
1379
1380
P
1381 130°46'
1382
1383
1197

Scale 1:25,000

½ 0 1 Statute Mile

½ 0 1 Nautical Mile

500 0 1000 2000 Meters

500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIn, ZONE "C"
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

POLYCONIC PROJECTION

RESTRICTED

Prepared under the direction of the Chief of Engineers by the Army Map Service (AMS), U.S. Army, Washington, D.C., 1945. Mosaic Controlled by average fit to best available map source. Aerial photographs flown by U.S.A.A.F. (Sorties): 4MC-39 24"V, June '44.

Reliability of grid uncertain due to local minor disagreement between photo map and topographic map.

Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point 'P' on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH as plotted on the degree scale at the north edge of the map.

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YAWATA No. 1—PM

By HR-PI NARA Date 1/10/11

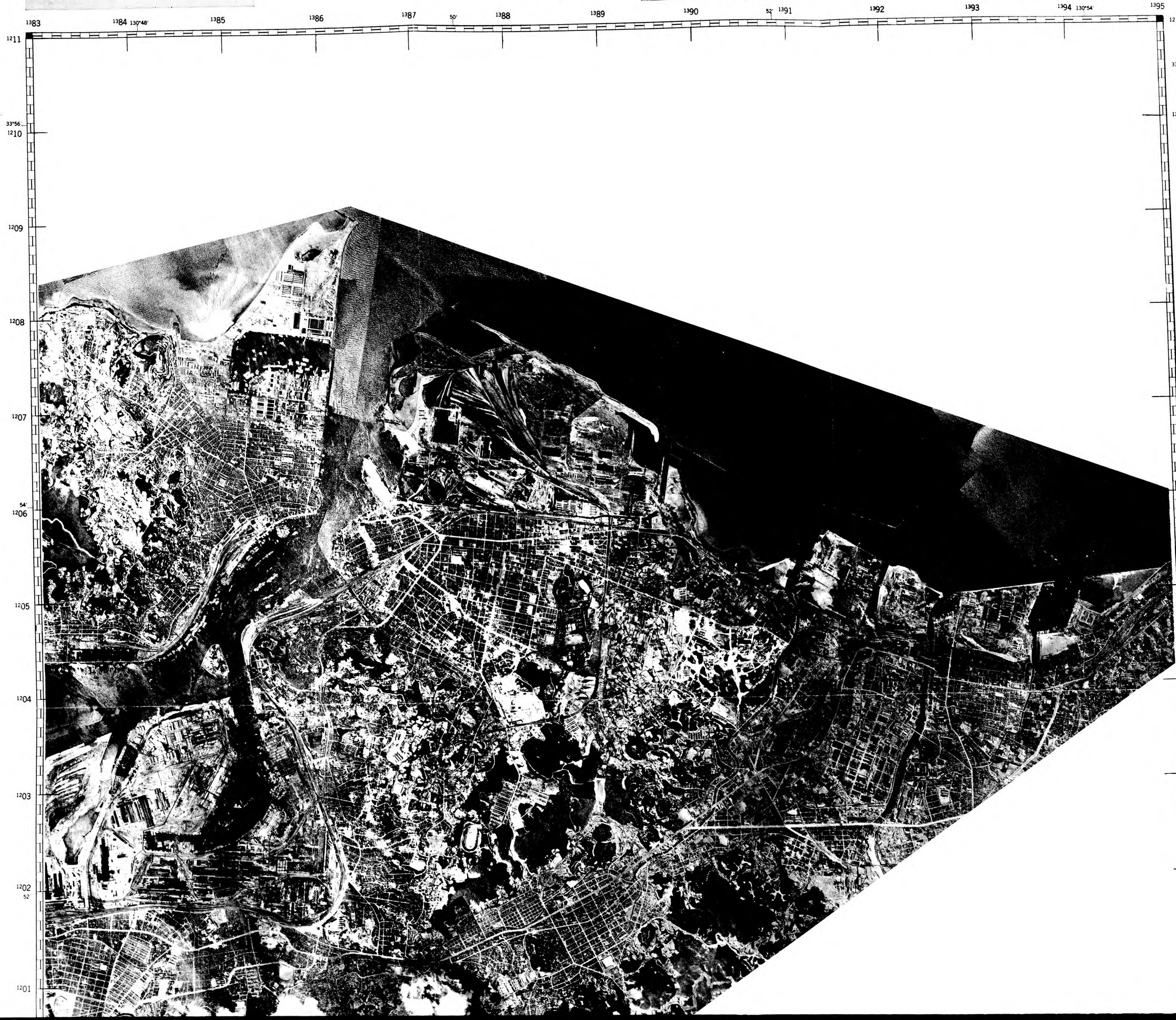
RESTRICTED

YAWATA No. 2 — JAPAN

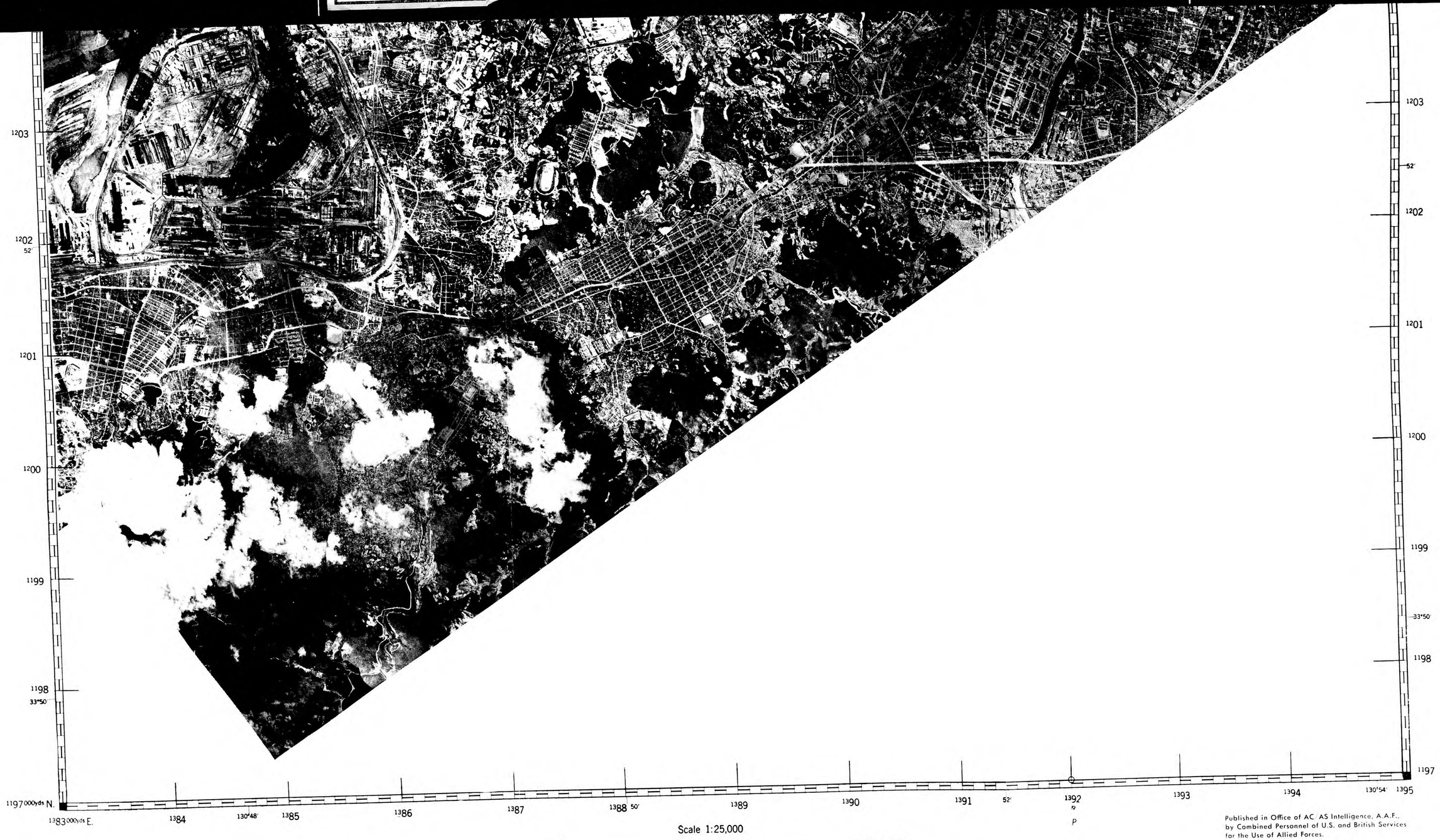
Clear Mosaic

JOINT TARGET GROUP, WASHINGTON, D. C.
URBAN AREA MOSAIC

ILLUSTRATION No.
YAWATA No. 2—PM
DATE . . . . . 21 May 1945



Holders of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Urban Areas with other Yawata material.



Scale 1:25,000

½ 0 1 Statute Mile

½ 0 1 Nautical Mile

500 0 1000 2000 Meters

500 0 1000 2000 Yards

ONE THOUSAND YARD WORLD POLYCONIC GRID, BAND IIIN, ZONE C"
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

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Prepared under the direction of the Chief of Engineers by the Army Map Service (AMS), U.S. Army, Washington, D.C., 1945. Mosaic Controlled by average fit to best available map source. Aerial photographs flown by U.S.A.A.F. (Sorties): 4MC-39 24"V, June '44.

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YAWATA No. 2—PM

JOINT TARGET GROUP, WASHINGTON, D. C.
TARGET LOCATION SHEET

YAWATA URBAN INDUSTRIAL CONCENTRATION NO. 3

YAWATA JAPAN

SHEET	90:34-3632–TL
DATE	31 May 1945
TARGET	90:34-3632
CATEGORY	Mxt. Ind. Conc.–UIC
COORDINATES	33°52'N 130°46'E
ALTITUDE	10-30 feet

SIGNIFICANCE:
This area includes a sizeable alumina plant, a large industrial chemicals and synthetic oil works, and several machinery and electrical equipment plants.

SCALE APPROX.: 1:33,250

File No. 714,632.1

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