Issued September 18, 1944

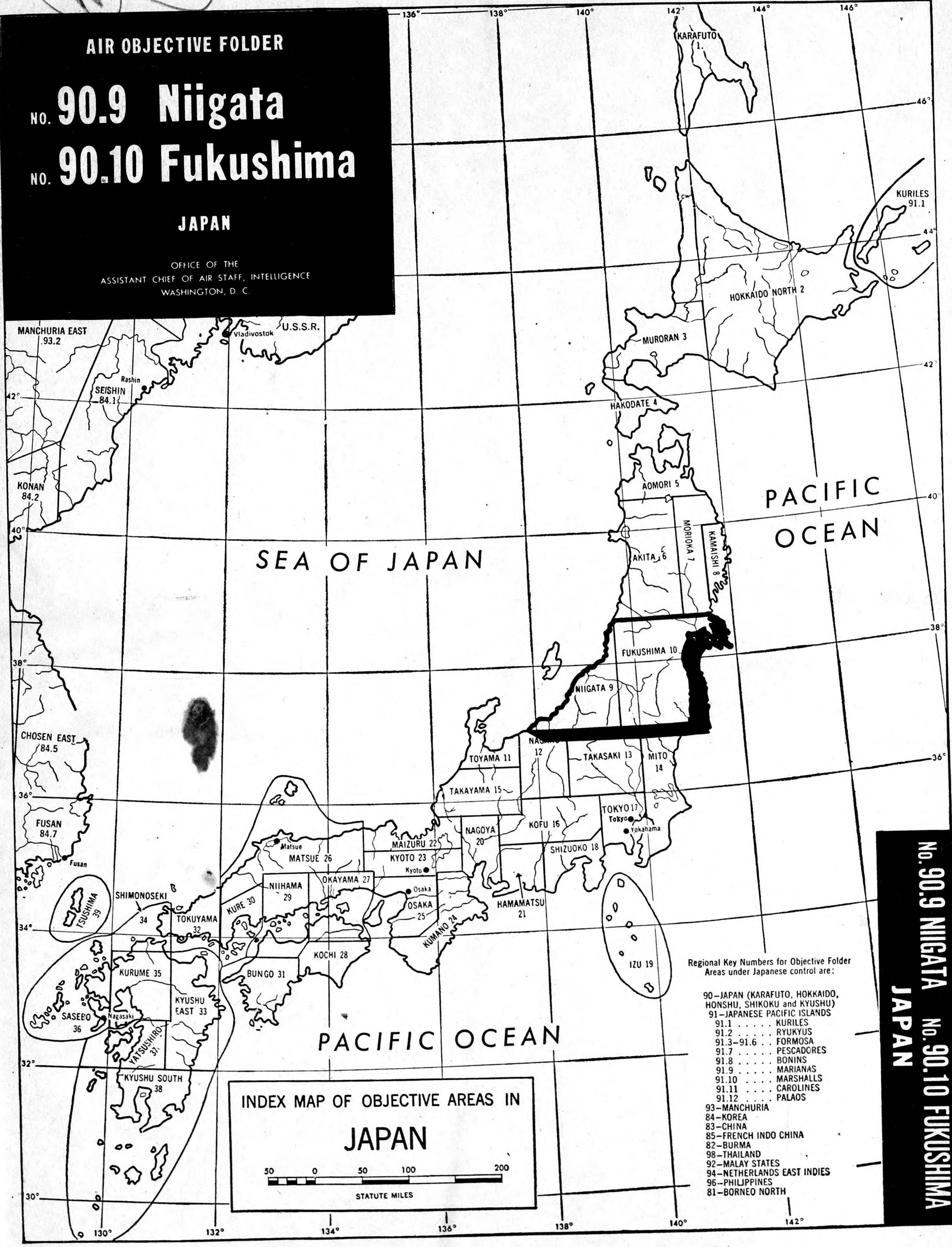
AIR OBJECTIVE FOLDER

NO. 90.9 Niigata

NO. 90.10 Fukushima

JAPAN

OFFICE OF THE
ASSISTANT CHIEF OF AIR STAFF, INTELLIGENCE
WASHINGTON, D. C.



INDEX MAP OF OBJECTIVE AREAS IN

JAPAN

50 0 50 100 200

STATUTE MILES

Regional Key Numbers for Objective Folder Areas under Japanese control are:

90–JAPAN (KARAFUTO, HOKKAIDO, HONSHU, SHIKOKU and KYUSHU)
91–JAPANESE PACIFIC ISLANDS
91.1 . . . . . KURILES
91.2 . . . . . RYUKYUS
91.3–91.6 . . FORMOSA
91.7 . . . . . PESCADORES
91.8 . . . . . BONINS
91.9 . . . . . MARIANAS
91.10 . . . . MARSHALLS
91.11 . . . . CAROLINES
91.12 . . . . PALAOS
93–MANCHURIA
84–KOREA
83–CHINA
85–FRENCH INDO CHINA
82–BURMA
98–THAILAND
92–MALAY STATES
94–NETHERLANDS EAST INDIES
96–PHILIPPINES
81–BORNEO NORTH

NO. 90.9 NIIGATA NO. 90.10 FUKUSHIMA
JAPAN

***CONFIDENTIAL** (equals British Confidential) not to be taken into the air on offensive missions*

CONFIDENTIAL equals British Confidential

Air Objective Folder

NIIGATA REGION

NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	HARBOR FACILITIES	
1670	Niigata Harbor	10
	MACHINERY AND MACHINE TOOLS	
998	Niigata Iron Works, Plant No. 1	13
999	Niigata Iron Works, Plant No. 2	13
	NON-FERROUS METALS	
1003	Japan Light Metals Co.	13
	PETROLEUM	
1000	Nippon Oil Refinery	11
1012	Niigata Oil Storage No. 1	12
1013	Niigata Oil Storage No. 2	12
	TRANSPORTATION	
1023	Niigata RR Yards	10

Summary and Evaluation of Niigata Region

With improvement of harbor facilities at Niigata and expansion of established industries, together with construction of new industrial units, the Niigata region in the past ten years has become one of the more important industrial districts on the Japan Sea coast of Honshu.

Niigata (population 150,000) is the largest city and contains the only large industrial concentration in this region. Of major importance are the Japan Light Metals Co. plant **TARGET 1003,** one of Japan's principal aluminum reduction plants, and the Niigata Iron Works, Plant No. 1 **TARGET 998** which is the largest plant of one of the "Big Five" machine tool producers as well as manufacturing approximately 15% of Japan's rolling stock. Plant No. 2 of the Niigata Iron Works **TARGET 999,** although not ranked as a major objective may prove of equal importance with Plant No. 1 when more information is available.

The Japan Light Metals aluminum plant **TARGET 1003** is one of the largest in Japan with an estimated capacity of 18,000 metric tons annually. The plant is constructed on 200 acres of flat land sloping toward the river, and separated from it by a high embankment.

Facilities at Niigata Harbor **TARGET 1670** have been undergoing extensive improvements for a number of years in connection with the increased use of Niigata as a trans-shipment point from Rashin and Seishin, Korea. Land has been reclaimed along both banks of the Shinano River to provide additional berthing space, rail facilities supplying the dock areas have been increased, and the harbor has been dredged to permit anchorage of large, ocean-going vessels. The Niigata Freight Yards **TARGET 1023** serve local industries and the wharf areas.

Also in the city is the Nippon Oil Refinery **TARGET 1000** which has an annual capacity of 990,000 barrels crude and 330,000 barrels cracking. Although a small refinery (less than 5% in terms of Empire capacity) it is important as one of the few refineries in Japan not dependent on crude from overseas. There is considerable storage capacity at the refinery and the company also has a large storage area, **TARGET 1012** with an estimated capacity of 560,000 barrels, at the mouth of the Shinano River which is believed to be a terminal or tanker loading point. Just north of the refinery is another oil storage area **TARGET 1013** with an estimated capacity of 420,000 barrels. Located in the center of the Niigata oil fields, this region also has numerous minor refineries with a capacity of 20 to 30 barrels a day of crude. An unconfirmed report says that the old Niitsu Oil Refinery in Niigata, not listed as a target, has started operation of an oil cracking plant with 1500 barrels daily capacity and has increased the crude capacity of the refinery. It is also said to produce 7300 barrels of iso-octane annually. The Hayama Oil Refinery, also in Niigata City, is a minor refinery with a crude capacity of only 200 barrels daily and is not listed as a target.

There is a small plant at Kameda, reportedly one of a number of small industries in this region making components for military equipment, possibly tanks, assembled at Niigata City. Belonging to this group may be the many, small converted factories in the towns of Sanjo, Tsubame, Kamo and Yoshida, which in peace-time manufactured cutlery, shovels, etc.

Other industries in this region include the manufacture of sulphuric acid, alcohol and medicines; paper, pulp, textile and saw mills, etc. None of the small and/or relatively unimportant manufacturing plants are listed as targets, but where information is available, they are spotted on the maps as a possible aid in photographic reconnaissance interpretation.

NIIGATA 90.9, FUKUSHIMA 90.10 INDEX & SUMMARY (NIIGATA REGION)

3636—8-24-44—Niigata-Fukushima—First Proof

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SUMMARY AND EVALUATION OF NIIGATA REGION—Concluded

NIIGATA CITY—INCENDIARY ATTACK DATA: Situated on low sandy land, at the mouth of the Shinano River, Niigata comprises two distinct city areas—Niigata proper to the west of the river, and several continuous industrial suburbs to the east. Niigata proper is crowded and low-lying, with typical congestion of predominantly wooden residences and relatively few substantial fire-resistive commercial and public buildings. With the exception of industrial clusters at the northern and southern ends, the city proper is primarily a residential area, with comparatively few small factories.

The principal industries and rail/ship facilities are located along the eastern side of the river. Of more recent development, this part of the city is characterized by uneven built-up residential/industrial districts separated by small rivers and inlets, patches of trees and other open spaces.

Detailed information concerning fire-fighting facilities is lacking, but the city is considered to have less efficient professional fire protection services than comparable cities in south-central Honshu. Fragmentary fire insurance statistics indicate that rates for general coverage have averaged almost 100% higher and those for storage facilities 40 to 60% higher than similar rates in such cities as Nagoya, Kobe or Osaka. On the other hand, the city is more cut up by effective fire breaks, which tends to reduce overall vulnerability and necessitate the designation of more extensive incendiary zones in proportion to population than are required for comparable cities in south-central Japan. Deep snow cover during much of the winter season would serve to slow down considerably the spread of fires set by incendiaries. Because of the more rigorous winters, residential construction here tends to be somewhat more substantial and, accordingly, slightly less combustible than in south-central Japan. This is compensated for, however, by the utilization of more gabled roofs and wider verandas (for protection against deep snow) which substantially increases the proportion of roof cover. There is also considerable correlation between crowded residential districts and industrial installations, exposing the latter to sweeping fires.

As shown on map on page M-5, two general areas are designated for incendiary attack. Zone I, more vulnerable because of greater congestion and higher proportion of combustible construction, covers the heart of Niigata proper, to the west of the Shinano River. Primarily residential, this zone also covers the bulk of the city's commercial and government buildings, located at the central and western sections of the zone, as well as wood pulp and machinery plants at the northern extremity. With the possible exceptions of a wide avenue leading west from Bandai Bridge and several canals running generally north-south, there are no major fire breaks. The zone is bounded on the western side by a solid lane of temple and school grounds, cemeteries and small parks, which constitute an effective break between Zones I and II.

Zone II, somewhat less vulnerable because of its lower built-up density, comprises two separate fire areas. The western area, separated from Zone I by the lane of temples and small parks, covers the better-zoned sections of Niigata proper, a residential district broken up by numerous schools and small parks.

The larger area of Zone II covers the entire mixed residential/industrial section of the city, to the east of the Shinano River.

The southern half includes a crowded residential district fringed by lumber yards, paper mills and an oil refinery. The northern half, less built-up, covers important waterfront storage sheds, machinery and tool plants, chemical works, lumber yards, oil, coal and grain storages and textile mills.

NIIGATA 90.9, FUKUSHIMA 90.10 SUMMARY (NIIGATA REGION)

3636—9—Niigata-Fukushima—8-24-44—First Proof

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NIIGATA 90.9, FUKUSHIMA 90.10 SUMMARY (NIIGATA REGION)

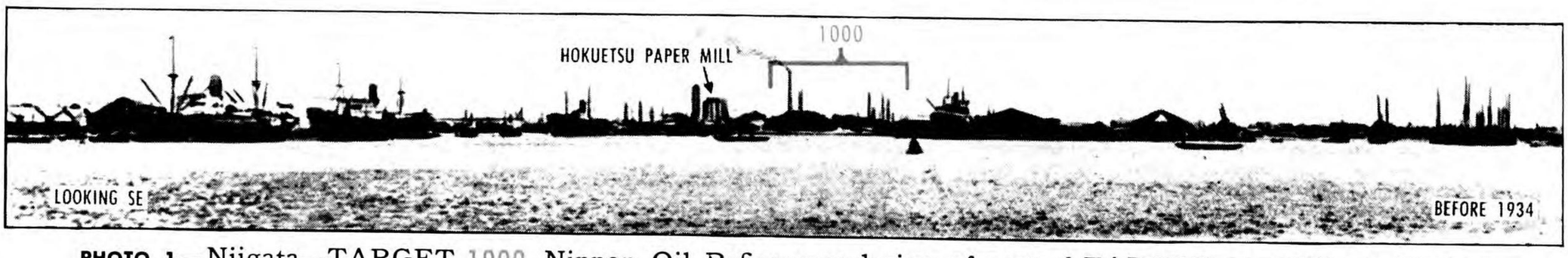


PHOTO 1—Niigata—TARGET 1000 Nippon Oil Refinery and view of part of TARGET 1670 Niigata Harbor.

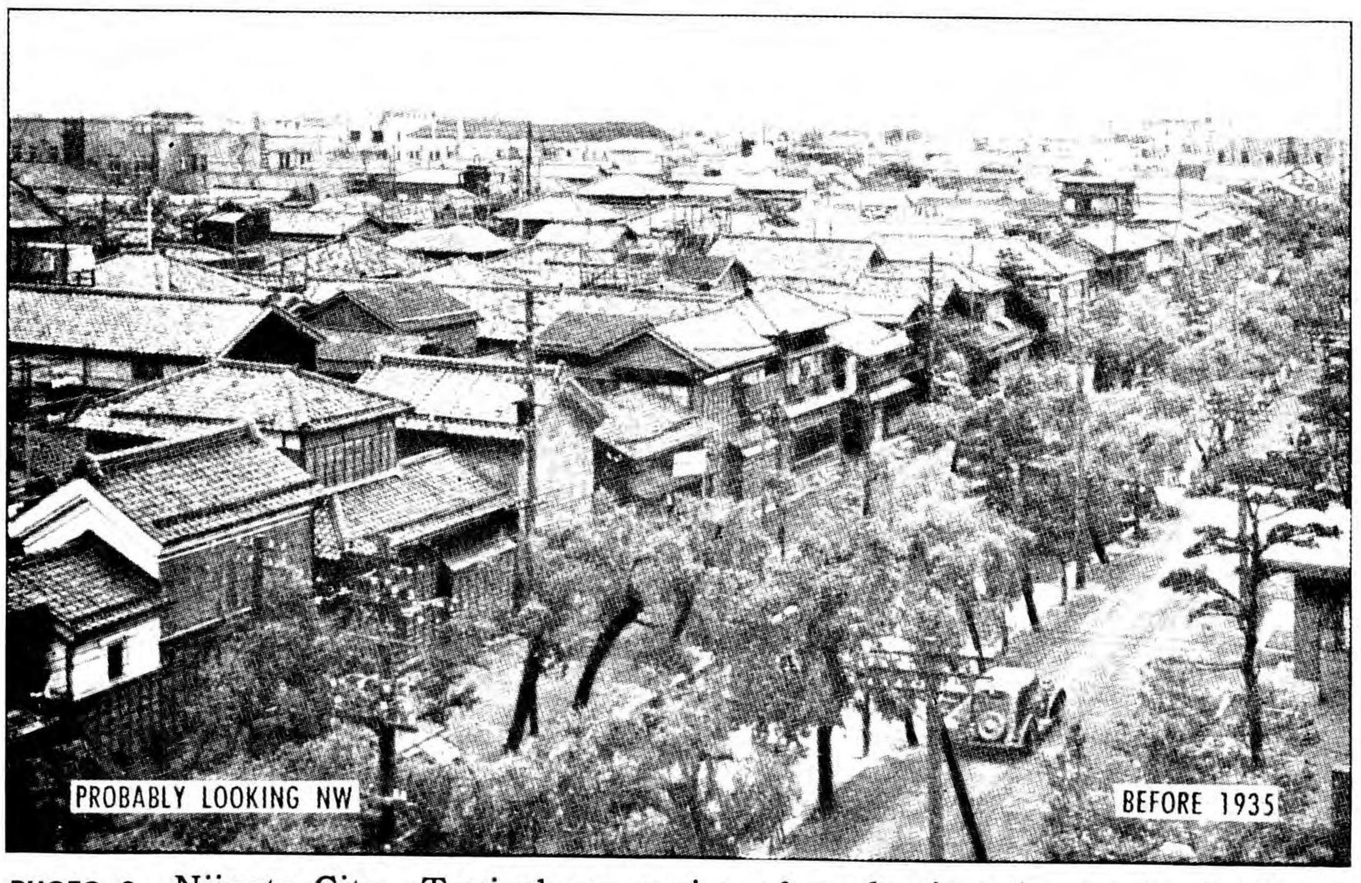


PHOTO 2—Niigata City—Typical congestion of predominantly wooden houses in Zone I fire area, showing part of commercial district in background.

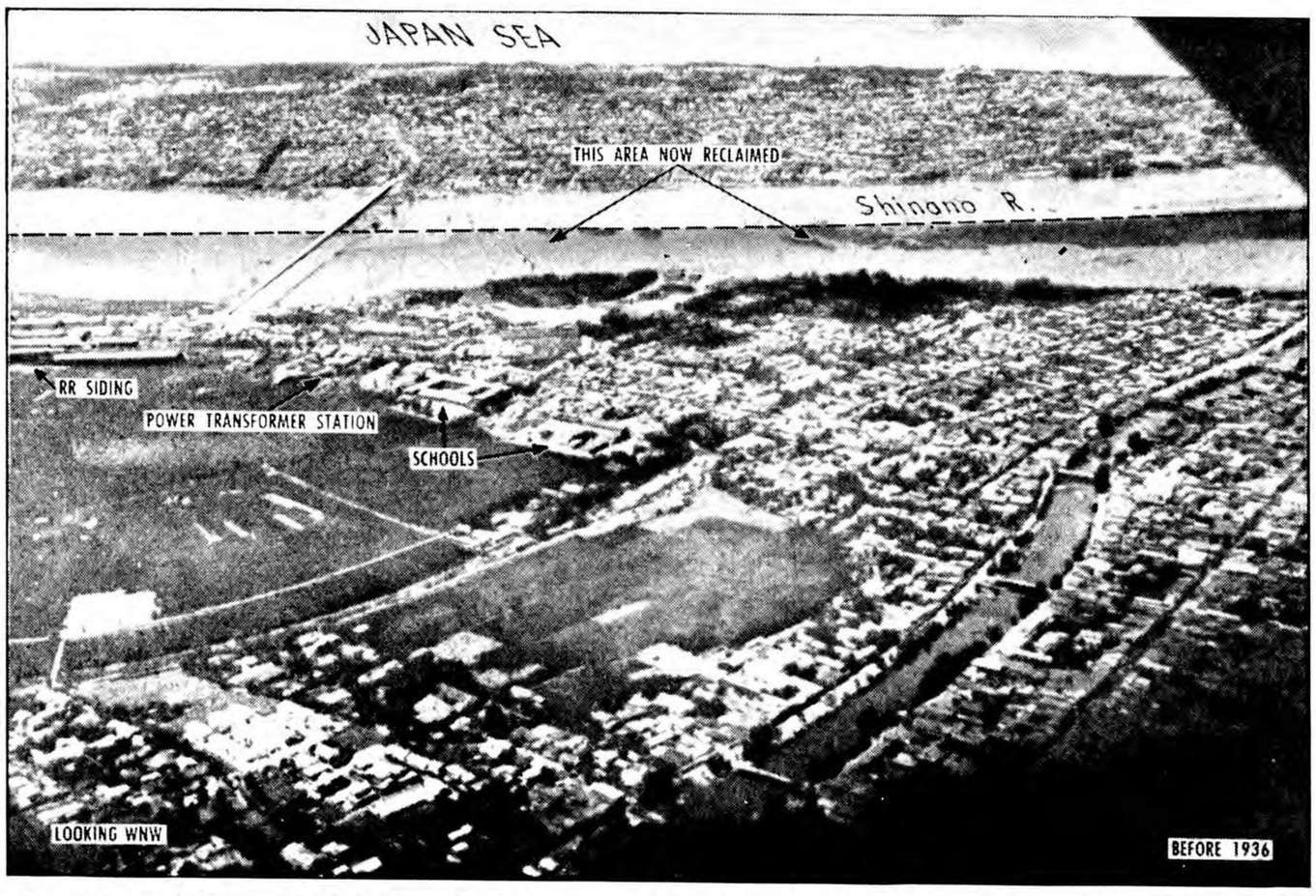
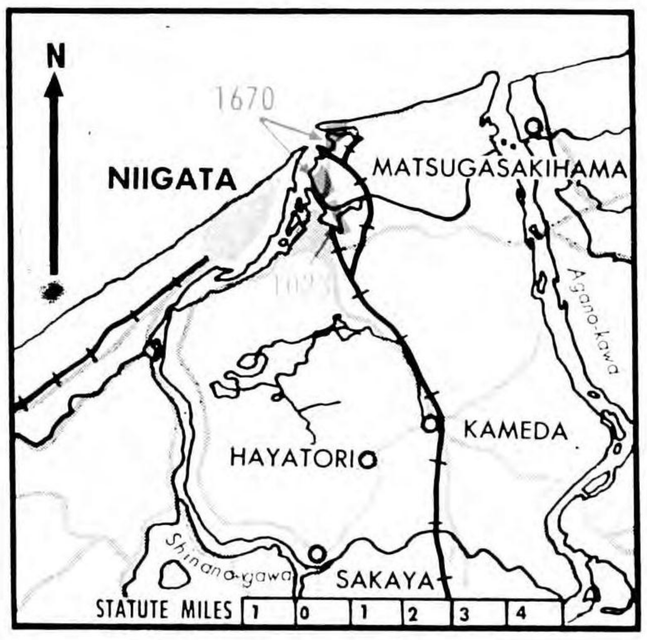


PHOTO 3—Niigata—View of city showing Bandai Bridge (Not listed as a target). Zone I fire area in background; Zone II in foreground.



TARGET 1670

NIIGATA HARBOR

NIIGATA

(HARBOR FACILITIES)

37° 56′ N 139° 04′ E (Approx)—Harbor area just inside dredged, breakwater protected mouth of Shinano River. Dredging and land reclamation since 1939 have extended the 5000 ft pre-war deep-water berthage. Port has good RR spurs to shipside, freight handling sheds and extensive whse storage for ship-to-rail connections. Several alternate rail routes leading thru Sanjo and Nagaoka connect with cross-island mainlines to Tokyo Bay Nagoya industrial regions and provide for import of iron ore concentrates and other mainland raw materials via Seishin and Rashin. There are drydock and repair facilities included in TARGET 998 (Niigata Iron Works) and some small-ship bldg has been reported. There is deep-water access to oil storage for bunkering.

(See photo 1; maps on pages M-4 and M-5.)

TARGET 1023

NIIGATA RR YARDS

NIIGATA

(TRANSPORTATION)

37° 55′ N 139° 04′ E (Approx)—Freight yards serving Niigata industry and wharf area. Yards are behind the southern wharves. On E is the Hokuetsu Paper Mill. SE corner of yards joins the Nippon Oil Refinery compound (TARGET 1000).

(See maps on pages M-4 and M-5.)

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 1023, 1670 (NIIGATA REGION)

3636—10—Niigata-Fukushima—8-24-44—First Proof

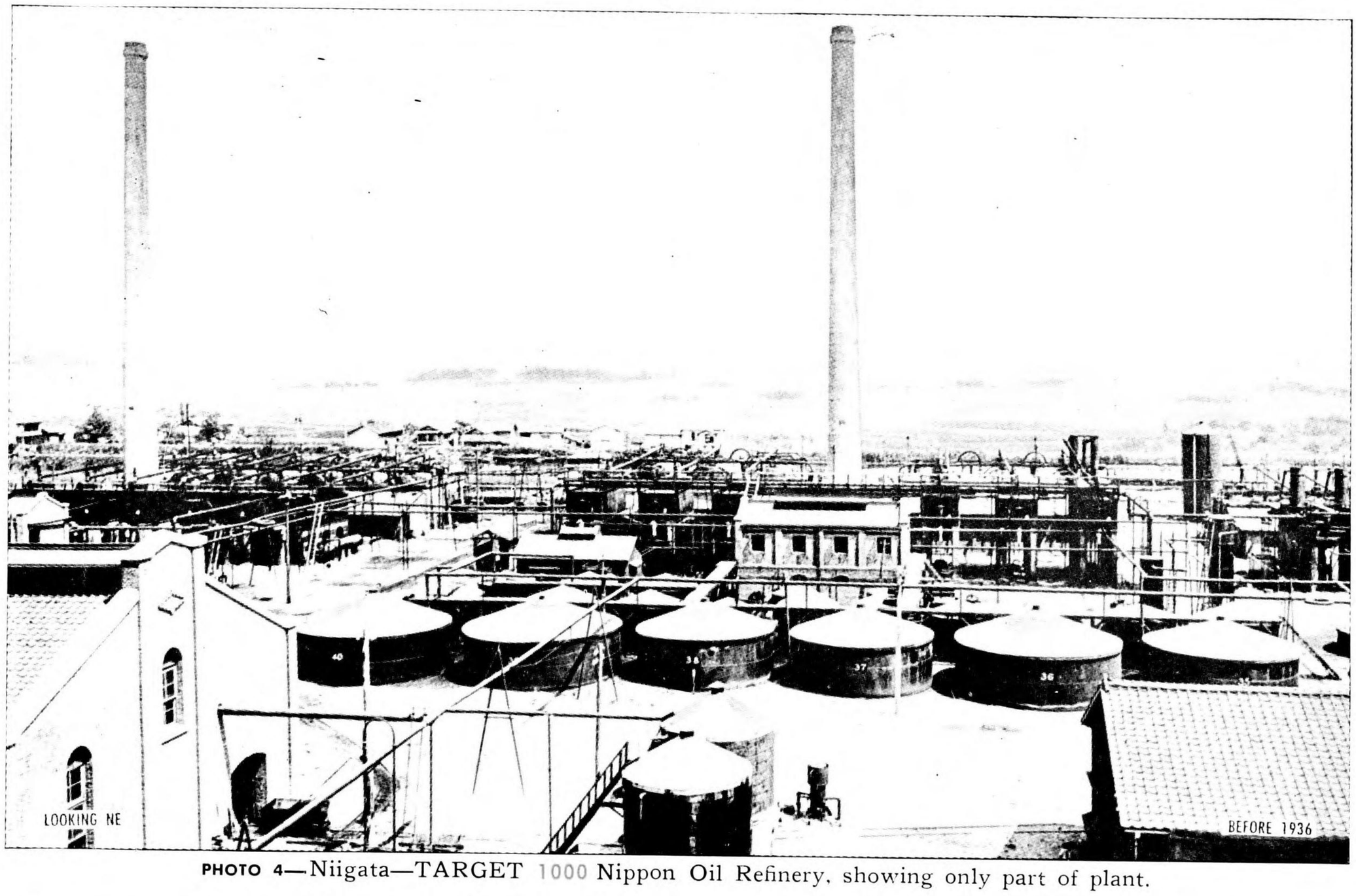
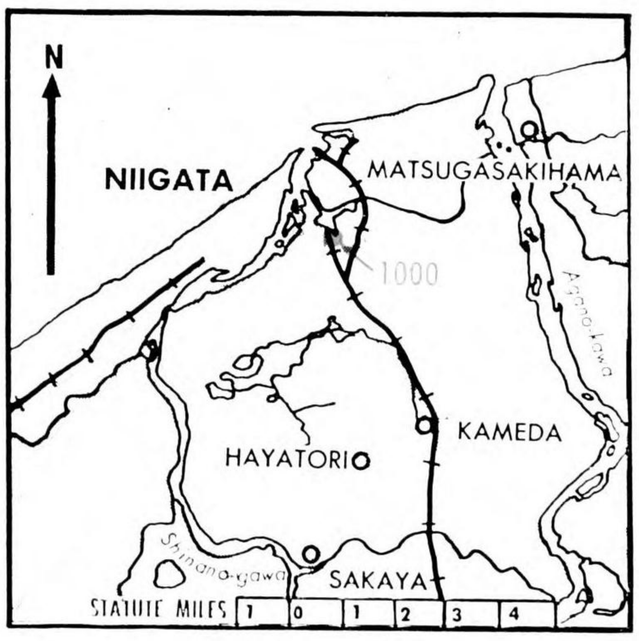


PHOTO 4—Niigata—TARGET 1000 Nippon Oil Refinery, showing only part of plant.



TARGET
1000

NIPPON OIL REFINERY

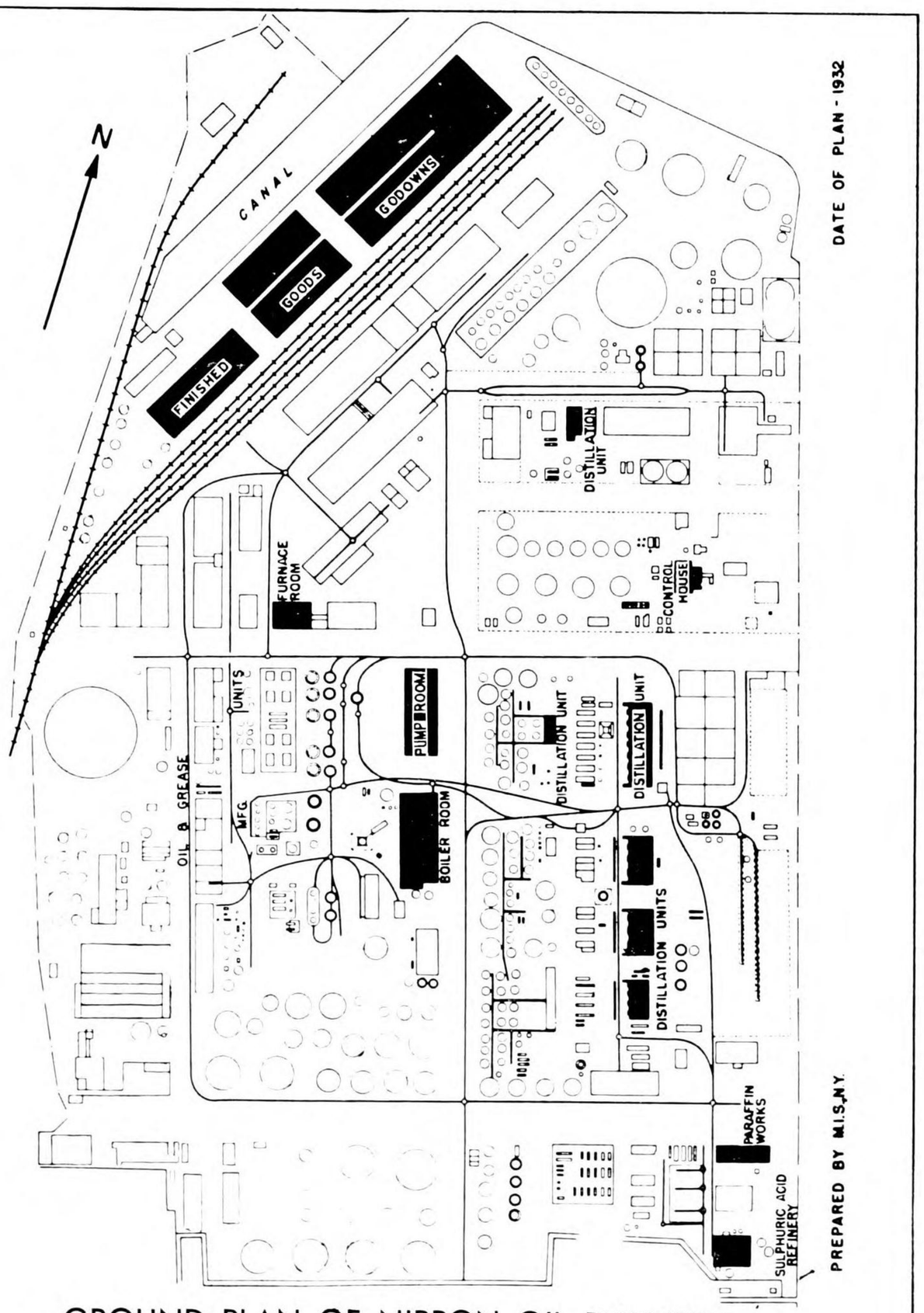
(Nippon Sekiyu KK)

NIIGATA

(PETROLEUM)

37° 55′ N 139° 04′ E (Approx)—One of few Japanese refineries not dependent on crude from overseas. Refines crude produced around Niigata. Cap 990,000 bbls crude; cracking 330,000 bbls. Accounts for less than 5% of Inner Zone cap. Reported to have increased output and enlarged plant, but no details available. Expansion is possible only to S. Refinery bounded on W by Niigata freight yards (TARGET 1023) on N by Hokuetsu Paper Mill, and on E by a canal.

(See photos 1 and 4; maps on pages M-4 and M-5.)



GROUND PLAN OF NIPPON OIL REFINERY
TARGET 1000

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NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1000 (NIIGATA REGION)

3636—11—Niigata-Fukushima 8-24-44—First Proof

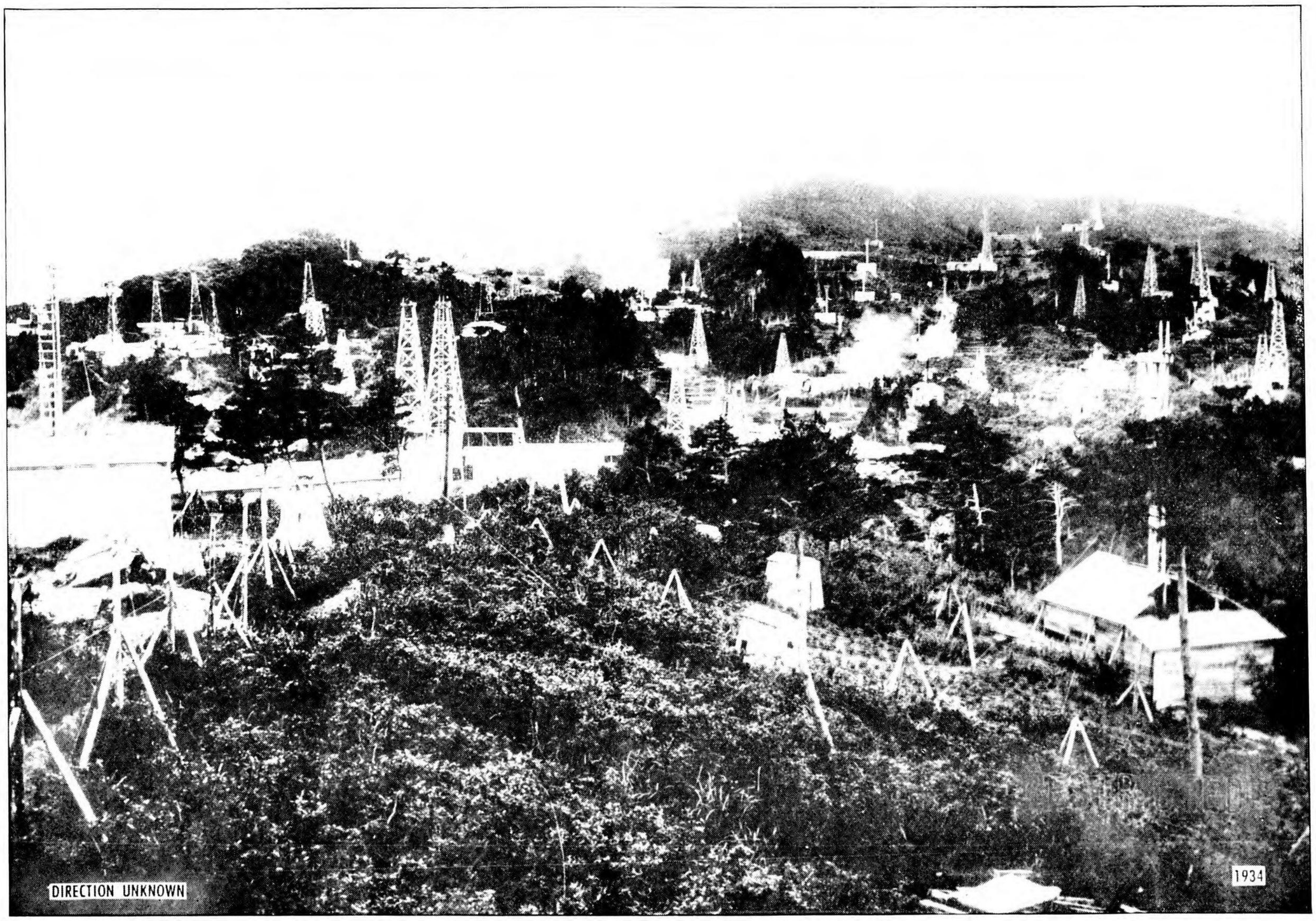
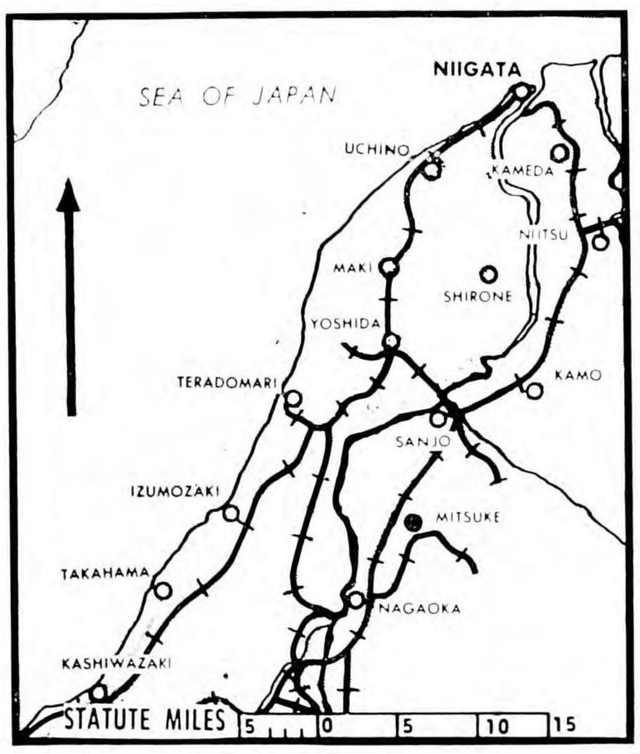


PHOTO 5—Higashiyama—View of oil field.



TARGET 1012

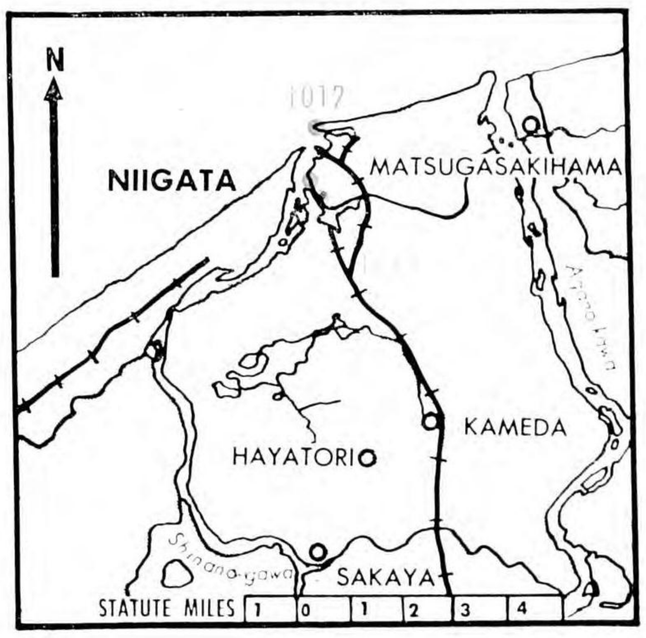
NIIGATA OIL STORAGE NO. 1

NIIGATA

(PETROLEUM)

37° 57′ N 139° 05′ E (Approx)—Oil storage area for Nippon Oil Co. Estimated cap 560,000 bbls. Reported enlarged. Probably terminal or tanker loading point. Amount of storage unknown. On E bank at mouth of Shinano R, approx three mi NE of twin radio towers.

(See maps on pages M-4 and M-5.)



TARGET 1013

NIIGATA OIL STORAGE No. 2

NIIGATA

(PETROLEUM)

37° 56′ N 139° 04′ E (Approx)—Oil storage reported increased to eight tanks with estimated cap 420,000 bbls. On E side of R just S of Plant No. 2 of Niigata Iron Works (TARGET 999). A small steam power plant is S of the compound which is bounded on the W by a branch of the Shinano R.

(See maps on pages M-4 and M-5.)

3636—12—Niigata-Fukushima—8-24-44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 1012, 1013 (NIIGATA REGION)

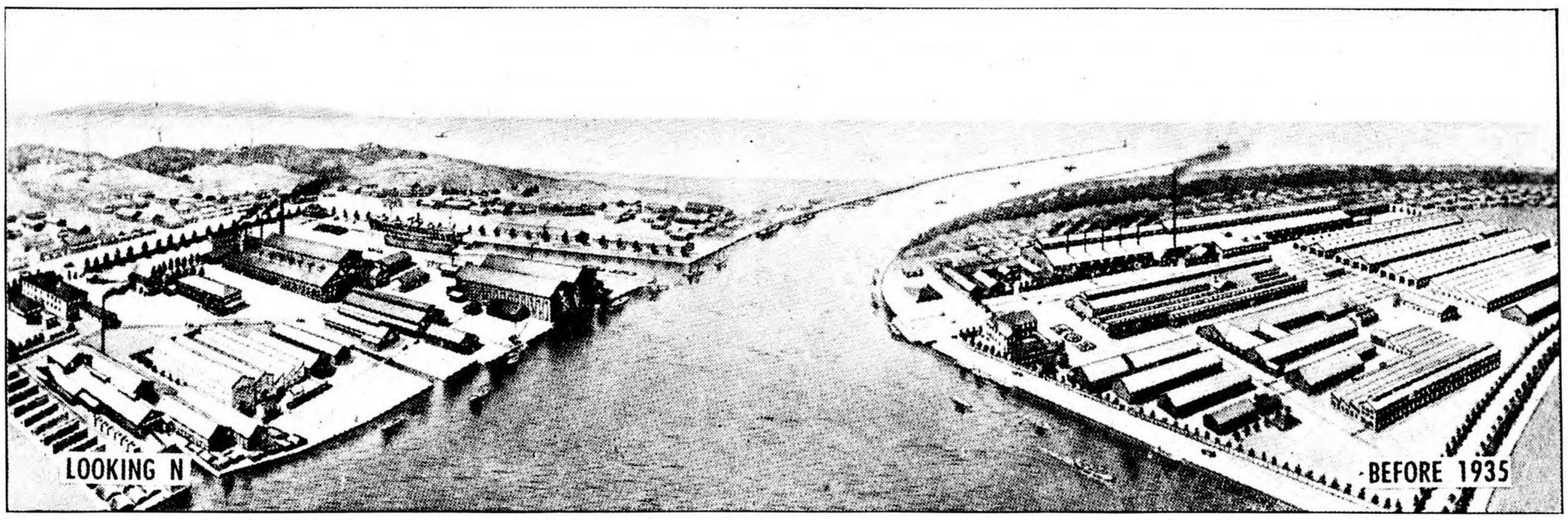
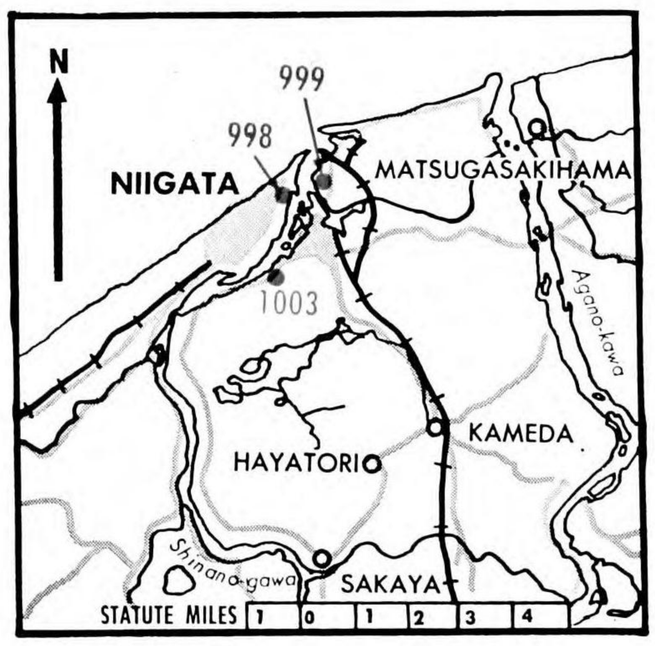


PHOTO 6—Niigata—TARGET 998 Niigata Iron Works, Plant No. 1 and TARGET 999 Niigata Iron Works, Plant No. 2. (Artist's sketch).



TARGET **998**

NIIGATA IRON WORKS, PLANT No. 1

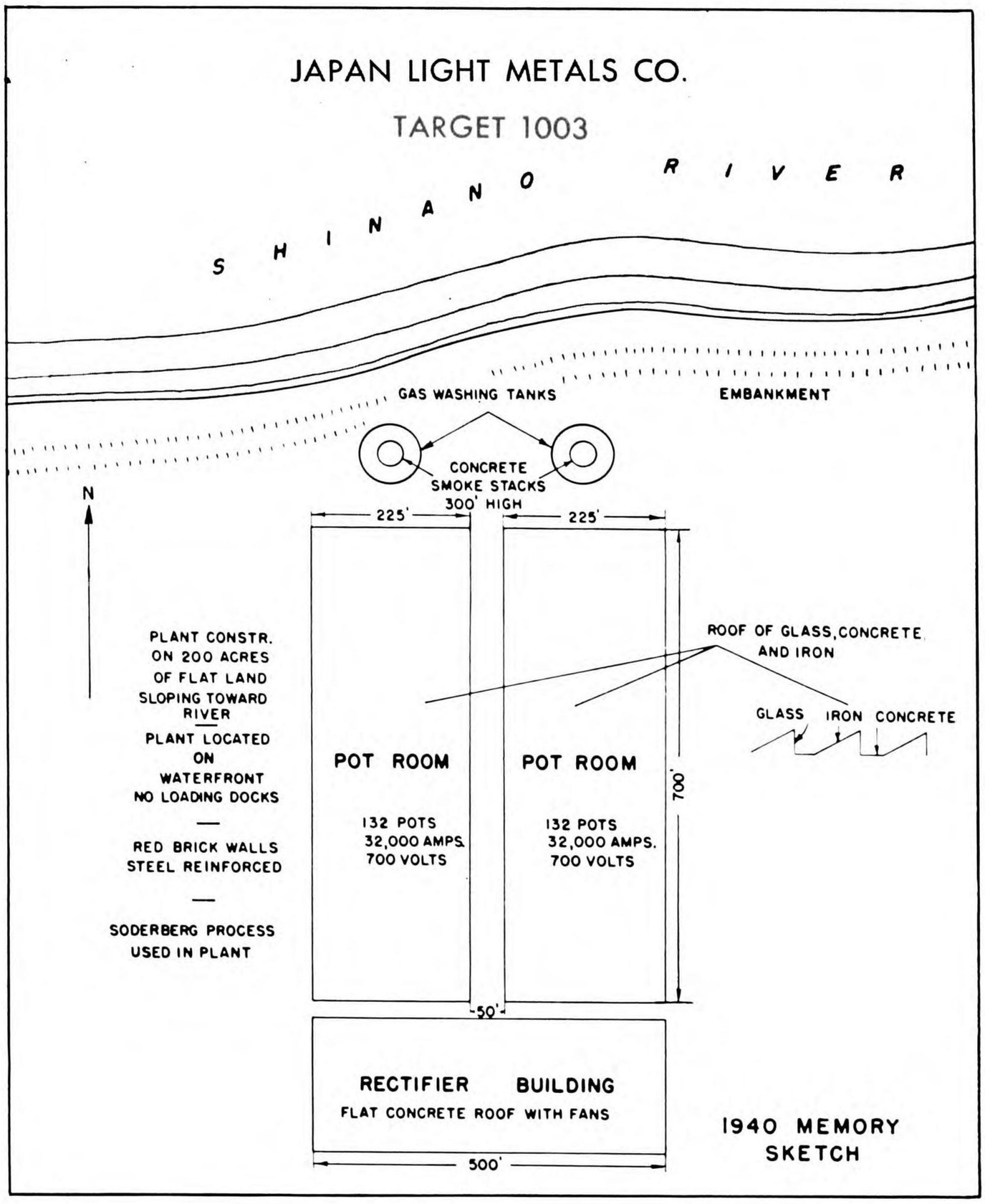
(Niigata Tekkosho KK)

NIIGATA

(MACHINERY AND MACHINE TOOLS)

37° 56′ N 139° 04′ E (Approx)—Original and important plant of one of "Big Five" machine tool producers. On W bank of river about 1 mi SSW of tip of breakwater. Products include general machinery, machine tools, small ships, rolling stock. By 1939 Government order, to specialize in lathes, millers, grinders, boring, planning and slotting machines. General machinery products include oil well machinery, airbrakes, steam and Diesel engines. One of six most important producers of freight cars in Japan. Ships up to 300 ft built on three ways. Planned expansion in 1941, particularly for ship and rolling stock sections.

(See photo 6; maps on pages M-4 and M-5.)



TARGET **999**

NIIGATA IRON WORKS, PLANT No. 2

(Niigata Tekkosho KK)

NIIGATA

(MACHINERY AND MACHINE TOOLS)

37° 56′ N 139° 04′ E (Approx)—On E bank of river. Directly across river from Plant No. 1 (TARGET 998). Between two wharf areas of Harbor. More recent installation of this Co producing complete line of machine tools. Expansion planned in 1941.

(See photo 6; maps on pages M-4 and M-5.)

TARGET **1003**

JAPAN LIGHT METALS CO

(Nippon Keikinzoku KK)

NIIGATA

(NON-FERROUS METALS)

37° 54′ N 139° 03′ E (Approx)—One of largest aluminum reduction plants in Japan. Cap 18,000 metric tons per year, or approx 10% of total under Japanese control. Alumina is furnished by Co plant at Shimizu (Area 90.18). Two concrete chinneys 300 ft high at end of pot rooms rising out of circular gas-washing tanks. Plant lies on E bank of river outside of industrial district of the city on a 200-acre site. A high earth embankment separates it from the river. Approx 3½ mi SSW of tip of W breakwater and 1 mi SE of twin radio towers. Most vulnerable bldg is the rectifier bldg.

(See maps on pages M-4 and M-5.)

3636-13-Niigata-Fukushima—8-24-44—First Proof

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PHOTO 7—Niitsu.

NIIGATA 90.9, FUKUSHIMA 90.10 GENERAL PHOTOS (NIIGATA REGION)

PHOTO 8—Sanjo.

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Air Objective Folder

NAGAOKA-KASHIWAZAKI REGION

NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	MACHINERY AND MACHINE TOOLS	
1656	Tsugami-Atagi Mfg. Co.	17
1659	Niigata Iron Works, Kashiwazaki Plant	20
1660	Niigata Iron Works, Nagaoka Plant	17
1661	Osaka Machinery Co. Plant No. 1	18
1662	Osaka Machinery Co. Plant No. 2	18
1668	Riken Heavy Industry, Kashiwazaki Plants	20

TARGET NUMBER	NAME	PAGE
	IRON AND STEEL	
1668	Riken Heavy Industry, Kashiwazaki Plants	20
1669	Riken Heavy Industry, Nagaoka Plants	17
	PETROLEUM	
1649	Nippon Oil Refinery, Kashiwazaki	19

Summary and Evaluation of the Nagaoka-Kashiwazaki Region

This region, extending inland to Nagaoka from Kashiwazaki on the coast, has experienced substantial industrial development in recent years.

Nagaoka is primarily a center of machine tool production, quite possibly with a major degree of interplant integration. With the exception of two plants, this production is concentrated in the northwestern section of the city. The individual plants are all believed to be small or of medium size, but in the aggregate produce a substantial quantity of tools, some of which are highly specialized. The Nagaoka plant of Niigata Iron Works **TARGET 1660** is reported to be the second most important plant of this company. Tsugami-Atagi Manufacturing Co **TARGET 1656** established in 1937, has its main plant here and is reported to produce precision measuring instruments and precision machine tools. Reconnaissance and/or further intelligence may show this plant to be a significant objective. Also located at Nagaoka are two small plants of Osaka Machinery Co **TARGETS 1661 and 1662,** which is an important machine tool and aircraft component producer. Specific information on these plants, however, is not available. In addition to these objectives, the concentration of plants in the northwest section of the city includes several unidentified factories, and a carbide plant, and pulp/paper mills belonging to the Hokuetsu Co.

Just south of Nagaoka, at Miyauchi, Riken Heavy Industry has two adjoining plants. One is a small boiler and engine plant and the other is a new steel plant, reported to be large.

Kashiwazaki is the southern boundary of the Niigata oil fields. The Nippon Oil Refinery **TARGET 1649** is the largest in these Areas, with an estimated crude capacity of 1,320,000 barrels annually and a cracking capacity of 495,000 barrels. It is reported to have built a high-pressure hydrogenation plant to produce aircraft gasoline and high-grade lubricating oil. In addition, there are two installations which may rank as potential targets: an oil storage area less than half a mile east of the Nippon Oil Refinery, and an unidentified oil refinery approximately two miles northeast of the town. An unconfirmed report (1940) says that the Kashiwazaki plant of Niigata Iron Works is doing sub-assembly work for landing barges, small submarines and other small naval craft. Steel lathes, grinding and milling machines and piston rings, are produced at three Riken plants in adjoining or the same compounds.

3636—15—Niigata-Fukushima—8-24-44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 INDEX & SUMMARY (NAGAOKA-KASHIWAZAKI REGION)

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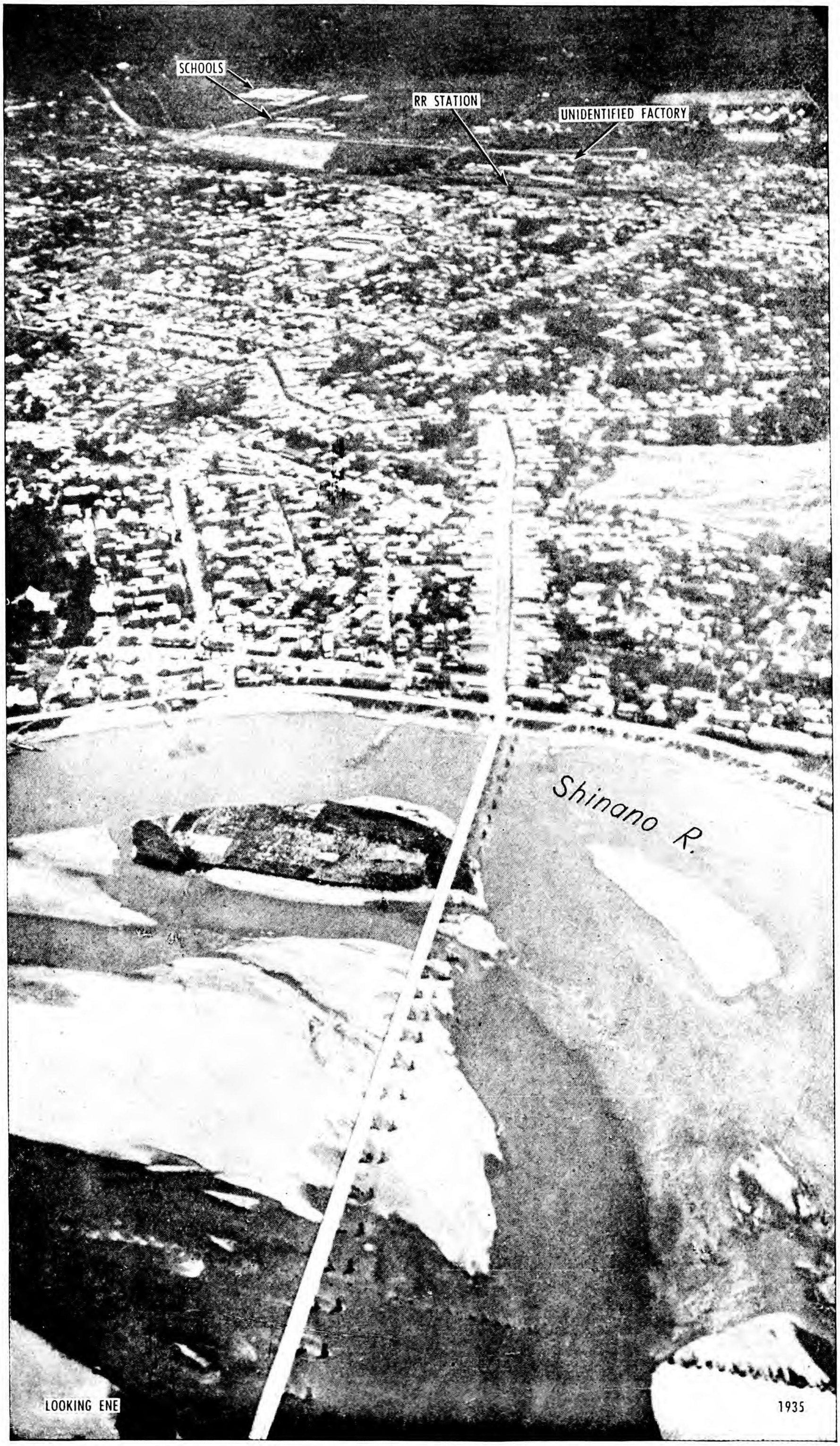

PHOTO 9—Nagaoka.

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NIIGATA 90.9, FUKUSHIMA 90.10 GENERAL PHOTOS (NAGAOKA-KASHIWAZAKI REGION)

3636—16—Niigata-Fukushima - 8-24-44 — First Proof

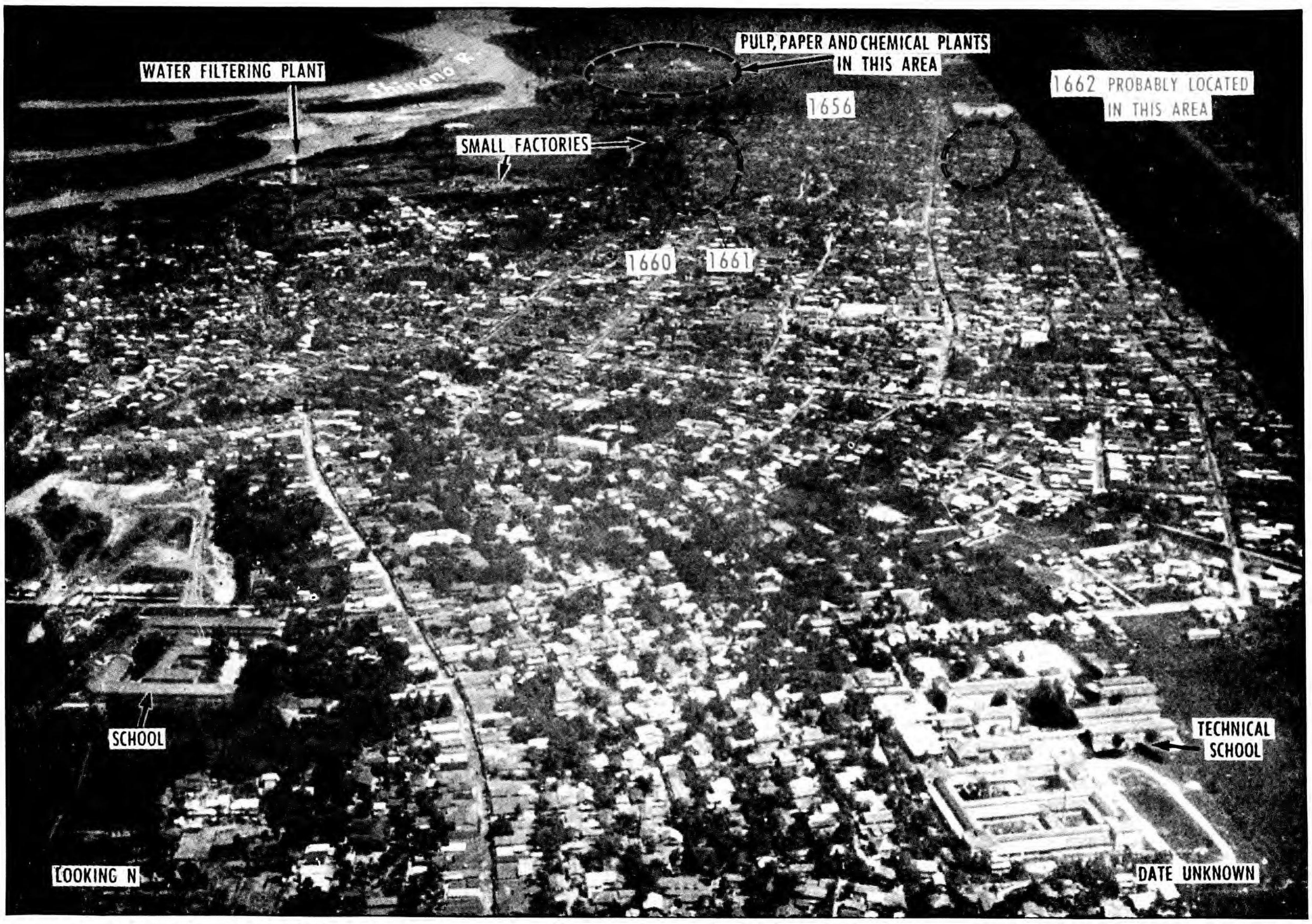


PHOTO 10—Nagaoka—TARGET 1660 Niigata Iron Works, Nagaoka Plant. TARGET 1661 Osaka Machinery Co., Plant No. 1. TARGET 1662 Osaka Machinery Co., Plant No. 2. TARGET 1656 Tsugami Atagi Mfg. Co. Other installations shown are not listed as targets.

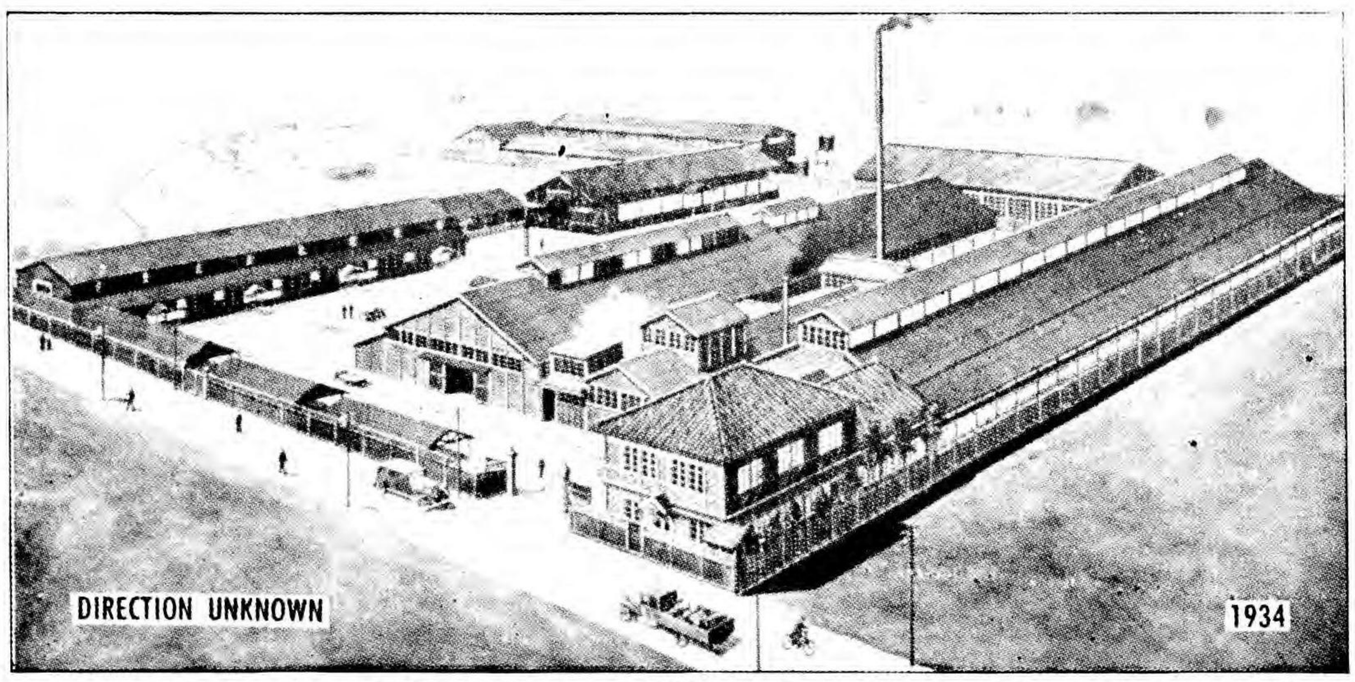


PHOTO 11—Nagaoka—TARGET 1660 Niigata Iron Works, Nagaoka Plant. (Artist's sketch).

TARGET **1669**

RIKEN HEAVY INDUSTRY, NAGAOKA PLANTS

NAGAOKA

(IRON AND STEEL)

37° 25′ N 138° 51′ E (Approx)—Two adjoining plants at Miyauchi just S of Nagaoka on RR leading into city. A new plant mfg steel castings and reported to be large. Smaller plant reported mfg boilers, die castings and charcoal engines. Recent information lacking.

(See map on page M-7.)

TARGET **1660**

NIIGATA IRON WORKS, NAGAOKA PLANT

(Niigata Tekkosho KK)

NAGAOKA

(MACHINERY AND MACHINE TOOLS)

37° 27′ N 138° 51′ E (Approx)—Newer plant of this Co, which is one of principal machinery machine tool concerns. Known to have specialized machinery and tools and reported to be an important machine tool producer, but no information on size or production. Located in a factory district on NW edge of town just N of Osaka Machinery Plant No. 1 (TARGET 1661).

(See photos 10 and 11; map on page M-7.)

TARGET **1656**

TSUGAMI-ATAGI MFG CO

(Tsugami-Atagi Seisakusho KK)

NAGAOKA

(MACHINERY AND MACHINE TOOLS)

37° 28′ N 138° 51′ E (Approx)—Established in 1937 for manufacture of machine tools, gauges, precision gauge blocks. By 1939 Government order, to specialize on lathes, grinders, borers. Compound includes gauge block, tool, machine tool, heat-treating, casting, training school, assembly and office, and forging plants and auxiliary bldgs of steel and concrete. In factory district on NW edge of town. S of the Hokuetsu mills.

(See photo 10 and map on page M-7.)

3636—17—Niigata-Fukushima—8-24-44—First Proof

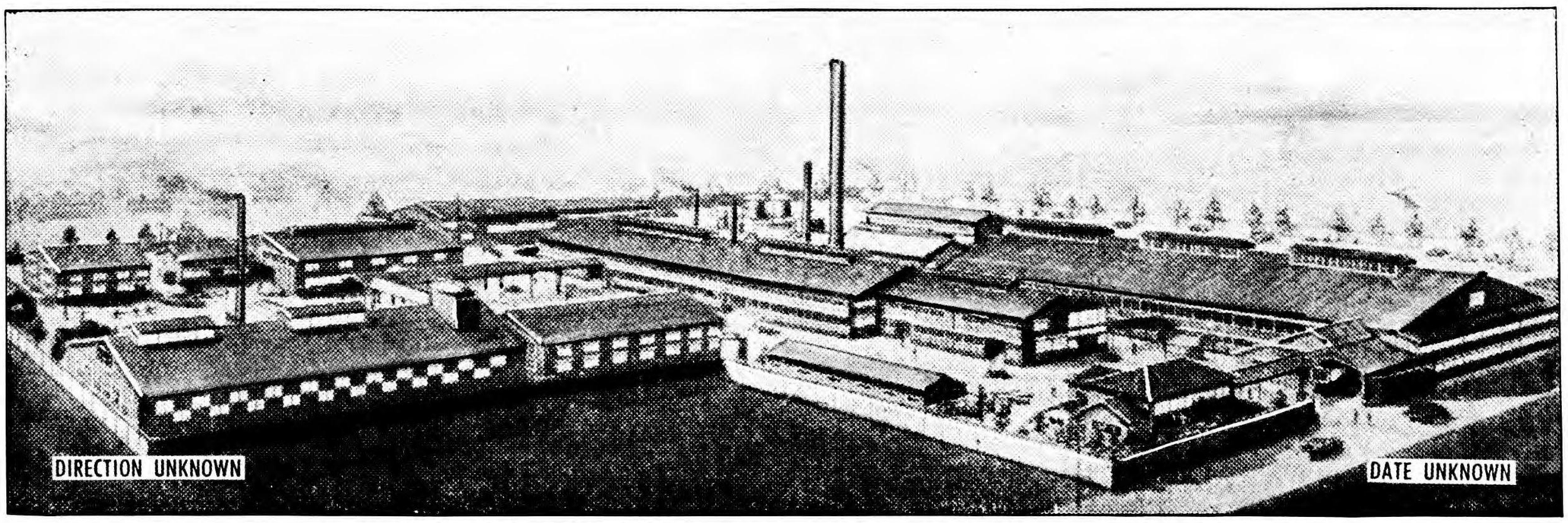
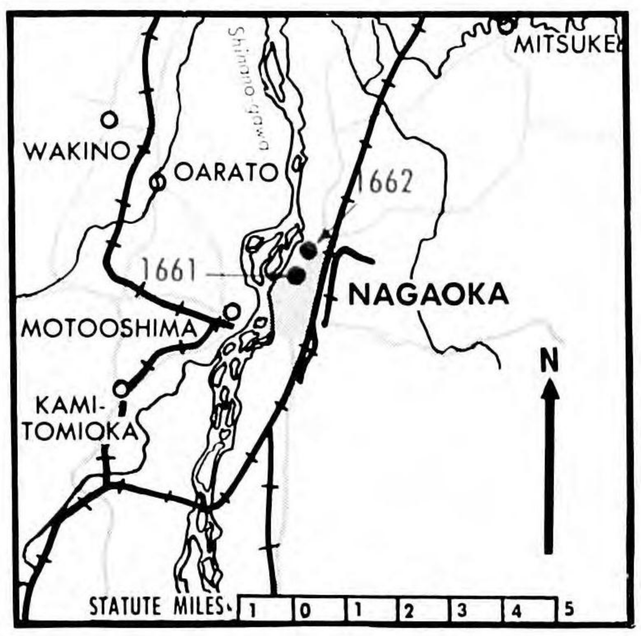


PHOTO 12—Nagaoka—TARGET 1661 Osaka Machinery Co., Plant No. 1 (Artist's sketch).



TARGET **1661**

OSAKA MACHINERY CO, PLANT No. 1

(Osaka Kikai Seisakusho KK)

NAGAOKA

(MACHINERY AND MACHINE TOOLS)

37° 27′ N 138° 51′ E (Approx)—One of a number of plants of important machine tool and aircraft component producer. No detailed information available on type or volume of products. Plant lies in factory district on NW edge of town just S of Niigata Iron Works (TARGET 1660).

(See photos 10 and 12; map on page M-7.)

TARGET **1662**

OSAKA MACHINERY CO, PLANT No. 2

(Osaka Kikai Seisakusho KK)

NAGAOKA

(MACHINERY AND MACHINE TOOLS)

37° 28′ N 138° 52′ E (Approx)—One of a number of plants of important Co producing machine tool and aircraft components. No detailed information available. Plant is in the factory district on the NW edge of town SE of the Hokuetsu mills.

(See photos 10 and 13; map on page M-7.)

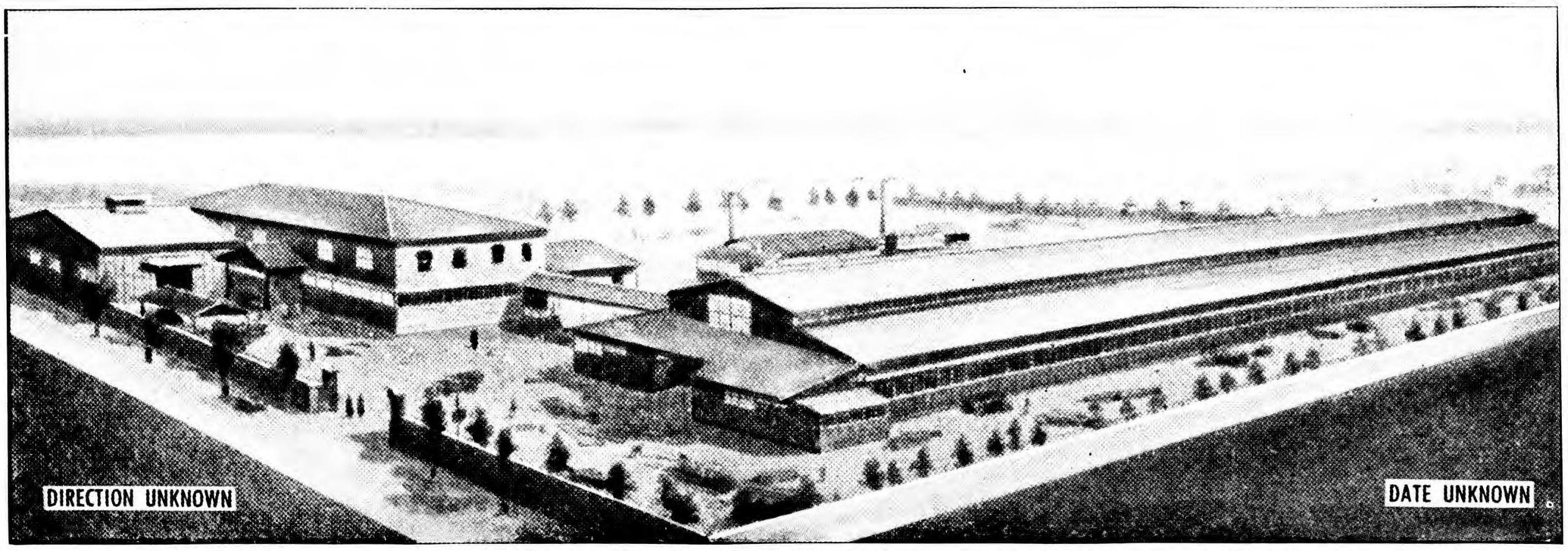


PHOTO 13—Nagaoka—TARGET 1662 Osaka Machinery Co., Plant No. 2 (Artist's sketch).

3636—18—Niigata-Fukushima 8-24-44—First Proof

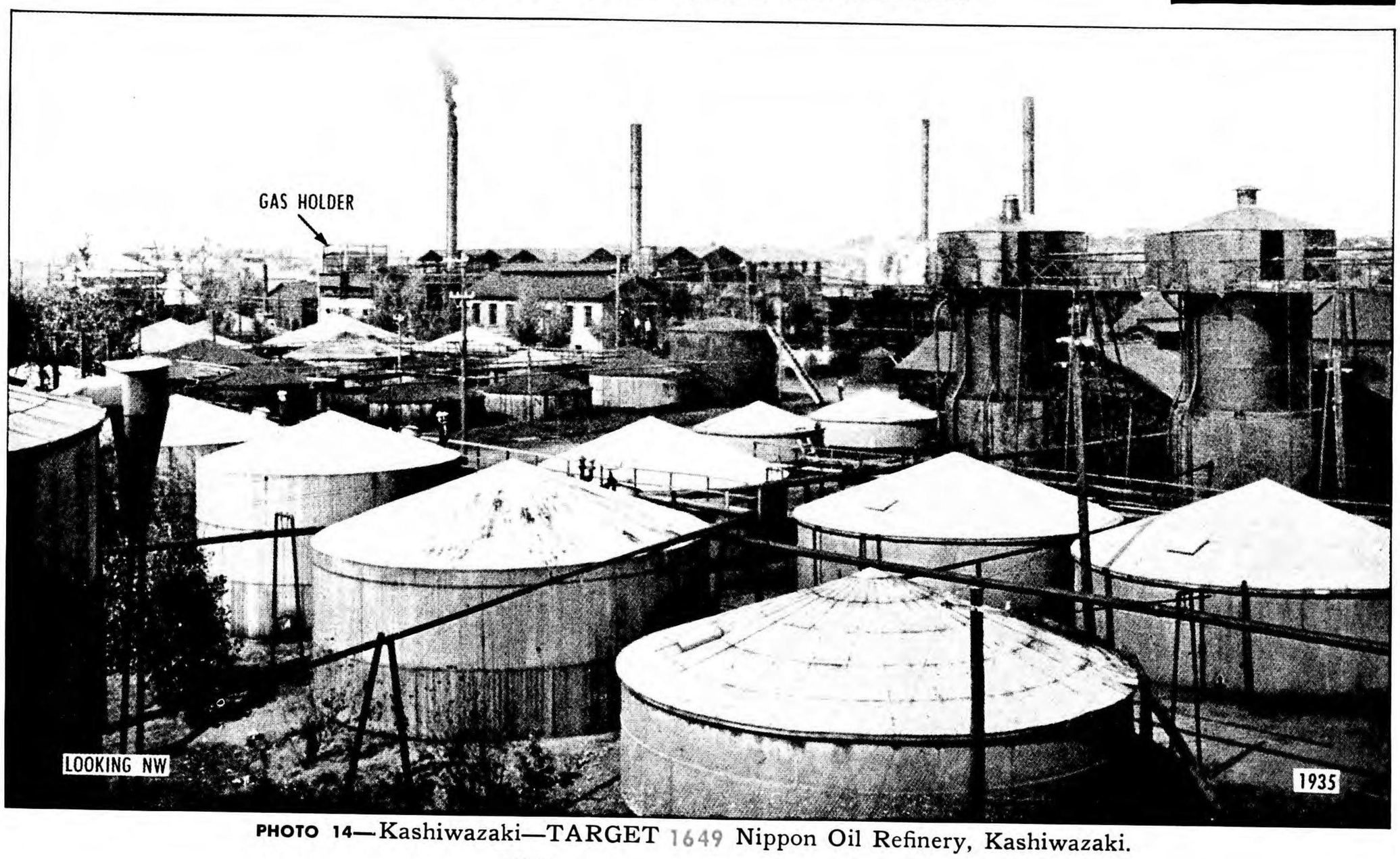


PHOTO 14—Kashiwazaki—TARGET 1649 Nippon Oil Refinery, Kashiwazaki.

TARGET 1649

NIPPON OIL REFINERY, KASHIWAZAKI

KASHIWAZAKI

(PETROLEUM)

37° 22′ N 138° 34′ E (Approx)—One of few Japan Proper refineries not dependent on overseas crude; processes crude from nearby fields. Large oil refinery. Estimated 1943 cap 1,320,000 bbls of crude, or approx 4% Inner Zone cap; 495,000 bbls cracking. Main storage tanks, cap unknown, at E end of compound are roofed over to resemble bldgs. On N side of main RR just E of station, extending for approx ½ mi along tracks.

(See photos 14 and 15; map on page M-8.)

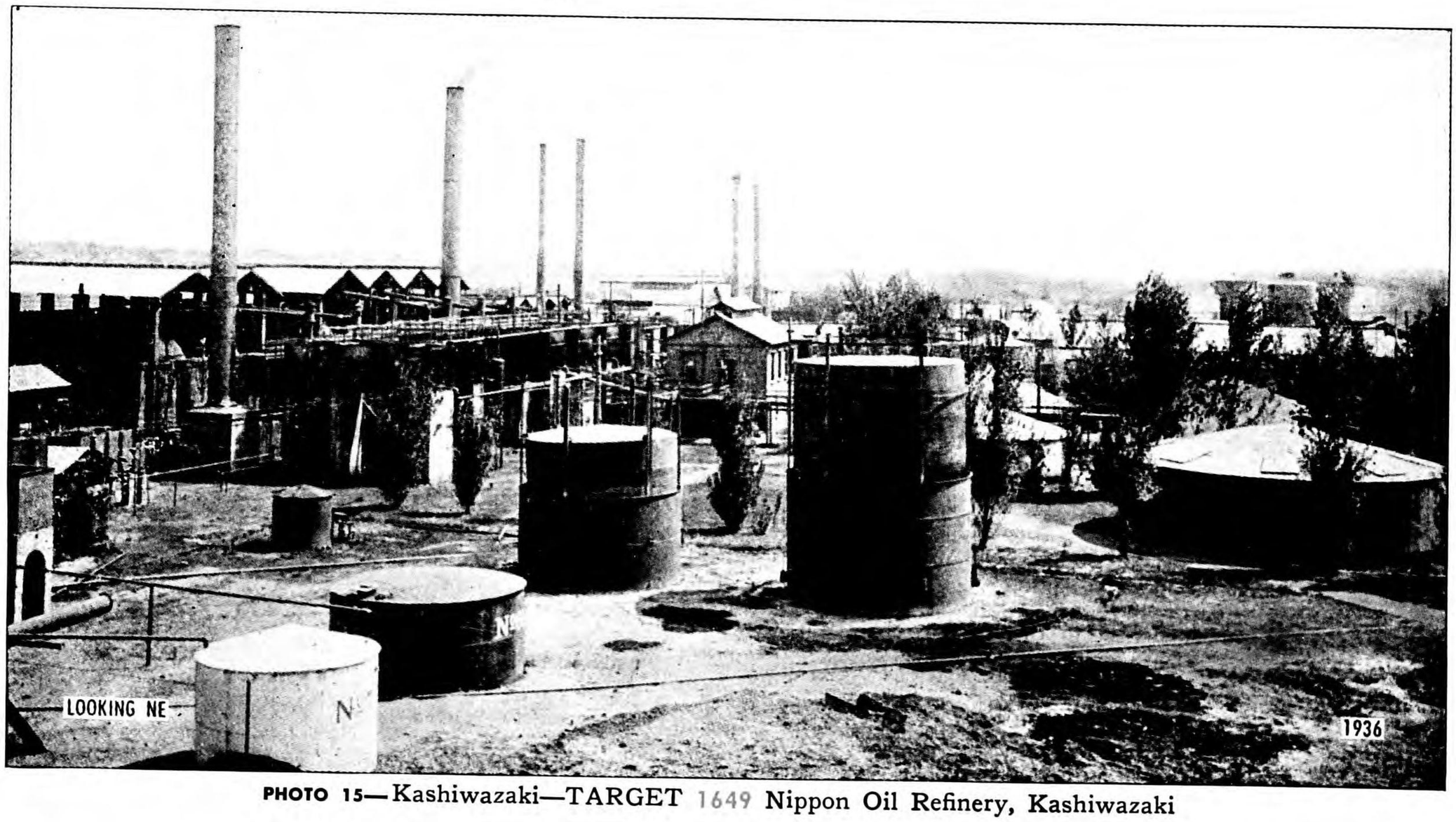


PHOTO 15—Kashiwazaki—TARGET 1649 Nippon Oil Refinery, Kashiwazaki

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NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1649 (NAGAOKA-KASHIWAZAKI REGION)

3636—19—Niigata-Fukushima—8:24:44—First Proof

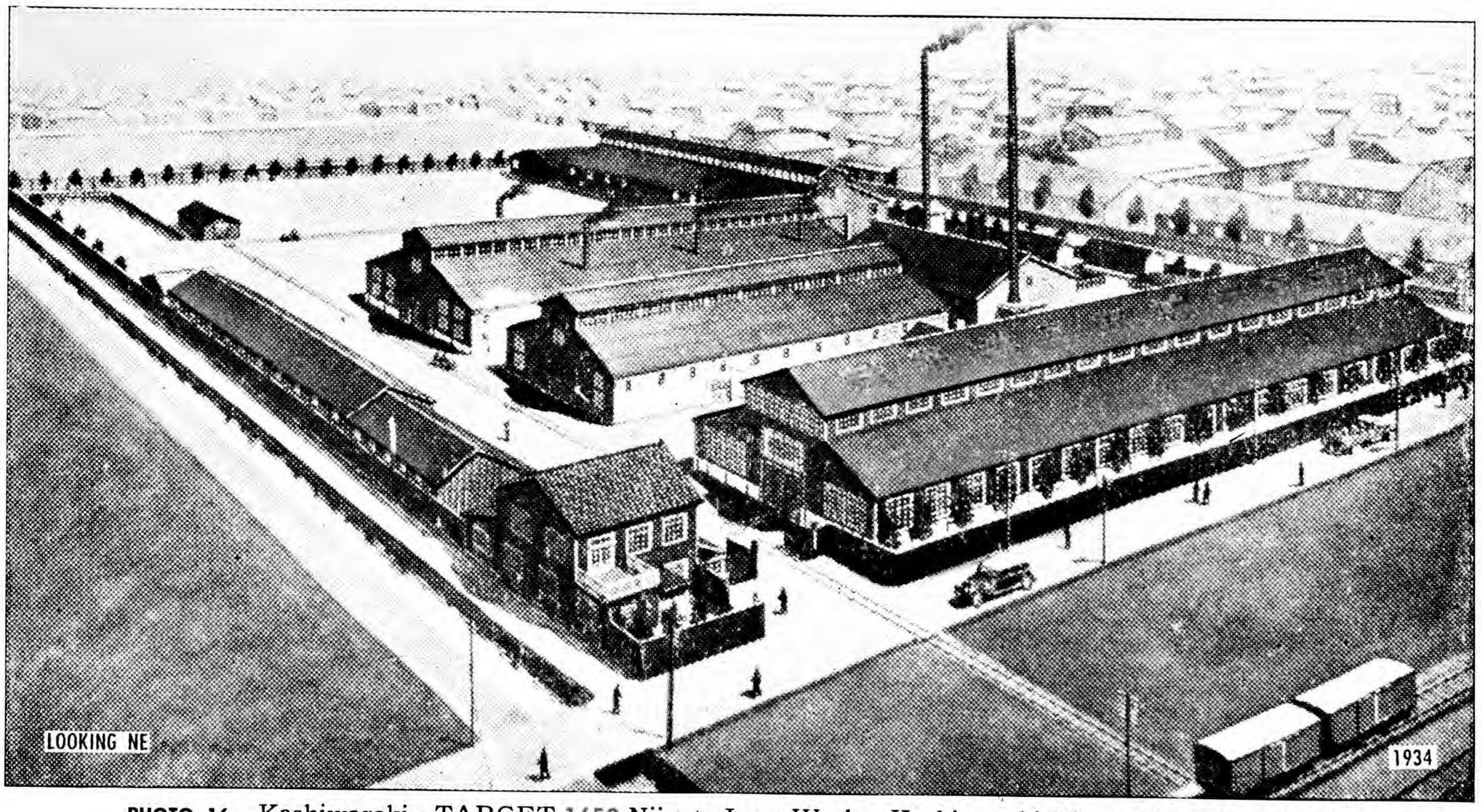

PHOTO 16—Kashiwazaki—TARGET 1659 Niigata Iron Works, Kashiwazaki Plant. (Artist's sketch).

TARGET **1668**

RIKEN HEAVY INDUSTRY, KASHIWAZAKI PLANTS

KASHIWAZAKI

(MACHINERY AND MACHINE TOOLS)

37° 22′ N 138° 34′ E (Approx)—Three plants of one of Japan's leading machinery machine tool concerns. Operations probably integrated. Located in same general compound or adjoining compounds—a steel plant reported to have electric furnaces; a plant making lathes, grinding and milling machines; and a machine tool plant mfg piston rings, gauges, etc. Location approx.

(See map on page M-8.)

TARGET **1659**

NIIGATA IRON WORKS, KASHIWAZAKI PLANT

(Niigata Tekkosho KK)

KASHIWAZAKI

(MACHINERY AND MACHINE TOOLS)

37° 22′ N 138° 33′ E (Approx)—One of a number of plants of this Co. Established to produce machinery for mining and chemical industries. Unconfirmed 1940 report of sub-assembly work on small naval craft. May be making machine tools. Plant lies on N side of Main RR approx $\frac{1}{8}$ mi W of station. On E of compound is a candy factory and on W oil storage area.

(See photo 16; map on page M-8.)

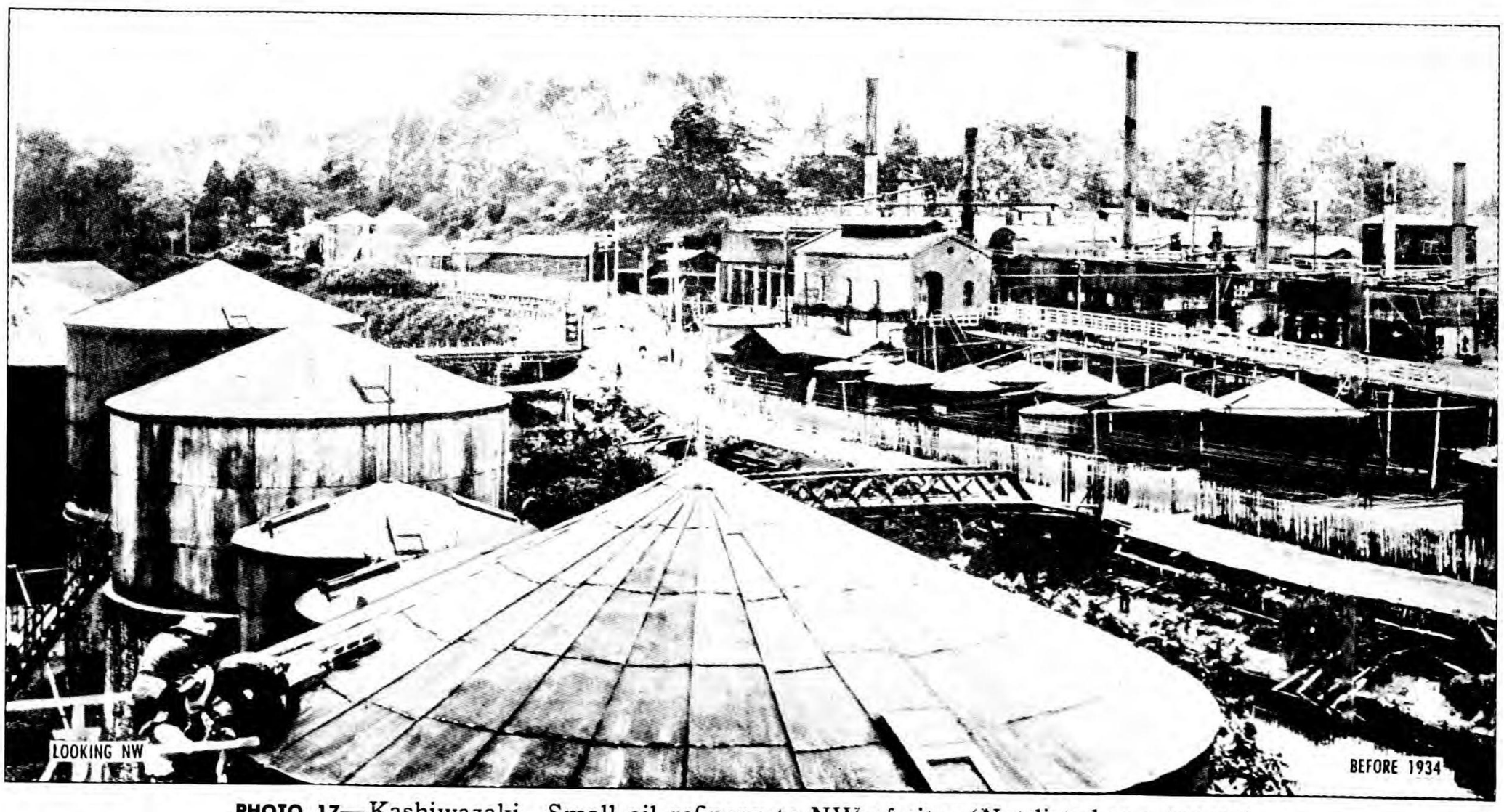

PHOTO 17—Kashiwazaki—Small oil refinery to NW of city. (Not listed as a target.)

Issued September 18, 1944

AIR OBJECTIVE FOLDER, JAPAN

Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

TABLE OF CONTENTS

INDEX: PAGE

Alphabetical Index of Targets ... 2
Numerical Index of Targets ... 2
Classified Index of Targets ... 3

TEXT-PHOTO SECTION:

Summary and Evaluation of Niigata-Fukushima Areas ... 4
Key Objectives in Niigata-Fukushima Areas ... 4

Niigata Region

Index of Targets in Niigata Region ... 8
Summary and Evaluation of Niigata Region ... 8
Target Descriptions and PHOTOS, Niigata Region ... 10

Nagaoka-Kashiwazaki Region

Index of Targets in Nagaoka-Kashiwazaki Region ... 15
Summary and Evaluation of Nagaoka-Kashiwazaki Region ... 15
Target Descriptions and PHOTOS, Nagaoka-Kashiwazaki Region ... 16

Koriyama-Fukushima Region

Index of Targets in Koriyama-Fukushima Region ... 21
Summary and Evaluation of Koriyama-Fukushima Region ... 21
Target Descriptions and PHOTOS, Koriyama-Fukushima Region ... 22

Sendai Region

Index of Targets in Sendai Region ... 23
Summary and Evaluation of Sendai Region ... 23
Target Descriptions and PHOTOS, Sendai Region ... 24

Outlying Targets

Index of Outlying Targets ... 27
Target Descriptions and PHOTOS, Outlying Targets ... 28

Weather Information, Niigata-Fukushima Areas ... 38
Map Information, Niigata-Fukushima Areas ... 43
Target Chart Information, Niigata-Fukushima Areas ... 44
Tabulation of Airfields and Seaplane Anchorages in Niigata-Fukushima Areas ... 42

MAP SECTION: *M—refers to pages in map section*

Index Map of Objective Areas in Japan ... COVER
Target Index Map of Niigata, 90.9, Fukushima, 90.10, Locating ALL targets ... FOLD-UP
Area Map of Niigata, 90.9, Fukushima, 90.10 ... M-1
Airfield Map of Niigata, 90.9, Fukushima, 90.10 ... M-2
Electric Power Central Honshu and Tokyo Networks ... M-3
Railway Installations Japan, Honshu and Kyushu ... M-3
Niigata City ... M-4
Incendiary Zone Map of Niigata City ... M-5
Niitsu City ... M-6
Nagaoka City ... M-7
Kashiwazaki City ... M-8
Sendai and Vicinity ... M-9
Senju and Vicinity ... M-10
Fukushima and Vicinity ... M-10
Kanose and Vicinity ... M-10
Fukushima City ... M-11
Koriyama City ... M-12
Naoetsu City ... M-13
Wakamatsu City ... M-14
Yamagata City ... M-15
Takada City ... M-16
Relief Map of Northern Honshu ... POCKET

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3636—1—Niigata-Fukushima — 8-24-44—First Proof

Alphabetical Index of Targets for Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

Target Name	Target Number	Text Page
Electro-Chemical Industry, Aomi Plant	1101	28
Fukushima RR Yards	1077	22
Government Aircraft Parts Plant	1671	24
Horai Hydro Plant	1607	36
Inawashiro Hydro Plant No. 1	881	34
Inawashiro Hydro Plant No. 2	900	34
Japan Light Metals Co.	1003	13
Japan Refining Co.	1088	22
Kanose Hydro Plant	1590	31
Koriyama RR Shops	1655	22
Nagamachi Marshalling Yards	1104	24
Niigata Harbor	1670	10
Niigata Iron Works, Plant No. 1	998	13
Niigata Iron Works, Plant No. 2	999	13
Niigata Iron Works, Kashiwazaki Plant	1659	20
Niigata Iron Works, Nagaoka Plant	1660	17
Niigata Oil Storage No. 1	1012	12
Niigata Oil Storage No. 2	1013	12
Niigata RR Yards	1023	10
Nippon Oil Refinery	1000	11
Nippon Oil Refinery, Kashiwazaki	1649	19
Nippon Soda, Odera Refinery	1666	34
Nippon Stainless Steel, Naoetsu Plant	1651	29
Northeast Aluminum Plant	1658	22
Osaka Machinery Co., Plant No. 1	1661	18
Osaka Machinery Co., Plant No. 2	1662	18
Riken Heavy Industry, Kashiwazaki Plants	1668	20
Riken Heavy Industry, Nagaoka Plants	1669	17
Senju Hydro Plant	1593	30
Shinagawa Mfg. Plant	1665	22
Shinano Hydro Plant	1592	30
Shinetsu Nitrogen Fertilizer Co. Naoetsu Plant	1667	29
Shingo Hydro Plant	1588	33
Showa Fertilizer Kanose Plant	1536	32
Tokyo-Shibaura Electric Co., Oguni Plant	1664	37
Toyomi Hydro Plant	1589	32
Tsugami-Atagi Mfg. Co.	1656	17

Numerical Index of Targets for Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

Target Number	Name	Text Page
881	Inawashiro Hydro Plant No. 1	34
900	Inawashiro Hydro Plant No. 2	34
998	Niigata Iron Works, Plant No. 1	13
999	Niigata Iron Works, Plant No. 2	13
1000	Nippon Oil Refinery	11
1003	Japan Light Metals Co.	13
1012	Niigata Oil Storage No. 1	12
1013	Niigata Oil Storage No. 2	12
1023	Niigata RR Yards	10
1077	Fukushima RR Yards	22
1088	Japan Refining Co.	22
1101	Electro-Chemical Industry, Aomi Plant	28
1104	Nagamachi Marshalling Yards	24
1536	Showa Fertilizer, Kanose Plant	32
1588	Shingo Hydro Plant	33
1589	Toyomi Hydro Plant	32
1590	Kanose Hydro Plant	31
1592	Shinano Hydro Plant	30
1593	Senju Hydro Plant	30
1607	Horai Hydro Plant	36
1649	Nippon Oil Refinery, Kashiwazaki	19
1651	Nippon Stainless Steel, Naoetsu Plant	29
1655	Koriyama RR Shops	22
1656	Tsugami-Atagi Mfg. Co.	17
1658	Northeast Aluminum Plant	22
1659	Niigata Iron Works, Kashiwazaki Plant	20
1660	Niigata Iron Works, Nagaoka Plant	17
1661	Osaka Machinery Co. Plant No. 1	18
1662	Osaka Machinery Co. Plant No. 2	18
1664	Tokyo-Shibaura Electric Co., Oguni Plant	37
1665	Shinagawa Mfg. Plant	22
1666	Nippon Soda, Odera Refinery	34
1667	Shinetsu Nitrogen Fertilizer Co., Naoetsu Plant	29
1668	Riken Heavy Industry, Kashiwazaki Plants	20
1669	Riken Heavy Industry, Nagaoka Plants	17
1670	Niigata Harbor	10
1671	Government Aircraft Parts Plant	24

3636—2—Niigata-Fukushima—8-2444—First Proof

Classified Index of Targets for Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

CLASSIFICATION AND NAME	TARGET NUMBER	LOCATION (GENERAL)	APPROXIMATE COORDINATES	TEXT ON PAGE	MAP ON PAGE	PHOTO ON PAGE
AIRCRAFT						
Shinagawa Mfg. Plant	1665	Fukushima	37° 46′N 140° 28′E	22	M-10, 11	
Government Aircraft Parts Plant	1671	Sendai	38° 16′N 140° 55′E	24	M-9	
CHEMICALS						
Japan Refining Co.	1088	Koriyama	37° 23′N 140° 24′E	22	M-12	
Electro-Chemical Industry, Aomi Plant	1101	Aomi	37° 00′N 137° 45′E	28		28
Showa Fertilizer, Kanose Plant	1536	Kanose	37° 42′N 139° 28′E	32	M-10	32
Shinetsu Nitrogen Fertilizer Co., Naoetsu Plant	1667	Naoetsu	37° 11′N 138° 16′E	29	M-13	
ELECTRIC POWER						
Inawashiro Hydro Plant No. 1	881	Nippashi River	37° 33′N 140° 00′E	34		
Inawashiro Hydro Plant No. 2	900	Nippashi River	37° 33′N 139° 59′E	34		
Shingo Hydro Plant	1588	Agano River	37° 36′N 139° 44′E	33		33
Toyomi Hydro Plant	1589	Agano River	37° 42′N 139° 34′E	32	M-10	32
Kanose Hydro Plant	1590	Agano River	37° 42′N 139° 28′E	31	M-10	31
Shinano Hydro Plant	1592	Shinano River	37° 03′N 138° 41′E	30	M-10	30
Senju Hydro Plant	1593	Shinano River	37° 09′N 138° 45′E	30	M-10	30
Horai Hydro Plant	1607	Abukuma River	37° 41′N 140° 30′E	36	M-10	36
HARBOR FACILITIES						
Niigata Harbor	1670	Niigata	37° 56′N 139° 04′E	10	M-4, 5	10
IRON AND STEEL						
Nippon Stainless Steel, Naoetsu Plant	1651	Naoetsu	37° 11′N 138° 15′E	29	M-13	
Tokyo-Shibaura Electric Co., Oguni Plant	1664	Oguni	38° 03′N 139° 45′E	37		
Riken Heavy Industry, Kashiwazaki Plants	1668	Kashiwazaki	37° 22′N 138° 34′E	20	M-8	
Riken Heavy Industry, Nagaoka Plants	1669	Nagaoka	37° 25′N 138° 51′E	17	M-7	
MACHINERY AND MACHINE TOOLS						
Niigata Iron Works, Plant No. 1	998	Niigata	37° 56′N 139° 04′E	13	M-4, 5	13
Niigata Iron Works, Plant No. 2	999	Niigata	37° 56′N 139° 04′E	13	M-4, 5	13
Tsugami-Atagi Mfg. Co.	1656	Nagaoka	37° 28′N 138° 51′E	17	M-7	
Niigata Iron Works, Kashiwazaki Plant	1659	Kashiwazaki	37° 22′N 138° 33′E	20	M-8	20
Niigata Iron Works, Nagaoka Plant	1660	Nagaoka	37° 27′N 138° 51′E	17	M-7	17
Osaka Machinery Co. Plant No. 1	1661	Nagaoka	37° 27′N 138° 51′E	18	M-7	17, 18
Osaka Machinery Co. Plant No. 2	1662	Nagaoka	37° 28′N 138° 52′E	18	M-7	17, 18
Riken Heavy Industry, Kashiwazaki Plants	1668	Kashiwazaki	37° 22′N 138° 34′E	20	M-8	
NON-FERROUS METALS						
Japan Light Metals Co.	1003	Niigata	37° 54′N 139° 03′E	13	M-4, 5	
Northeast Aluminum Plant	1658	Koriyama	37° 24′N 140° 24′E	22	M-12	
Nippon Soda, Odera Refinery	1666	Odera	37° 33′N 139° 59′E	34		
PETROLEUM						
Nippon Oil Refinery	1000	Niigata	37° 55′N 139° 04′E	11	M-4, 5	10, 11
Niigata Oil Storage No. 1	1012	Niigata	37° 57′N 139° 05′E	12	M-4, 5	
Niigata Oil Storage No. 2	1013	Niigata	37° 56′N 139° 04′E	12	M-4, 5	
Nippon Oil Refinery, Kashiwazaki	1649	Kashiwazaki	37° 22′N 138° 34′E	19	M-8	19
TRANSPORTATION						
Niigata RR Yards	1023	Niigata	37° 55′N 139° 04′E	10	M-4, 5	
Fukushima RR Yards	1077	Fukushima	37° 45′N 140° 28′E	22	M-10, 11	
Nagamachi Marshalling Yards	1104	Sendai	38° 13′N 140° 53′E	24	M-9	
Koriyama RR Shops	1655	Koriyama	37° 23′N 140° 23′E	22	M-12	

3636—3—Niigata-Fukushima—8-24-44—First Proof

Summary and Evaluation of Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

GENERAL: This section of Japan includes the outlying industrial center and potentially strategic port of Niigata, oil and additional industry that has developed to the south of Niigata, and hydroelectric capacity which is of major importance in the Tokyo power network.

Niigata is a newer industrial center, having expanded considerably during the past ten years. It is the site of Japan's second largest aluminum plant, and of two of the plants of one of the leading machine tool companies. Of major importance are nearby natural petroleum production, and related refining. Pre-war, Niigata was a secondary port; directly across the Japan Sea from the north Korean ports of Rashin and Seishin and with short rail connections to both the Tokyo Bay and Central Honshu regions, it has strategic advantages as a port which may be substantially increased by the course of the war.

The area south from Niigata to Nagaoka and Kashiwazaki is reported to have had considerable wartime industrial development, particularly in machinery and machine tool production. Intelligence indicates that clusters of small and medium-sized works have grown up in the Nagaoka region to supplement the older plants in Tokyo, Nagoya, Osaka, etc. Sendai, near the east coast, is the largest city in these Areas but is better known as a university site than for industry.

Several river courses through the mountains, and Lake Inawashiro at an elevation of over 1650 feet, provide a series of hydroelectric power sites which have been developed to provide a substantial block of the power for the Tokyo network. Two plants eight miles apart on the Shinano River are by far the largest hydroelectric installations in Japan. This power feeds into the Tokyo Bay district through the series of key transformer stations outlying from Tokyo.

These Areas are traversed by the two principal railroads between Northern and Central Honshu and by an alternate rail route along the east coast. The only developed port is Niigata on the Japan Sea coast, which has been considerably improved in recent years.

The central mountains rise to elevations above 6000 feet, with relatively sparse population and few sizable towns. Population is also sparse along the eastern coastal shelf, except for the Sendai region. Niigata lies in an extensive coastal plain which includes one of Japan's two sizable natural oil fields, the larger of which is to the north around Akita (Area 90.6).

This folder lists a total of 37 targets, of which, on the basis of available intelligence, three are considered of key importance in the Japanese war economy. The three key targets are:

KEY OBJECTIVES

Target No.	Target Name	Location
1003	Japan Light Metals Co.	Niigata
1592	Shinano Hydro Plant	37° 03′ N 138° 41′ E
1593	Senju Hydro Plant	37° 09′ N 138° 45′ E

Inasmuch as this section has had considerable wartime expansion of industry, it includes a number of new plants, or groups of plants, the significance of which cannot be closely evaluated. This is especially true of the newer machinery, machine tool, and specialty plants in Niigata and in Kashiwazaki-Nagaoka region to the south of Niigata. Of the numerous chemical plants in these Areas only the three large carbide plants and the phosphorus plant are designated as targets. Although the Joban coal mines, centering around Taira, are important, none of the mine installations are listed as targets. In addition to the targets, the folder mentions and includes graphic material on a number of other installations as an aid to evaluation of reconnaissance and other intelligence. Among these are sizable plants, the importance of which cannot be closely evaluated on the basis of available intelligence. As noted, there have been reports of wartime industrial development in these Areas, and reconnaissance may identify additional installations.

AIRFIELDS: There are seven known airfields, nine landing grounds and one seaplane anchorage. There has been some additional development, although the terrain generally will limit extensive airfields to the Niigata and Sendai plains and the river valleys in the central part of the Areas. Airfields and seaplane bases are a special category of targets, the characteristics and importance of which are subject to considerable change and none are listed as targets in this folder. All airfields and seaplane stations are tabulated on page 42 and shown on map on page M-2.

AIRCRAFT: No aircraft centers are known to exist in these Areas and only two plants have been identified as producing aircraft components. Of these, the new Government Aircraft Parts plant **TARGET 1671** at Sendai may be indicated as an important objective by reconnaissance and/or further intelligence. The other plant listed **TARGET 1665** is a converted spinning mill taken over by an important aircraft component manufacturing company; details of production are not known.

CHEMICALS: These Areas are of considerable importance for production of carbide. The three plants listed as targets in this folder **TARGETS 1101, 1536 and 1667** account for over 40% of the production of carbide capacity in Japan Proper and 30% of Empire capacity. They include three out of the four plants in Japan Proper estimated to have capacities of more than 50,000 metric tons per year.

Wartime requirements for carbide derivatives—the most important of which include acetylene (for welding), acetone (a solvent with many war uses including production of cordite propellants), acetic acid (used in plastics including "plexi-glass") and certain explosives, poison gases and metallurgical fluxes—have diverted a considerable proportion of capacity which in peace time principally produced carbide for calcium carbide fertilizer.

Carbide production consumes a very large amount of electric power—more than 20,000 KWH per metric ton. Since the available electric power fluctuates considerably between the wet and dry seasons (see ELECTRIC POWER) it is probable that these plants do not produce to capacity during the entire year.

3636—4—Niigata-Fukushima—8-24-44—First Proof

Classified Index of Targets for Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

CLASSIFICATION AND NAME	TARGET NUMBER	LOCATION (GENERAL)	APPROXIMATE COORDINATES	TEXT ON PAGE	MAP ON PAGE	PHOTO ON PAGE
AIRCRAFT						
Shinagawa Mfg. Plant	1665	Fukushima	37° 46′N 140° 28′E	22	M-10, 11	
Government Aircraft Parts Plant	1671	Sendai	38° 16′N 140° 55′E	24	M-9	
CHEMICALS						
Japan Refining Co.	1088	Koriyama	37° 23′N 140° 24′E	22	M-12	
Electro-Chemical Industry, Aomi Plant	1101	Aomi	37° 00′N 137° 45′E	28		28
Showa Fertilizer, Kanose Plant	1536	Kanose	37° 42′N 139° 28′E	32	M-10	32
Shinetsu Nitrogen Fertilizer Co., Naoetsu Plant	1667	Naoetsu	37° 11′N 138° 16′E	29	M-13	
ELECTRIC POWER						
Inawashiro Hydro Plant No. 1	881	Nippashi River	37° 33′N 140° 00′E	34		
Inawashiro Hydro Plant No. 2	900	Nippashi River	37° 33′N 139° 59′E	34		
Shingo Hydro Plant	1588	Agano River	37° 36′N 139° 44′E	33		33
Toyomi Hydro Plant	1589	Agano River	37° 42′N 139° 34′E	32	M-10	32
Kanose Hydro Plant	1590	Agano River	37° 42′N 139° 28′E	31	M-10	31
Shinano Hydro Plant	1592	Shinano River	37° 03′N 138° 41′E	30	M-10	30
Senju Hydro Plant	1593	Shinano River	37° 09′N 138° 45′E	30	M-10	30
Horai Hydro Plant	1607	Abukuma River	37° 41′N 140° 30′E	36	M-10	36
HARBOR FACILITIES						
Niigata Harbor	1670	Niigata	37° 56′N 139° 04′E	10	M-4, 5	10
IRON AND STEEL						
Nippon Stainless Steel, Naoetsu Plant	1651	Naoetsu	37° 11′N 138° 15′E	29	M-13	
Tokyo-Shibaura Electric Co., Oguni Plant	1664	Oguni	38° 03′N 139° 45′E	37		
Riken Heavy Industry, Kashiwazaki Plants	1668	Kashiwazaki	37° 22′N 138° 34′E	20	M-8	
Riken Heavy Industry, Nagaoka Plants	1669	Nagaoka	37° 25′N 138° 51′E	17	M-7	
MACHINERY AND MACHINE TOOLS						
Niigata Iron Works, Plant No. 1	998	Niigata	37° 56′N 139° 04′E	13	M-4, 5	13
Niigata Iron Works, Plant No. 2	999	Niigata	37° 56′N 139° 04′E	13	M-4, 5	13
Tsugami-Atagi Mfg. Co.	1656	Nagaoka	37° 28′N 138° 51′E	17	M-7	
Niigata Iron Works, Kashiwazaki Plant	1659	Kashiwazaki	37° 22′N 138° 33′E	20	M-8	20
Niigata Iron Works, Nagaoka Plant	1660	Nagaoka	37° 27′N 138° 51′E	17	M-7	17
Osaka Machinery Co. Plant No. 1	1661	Nagaoka	37° 27′N 138° 51′E	18	M-7	17, 18
Osaka Machinery Co. Plant No. 2	1662	Nagaoka	37° 28′N 138° 52′E	18	M-7	17, 18
Riken Heavy Industry, Kashiwazaki Plants	1668	Kashiwazaki	37° 22′N 138° 34′E	20	M-8	
NON-FERROUS METALS						
Japan Light Metals Co.	1003	Niigata	37° 54′N 139° 03′E	13	M-4, 5	
Northeast Aluminum Plant	1658	Koriyama	37° 24′N 140° 24′E	22	M-12	
Nippon Soda, Odera Refinery	1666	Odera	37° 33′N 139° 59′E	34		
PETROLEUM						
Nippon Oil Refinery	1000	Niigata	37° 55′N 139° 04′E	11	M-4, 5	10, 11
Niigata Oil Storage No. 1	1012	Niigata	37° 57′N 139° 05′E	12	M-4, 5	
Niigata Oil Storage No. 2	1013	Niigata	37° 56′N 139° 04′E	12	M-4, 5	
Nippon Oil Refinery, Kashiwazaki	1649	Kashiwazaki	37° 22′N 138° 34′E	19	M-8	19
TRANSPORTATION						
Niigata RR Yards	1023	Niigata	37° 55′N 139° 04′E	10	M-4, 5	
Fukushima RR Yards	1077	Fukushima	37° 45′N 140° 28′E	22	M-10, 11	
Nagamachi Marshalling Yards	1104	Sendai	38° 13′N 140° 53′E	24	M-9	
Koriyama RR Shops	1655	Koriyama	37° 23′N 140° 23′E	22	M-12	

3636—3—Niigata-Fukushima—8-24-44—First Proof

Summary and Evaluation of Niigata Area, No. 90.9 and Fukushima Area, No. 90.10

GENERAL: This section of Japan includes the outlying industrial center and potentially strategic port of Niigata, oil and additional industry that has developed to the south of Niigata, and hydroelectric capacity which is of major importance in the Tokyo power network.

Niigata is a newer industrial center, having expanded considerably during the past ten years. It is the site of Japan's second largest aluminum plant, and of two of the plants of one of the leading machine tool companies. Of major importance are nearby natural petroleum production, and related refining. Pre-war, Niigata was a secondary port; directly across the Japan Sea from the north Korean ports of Rashin and Seishin and with short rail connections to both the Tokyo Bay and Central Honshu regions, it has strategic advantages as a port which may be substantially increased by the course of the war.

The area south from Niigata to Nagaoka and Kashiwazaki is reported to have had considerable wartime industrial development, particularly in machinery and machine tool production. Intelligence indicates that clusters of small and medium-sized works have grown up in the Nagaoka region to supplement the older plants in Tokyo, Nagoya, Osaka, etc. Sendai, near the east coast, is the largest city in these Areas but is better known as a university site than for industry.

Several river courses through the mountains, and Lake Inawashiro at an elevation of over 1650 feet, provide a series of hydroelectric power sites which have been developed to provide a substantial block of the power for the Tokyo network. Two plants eight miles apart on the Shinano River are by far the largest hydroelectric installations in Japan. This power feeds into the Tokyo Bay district through the series of key transformer stations outlying from Tokyo.

These Areas are traversed by the two principal railroads between Northern and Central Honshu and by an alternate rail route along the east coast. The only developed port is Niigata on the Japan Sea coast, which has been considerably improved in recent years.

The central mountains rise to elevations above 6000 feet, with relatively sparse population and few sizable towns. Population is also sparse along the eastern coastal shelf, except for the Sendai region. Niigata lies in an extensive coastal plain which includes one of Japan's two sizable natural oil fields, the larger of which is to the north around Akita (Area 90.6).

This folder lists a total of 37 targets, of which, on the basis of available intelligence, three are considered of key importance in the Japanese war economy. The three key targets are:

KEY OBJECTIVES

Target No.	Target Name	Location
1003	Japan Light Metals Co.	Niigata
1592	Shinano Hydro Plant	37° 03′ N 138° 41′ E
1593	Senju Hydro Plant	37° 09′ N 138° 45′ E

Inasmuch as this section has had considerable wartime expansion of industry, it includes a number of new plants, or groups of plants, the significance of which cannot be closely evaluated. This is especially true of the newer machinery, machine tool, and specialty plants in Niigata and in Kashiwazaki-Nagaoka region to the south of Niigata. Of the numerous chemical plants in these Areas only the three large carbide plants and the phosphorus plant are designated as targets. Although the Joban coal mines, centering around Taira, are important, none of the mine installations are listed as targets. In addition to the targets, the folder mentions and includes graphic material on a number of other installations as an aid to evaluation of reconnaissance and other intelligence. Among these are sizable plants, the importance of which cannot be closely evaluated on the basis of available intelligence. As noted, there have been reports of wartime industrial development in these Areas, and reconnaissance may identify additional installations.

AIRFIELDS: There are seven known airfields, nine landing grounds and one seaplane anchorage. There has been some additional development, although the terrain generally will limit extensive airfields to the Niigata and Sendai plains and the river valleys in the central part of the Areas. Airfields and seaplane bases are a special category of targets, the characteristics and importance of which are subject to considerable change and none are listed as targets in this folder. All airfields and seaplane stations are tabulated on page 42 and shown on map on page M-2.

AIRCRAFT: No aircraft centers are known to exist in these Areas and only two plants have been identified as producing aircraft components. Of these, the new Government Aircraft Parts plant **TARGET 1671** at Sendai may be indicated as an important objective by reconnaissance and/or further intelligence. The other plant listed **TARGET 1665** is a converted spinning mill taken over by an important aircraft component manufacturing company; details of production are not known.

CHEMICALS: These Areas are of considerable importance for production of carbide. The three plants listed as targets in this folder **TARGETS 1101, 1536 and 1667** account for over 40% of the production of carbide capacity in Japan Proper and 30% of Empire capacity. They include three out of the four plants in Japan Proper estimated to have capacities of more than 50,000 metric tons per year.

Wartime requirements for carbide derivatives—the most important of which include acetylene (for welding), acetone (a solvent with many war uses including production of cordite propellants), acetic acid (used in plastics including "plexi-glass") and certain explosives, poison gases and metallurgical fluxes—have diverted a considerable proportion of capacity which in peace time principally produced carbide for calcium carbide fertilizer.

Carbide production consumes a very large amount of electric power—more than 20,000 KWH per metric ton. Since the available electric power fluctuates considerably between the wet and dry seasons (see ELECTRIC POWER) it is probable that these plants do not produce to capacity during the entire year.

3636—4—Niigata-Fukushima—8-24-44—First Proof

SUMMARY AND EVALUATION OF NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10—Continued

Carbide plants are ruggedly constructed and rather quickly and easily repaired. Some by-product plants are more likely to be damaged by blast and are less easily repaired. All have large transformer stations and considerable electrical equipment of critical importance in production.

Considerable sulfuric acid (nearly all low strength acid by the lead chamber process) is produced in the Area. Since Japanese lead chamber capacity is estimated to be far in excess of wartime requirements and none of the plants in these Areas produce a significant percentage of the Japanese total, none have been listed as targets.

The Japan Refining Co plant **TARGET 1088** is reported to be the largest phosphorus refinery in Japan and to be producing smoke screening and incendiary munitions. It has been a restricted area for several years and no details are available on the type or volume of production. This plant may be manufacturing a very substantial proportion of Japanese phosphorus munitions.

No current intelligence is available on the large chemical plant located approximately two miles west of the Odera refinery (See plan on page 35).

COAL: Not listed as targets are coal mines in the Joban field which, centering on Taira, stretches for some 50 miles along the Sendai-Tokyo coastal railroad. While this field is credited with less than 10% of total Japan Proper production, in contrast with the Kyushu and Hokkaido fields, it provides during the current coal shortage some 4,000,000 tons for the Tokyo Bay industrial region a short rail haul to the south. In all, there are about 18 small mine areas, an important group of which is just west of Taira. A smaller group some 25 miles to the north, west of Hirono, marks the northern limit of the field; south of Taira, where double-tracking begins, numerous mines lie on both sides of the railroad. The coal, a black lignite, is chiefly used as an industrial fuel.

ELECTRIC POWER: These Areas are a primary source of hydroelectric power. Most of the generating capacity feeds into the Tokyo power network and is concentrated in a few stations on the Shinano and Agano Rivers. The Shinano and Senju Hydro Plants **TARGETS 1592 and 1593** 8 miles apart on the Shinano River are by far the largest in Japan and are key units in the Tokyo system. Other plants are of secondary importance, small dimensions and limited vulnerability and only six are listed as targets.

Outlying hydro plants supply the bulk of the power consumed in the 50 cycle Tokyo power system which extends as much as 150 miles northwest and north of the Tokyo Bay district (See map on page M-3). Four steam plants in Tokyo-Kawasaki represent the system's principal concentration of generating capacity and are of critical importance during the dry seasons (November-March and August), when hydro output drops by more than 50% and supply is particularly tight. The Shinano and Senju Hydro Plants **TARGETS 1592 and 1593** with a combined capacity of 335,000 KW are the other key installations in the Tokyo system. These stations normally supply the widely fluctuating requirements of the electric railway system around Tokyo and their elimination would place a drastic burden on the Tokyo steam plants.

Hydro power feeding into Tokyo from elsewhere in Niigata-Fukushima and other Areas originates in a large number of plants, none of which represent a significant percentage of the total available to the network. The possible strategic effect of attack on these secondary power plants is further reduced by the fact that a few sizable hydro plants in central Honshu are equipped to supply either the Tokyo or the central Honshu networks. These two networks are separated by a cycle difference which prevents direct interchange of power but it is technically possible for all this double-cycle capacity to be diverted to Tokyo in an emergency. Accordingly, operations against any secondary power targets in the Tokyo system would have no decisive effect on essential activity until **TARGETS 1592 and 1593** and large-capacity steam plants in Tokyo, Nagoya and Osaka-Amagasaki were eliminated. Among approximately thirty of the secondary hydro targets in these two networks which might then be considered, five are located in the Niigata-Fukushima Areas.

The Shingo, Toyomi and Kanose Hydro Plants **TARGETS 1588, 1589, 1590** along the Agano River in the mountains east of the Niigata plain, have conspicuous dams but little usable water storage. A chain of four plants along the Nippashi branch of the Agano River are supplementary plants utilizing water stored during the wet season in Lake Inawashiro and three auxiliary lakes to operate at capacity in the dry seasons. Two of these, Inawashiro Hydro Plants 1 and 2 **TARGETS 881 and 900,** have horizontal generator sets susceptible to secondary as well as direct-hit damage. Many districts in the northern and eastern part of Fukushima were formerly served with 60 cycle power and were thus linked with the northern Honshu network but efforts have recently been undertaken to convert the more important districts to 50 cycle current, thereby permitting tie-in with the Tokyo network.

HARBOR FACILITIES AND SHIPPING: Niigata is the only harbor and extensively developed port on the west coast covered by this folder. Naoetsu to the south is a small, shallow draft port, and Kashiwazaki has no berthing facilities. This west coast is known for bad weather and for most of the year roadstead lightering is hazardous.

Niigata, with its cross-island railroad connections to Tokyo Bay region, provides an import point on the Japan Sea for iron ore concentrates and other mainland bulk commodities shipped through Seishin and Rashin opposite on the Korean coast.

Shiogama, the port for Sendai region on the east coast, provides limited berthing facilities. There is an open basin in reclaimed land with railroad spurs and freight sheds. It is approached by a 24 foot channel dredged in from deep water in Matsushima Bay.

Onagawa Bay, north of Oshika Peninsula and reached by a branch line from Ishinomaki is reported

3636—5—Niigata-Fukushima—8-24-44—First Proof

SUMMARY AND EVALUATION OF NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10—Continued

used as a naval anchorage and the site of oil storage tanks. Matsushima Bay and the deep fjords of Oshika Peninsula, provide the only sheltered anchorage between the Sendai region and Tokyo Bay.

IRON AND STEEL: There are no large steel works listed in this folder, but there are four plants of considerable possible importance as sources of supply for nearby machine tool and specialty manufacture. Further intelligence and/or reconnaissance may establish two of these plants as major objectives. The first, the new Tokyo-Shibaura plant at Oguni **TARGET 1664** is believed to be an important unit, but current information on plant details and type of production is not available. The second plant, Nippon Stainless Steel **TARGET 1651** has new, modern, foreign equipment and is reported to have expanded.

The two Riken steel plants at Nagaoka and Kashiwazaki **TARGETS 1669 and 1668** are new units of this leading industrial concern which has wide interests and many plants throughout Japan. The Nagaoka plant was constructed in conjunction with the Riken boiler and engine plant which adjoins it; the Kashiwazaki plant in conjunction with the Riken machinery and machine tool units located in the same general compound or adjoining compounds. The new plants furnish steel and steel castings to their affiliated units. Not listed as a target, the plant of the Tohoku Tokushu Co is reported to produce high-speed steel in electric furnaces. Detailed information on this plant is lacking, but it is known to be located in Nagamachi and may be the large new factory west of Nagamachi Marshalling Yards **TARGET 1104**.

MACHINERY, MACHINE TOOLS: The Niigata region and the Nagaoka-Kashiwazaki region just to the south are important centers for machinery and machine tool production. There are a number of large and well established plants, and wartime development of specialized and precision tool makers has been reported.

The Niigata plant of Niigata Iron Works **TARGET 998** is reported to be the most important plant of this company, which is one of Japan's original "Big Five" machine tool concerns and has half a dozen or more plants in this Area and around Tokyo. This plant also is an important producer of heavy machinery and railroad rolling stock, and is reported controlling some shipbuilding. A second and newer Niigata plant of the company **TARGET 999** produces a general line of machine tools.

Possibly the second most important plant of Niigata Iron Works is located in Nagaoka **TARGET 1660.** Also in Nagaoka are the considerably-expanded plant of Tsugami-Atagi Manufacturing Co **TARGET 1656,** two smaller Osaka Machinery plants **TARGETS 1661 and 1662,** all making machine tools, and Riken Heavy Industry plants **TARGET 1669** producing boilers, engines and general machinery.

NON-FERROUS METALS: The Japan Light Metals aluminum reduction plant **TARGET 1003** in Niigata City is a key target in Japanese aluminum production, ranking second in Japan Proper. It has an estimated annual capacity of 18,000 metric tons (some 10% of Japanese total) which is approximately double the capacity of any other such unit, with the exception of the Kambara plant of the same company (Shizuoka Area—90.18). Alumina for the Niigata plant is reported to be supplied by the Company's alumina plant at Shimizu (Area 90.18). The small Northeast Aluminum Plant **TARGET 1658,** estimated capacity 5000 metric tons or 3% of Japanese total, is a new plant which began operation in 1940. The Higashi-Iwase plant of Nichiman Aluminum (Area 90.11) is reported to supply this plant with alumina and electrodes.

A large zinc refinery and smelter of Nippon Soda Co **TARGET 1666** is located at Odera, near Wakamatsu City. It has an estimated capacity of 7000 metric tons of high grade zinc, or nearly 15% of Japanese total.

PETROLEUM: The oil field around Niigata and south down the coast to Kashiwazaki is one of the two sources of natural petroleum production in Japan Proper. The field around Akita (Area 90.6) is the larger of the two; other natural production is relatively negligible. While production from these two fields has been comparatively unimportant in terms of the total crude which has been available to Japan it would become of major importance as result of denial to Japan of NEI resources.

The Niigata-Kashiwazaki field is estimated producing 1,500,000-2,500,000 barrels of crude per year. Estimates for the Akita fields vary from 3,000,000 to 5,000,000 barrels.

The bulk of the Niigata-Kashiwazaki crude undoubtedly is refined at the Nippon Oil refineries at Kashiwazaki **TARGET 1649** and at Niigata **TARGET 1000.** At least one other small refinery has been reported in the area. This refinery capacity is increased in importance by its proximity to crude production, in contrast with the dependence of most Japanese refineries upon crude from overseas. There are several oil storages in this section and probably bunkering facilities at Niigata.

TRANSPORTATION: Three principal single track north-south railroad mainlines traverse the Areas to connect with three junctions on the Tokyo Plain where double-tracking begins. The Tohoku, down from Hokkaido via the Hakodate-Aomori car-ferry and via the Kitakami Valley, is the principal north-south line north of Tokyo. The O-u line also from Aomori but via Akita on the west coast, joins the Tohoku at Fukushima junction from where the line continues single tracked to Utsunomiya. South of Sendai the Joban line leaves the Tohoku and, skirting the mountains along a narrow coastal plain, passes through the Joban coal field and joins the Tokyo Plain rail network at Mito. The third mainline, the Joetsu, from Niigata and the northwest coast, comes into the Tokyo Plain via Maebashi and Takasaki.

The Tohoku, a relatively heavy-duty line for the most part through long north-south valleys, is the principal railroad connecting Hokkaido with the in-

3636—6—Niigata-Fukushima—8-24-44—First Proof

SUMMARY AND EVALUATION OF NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10 — Concluded

dustrial regions of central Japan. The war-time disruption of coastal shipping which formerly moved tonnages in excess of railroad capacity, has made the Tohoku a principal carrier of coal, lumber and other bulk commodities from the north. The Joban Line, along the coastal plain, provides a by-pass for the single track Tohoku stretch south of Fukushima and releases line capacity required by the O-u at its junction with the Tohoku. From Taira southward double-tracking on the Joban provides line capacity to move substantial tonnages of coal from the adjacent mines.

The Joetsu from the port of Niigata **TARGET 1670,** is a rail connection of strategic importance between Japan's great industrial capacity on the Pacific side and Korean/Manchurian raw materials via Seishin/Rashin and the Sea of Japan.

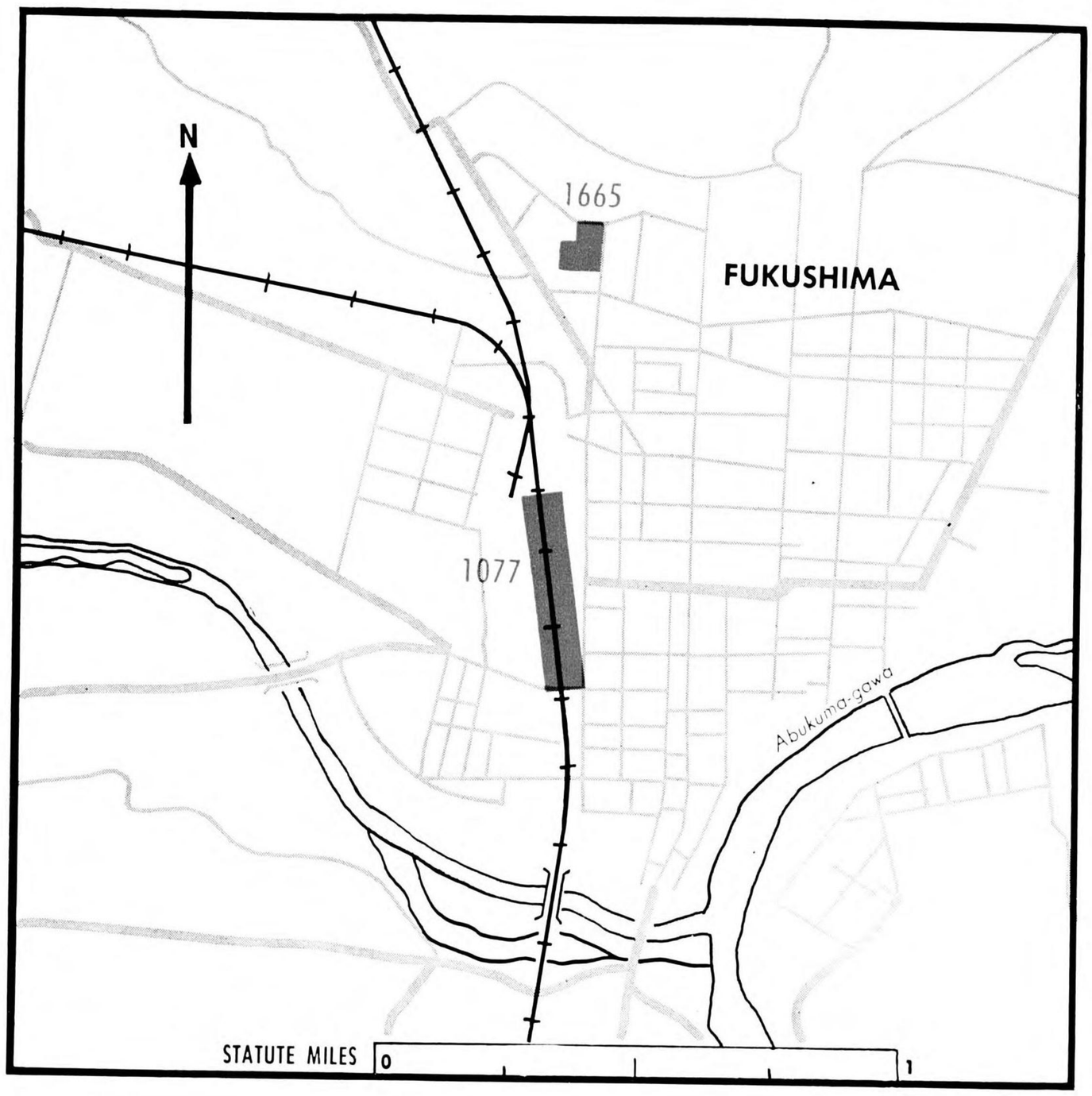
A single track line along the west coast connects Niigata with Aomori to the north and ports to the south, and also a line leaving the Joetsu at Kawaguchi reaching Nagoya via Nagano. Several lateral lines through difficult mountain country provide low-capacity cross connections.

The most important IGR repair shops north of Tokyo region are located at Koriyama **TARGET 1655.**

URBAN AREA INCENDIARY ATTACK: The larger cities and towns in these Areas are characterized by the same general type of wood and plaster houses, high built-up density and congestion which have made many Japanese cities susceptible to sweeping fires. With the exception of Niigata, however, they are either too small or not sufficiently important industrially for consideration as incendiary bombing objectives. While probably not as vulnerable as the large cities of south-central Honshu, Niigata's combustible construction and intermingling of factories and workers' homes make it a suitable objective for concentrated incendiary attack (See Summary and Evaluation, Niigata Region, page 8).

In view of its minor industrial importance and its cultural significance, Sendai is not considered a primary objective for such attack, although it is the largest and probably the most vulnerable city in these areas. It may warrant consideration for such attack should the course of the war require the neutralization of its extensive army garrison and supply installations. Of the remaining towns, Nagaoka, Koriyama and possibly Fukushima may serve as alternate or opportunity targets for incendiary bomb attack. During much of the winter season deep snow cover (particularly along the west coast) would effectively retard the spread of fires.

3636—7—Niigata-Fukushima—8-24-44—First Proof



TARGET
1077 FUKUSHIMA RR YARDS
FUKUSHIMA
(TRANSPORTATION)

37° 45′ N 140° 28′ E (Approx)—Freight yards at junction of two main lines from Aomori.

(See maps on pages M-10 and M-11.)

TARGET
1665 SHINAGAWA MFG PLANT
(Shinagawa Seisakusho)
FUKUSHIMA
(AIRCRAFT)

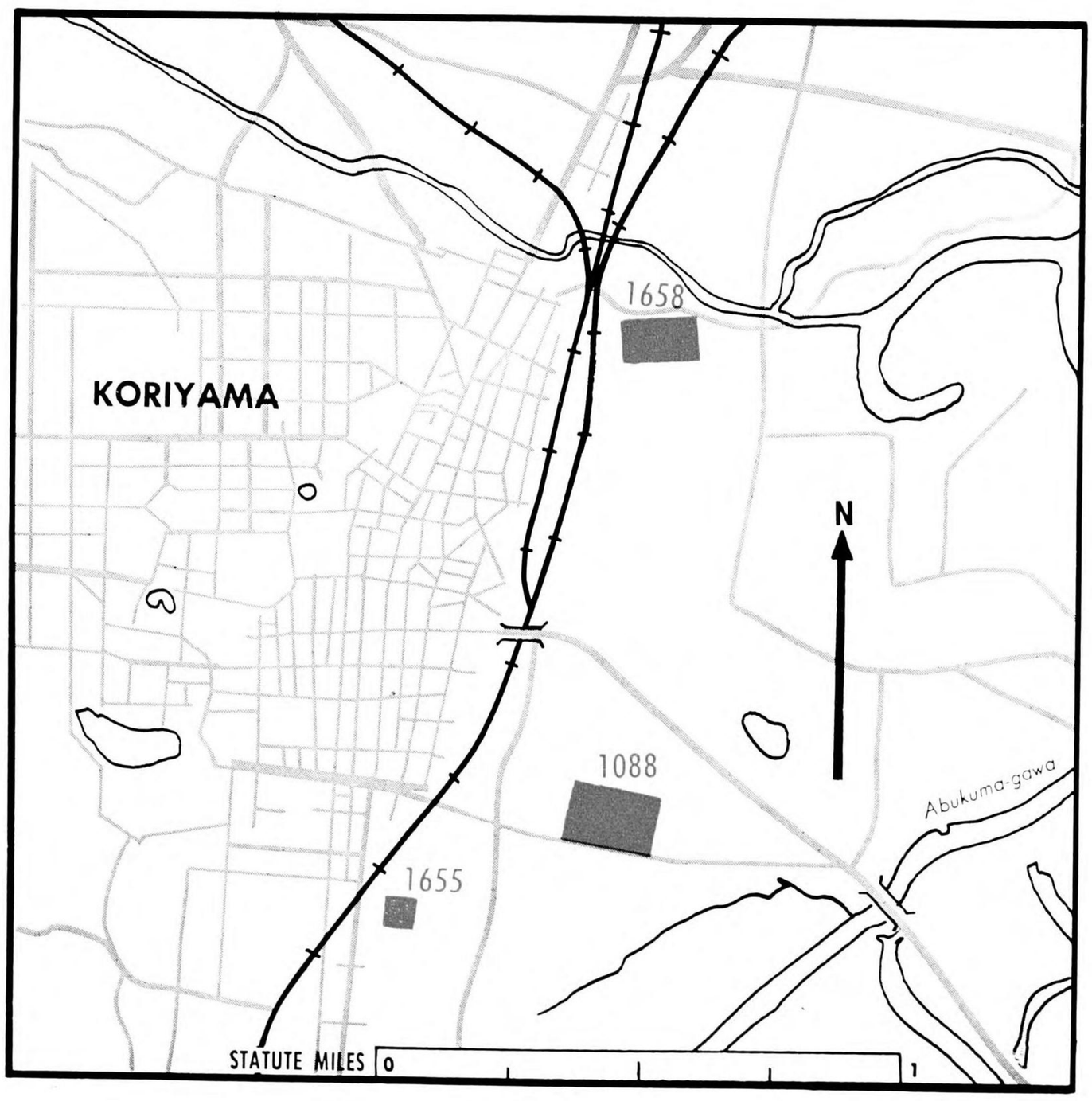
37° 46′ N 140° 28′ E (Approx)—Converted (1943) Kanegafuchi Textile factory. Probably produces aircraft components (gauges, altimeters, etc.) Plant lies E of Tohoku RR line and just N of junction of this line with Ou RR. A school forms the N boundary of the compound and textile mills the E.

(See maps on pages M-10 and M-11.)

TARGET
1088 JAPAN REFINING CO
(Nippon Seiren KK)
KORIYAMA
(CHEMICALS)

37° 23′ N 140° 24′ E (Approx)—Reported largest phosphorus plant in Japan. Restriction of plant area for some time makes it impossible to give details on type and volume of war materials produced. Plant E of RR approx ¼ mi to NE of RR Shops (TARGET 1655).

(See map on page M-12.)



TARGET
1655 KORIYAMA RR SHOPS
KORIYAMA
(TRANSPORTATION)

37° 23′ N 140° 23′ E (Approx)—One of main IGR repair shops. Facilities for repairing both locomotives and rolling stock. Shops area, approx 650 ft by 980 ft and surrounded by a wooden fence, includes two factory bldgs of corrugated iron; three wooden office bldgs, and two steel material yards. Two cranes mounted on RR cars are used to haul steel for the yards. Located at the southern edge of the city on E side of the RR.

(See map on page M-12.)

TARGET
1658 NORTHEAST ALUMINUM PLANT
(Tohoku Shinko Aruminiumu)
KORIYAMA
(NON-FERROUS METALS)

37° 24′ N 140° 24′ E (Approx)—Small aluminum plant built in 1940. Cap 5000 metric tons, or 3% of Japan's total cap. Alumina and electrodes from Nichiman Aluminum, Higashi-Iwase plant (Area 90.11). By-products—iron alloys, aluminum chloride and titanium. Current production in doubt as plant and materials damaged by flood in 1941. Located on E side of main RR just below junction of three rail lines at N edge of Koriyama. A branch of the Abukuma R to the N of the plant.

(See map on page M-12.)

3686—22—Niigata-Fukushima—8-24-44—First Proof

Air Objective Folder

KORIYAMA-FUKUSHIMA REGION

NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	AIRCRAFT	
1665	Shinagawa Mfg. Plant	22
	CHEMICALS	
1088	Japan Refining Co.	22
	NON-FERROUS METALS	
1658	Northeast Aluminum Plant	22
	TRANSPORTATION	
1077	Fukushima RR Yards	22
1655	Koriyama RR Shops	22

Summary and Evaluation of Koriyama-Fukushima Region

Koriyama and Fukushima, in the Abukuma River valley, are two small industrial centers. Available intelligence indicates only minor industrial expansion as a result of the war.

At Koriyama is one of the main IGR shops **TARGET 1655** with repair facilities for both locomotives and rolling stock, and possibly some manufacture. Here, also, is the Japan Refining Co plant **TARGET 1088** reported to be Japan's largest producer of phosphorus for chemical warfare. A small aluminum plant **TARGET 1658** with estimated annual capacity 5000 metric tons began operation in Koriyama in 1940, and at that time additional building was in progress. These three installations are all located on the east side of the railroad in the newer and less built-up portion of the city. The factories on the west and older side of the railroad are practically all textile mills.

The city of Fukushima, the prefectural capital, is mainly a silk weaving and commercial center and is located at the junction of the two main railroad lines from Aomori. Increase in the large tonnages of raw materials, military supplies, etc., hauled by these lines as result of Japan's shift from ship to rail because of her shipping position, has added to the importance of the freight yards at this junction **TARGET 1077.** There is one known conversion in Fukushima of a textile mill to war production. Shinagawa Manufacturing Co, one of the important aircraft component manufacturers, purchased and converted the Kanegafuchi Spinning Mill. Details on production of this plant **TARGET 1665** are lacking.

3636—21—Niigata-Fukushima—8-24-44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 INDEX & SUMMARY (KORIYAMA-FUKUSHIMA REGION)

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Air Objective Folder

SENDAI REGION

NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	AIRCRAFT	
1671	Government Aircraft Parts Plant	24
	TRANSPORTATION	
1104	Nagamachi Marshalling Yards	24

Summary and Evaluation of Sendai Region

Largest city in northeast Japan, Sendai has been significant primarily as a cultural center, being the site of the large Tohoku Imperial University and of several foreign missionary society centers. It is an important railroad corridor on the Tohoku and Joban Lines, which figure prominently in the shift from ship to rail transport necessitated by Japan's tight shipping position. These lines carry large tonnage of coal, lumber and other raw materials, military supplies, etc. The largest marshalling yards in northern Honshu **TARGET 1104** are located at Nagamachi, just south of Sendai. Large yards and locomotive shops are also located in Sendai itself.

The city has also been an important army garrison post, with large barracks and storage installations, training grounds, etc. The Sendai Airport just east of the city, is believed to be one of the primary bases in northern Honshu and may also serve as an air depot.

Industrially the city is unimportant, except for silk and textile mills and semi-handicraft shops. Available intelligence indicates that the city has experienced only minor industrial expansion as a result of the war. A large government-controlled aircraft parts plant **TARGET 1671** is just northeast of the Sendai airport, but information is lacking concerning its production and importance. A special steel plant, located just south of the city, is reported to produce high-grade tool steel. Detailed information is not available, but it may be the large new factory west of the Nagamachi Marshalling Yards **TARGET 1104**. A factory of the Tokyo First Army Arsenal producing tools, dies, shells, etc., is also reported to be in Sendai. Nippon Electric, one of the leading radio and electrical equipment concerns in Japan, operates a very small factory here which is believed to be unimportant. Also reported are several other small electrical instrument and testing apparatus plants, none of which have been identified. It is possible that they operate in conjunction with the research activities of Tohoku University. One of Japan's important research centers, the University is reported to specialize in work on special metals for fine indicating instruments. It may also be engaged in research and development of radio detecting equipment.

The large Iwaki Wireless Station, located at Haranomachi about 45 miles south by east of Sendai, was one of the leading short-wave stations for North American service.

3636—23—Niigata-Fukushima—8-24-44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 INDEX & SUMMARY (SENDAI REGION)

NIIGATA 90.9, FUKUSHIMA 90.10 INDEX & SUMMARY (SENDAI REGION)

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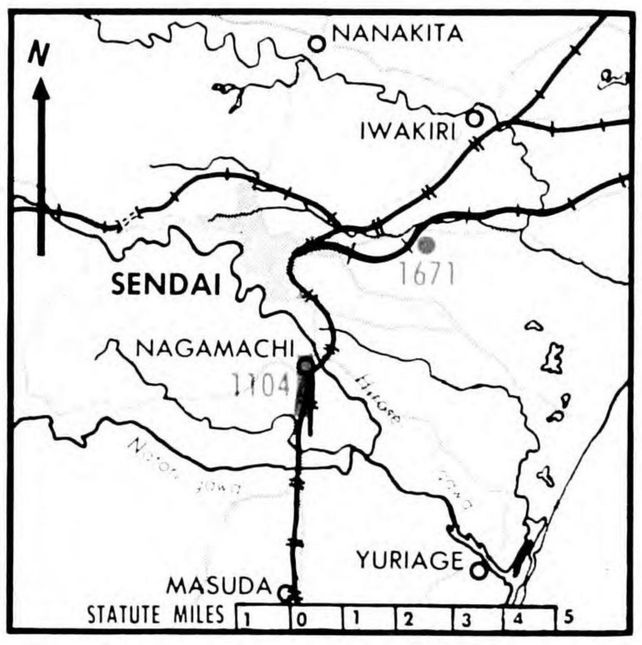
PHOTO 18—Sendai—View of central section of city. Installations shown are not listed as targets.



TARGET
1104 NAGAMACHI MARSHALLING YARDS

SENDAI

(TRANSPORTATION)

38° 13′ N 140° 53′ E (Approx)—Most extensive marshalling yards in N Honshu. Located in region where a number of N-S and trans-island lines converge. Locomotive shed. Located on the Tohoku mainline at the junction of several other lines, this is the most extensive marshalling yard between Tokyo and Aomori.

(See map on page M-9.)

TARGET
1671 GOVERNMENT AIRCRAFT PARTS PLANT

SENDAI

(AIRCRAFT)

38° 16′ N 140° 55′ E (Approx)—Large new plant producing unspecified aircraft parts. On outskirts of Sendai about 1 mi NE of airport, site extends for approx ½ mi along main road from Sendai to Shiogama. Additional bldgs under construction in 1941.

(See map on page M-9.)

3636—24—Niigata-Fukushima—8-24-44—First Proof

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PHOTO 19—Sendai—View of southern part of city. Installations shown are not listed as targets.

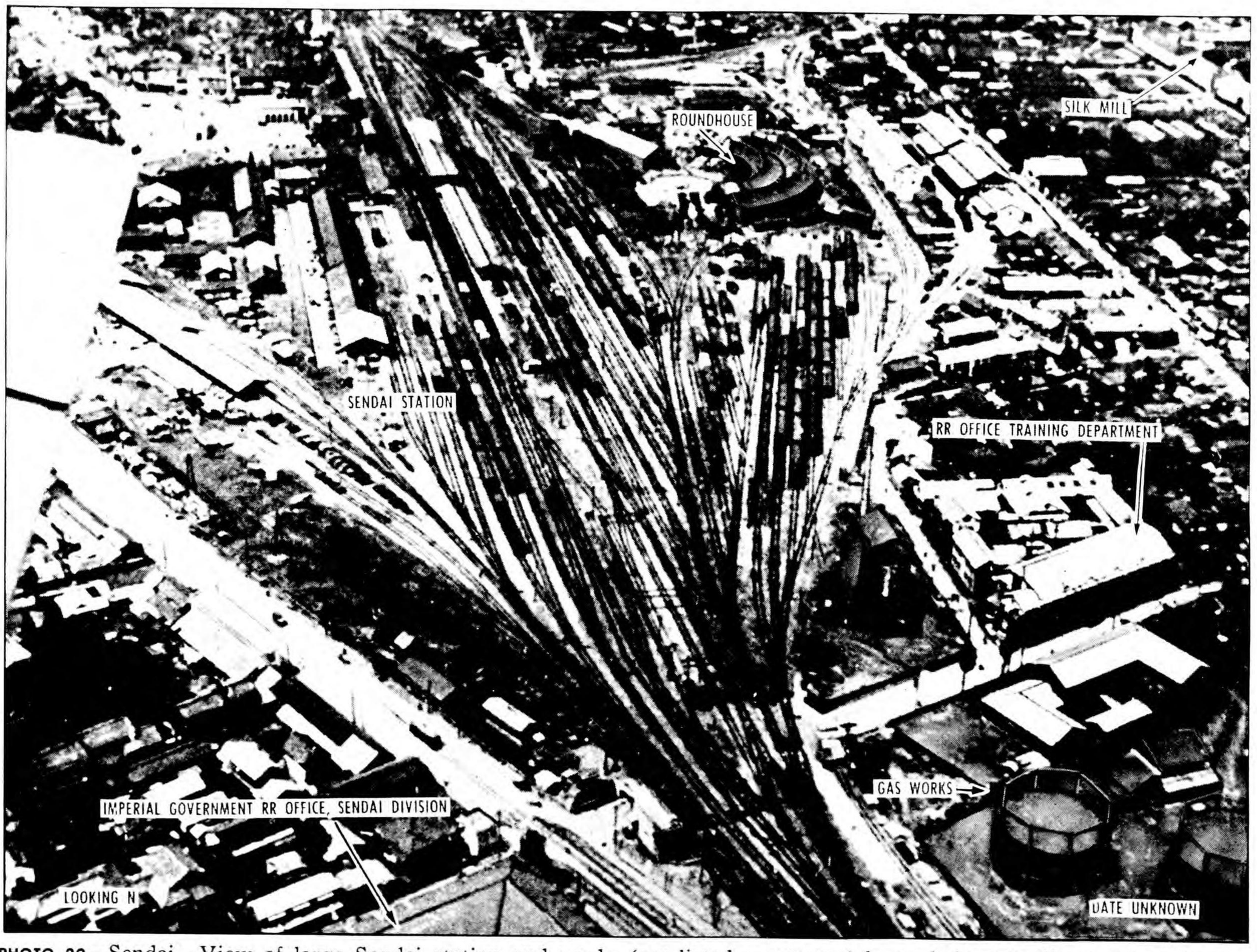

PHOTO 20—Sendai—View of large Sendai station and yards (not listed as a target) located about 2 miles north of the major Nagamachi Marshalling Yards (TARGET 1104).

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3636 25 Niigata-Fukushima—8-24-44—First Proof

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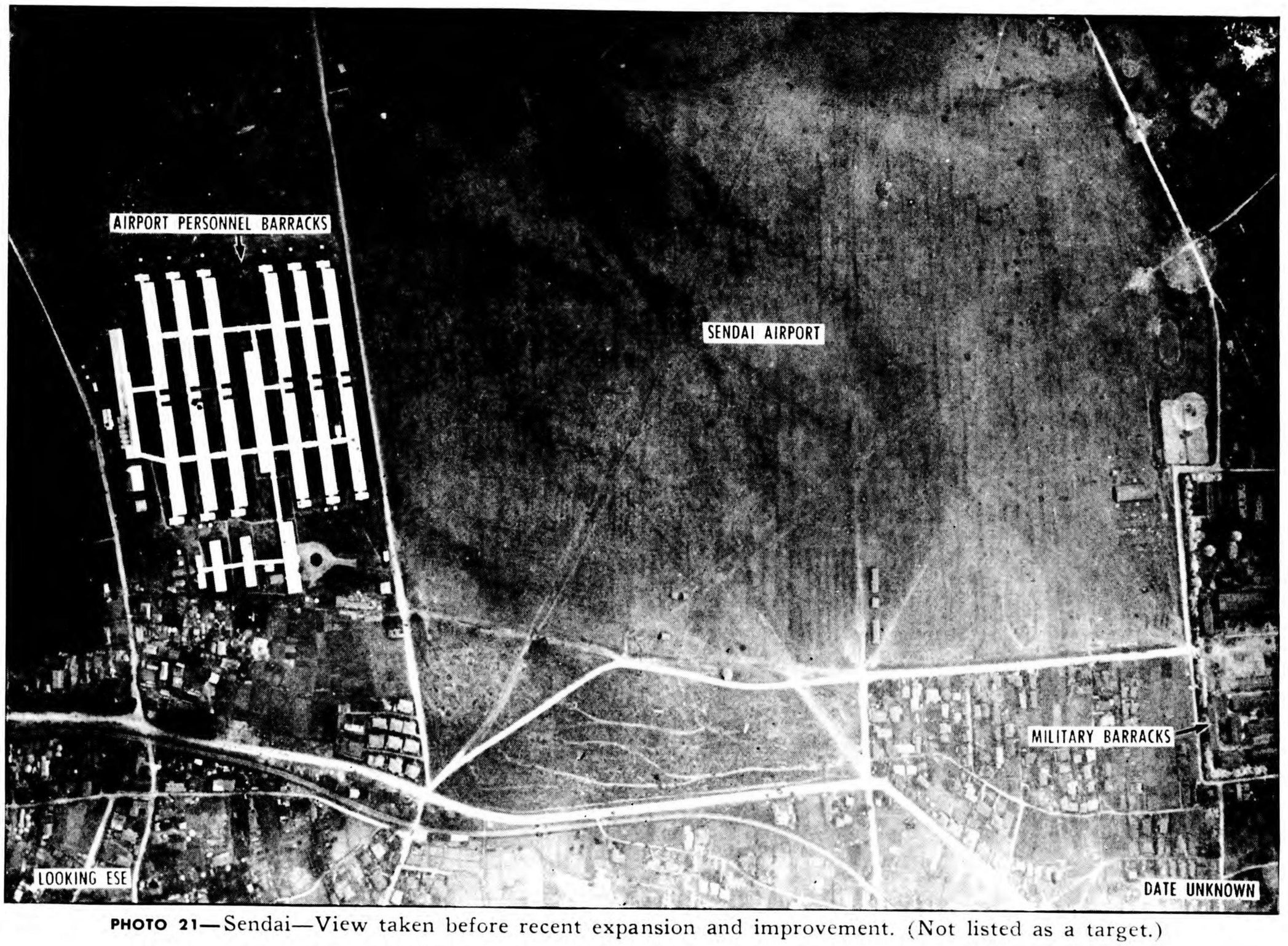

PHOTO 21—Sendai—View taken before recent expansion and improvement. (Not listed as a target.)

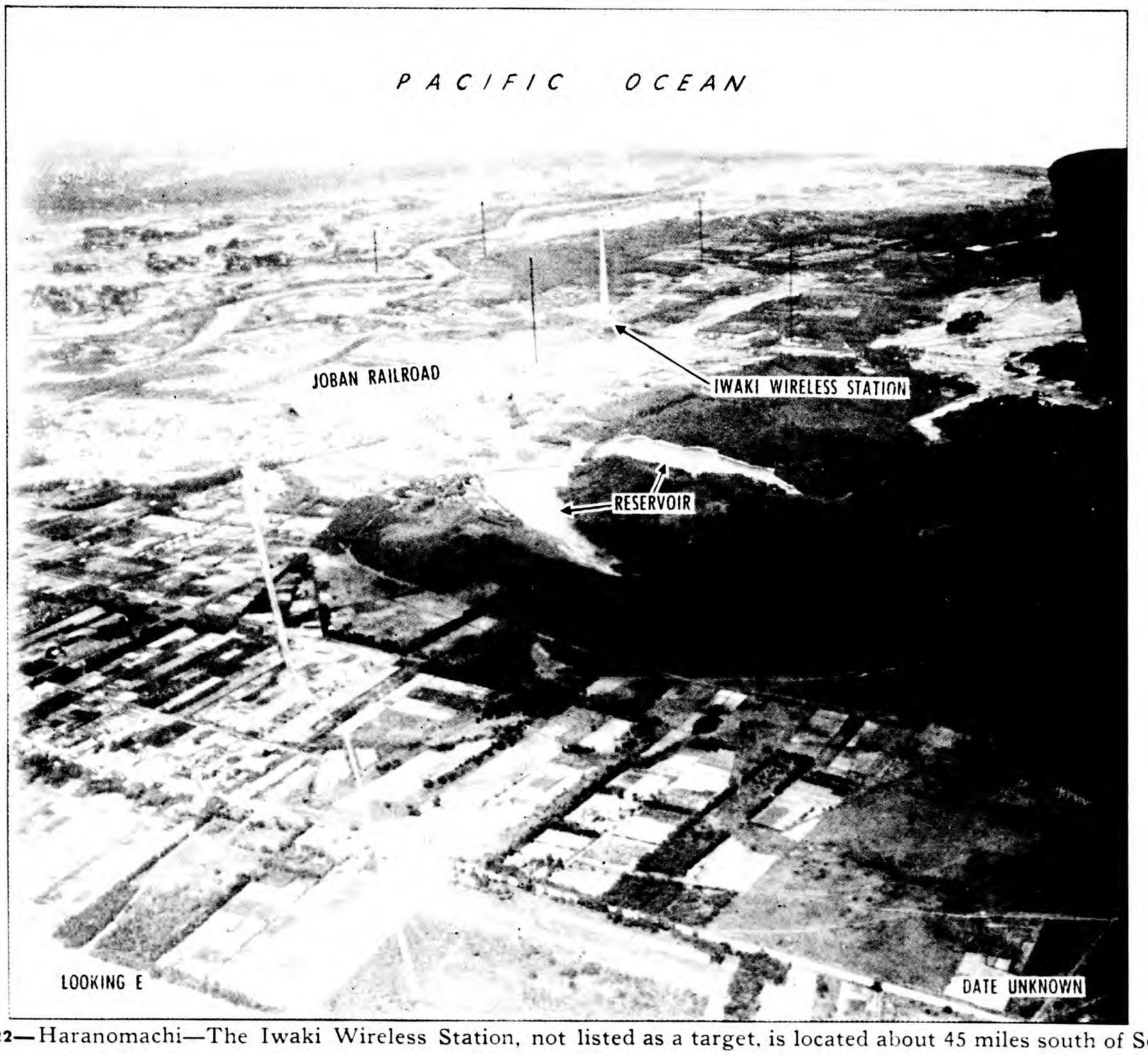

PHOTO 22—Haranomachi—The Iwaki Wireless Station, not listed as a target, is located about 45 miles south of Sendai.

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NIIGATA 90.9, FUKUSHIMA 90.10 GENERAL PHOTOS (SENDAI REGION)

NIIGATA 90.9, FUKUSHIMA 90.10 GENERAL PHOTOS (SENDAI REGION)

3636—26—Niigata Fukushima 8-24-44 First Proof

Air Objective Folder

OUTLYING TARGETS

NIIGATA AREA, No. 90.9 AND FUKUSHIMA AREA, No. 90.10

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	CHEMICALS	
1101	Electro-Chemical Industry, Aomi Plant	28
1536	Showa Fertilizer, Kanose Plant	32
1667	Shinetsu Nitrogen Fertilizer Co., Naoetsu Plant	29
	ELECTRIC POWER	
881	Inawashiro Hydro Plant No. 1	34
900	Inawashiro Hydro Plant No. 2	34
1588	Shingo Hydro Plant	33
1589	Toyomi Hydro Plant	32
1590	Kanose Hydro Plant	31
	ELECTRIC POWER	
1592	Shinano Hydro Plant	30
1593	Senju Hydro Plant	30
1607	Horai Hydro Plant	36
	IRON AND STEEL	
1651	Nippon Stainless Steel, Naoetsu Plant	29
1664	Tokyo-Shibaura Electric Co., Oguni Plant	37
	NON-FERROUS METALS	
1666	Nippon Soda, Odera Refinery	34

NIIGATA 90.9, FUKUSHIMA 90.10 INDEX (OUTLYING TARGETS)

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NIIGATA 90.9, FUKUSHIMA 90.10 INDEX (OUTLYING TARGETS)

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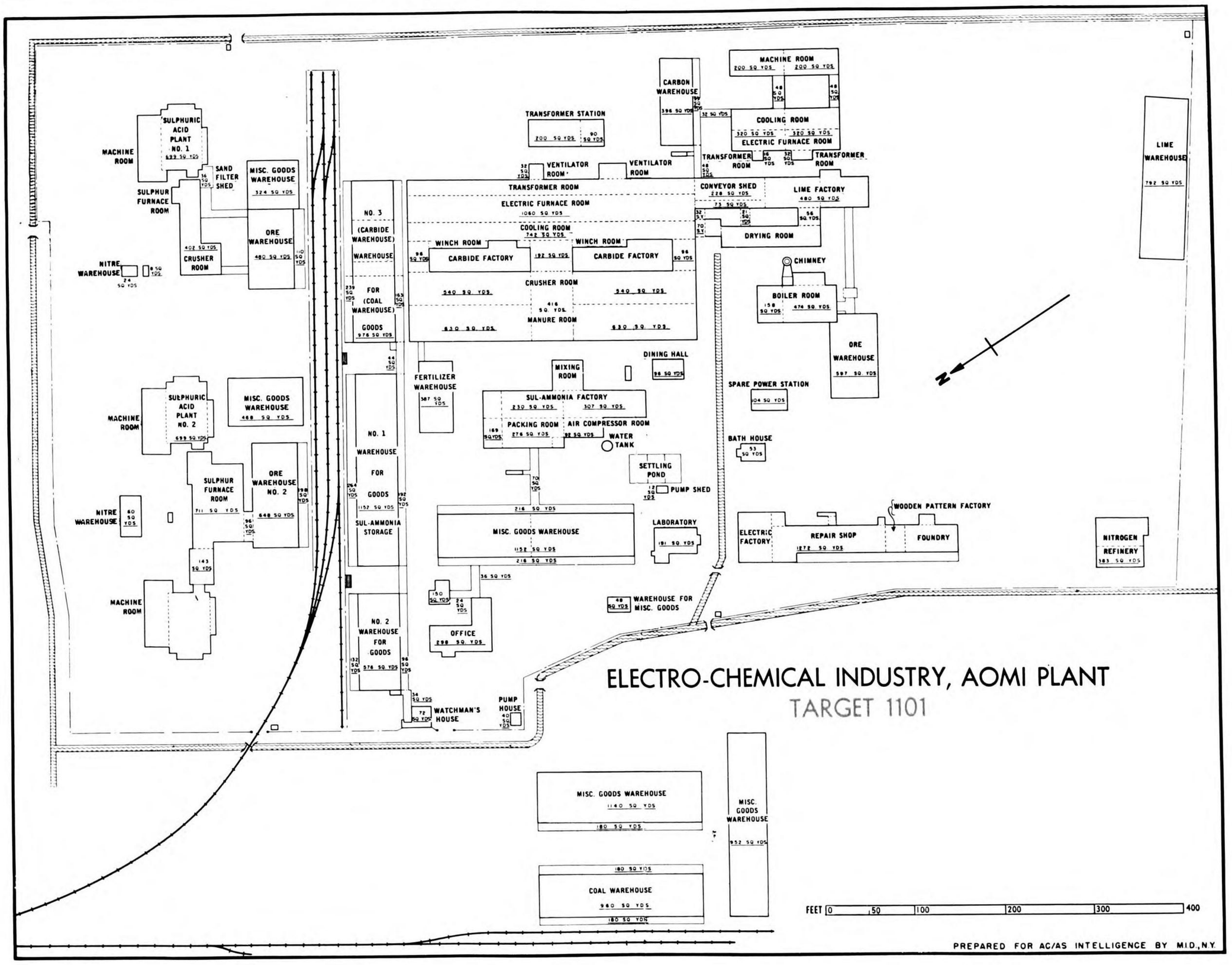
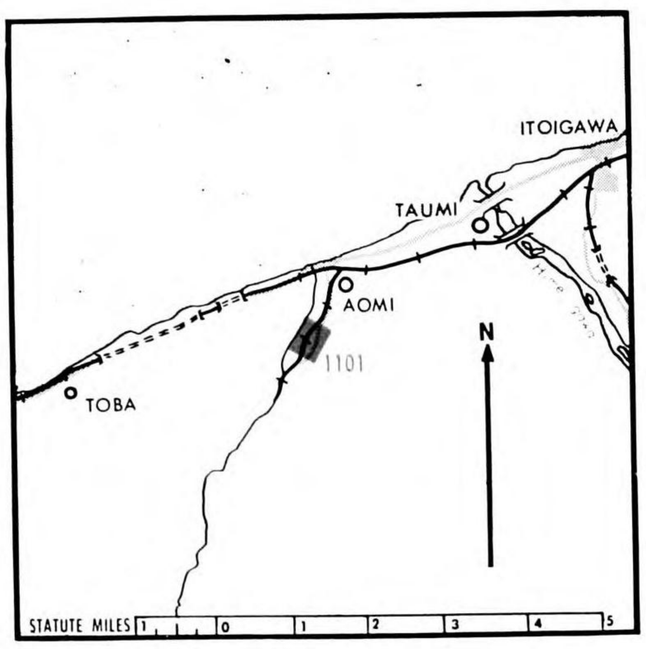


ELECTRO-CHEMICAL INDUSTRY, AOMI PLANT

TARGET 1101



TARGET

1101 ELECTRO-CHEMICAL INDUSTRY, AOMI PLANT

Denki Kagaku Kogyo

AOMI

(CHEMICALS)

37° 00′ N 137° 45′ E (Approx)—Cne of the two largest carbide plants in Japan Proper. Estimated annual cap 137,000 metric tons or 18% Japan Proper. Produced fertilizer before war.

No detailed information on wartime production of carbide derivatives. Construction principally metal sheeting over wood frame, one or two stories. Small standby electric power plant in compound; three power lines near the plant. Located approx 1 mile S of Aomi on spur line and isolated from other industrial installations. Critical points: Transformer station, electrical equipment, air liquefaction plant.

(See photo 23 and map on page 29.)

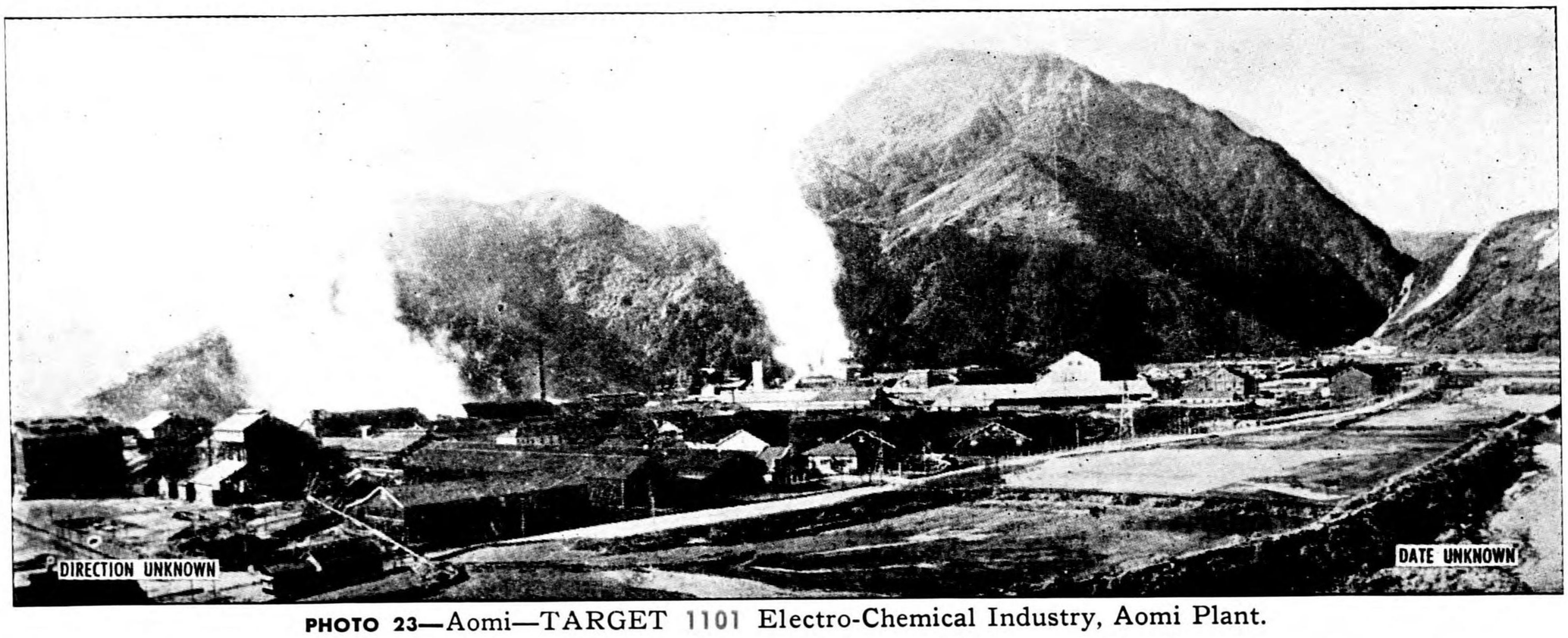
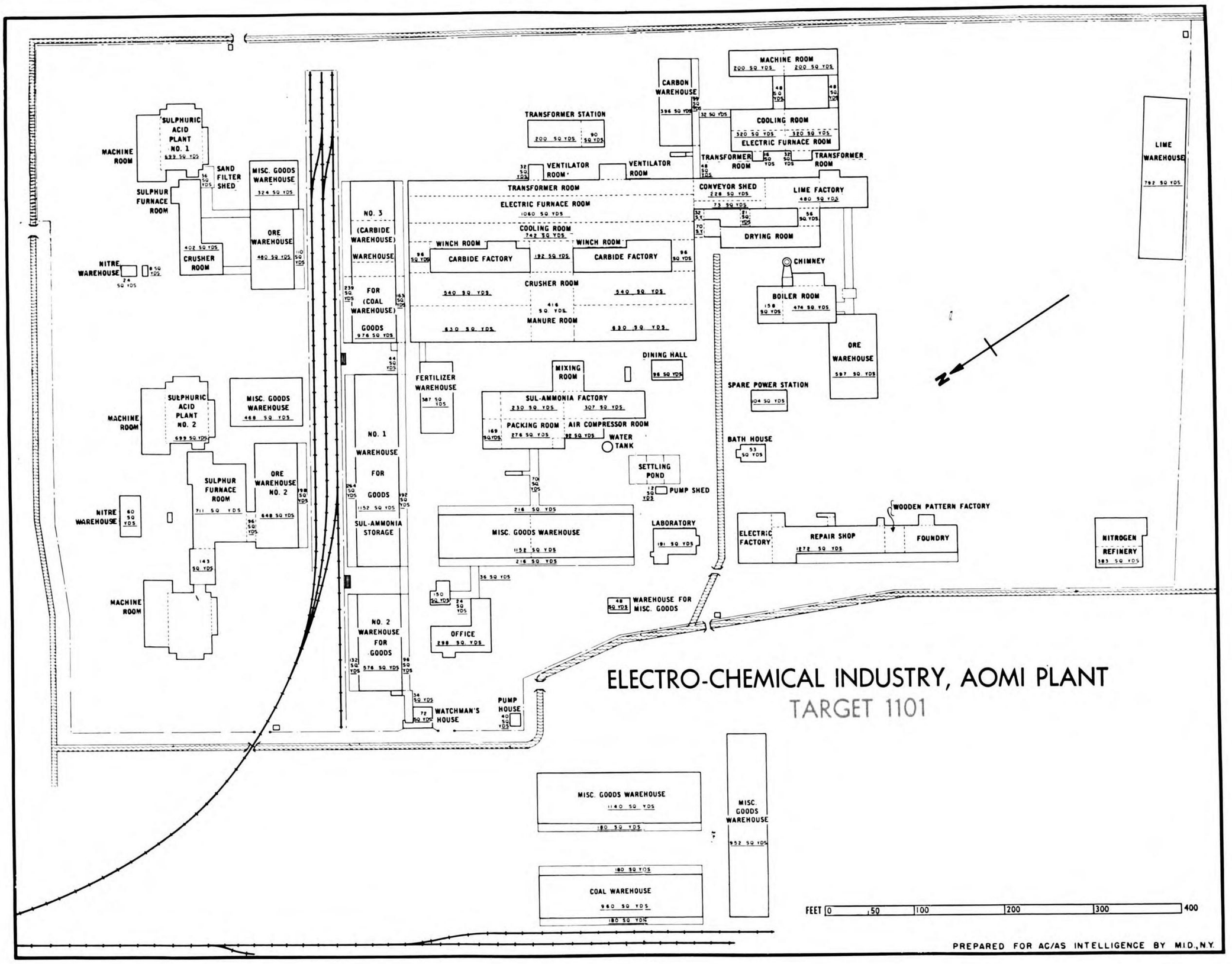


PHOTO 23—Aomi—TARGET 1101 Electro-Chemical Industry, Aomi Plant.

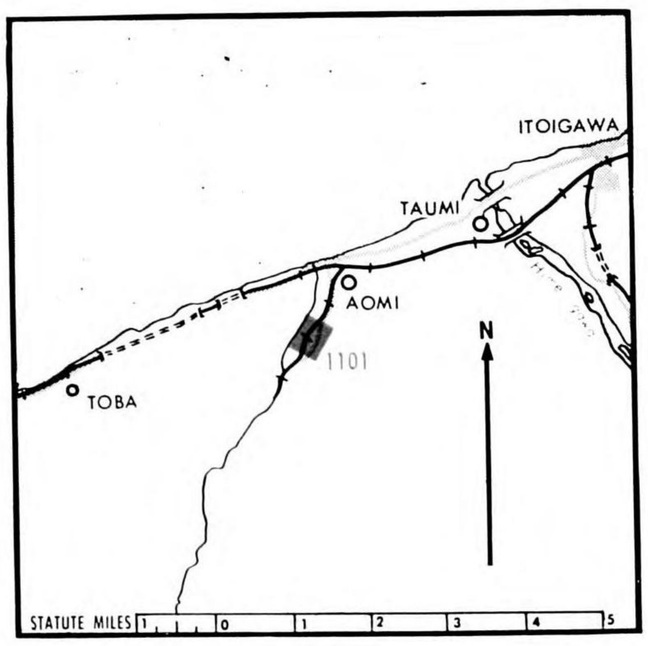
NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1101 (OUTLYING)

3636—28—Niigata-Fukushima—8-24-44—First Proof



ELECTRO-CHEMICAL INDUSTRY, AOMI PLANT

TARGET 1101



TARGET

1101 ELECTRO-CHEMICAL INDUSTRY, AOMI PLANT

Denki Kagaku Kogyo

AOMI

(CHEMICALS)

37° 00′ N 137° 45′ E (Approx)—Cne of the two largest carbide plants in Japan Proper. Estimated annual cap 137,000 metric tons or 18% Japan Proper. Produced fertilizer before war.

No detailed information on wartime production of carbide derivatives. Construction principally metal sheeting over wood frame, one or two stories. Small standby electric power plant in compound; three power lines near the plant. Located approx 1 mile S of Aomi on spur line and isolated from other industrial installations. Critical points: Transformer station, electrical equipment, air liquefaction plant.

(See photo 23 and map on page 29.)

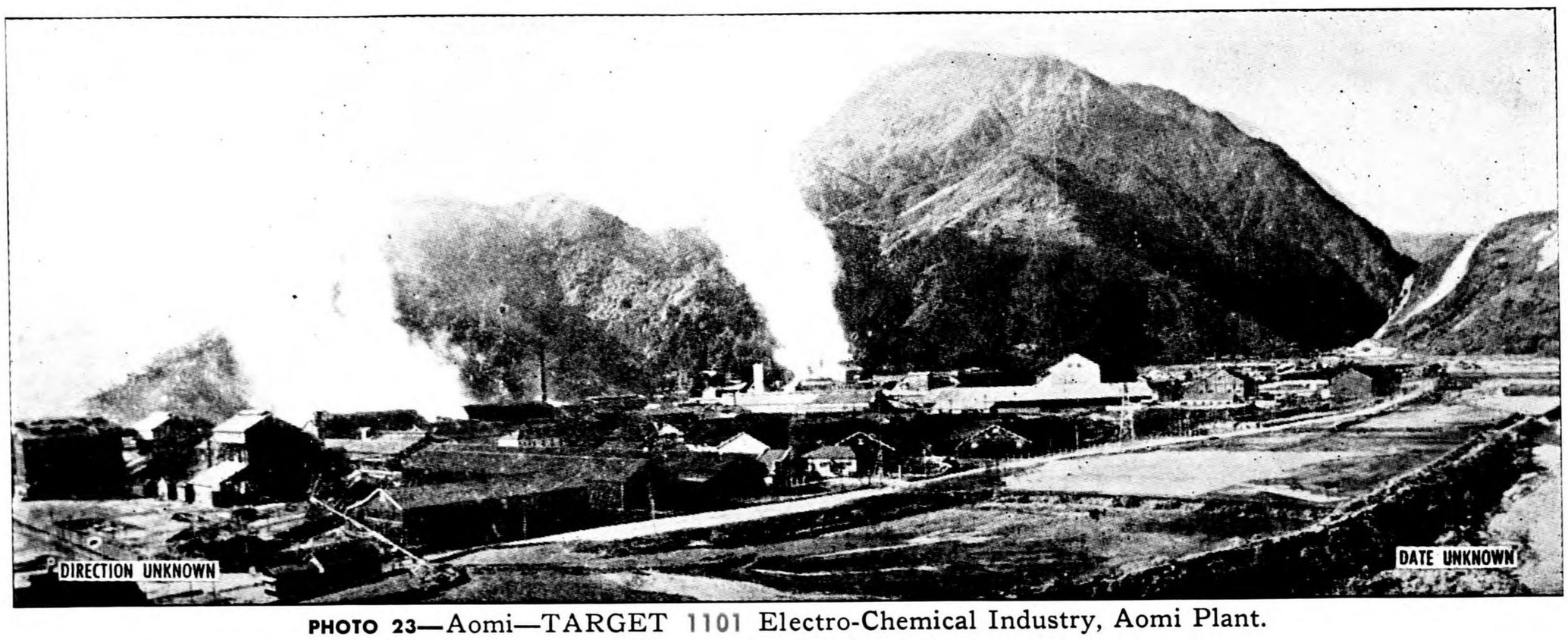


PHOTO 23—Aomi—TARGET 1101 Electro-Chemical Industry, Aomi Plant.

NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1101 (OUTLYING)

3686—28—Niigata-Fukushima—8-24-44—First Proof

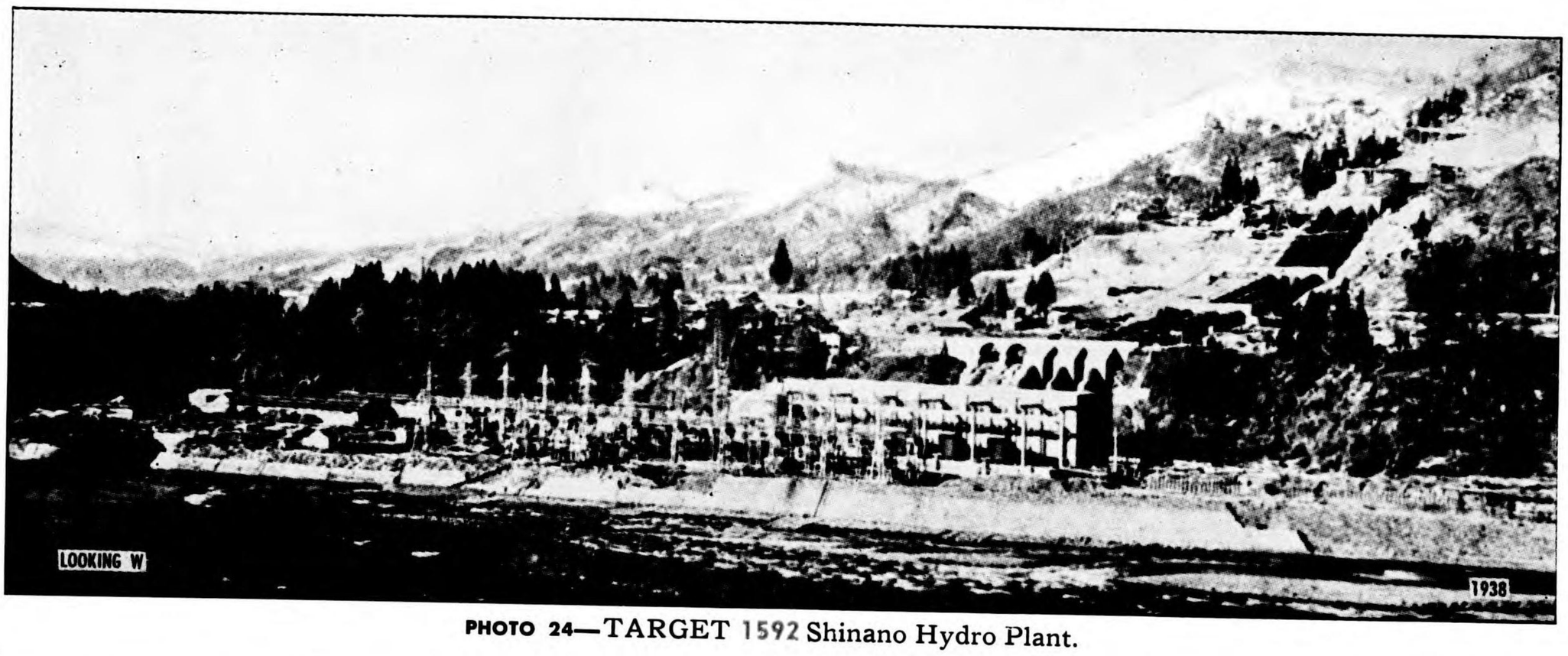
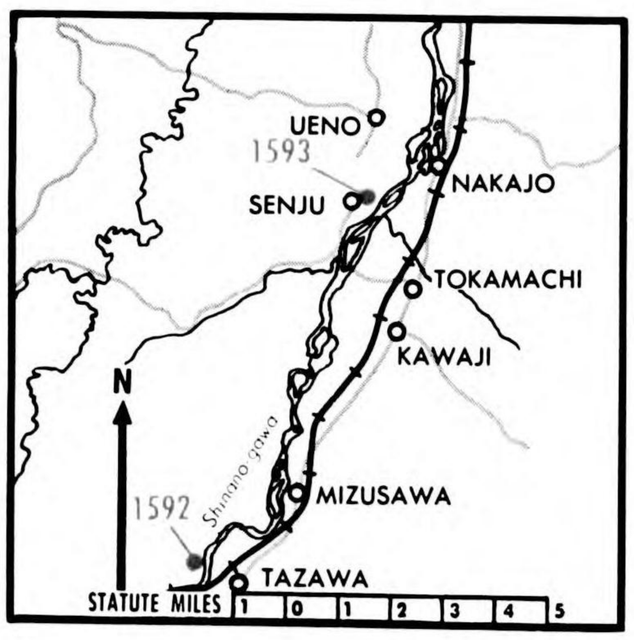


PHOTO 24—TARGET 1592 Shinano Hydro Plant.



TARGET
1593 SENJU HYDRO PLANT
SHINANO RIVER
(ELECTRIC POWER)

37° 09′ N 138° 45′ E (Approx)—Installed cap 150,000 KW. Second largest hydroelectric plant in Japan. One of six key generating stations in Tokyo network. Water is diverted from Shinano R two mi below TARGET 1592 and carried by tunnel to small regulating pond three mi SW of power house and to surge tanks. Penstocks lead E from surge tanks to 400 by 80 ft power house. Six vertical generators. 500 by 400 ft transformer yard N of power house. Power lines lead from TARGET 1592, eight mi S, into transformer yard and continue E across Shinano R toward Tokyo.

(See photo 25; map on page M-10.)

TARGET
1592 SHINANO HYDRO PLANT
SHINANO RIVER
(ELECTRIC POWER)

37° 03′ N 138° 41′ E (Approx)—Largest hydroelectric plant in Japan. One of six key generating stations in Tokyo network. Installed cap 185,000 KW. Dry season output 110,000 KW. Water is diverted from Shinano R 12 mi upstream and carried by tunnel and canal to small regulating pond two mi WSW of plant and to surge tanks. Penstocks lead E from surge tanks to 300 by 75 ft concrete power house. Five vertical generators. Transformer yard parallels plant to NE. Power lines lead NE across Shinano R thence eight mi N to Senju Hydro Plant, (TARGET 1593).

(See photo 24; map on page M-10.)

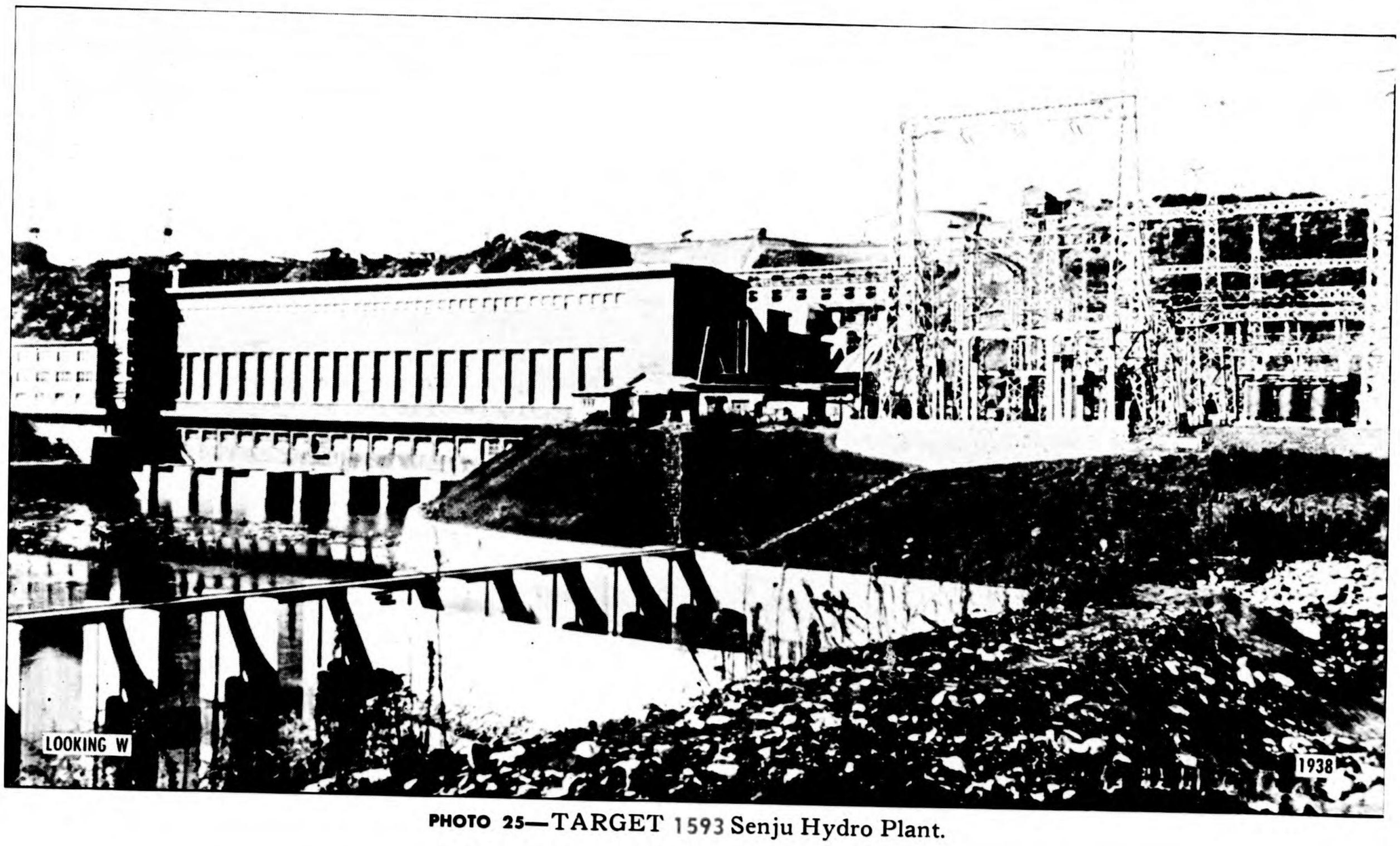


PHOTO 25—TARGET 1593 Senju Hydro Plant.

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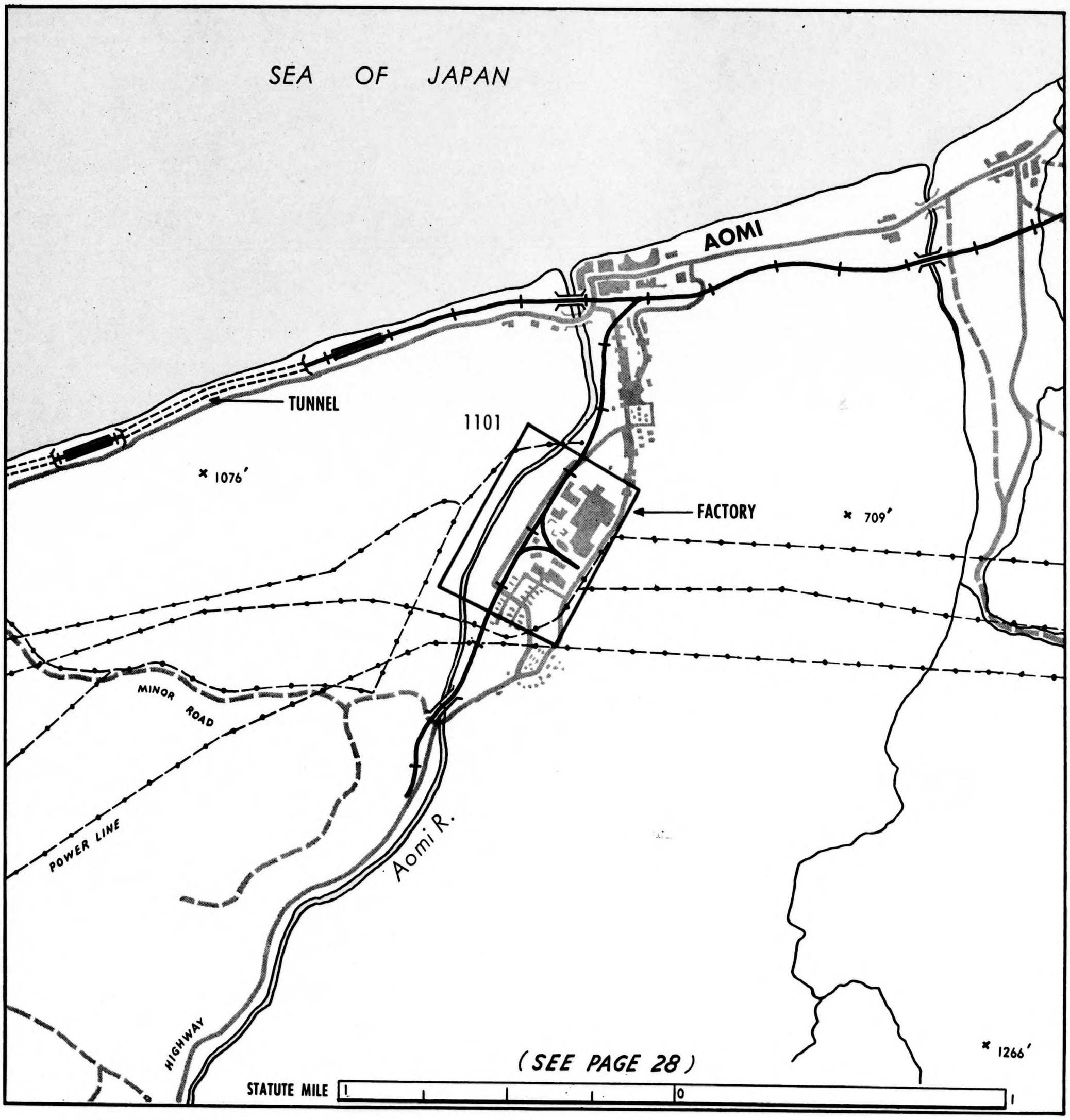
NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 1592, 1593 (OUTLYING)

3636—30—Niigata-Fukushima—8-24-44—First Proof



NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 1101, 1651, 1667 (OUTLYING)

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 1101, 1651, 1667 (OUTLYING)

3(3636)29-Niigata-Fukushima-8-8-44-First Proof

TARGET
1651 NIPPON STAINLESS STEEL, NAOETSU PLANT

NAOETSU

(IRON AND STEEL)

37° 11′ N 138° 16′ E (Approx)—One of four plants of this Co. Cap approx 16,000 metric tons stainless steel tubes annually. Produces its own steel—cap 20,000 metric tons. Planned (1939) 15,000 metric tons expansion. Located on E outskirts of Naoetsu approx 1/8 mi from the coast just W of Shinetsu Nitrogen Fertilizer Co (TARGET 1667).

(See map on page M-13.)

TARGET
1667 SHINETSU NITROGEN FERTILIZER CO, NAOETSU PLANT

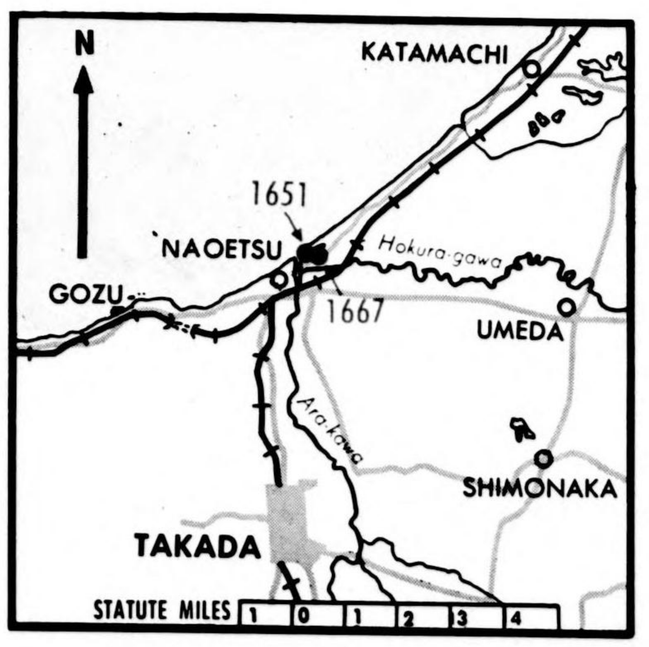
(Shinetsu Chisso Hiryo KK)

NAOETSU

(CHEMICALS)

37° 11′ N 138° 16′ E (Approx)—Calcium cyanimide plant. Estimated carbide cap (1943) 63,000 metric tons, less than 10% Japanese cap. Nitrogen fixation 10,000 metric tons, less than 10% Japanese cap. Small magnesium and ferro alloy production reported. Located on W side of Kuroi station. RR spurs extend along S and E side of compound which covers an area approx 1/4 mi E-W and 1/2 mi N-S. Critical points: Electrical equipment, air liquefaction plant.

(See map on page M-13.)



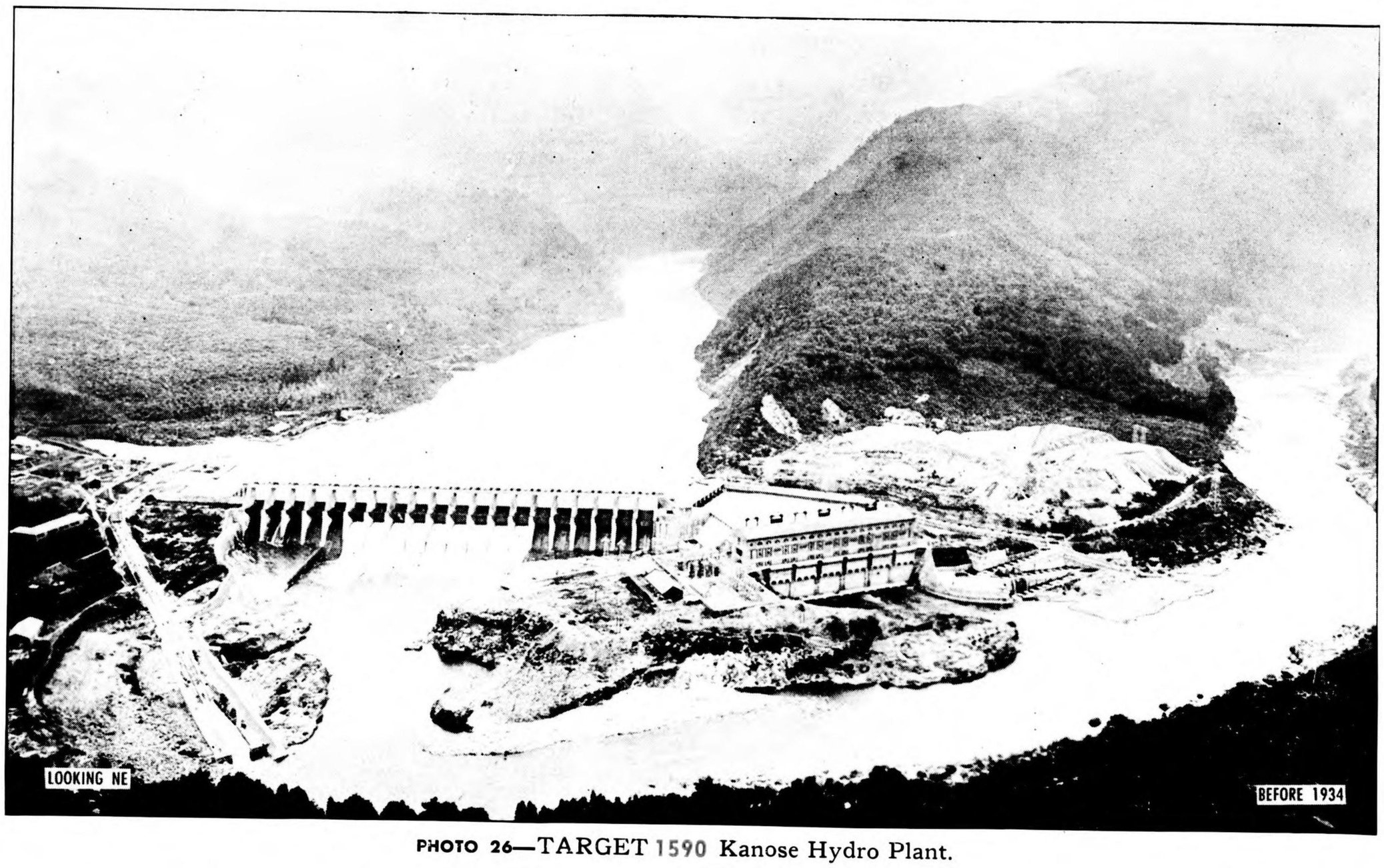
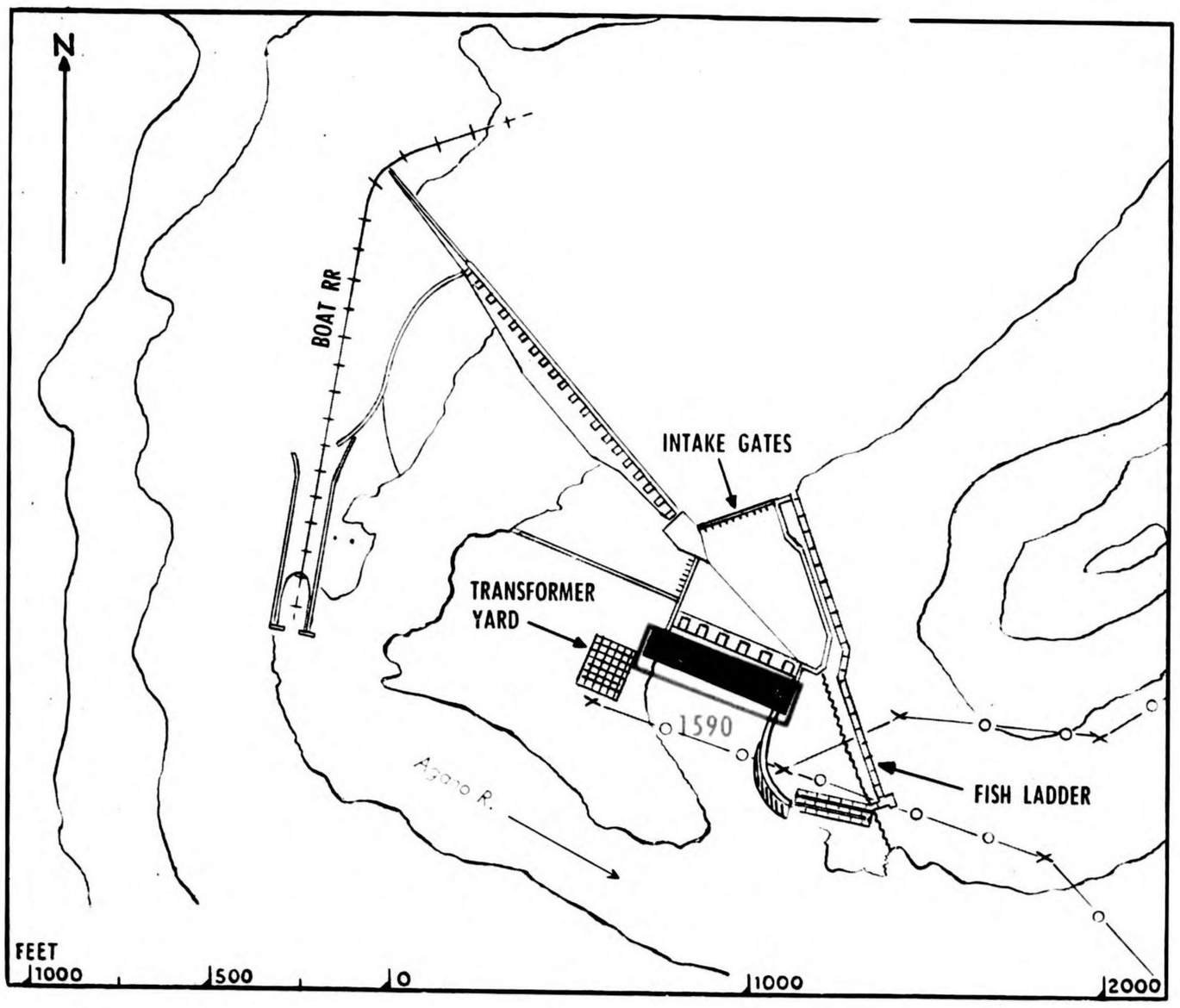
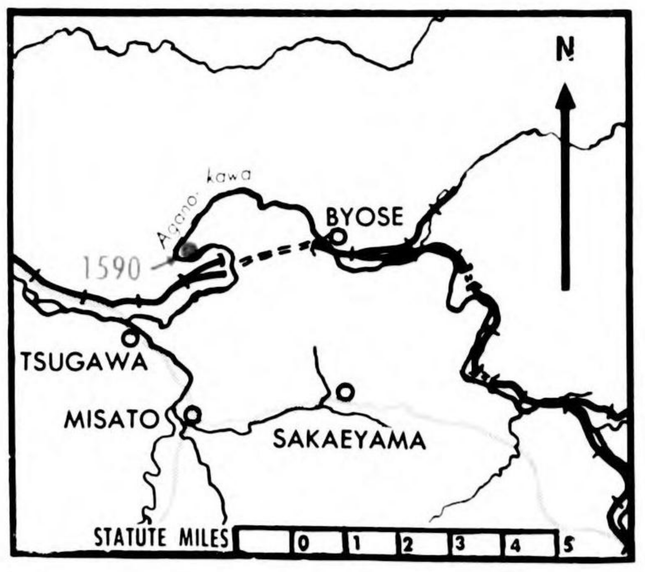


PHOTO 26—TARGET 1590 Kanose Hydro Plant.





TARGET **1590**

KANOSE HYDRO PLANT

AGANO RIVER

(ELECTRIC POWER)

37° 42′ N 139° 28′ E (Approx)—Installed cap 45,000 KW. Dry season output 20,000 KW. 1000 ft concrete dam. Six vertical generators in 300 by 80 ft concrete power house. Transformer yard adjoins to W. Power lines lead five mi E to Toyomi Hydro Plant (TARGET 1589) and ½ mi SE to Showa Fertilizer Co (TARGET 1536). (See photo 26; map on page M-10.)

NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1590 (OUTLYING)

3636—31—Niigata-Fukushima—8-24-44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1590 (OUTLYING)

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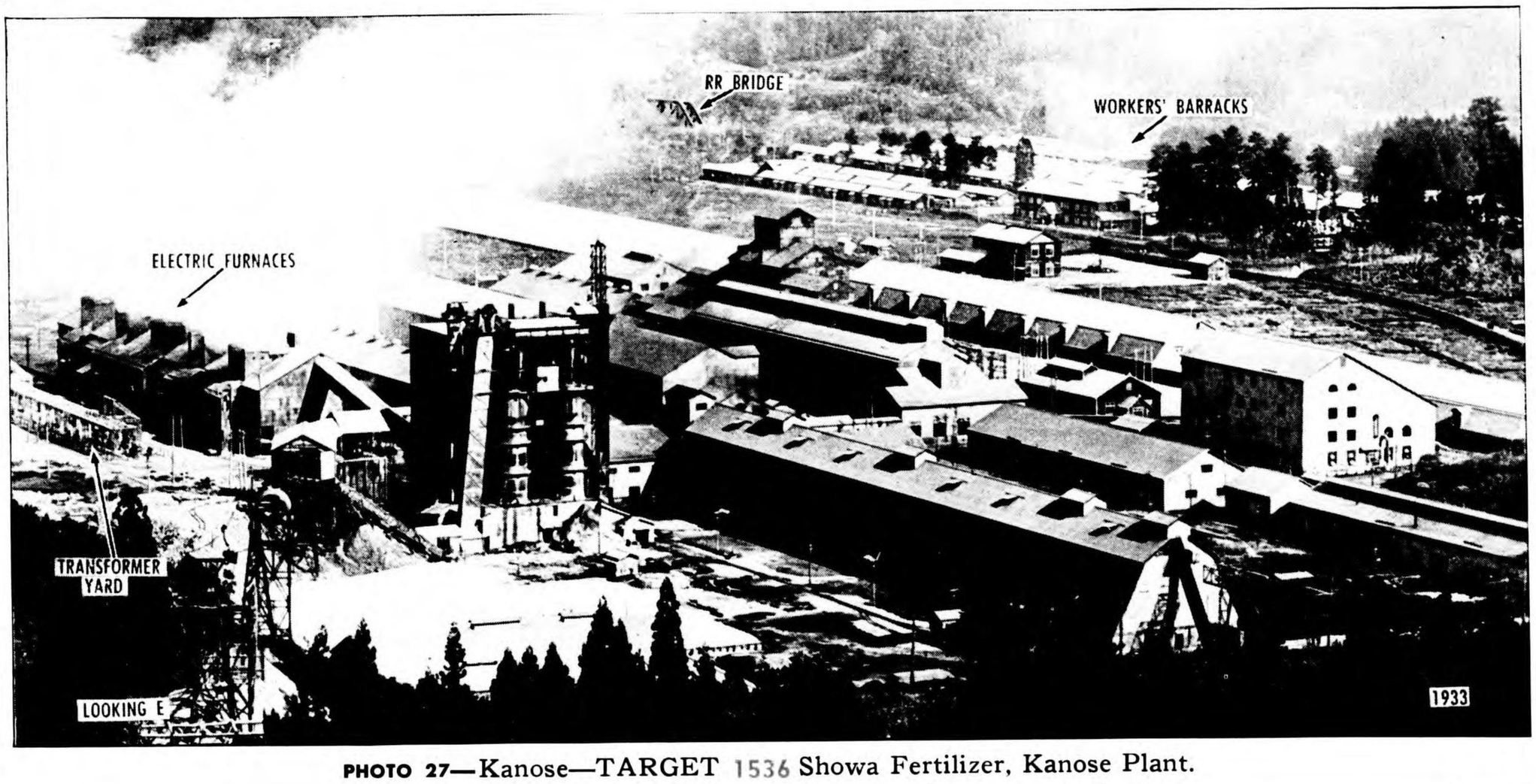
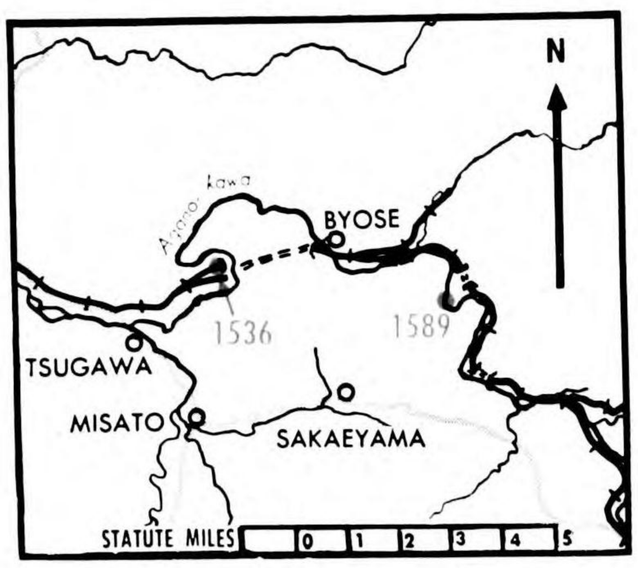


PHOTO 27—Kanose—TARGET 1536 Showa Fertilizer, Kanose Plant.



TARGET **1536**

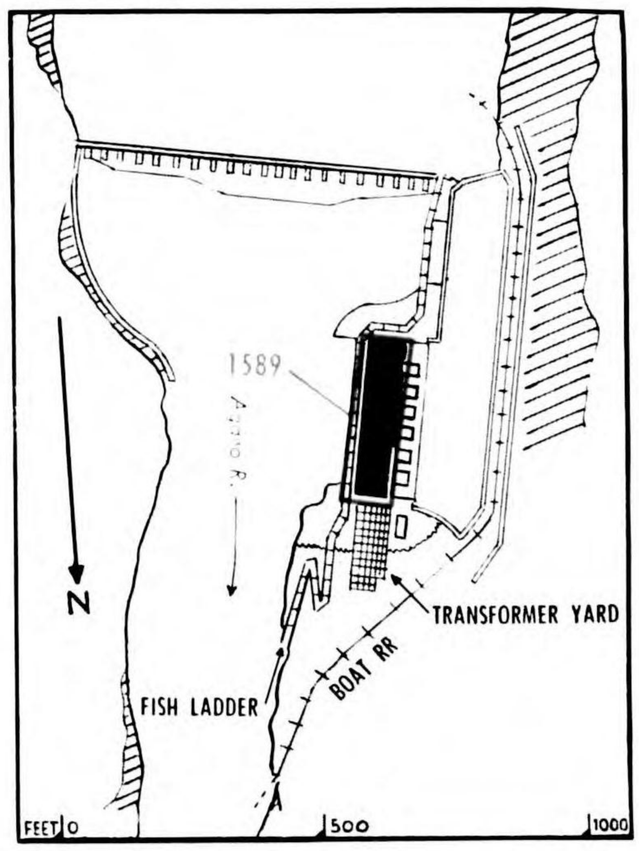
SHOWA FERTILIZER, KANOSE PLANT

KANOSE

(CHEMICALS)

37° 42′ N 139° 28′ E (Approx)—One of largest carbide plants in Japan. Estimated annual cap 124,000 metric tons, approx 16% of Japan Proper. Nitrogen fixation cap 10,000-20,000 metric tons, less than 5% of Japanese total. Reported large producer of acetone, (essential for cordite powders) and other carbide derivatives. Located approx 20 miles SE of Niigata. Plant site, about ½ mi E-W and ¼ mi N-S is approx ⅛ mi N of Kanose station. RR spur to plant. Critical points: Transformer station, air liquefaction unit. Power normally obtained from TARGET 1590, ½ mi NW.

(See photo 27; map on page M-10.)



TARGET **1589**

TOYOMI HYDRO PLANT

AGANO RIVER

(ELECTRIC POWER)

37° 42′ N 139° 34′ E (Approx)—Installed cap 53,000 KW. Dry season output approx 24,000 KW. 300 by 80 ft power house along W bank of Agano R directly below 675 ft concrete dam. Six vertical generators. Transformer yard adjoins power house to N.

(See photo 28; map on page M-10.)

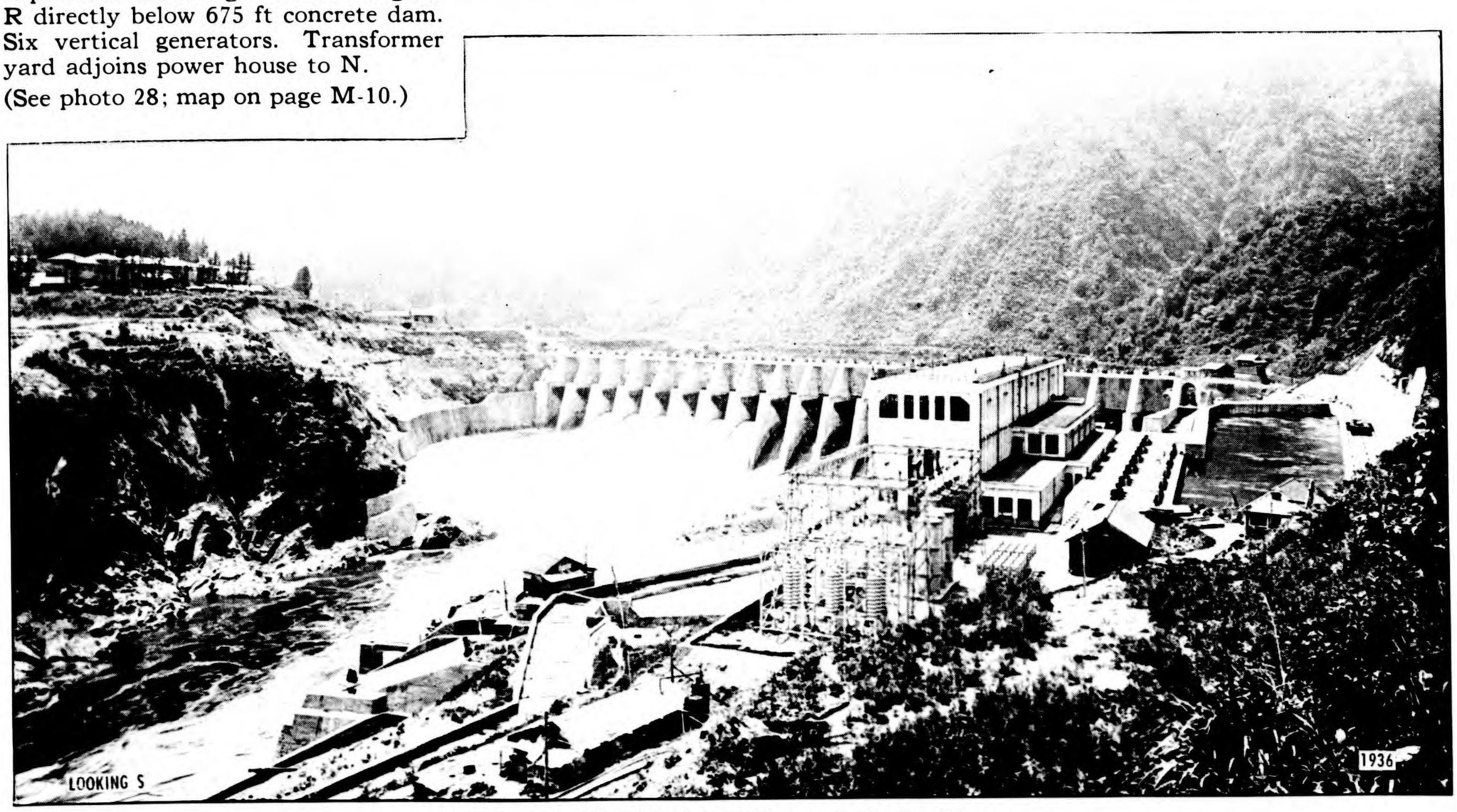


PHOTO 28—TARGET 1589 Toyomi Hydro Plant.

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 1536, 1589 (OUTLYING)

3636—32—Niigata-Fukushima—8-24-44—First Proof

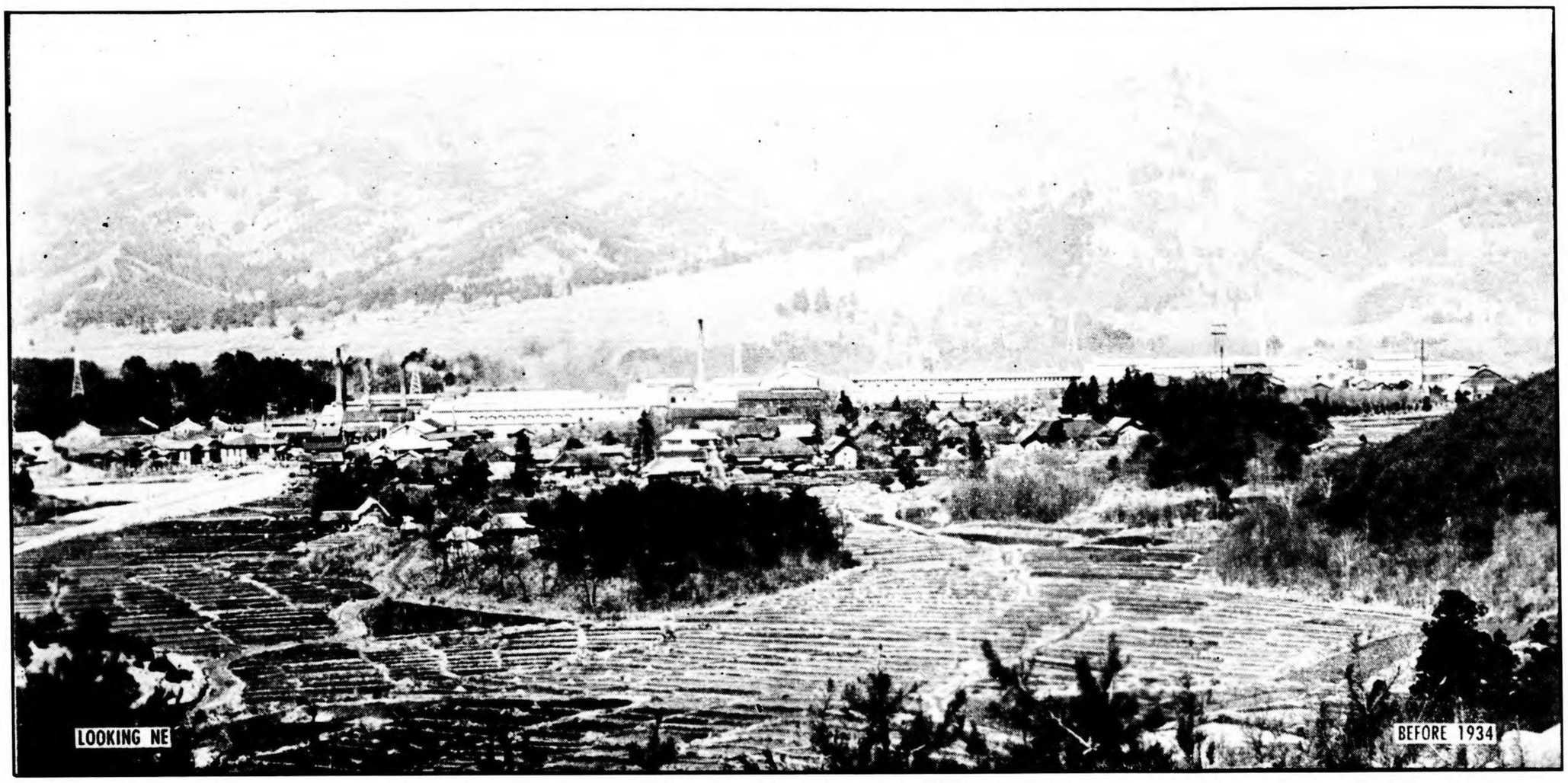
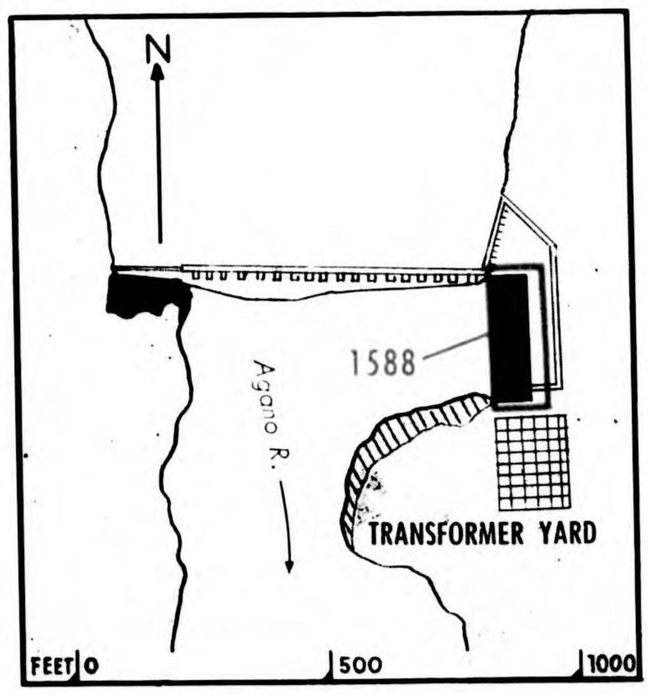


PHOTO 29—Hirota— Showa Denko Chemical Plant (not listed as a target).



TARGET
1588

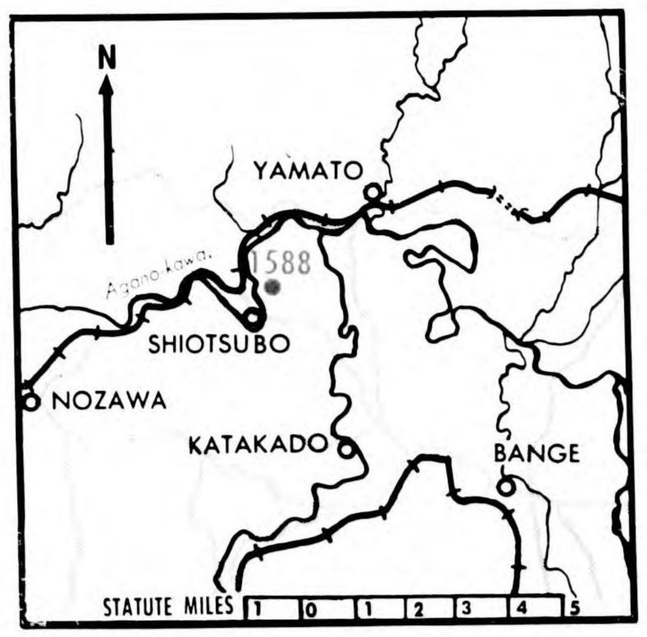
SHINGO HYDRO PLANT

AGANO RIVER

(ELECTRIC POWER)

37° 36′ N 139° 44′ E (Approx)—Installed cap 51,500 KW. Dry season output approx 23,000 KW. 230 by 80 ft power house along E bank directly below 775 ft concrete dam. Four vertical generators. Switchgear adjoins power house to S.

(See photo 30.)



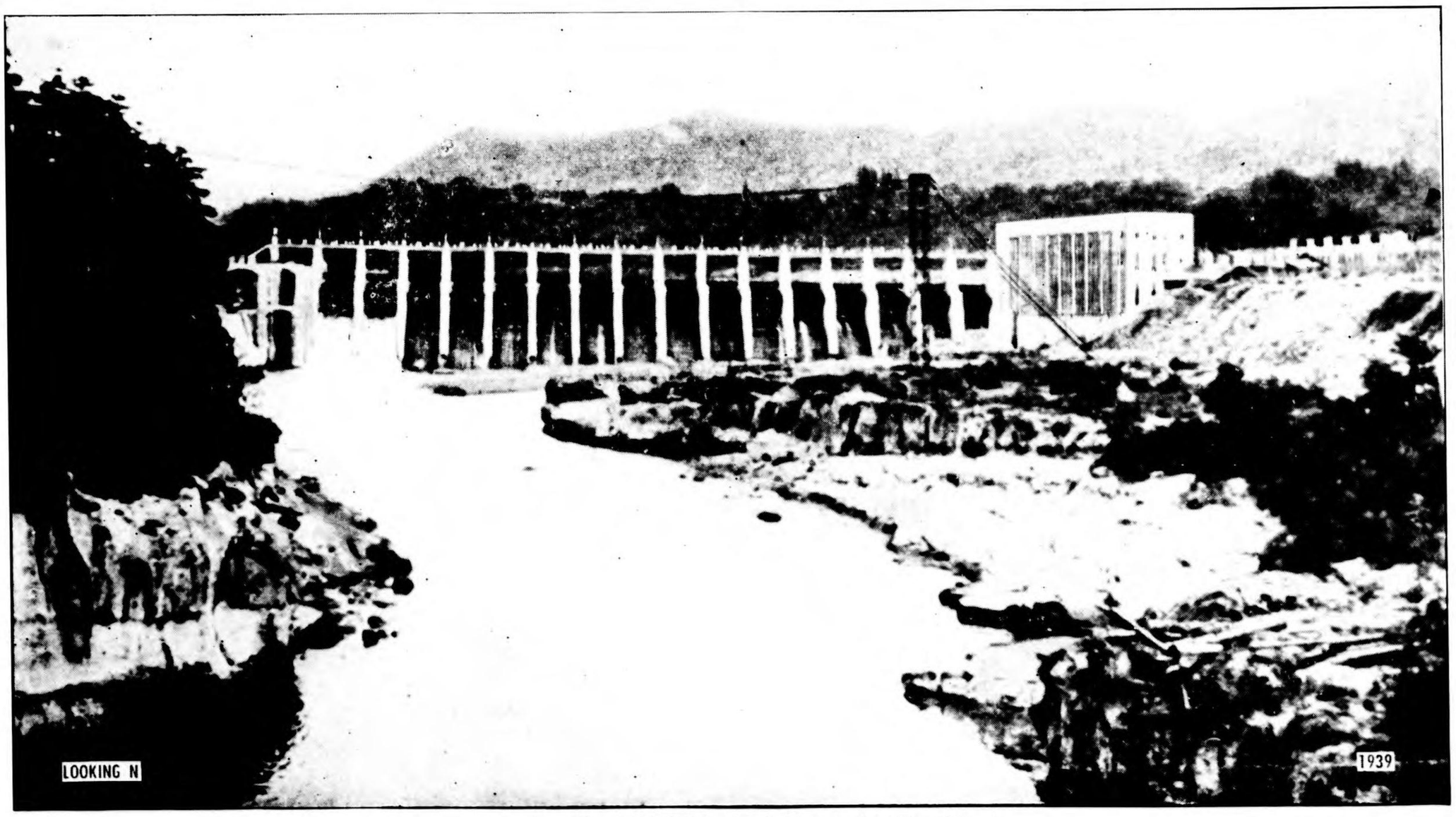


PHOTO 30—TARGET 1588 Shingo Hydro Plant.

3636—33—Niigata-Fukushima—8-24-44—First Proof

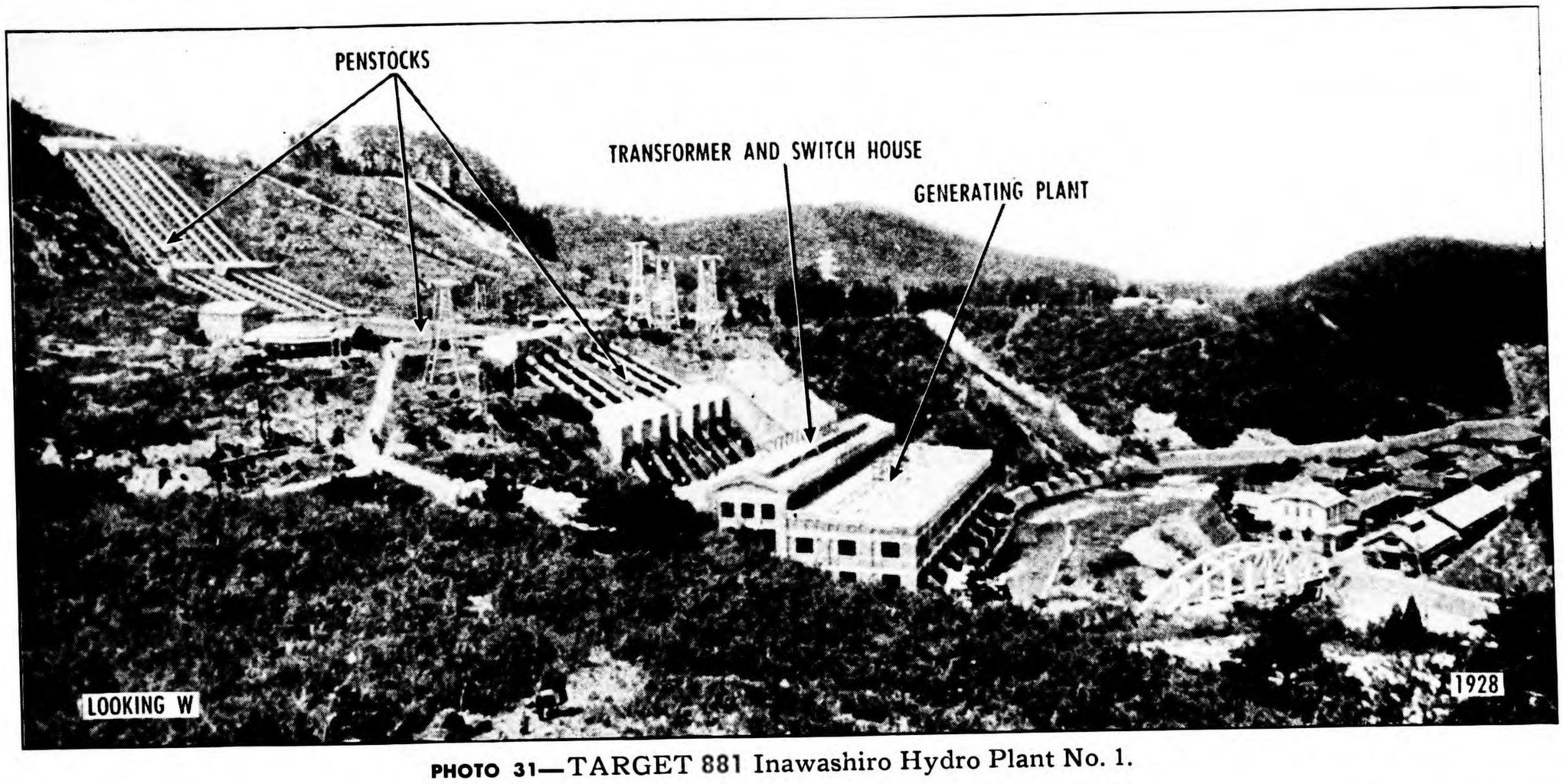
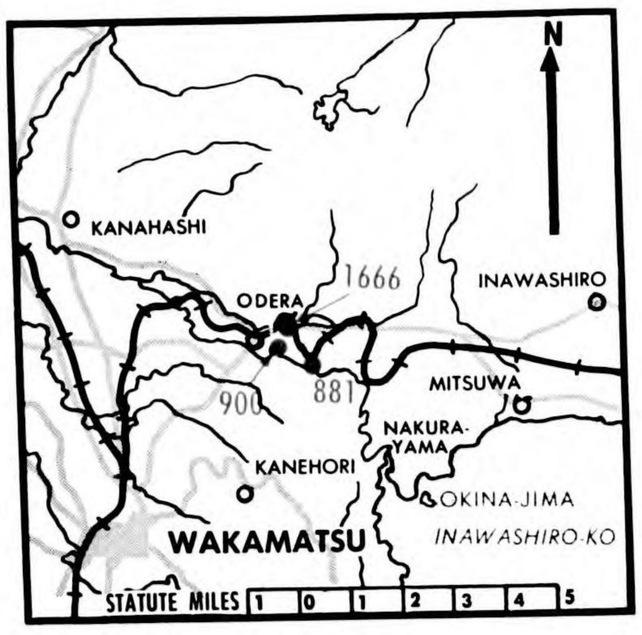


PHOTO 31—TARGET 881 Inawashiro Hydro Plant No. 1.



TARGET **1666**

NIPPON SODA, ODERA REFINERY

ODERA

(NON-FERROUS METALS)

37° 33′ N 139° 59′ E (Approx)—Large zinc refinery and smelter with estimated cap of 7000 metric tons, nearly 15% of Japanese total. Believed operating at less than half cap in 1944, due to shortage in raw materials. Electric Railway from plant to main RR at Odera station which is approx ¼ mi NE of plant. W boundary of the compound is the Nippashi River and a power line runs just S of plant.

(See map on page 35.)

TARGET **881**

INAWASHIRO HYDRO PLANT No. 1

NIPPASHI RIVER

(ELECTRIC POWER)

37° 33′ N 140° 00′ E (Approx)—Installed cap 37,000 KW. Penstocks lead NNE to 150 by 330 ft brick bldg on S bank of Nippashi R. Six horizontal generators.

(See map on page 35.)

TARGET **900**

INAWASHIRO HYDRO PLANT No. 2

NIPPASHI RIVER

(ELECTRIC POWER)

37° 33′ N 139° 59′ E (Approx)—Installed cap 26,000 KW. Penstocks lead NW to 100 by 375 ft brick bldg on S bank of Nippashi R. Five horizontal generators.

(See map on page 35.)

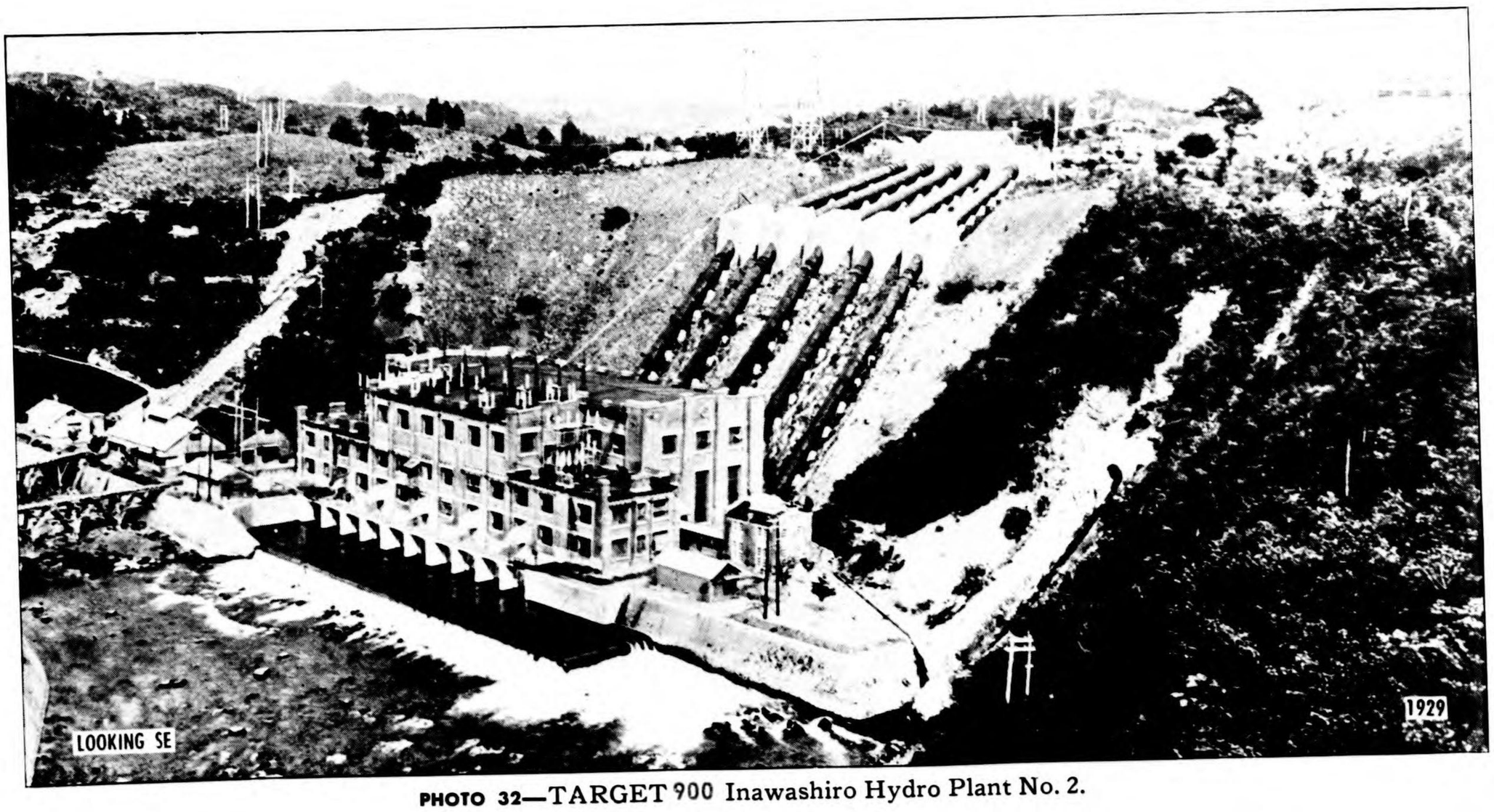
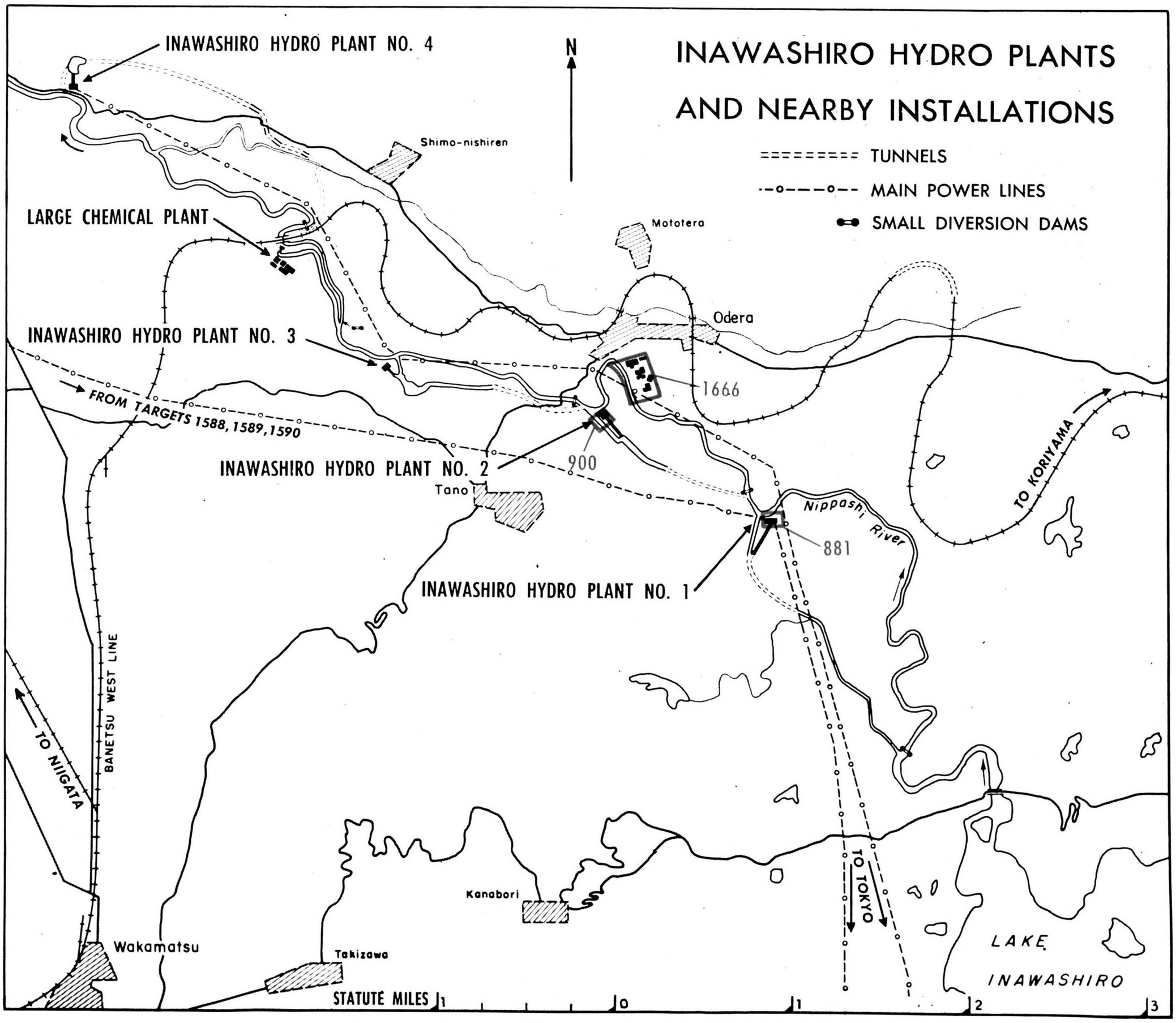


PHOTO 32—TARGET 900 Inawashiro Hydro Plant No. 2.

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 881, 900, 1666 (OUTLYING)

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 881, 900, 1666 (OUTLYING)

13636—34—Niigata-Fukushima—8-24-44—First Proof



(See page 34)

NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 881, 900, 1666 (OUTLYING)

33636—35—Niigata-Fukushima—8-24-44—First Proof

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NIIGATA 90.9, FUKUSHIMA 90.10 TARGETS 881, 900, 1666 (OUTLYING)

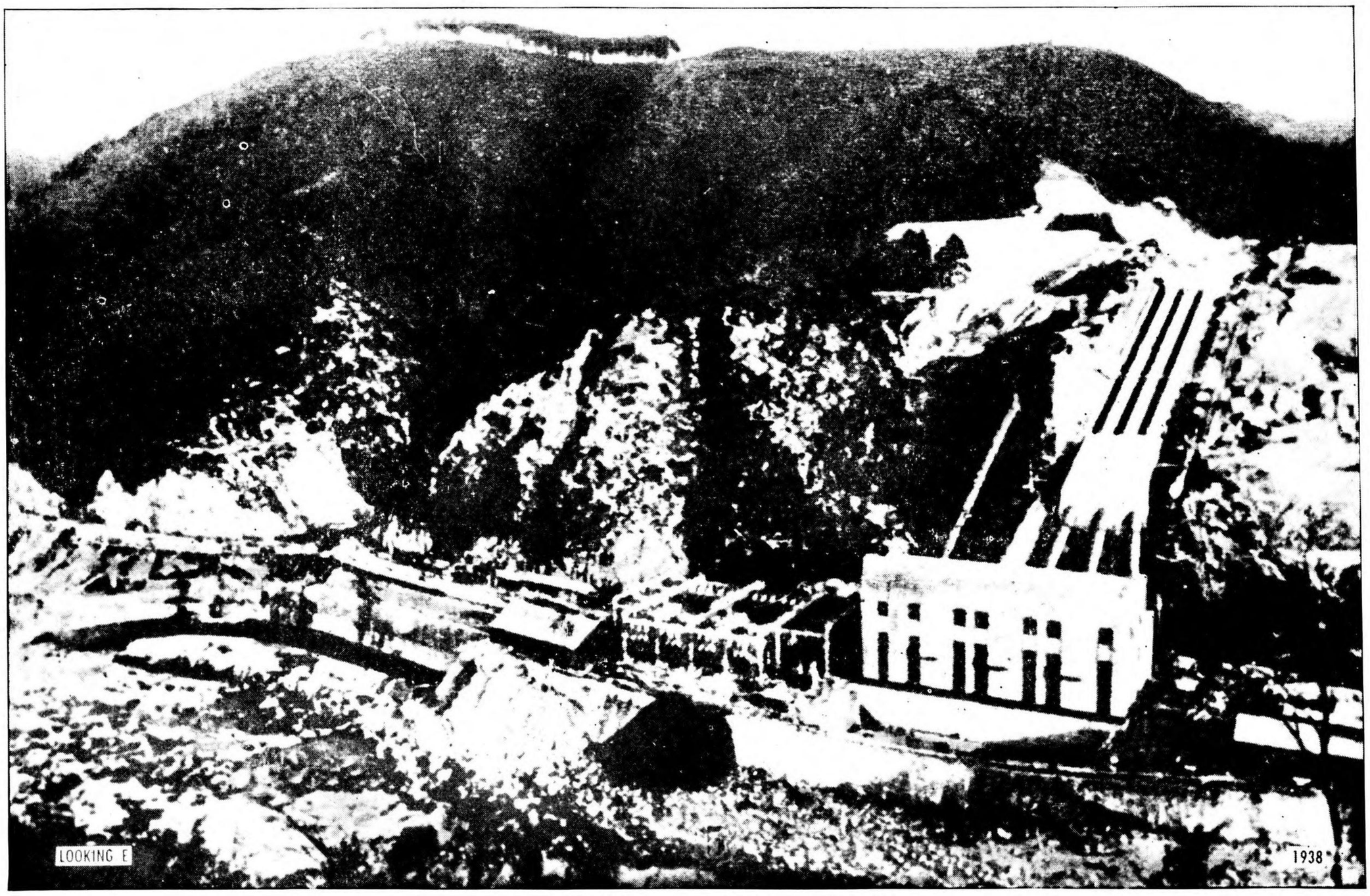
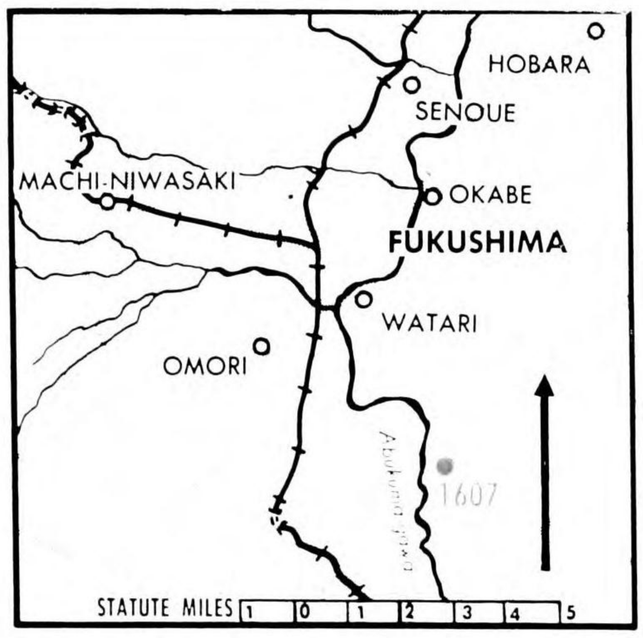


PHOTO 33—TARGET 1607 Horai Hydro Plant.



TARGET
1607

HORAI HYDRO PLANT

ABUKUMA RIVER

(ELECTRIC POWER)

37° 41′ N 140° 30′ E (Approx)—Installed cap 39,000 KW. Dry season output 13,000 KW. Primarily serving Koriyama, Fukushima and Sendai Regions. Three penstocks lead W to power house. Three vertical generators. Switchgear adjoins plant to N. Small dam and power plant approx 1½ mi downstream.

(See photo 33; map on page M-10.)

NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1607 (OUTLYING)

3636—36—Niigata-Fukushima—8-24-44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1607 (OUTLYING)

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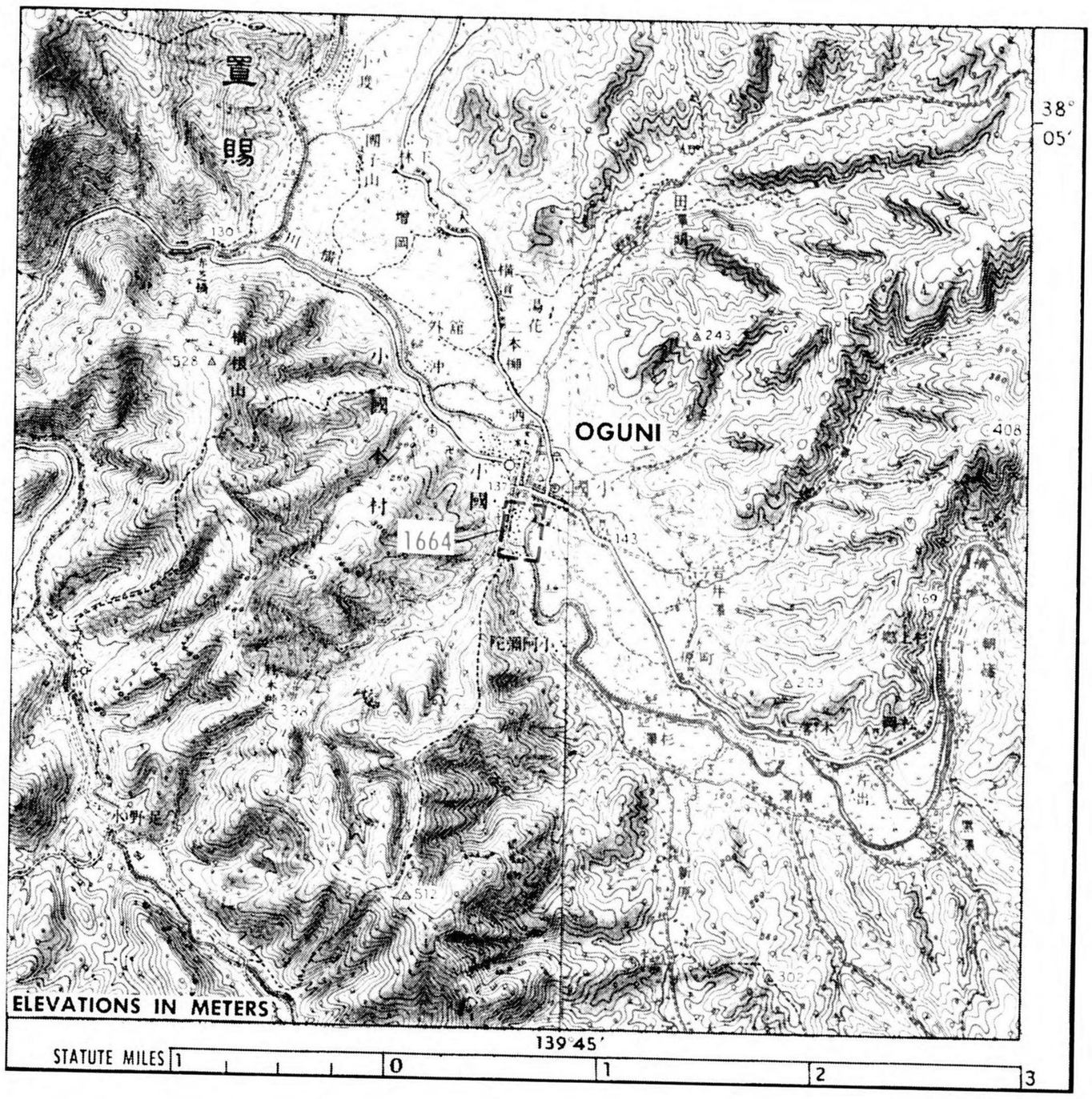
TARGET
1664 TOKYO-SHIBAURA ELECTRIC CO, OGUNI PLANT

OGUNI

(IRON AND STEEL)

38° 03′ N 139° 45′ E (Approx)—New plant built in 1938 and 1939. Exact products uncertain. Constructed for electro-chemical and metallurgical mfg and reported to produce steel alloys, tungsten steel, molybdenum steel and carbon rods. Approx 36 mi NE of Niigata City on an E-W branch RR. At or near plant are a power dam and generating station furnishing power for factory.



NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1664 (OUTLYING)

3636—37—Niigata-Fukushima—8:24:44—First Proof

NIIGATA 90.9, FUKUSHIMA 90.10 TARGET 1664 (OUTLYING)

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Weather Information for Niigata and Fukushima Areas

GENERAL CLIMATIC CONTROLS

The weather and climate of the Japanese Islands are conditioned by the relative strengths and positions of the North Pacific anticyclone and the Asiatic anticyclone. In winter, the Asiatic anticyclone reaches its greatest development, while the Pacific anticyclone is relatively weak and withdrawn to the southeast from the Asiatic continent. This situation results in a preponderance of northwest to north winds over the Japanese Islands, with fine weather over the east and south coastal areas and considerable cloudiness with frequent snow showers over the western and northern sections. In summer, the North Pacific anticyclone is predominant with the result that there is a prevailing southerly air flow over Japan. The maximum cloudiness and most frequent precipitation are now found over the southern and eastern areas.

Between the two great anticyclonic systems is a wide zone wherein the dissimilar air masses of the Pacific and Asia interact to form the travelling cyclones of the region. This zone of maximum cyclonic activity is found most frequently to the south and east of Japan in winter, over the southern portions of Japan in June and again in September, and over extreme northern Japan in July and August. Thus there are two periods of maximum storm activity in southern Japan, in June and September, while in northern Japan there is but a single maximum, in late summer or early autumn, when the warm, moist marine air masses are being displaced by the colder, drier continental air masses.

LOCAL CLIMATIC CONTROLS

The Niigata and Fukushima Areas occupy the north-central portions of the island of Honshu and illustrate the wide variation in climate to be found in western and eastern exposures in the Japanese archipelago. Three mountain ranges separate the area into three natural climatic divisions: (1) The west coast area, including the island of Sado, with extensive lowlands in the vicinity of Niigata, where the Shinano and Agano Rivers reach the Sea of Japan. Niigata on the west coast and Aikawa on the island of Sado are typical of this area.

(2) The intermountain area between the western and eastern ranges. This may be subdivided into two areas (a) the area between the western and central ranges, of which Yamagata is typical, and (b) the area between the central and eastern ranges, of which Fukushima is typical. Yamagata is in the watershed of the Mogami River which empties into the Sea of Japan, while the river flowing past Fukushima empties into the Pacific near Sendai.

(3) The eastern coastal area. Here Onahama is typical of weather conditions in the south, and Sendai and Ishinomaki are typical of conditions in the north. The wide valley of the Kitakami, immediately north of Sendai, is one of the widest in all Japan. Ishinomaki is protected by low mountains to the north and northeast, while Sendai is protected by high mountains to the west (the Ousanimyaku Range). The contrast between the east and west coastal areas is greatest in the south of the region, where the mountains rise to elevations of 5000 to 7000 feet, and least in the north, where the mountains between the Mogami and lower Katagami are only 2000 to 3000 feet in height.

SEASONAL AND DIURNAL VARIATIONS IN WEATHER ELEMENTS

Winds

Prevailing winds for Yamagata and Ishinomaki, and resultant winds for Niigata are shown in table 2 on page 39. Mean wind speeds for all stations are shown in table 3 on page 39. The winds at the surface are influenced by local topography and do not indicate the true condition of free air flow. At Yamagata, southerly winds are in evidence at all seasons of the year because of the south-north trend of the valley. This is true to a lesser extent at Niigata. Ishinomaki reflects more nearly the gradient flow, with northwest to west-northwest winds during the cooler months and east to southeast winds in the warm months. Velocities are low in the protected valleys but may be quite strong at exposed points along the coast. Thus, the average velocity at Aikawa in January is 15 m.p.h. as compared to 5 m.p.h. at Fukushima. Extreme velocities (see table 4 on page 41) may reach 40 to 50 m.p.h. in the interior valleys and 60 to 90 m.p.h. along the coasts. Winds aloft are prevailingly westerly at all levels during the cooler months and at all levels above 5000 or 6000 feet during the warmer months.

Mean diurnal variation in surface wind speeds at Niigata is shown in figure 1 on page 41. The daily maxima occur between 1200 and 1600 and the daily minima during the night hours. This diurnal variation in wind speeds at Niigata is most marked during the summer months and least marked during the winter months; the mean wind speeds in summer are of an order of one-half those of winter.

CLOUDINESS AND CEILINGS

Data on mean cloudiness and on the mean number of cloudy and clear days are given in tables 5, 6, and 7 on pages 39 and 40. These data indicate that the cloudiest region is the west coast and the least cloudy region the east coast. On the west coast, 18 to 25 days or more of each winter month are cloudy, while on the east coast, only 6 to 9 days are cloudy during the same months. In summer, the contrast is not so great, but the relation is reversed, the east coast having the greater number of cloudy days. The probability of finding days suitable for bombing is greatest for west coast cities in August and for east coast cities in winter. In the interior valleys, the contrast is not so great between seasons; Fukushima resembles the east coast regime, while Yamagata approximates the west coast regime, indications that the central mountain range is the principal climatic divide. Figures 2 and 3 on page 41 show the monthly variation in mean cloudiness for Niigata and Ishinomaki, respectively. Figure 4 on page 41 shows the diurnal trend of cloudiness for a poor bombing month (January), figure 5 on page 42 for a good bombing month (August) at Niigata. In both months, the best conditions are shown to occur during the night hours. In January, the poorest conditions occur between 0900 and 1700, while in August the poorest conditions occur between 0500 and 0900, improving slightly at midday and becoming poor again at 1700 and 1800.

Data on ceilings are not available. It may be estimated that the greatest frequency of low ceilings occurs along the west coast in winter and along the east coast in summer and early autumn. Ceilings of 1000 to 2000 feet are common along the west coast in winter, with somewhat higher ceilings occurring over the open sea. Low ceilings are, of course, very frequent over the higher mountains in the southern portion of the district at all seasons of the year.

FOGS AND VISIBILITY

The west coast is bathed by a warm ocean current, the Tsushima Current, whereas the east coast is bathed by a cold current, the Oyashio, with the warm Kuroshio a considerable distance to the east. The contrast between the warm and cold currents is greatest in the summer when the cold Oyashio is fed by melting ice in the Sea of Okhotsk. In winter, cold winds blowing across the warm Tsushima Current in the Sea of Japan are warmed at the surface, with resulting turbulence and formation of large masses of stratocumulus clouds, which impinge upon the western coasts of Japan. Surface fogs, however, are uncommon over the coastal areas under these conditions. Off the east coast, warm, moist winds cross the cold Oyashio and are cooled at the surface—a condition favorable for the formation of advection fogs. Slightly warmer water near the shore or the warm land will impart sufficient turbulence to the air mass to result in low stratus clouds. Thus, fogs and low stratus clouds are common over and off the east coast, particularly with winds from the southeast quadrant. Fogs are prevalent along the east coast (see data for Onahama and Ishinomaki in table 8 on page 40), and the high percentage of cloudiness at Sendai in the summer months indicates a large frequency of low stratus clouds in that area. In favorable locations in the interior valleys, radiation fogs may be quite common in the fall and early winter months. Yamagata appears to be in a locality favorable for the formation of radiation fogs. This type of fog forms most frequently in the very early hours of the morning and is dissipated in the late morning hours.

Data on visibilities are not available for this area. In general, visibility is poorest in the mT air masses. Since these air masses are most common in the summer and in greater evidence along the east coast, it follows that the poorest visibility in the area would occur along the east coast in the summer season. Visibility is, lowered at times also, because of snow, rain, mist, smoke, fog, etc. Data on the number of days on which rain, snow and fog are to be expected are given in the tables, but are not available for mist and smoke.

3636—38—Niigata-Fukushima—8-24-44—First Proof

SUMMARY

Operation	Area	Best Month or Season	Best time of Day	Remarks
Bombing	Niigata	August	2000–0300	Least cloudiness; April and May 2d choice.
Incendiary bombing	Niigata	August	1100–1800	Strongest winds to spread fires.
Chemical warfare	Niigata	April-May	0800–1700	Lowest humidity.
Bombing	Fukushima	Nov.-Feb.	1900–0500	Least cloudiness.
Incendiary bombing	Fukushima	Nov.-Feb.	0900–1700	Strongest winds to spread fires.
Chemical warfare	Fukushima	Feb.-Mar.	0900–1700	Lowest humidity.

Operation	Area	Worst Month or Season	Worst time of Day	Remarks
Bombing	Niigata	Dec.-Feb.	0600–1700	Most frequent cloudiness and precipitation. Strong surface winds.
Incendiary bombing	Niigata	Dec.-Feb.	No choice	
Chemical warfare	Niigata	Dec.-Feb.	0100–0600	Highest humidities.
Bombing	Fukushima	June-Sept.	0300–1900	Greatest cloudiness and most frequent precipitation.
Incendiary bombing	Fukushima	June-Sept.	0100–0700	Least wind.
Chemical warfare	Fukushima	June-Sept.	2400–0600	Highest humidities.

WEATHER INFORMATION FOR NIIGATA AND FUKUSHIMA AREAS—Continued

PRECIPITATION

Total monthly amounts of precipitation are shown in table 9 on page 40 and the mean number of days with precipitation is given in table 10 on page 40. Over most of the area the maximum amounts occur in the early autumn, when the moist maritime air is being displaced by colder continental air in a series of cyclonic disturbances. In the eastern areas, this maximum in total amount coincides with the maximum frequency of precipitation, but in the western sections, the maximum frequency occurs in the winter months. Twenty-two to twenty-eight days with precipitation each month are normal for stations west of the central mountain range from November through March, and a period of 90 days of consecutive precipitation are on record for Niigata—from November 20 through February 17. Maximum precipitation for 1-hour, 4-hour, and 24-hour periods is shown in table 11 on page 40.

Thunderstorms are not frequent. The average number per month for three stations is given in table 12 on page 40.

The average maximum depth of snow on the ground for four stations is given in table 13 on page 40 and the mean number of days with snow in table 14 on page 40. Although the stations showing the depth of snow are representative of their immediate regions, they are not typical of the western slopes of northern Japan, along which heavy snowfall is to be expected. In many localities, maximum depths of 100 to 150 inches are to be expected in the course of the winter. The longest period during which snow has been known to stay on the ground at Niigata is 75 days, from December 21 to March 5.

TEMPERATURE

Throughout the area, temperatures are high in the summer and moderately low in the winter. Mean maxima in the warmest month vary between 79° F. for Ishinomaki and 86° F. for Niigata and Yamagata, while mean minima for the coldest month vary between 22° F. for Yamagata and 31° F. for Aikawa. The lowest and highest temperatures are found over the interior, since the surrounding ocean areas exert a moderating effect. Extreme high temperatures of 102° F. have been recorded in the interior and of 94° to 96° F. on the coasts. Extreme low temperatures of slightly below zero have been recorded in the interior and of 10° to 15° F. on the coasts. (Temperature data are given in tables 15, 16, 17, on pages 40 and 41.)

RELATIVE HUMIDITY

The relative humidity is high along the east coast in summer and moderate in winter. Coupled with the high temperatures of the summer season, the high humidity causes some personal discomfort, but not to the extent that is experienced over the Inland Sea or Ise Bay regions. Humidities are moderately high along the west coast in both the winter and summer seasons. In the winter, the high humidity and the strong winds make the west coast particularly disagreeable in spite of the somewhat more moderate temperature of that region. Late spring is the most pleasant season in the west coast area, with lower humidities, diminishing winds, and an increasing number of clear days. (Data on relative humidity are given in table 18 on page 41.)

SYNOPTIC WEATHER

A few remarks may be made here as to the most favorable synoptic situations for operations in the Niigata and Fukushima regions, but the Weather Officer should always be consulted in regard to any specific operation. One of the most favorable situations for the Fukushima region is for an anticyclone to be centered over eastern Siberia, with its influence extending over the Japanese Islands, and a storm area well to the east of Japan. This situation will cause downslope winds along the eastern coasts, with resulting clear weather over the target. At the same time, the west coast will experience cloudy weather with frequent snow showers. If the high pressure area moves across the coast of Siberia into the Sea of Japan, excellent conditions will prevail over the entire northern portion of Honshu with clear weather prevailing over both east and west coasts. A situation to be avoided is one where a newly developed disturbance moves from southwest to northeast across, or very close to, the Japanese Islands. The successive passages of warm and cold fronts are attended by almost continuous low overcast, high winds, precipitation, icing aloft and by rough seas along the coasts.

*The data given in the tables are for the following periods of record unless otherwise indicated: Niigata, Yamagata, Fukushima and Ishinomaki, 30 years; Onahama, 16 years; Aikawa, 15 years; Sendai, 3 years.

Table 2.—Mean Wind Directions (degrees)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Niigata*	266	253	262	248	227	198	199	149	141	154	212	250	226
Yamagata **	210	213	227	235	147	114	99	107	113	137	177	191	
Ishinomaki**	297	297	291	293	87	113	137	110	25	323	306	305	

*Mean resultant winds.
**Prevailing winds.

Table 3.—Mean Wind Speeds (m.p.h.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	15	13	11	7	7	5	5	5	7	8	11	14	9
Niigata	11	10	9	8	7	6	5	5	6	7	9	11	8
Yamagata	3	4	4	5	5	4	4	4	3	3	4	4	4
Fukushima	5	5	6	6	5	4	4	4	3	3	5	5	5
Onahama	6	6	6	6	5	4	4	4	4	4	5	5	5
Ishinomaki	9	9	10	9	8	7	6	6	6	7	8	9	8
Sendai	4	5	4	4	3	3	2	3	3	2	3	4	3

Table 5.—Mean Cloud Amount (percent)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	91	87	80	66	66	71	69	55	72	70	78	88	74
Niigata	87	84	79	66	68	72	72	61	73	70	75	84	74
Yamagata	77	75	72	64	67	73	74	67	74	68	67	77	71
Fukushima	61	63	65	66	71	79	81	75	79	68	59	62	69
Onahama	42	53	57	67	71	80	76	69	75	67	53	44	63
Ishinomaki	50	53	58	61	66	74	78	73	75	62	53	50	63
Sendai	58	54	62	67	74	78	82	76	77	64	59	61	68

Table 6.—Mean Number of Cloudy Days (8/10 to 10/10)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	27	22	20	14	13	15	15	10	15	15	18	24	208
Niigata	24	21	19	13	14	16	16	11	16	15	17	22	204
Yamagata	17	15	15	13	14	16	17	13	16	14	13	17	180
Fukushima	8	9	12	12	15	19	20	17	19	13	8	9	161
Onahama	4	8	9	13	15	19	18	14	17	14	9	6	146
Ishinomaki	6	7	9	11	14	17	19	16	17	11	7	5	138
Sendai	7	6	12	15	18	18	21	19	19	13	9	10	167

36—39—Niigata-Fukushima—3-24-44—First Proof

WEATHER INFORMATION FOR NIIGATA AND FUKUSHIMA AREAS—Continued

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Total monthly amounts of precipitation are shown in table 9 on page 40 and the mean number of days with precipitation is given in table 10 on page 40. Over most of the area the maximum amounts occur in the early autumn, when the moist maritime air is being displaced by colder continental air in a series of cyclonic disturbances. In the eastern areas, this maximum in total amount coincides with the maximum frequency of precipitation, but in the western sections, the maximum frequency occurs in the winter months. Twenty-two to twenty-eight days with precipitation each month are normal for stations west of the central mountain range from November through March, and a period of 90 days of consecutive precipitation are on record for Niigata—from November 20 through February 17. Maximum precipitation for 1-hour, 4-hour, and 24-hour periods is shown in table 11 on page 40.

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*Mean resultant winds.
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Yamagata	3	4	4	5	5	4	4	4	3	3	4	4	4
Fukushima	5	5	6	6	5	4	4	4	3	3	5	5	5
Onahama	6	6	6	6	5	4	4	4	3	4	5	5	5
Ishinomaki	9	9	10	9	8	7	6	6	6	7	8	9	8
Sendai	4	5	4	4	3	3	2	3	3	2	3	4	3

Table 5.—Mean Cloud Amount (percent)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	91	87	80	66	66	71	69	55	72	70	78	88	74
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Yamagata	77	75	72	64	67	73	74	67	74	68	67	77	71
Fukushima	61	63	65	66	71	79	81	75	79	68	59	62	69
Onahama	42	53	57	67	71	80	76	69	75	67	53	44	63
Ishinomaki	50	53	58	61	66	74	78	73	75	62	53	50	63
Sendai	58	54	62	67	74	78	82	76	77	64	59	61	68

Table 6.—Mean Number of Cloudy Days (8/10 to 10/10)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	27	22	20	14	13	15	15	10	15	15	18	24	208
Niigata	24	21	19	13	14	16	16	11	16	15	17	22	204
Yamagata	17	15	15	13	14	16	17	13	16	14	13	17	180
Fukushima	8	9	12	12	15	19	20	17	19	13	8	9	161
Onahama	4	8	9	13	15	19	18	14	17	14	9	6	146
Ishinomaki	6	7	9	11	14	17	19	16	17	11	7	5	138
Sendai	7	6	12	15	18	18	21	19	19	13	9	10	167

36—39—Niigata-Fukushima—3-24-44—First Proof

WEATHER INFORMATION FOR NIIGATA AND FUKUSHIMA AREAS—Continued

Table 7.—Mean Number of Clear Days (0/0-2/10)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	#	#	1	3	3	3	4	6	2	2	2	#	28
Niigata	#	#	1	3	3	2	2	4	2	2	1	#	21
Yamagata	#	1	2	3	2	2	2	3	1	2	3	1	22
Fukushima	2	1	2	3	2	1	1	1	1	2	3	2	21
Onahama	8	6	5	3	2	2	2	2	2	3	6	8	49
Ishinomaki	5	4	1	4	3	2	1	2	2	4	4	5	37
Sendai	2	3	2	2	1	1	1	1	#	4	2	2	21

#Less than 0.5 day.
†Visibility ¾ mile.

Table 8.—Mean Number of Days with Fog†

Stations	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	–	#	#	#	1	2	2	#	–	–	#	–	6
Niigata	#	#	#	#	1	#	#	1	#	#	#	#	4
Yamagata	2	1	1	#	1	1	1	3	4	5	3	2	24
Fukushima	#	#	#	1	1	1	1	1	2	4	2	#	13
Onahama	#	#	1	3	3	5	11	6	2	1	1	#	34
Ishinomaki	1	1	2	3	4	6	7	4	4	4	2	1	39
Sendai	#	#	#	3	3	5	5	2	2	1	1	1	23

†Visibility ¾ mile.
#Less than 0.5 day.

Table 9.—Mean Monthly Precipitation (inches)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	5.4	4.3	4.1	4.3	3.9	4.4	6.4	3.9	7.0	6.4	6.6	6.9	63.6
Niigata	7.3	5.3	4.5	4.0	3.7	4.8	6.6	5.0	8.2	6.7	7.9	9.1	72.9
Yamagata	3.6	2.9	3.0	2.9	3.1	4.1	5.5	5.8	6.1	3.9	3.4	4.7	49.0
Fukushima	1.9	2.2	2.9	3.4	3.6	5.1	5.7	6.5	8.2	4.8	2.4	2.4	49.1
Onahama	1.8	3.4	3.9	5.2	6.0	6.6	4.6	5.9	8.4	8.7	3.8	2.3	60.6
Ishinomaki	1.8	2.1	3.0	3.6	4.6	4.8	5.0	4.9	6.9	5.0	2.6	1.8	46.1
Sendai	1.3	1.3	2.3	6.0	5.3	3.9	3.6	4.4	6.0	5 7	2.7	2.0	44.5

Table 10.—Mean Number of Days with Precipitation (.004 inch)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	28	22	22	15	13	13	13	9	17	18	22	27	219
Niigata	28	22	22	15	14	13	14	12	18	20	22	27	227
Yamagata	23	20	19	14	14	13	15	13	16	17	18	23	205
Fukushima	14	13	13	12	13	15	16	16	17	14	12	15	170
Onahama	7	9	12	13	14	17	16	13	18	16	11	7	153
Ishinomaki	11	11	10	9	13	13	15	14	16	15	12	12	156
Sendai	12	11	10	9	13	13	16	16	16	14	10	14	154

Table 11.—Maximum Precipitation (inches)

Aikawa	Niigata	Yamagata	Fukushima	Onahama	Sendai	Ishinomaki
1 Hour						
–	1.54	–	–	–	–	–
4 Hours						
–	3.41	4.06	3.95	4.48	–	4.72
24 Hours						
5.24	5.22	8.57	6.48	8.88	3.92	5.99

Table 13.—Average Maximum Depth of Snow on Ground (inches)

Stations	Dec.	Jan.	Feb.	Mar.	Apr.
Niigata	5	14	12	6	½
Yamagata	16	18	15	9	1
Fukushima	6	7	4	3	½
Onahama	½	½	1	1	—

Table 17.—Temperature Extremes (°F.)

	Aikawa	Niigata	Yamagata	Fukushima	Onahama	Sendai	Ishinomaki
Extreme max.	96	102	100	102	94	98	96
Extreme min.	18	15	−4	−1	15	12	6

Table 12.—Mean Number of Days with Thunderstorms

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Niigata	1	#	1	#	1	1	1	2	2	3	1	1	15
Yamagata	–	–	–	–	2	2	2	2	1	#	#	–	9
Ishinomaki	–	–	#	–	1	1	1	1	1	#	#	–	6

#Less than 0.5 day.

Table 14.—Mean Number of Days with Snow

Stations	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	23	18	13	1	–	–	–	–	–	–	1	14	70
Niigata	21	19	13	1	–	–	–	–	–	–	2	15	71
Yamagata	24	21	17	3	–	–	–	–	–	#	4	20	89
Fukushima	17	15	12	1	–	–	–	–	–	–	2	13	60
Onahama	4	5	3	1	–	–	–	–	–	–	–	2	15
Sendai	18	17	12	#	–	–	–	–	–	–	1	10	58
Ishinomaki	15	14	11	1	–	–	–	–	–	#	2	11	54

#Less than 0.5 day.
Note: Niigata longest period of snow on ground—Dec. 21–Mar. 5—75 days.
Longest period of consecutive rainy days—Nov. 20–Feb. 17—90 days.
Longest period of consecutive drought—Aug. 4–Aug. 29—26 days.

3636—40—Niigata-Fukushima—8-24-44—First Proof

WEATHER INFORMATION FOR NIIGATA AND FUKUSHIMA AREAS—Continued

Table 15.—Mean Monthly Maximum Temperatures (°F.)

Stations	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	41	42	46	57	65	73	81	85	78	67	57	47	62
Niigata	40	41	47	59	67	75	82	86	78	67	56	45	62
Yamagata	37	39	45	60	70	77	83	86	77	65	53	42	61
Fukushima	41	42	48	62	71	77	83	85	77	67	57	46	63
Onahama	46	46	50	59	65	70	77	81	77	68	60	51	62
Sendai	40	39	47	58	65	71	80	83	75	67	57	46	61
Ishinomaki	38	40	45	56	63	69	76	79	74	64	54	43	58

Table 16.—Mean Monthly Minimum Temperatures (°F.)

Stations	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	31	32	34	43	51	60	69	72	66	55	45	36	50
Niigata	30	30	34	43	51	60	69	71	64	53	43	34	49
Yamagata	22	22	28	37	47	56	65	67	59	46	35	27	43
Fukushima	26	26	31	40	48	58	66	69	61	48	37	30	45
Onahama	27	29	32	42	49	58	65	69	63	51	41	32	46
Sendai	24	24	29	39	48	56	67	69	61	49	39	30	45
Ishinomaki	26	27	31	40	49	57	65	69	62	50	38	30	45

Table 18.—Mean Monthly Relative Humidity (percent)*

Stations	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Aikawa	74	72	69	71	77	83	83	79	77	75	74	76	76
Niigata	83	81	76	76	76	80	82	81	81	79	78	81	80
Yamagata	85	83	78	71	71	76	80	80	83	84	83	86	80
Fukushima	73	71	68	67	70	77	81	82	84	81	76	75	76
Onahama	69	70	71	78	83	87	90	90	87	82	76	71	80
Ishinomaki	75	73	72	77	81	87	90	90	88	83	79	77	81
Sendai	76	70	70	73	78	83	87	83	84	80	75	74	78

*Mean of the 0200, 0600, 1000, 1400, 1800 and 2200 observations.

Figure 1.—Mean Wind Speed—Niigata, 1915-1918

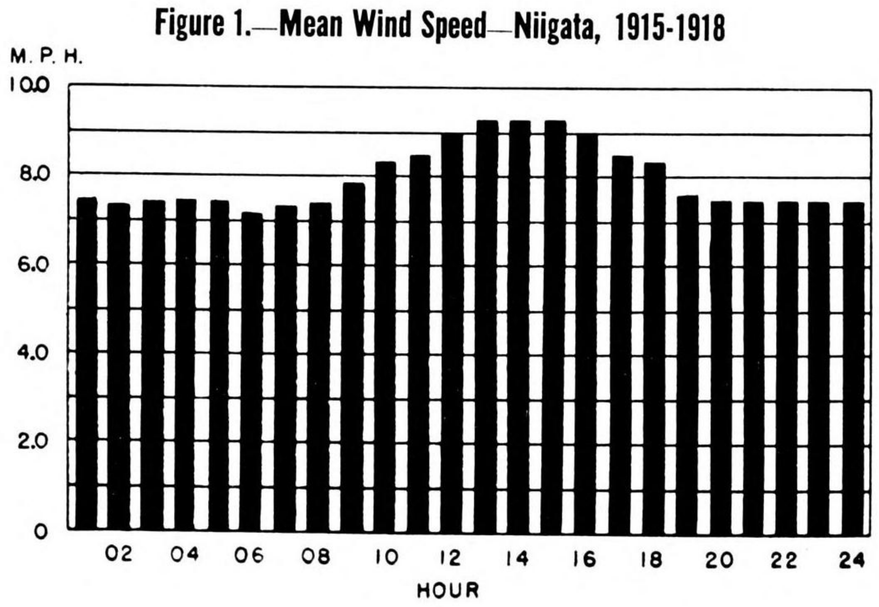


Table 4.—Maximum Velocity of Winds (m.p.h.)

Aikawa	Niigata	Yamagata	Fukushima	Onahama	Sendai	Ishinomaki
63	90	42	54	64	33	59

Figure 2.—Mean Cloud Amount—Niigata

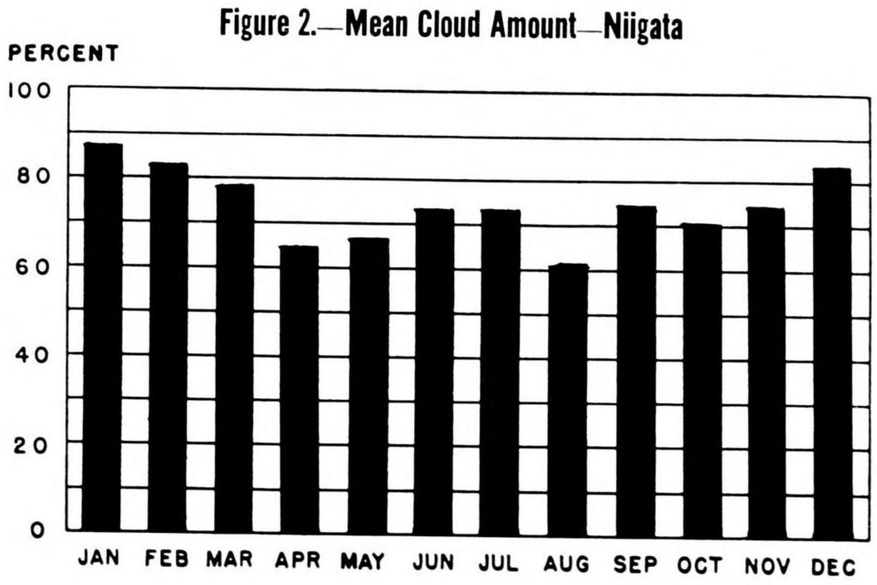


Figure 3.—Mean Cloud Amount—Ishinomaki

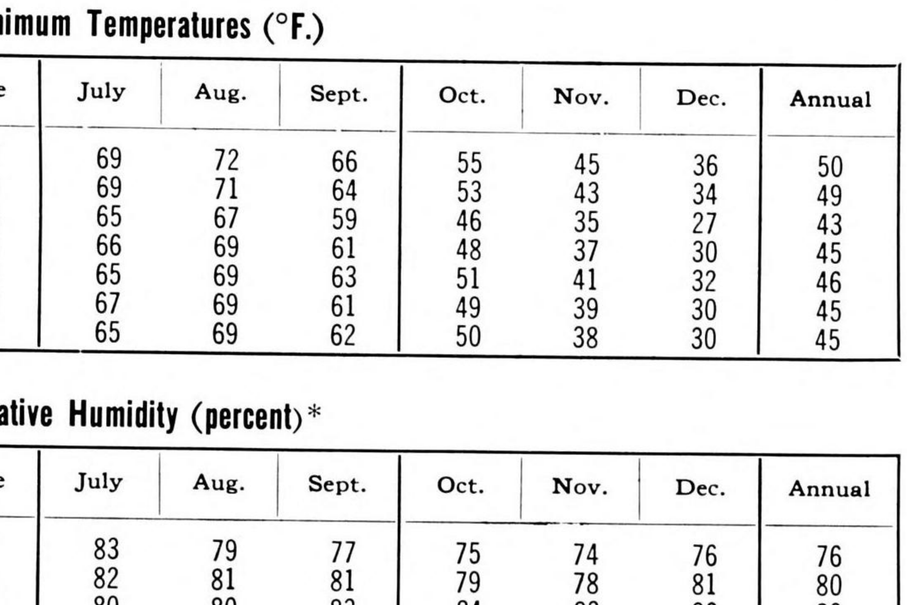
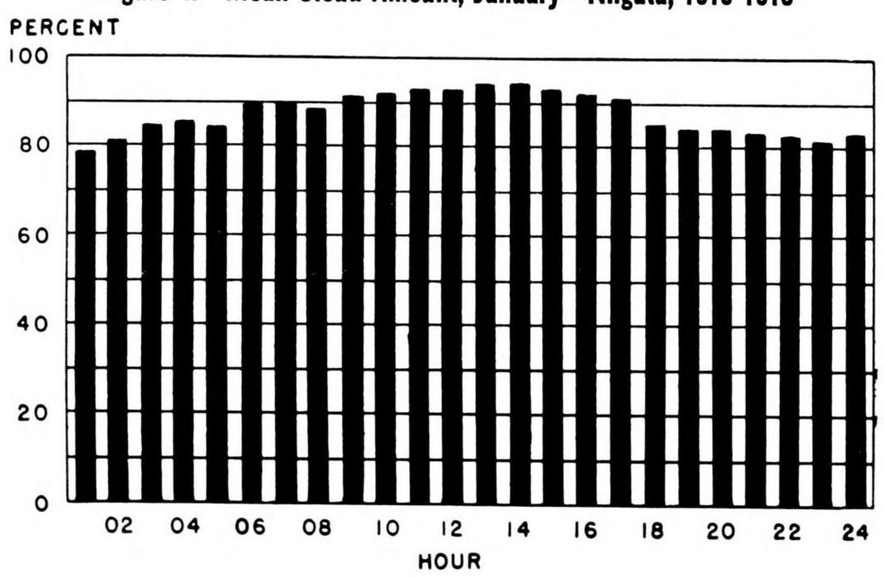


Figure 4.—Mean Cloud Amount, January—Niigata, 1915-1918



3636—41—Niigata-Fukushima—8-24-44—First Proof

Figure 5.—Mean Cloud Amount, August—Niigata, 1915-1918

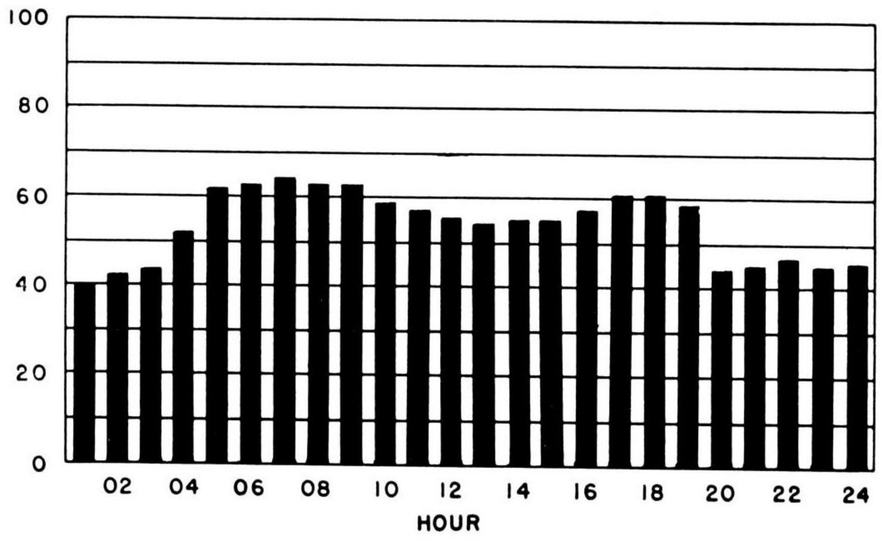
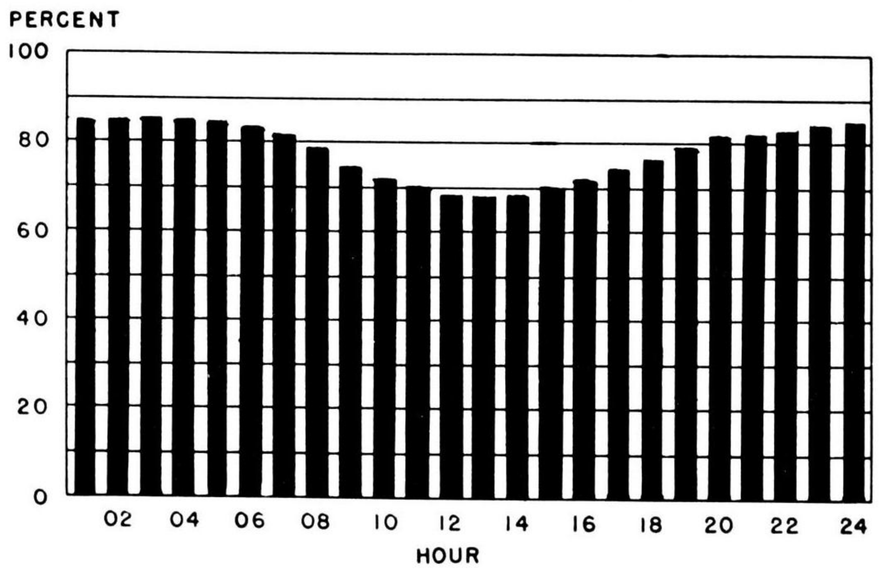


Figure 6.—Mean Annual Relative Humidity—Niigata, 1915-1918



Tabulation of Airfields and Seaplane Anchorages in Niigata and Fukushima Areas

Data and classification as supplied by Air Movements Branch:

Location	Approximate Coordinates	Type
Sukagawa	37° 17′ N 140° 21′ E	Medium Bomber Airfield
Niigata	37° 57′ N 139° 08′ E	Fighter Airfield
Nagaoka	37° 27′ N 138° 51′ E	Fighter Airfield
Ojiya North	37° 20′ N 138° 48′ E	Fighter Airfield
Matsushima	38° 24′ N 141° 04′ E	Fighter Airfield
Sendai	38° 15′ N 140° 55′ E	Fighter Airfield
Shiogama	38° 19′ N 141° 02′ E	Fighter Airfield
Yonezawa East	37° 54′ N 140° 09′ E	Fighter Landing Ground
Kawarada	38° 00′ N 138° 19′ E	Emergency Landing Ground
Ojiya South	37° 18′ N 138° 48′ E	Emergency Landing Ground
Ryotsu	38° 04′ N 138° 25′ E	Emergency Landing Ground
Takada	37° 06′ N 138° 14′ E	Emergency Landing Ground
Yabuki	37° 12′ N 140° 20′ E	Emergency Landing Ground
Yonezawa	37° 56′ N 140° 05′ E	Emergency Landing Ground
Masuda	38° 10′ N 140° 53′ E	Landing Ground
Obara	38° 20′ N 141° 32′ E	Landing Ground
Kamo Lagoon	38° 04′ N 138° 26′ E	Seaplane Anchorage

3636—42—Niigata-Fukushima—8-24-44—First Proof

Map Information for Niigata and Fukushima Areas

LEGEND FOR THE USE OF JAPANESE IMPERIAL LAND SURVEY MAPS 1,:50,000

Density of Construction in Urban Areas
Dense | Moderate | Sparse

- Navy Lookout Tower
- Factory
- Bank
- Powder Magazine
- Water Wheel or Mill
- Generating Plant
- Masonry Wall
- Fences
- Bamboo Fences
- Stone Wall
- Earthen Wall
- Hedge
- Cemetery
- Ditches
- Shrine Gate
- Stone Lantern
- Monument
- Statue
- Signpost
- Stone Steps
- Crane
- Oil Well
- Mileage Marker
- Stumps
- Isolated Trees
- Chimney
- 96.1 Triangulation Point
- 365.37 Secondary Control Point
- 423.42 Bench Mark
- 32.5 Spot Elevation

All above Sea Level

- Old Battlefield
- Spring
- Tomb
- Castle Site
- Volcano
- Mineral Spring
- Material Dump
- Mine
- Boundary Marker

- Shrine
- Temple
- Grave
- Pagoda
- Church
- Japanese Government Building
- Foreign Government Building
- Military Reservation
- Naval Reservation
- Division Headquarters
- Brigade Headquarters
- Fortress and Defense Headquarters
- Battalion Headquarters and Garrison
- Regimental Headquarters
- Naval Station
- Secondary Naval Station
- Naval Camp
- Army Camp
- Shipyard
- Prefectural Seat
- Sub-prefectural, Island-office or Gun Seat
- City Office
- Town, Village or Ward Office
- School
- Hospital
- Isolation Hospital
- Gendarmerie Post
- Police Station
- Court of Appeals
- Prison
- Customs House
- Tax Office
- Forestry Office
- Mining Office
- Government Monopoly Bureau Office or Factory
- Office of Maritime Affairs
- Meteorological Station
- Post Office (with Telegraph and Telephone service)
- Post Office
- Telegraph Office
- Telephone Office

CONTOUR INTERVAL 20 METERS
HEIGHTS IN METERS

- National Highway
- Main Prefectural Roads
- More than 3 Meters Wide
- More than 2 Meters Wide
- More than 1 Meter Wide
- Less than 1 Meter Wide
- Impassable for Carts
- Tree-lined Roads: (A) Narrow (B) Wide
- Power Lines along Road: (A) Ordinary (B) High Tension
- Government Railways: (A) Two Tracks (B) Single Track (C) Station
- Feeder Railways: (D) Double (E) Single

- Boundaries: International
  - Prefectural (A) Fixed (B) Approximate
  - Province (Obsolete)
  - Gun, shi or Sub-prefectural
  - Ward, Machi or Mura (A) Fixed (B) Approx.
  - Government Lands
  - Property Lines (A) Fixed (B) Approximate

CONVERSION GRAPH

Meters	Feet
3,000	10,000
	9,000
2,500	8,000
	7,000
2,000	6,000
1,500	5,000
	4,000
1,000	3,000
	2,000
500	1,000
0	0

- 4.7 Height of Bank
- 7.8 Depth of Water

(A) Iron Bridge
(B) Wooden Bridge
(C) Foot Bridge
(D) Foot Ford
(E) Vehicular Ford
(F) Passenger Ferry (Single Boat)
(G) Passenger and Horse Ferry (Two Boats)
(H) Steam Ferry

- Lighthouse
- Radio Mast
- Warning Signal
- Boat Anchorage
- Ship Anchorage
- Anchorage
- Commercial Port
- Fixed Beacon
- Fixed Beacon (Lightless)
- Buoy (Lightless)

(A) Flower Garden
(B) Grove
(C) Truck Garden

(A) Orchard
(B) Tea
(C) Mulberry
(D) Cultivated marsh
(E) Irrigated rice field
(F) Dry Rice Field

(A) Wild Land
(B) Palm
(C) Bamboo
(D) Conifers
(E) Broad-leaf Trees
(F) Grass Land

(A) Cliff
(B) Rock Outcropping
(C) Scattered Rock
(D) Talus Slope
(E) Depression
(F) Ravine, Gully
(G) Crumbling Bank

GLOSSARY

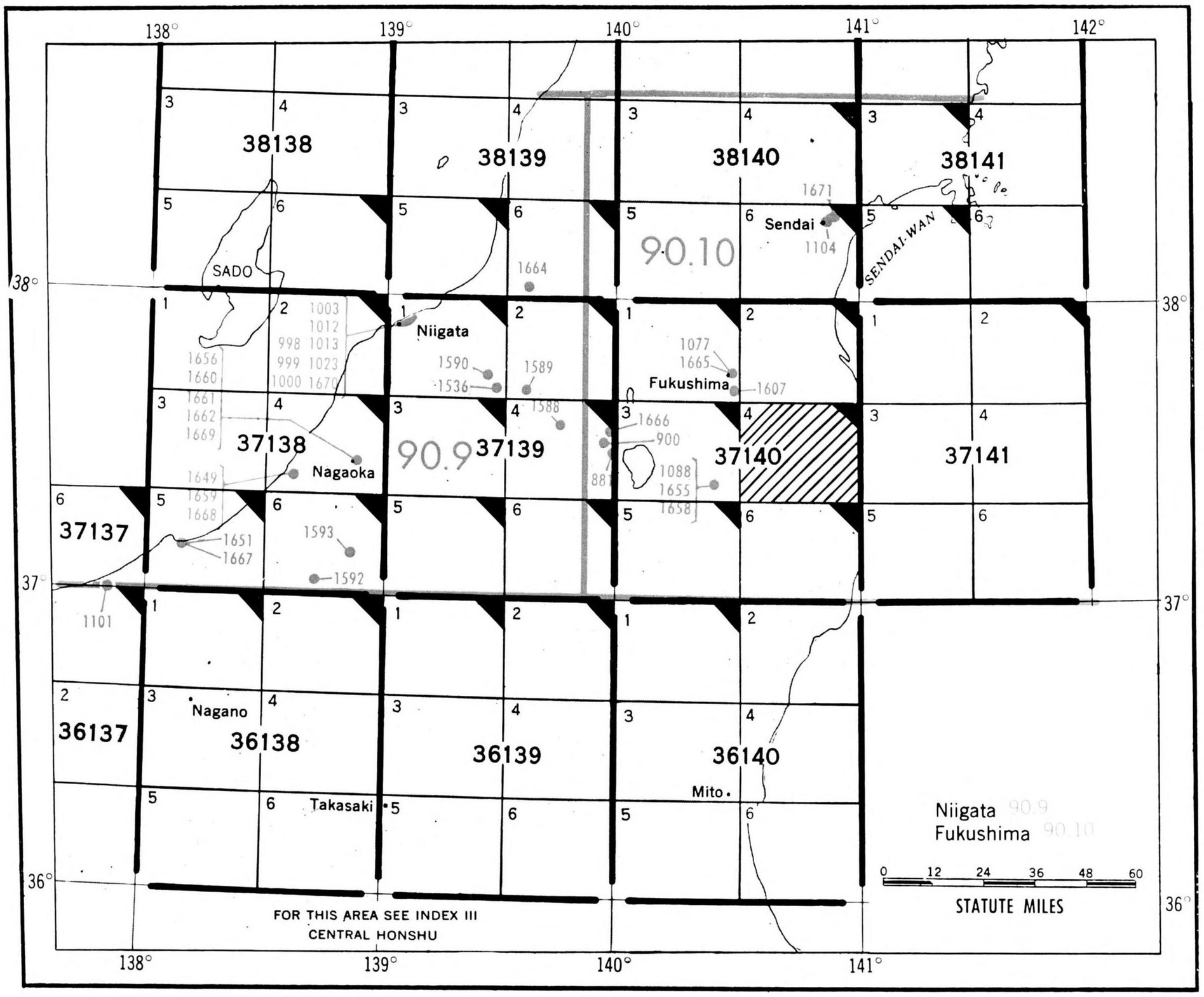
VARIANTS IN PARENTHESES

-bae (-hae)	rock
-bakufu	waterfall
-bama (-hama)	beach, field
-bana (-hana)	point
-bara (-hara)	plain, field
-chō (-machi)	township
-dai (-tai)	plateau, plain
-dake (-take)	mountain
-daki (-taki)	waterfall
-dani (-tani)	valley, stream
-gan (-iwa)	rock, cliff
-gata	bay, inlet, lake
-gawa (-kawa)	river
-goe (-koe)	mountain pass
-gun	county
-guntō	archipelago
-fuji	mountain
-hae (-bae)	rock
-hama (-bama)	beach, field
-hana (-bana)	point
-hantō	peninsula
-hara (-bara)	plain, field
-ike	pond
-ishi	rock, cliff
-iso	rock, skoal
-iwa (-gan)	rock, cliff
-jima (-shima, -tō)	island
-kai (-umi)	bay, gulf
-kaikyō	strait
-kawa (-gawa)	river
-ken	prefecture
-ko	lake
-kō	harbor
-koe (-goe)	mountain pass
-kojima	small isle
-machi (-chō)	township
-mine	mountain
-misaki (-saki, -zaki)	cape
-mori	mountain, forest
-mura	township
-nada	sea
-no	plain, field
-onsen	hot spring, spa
-rettō	island chain
-saki (-zaki, -misaki)	cape
-san (-zan, -yama)	mountain, ridge
-se	reef, shoal, rapid
-seto	strait
-shi	municipality, city
-shima (-jima, -tō)	island
-shō	reef, shoal
-shotō	island group
-suidō	channel
-tai (-dai)	plateau, plain
-take (-dake)	mountain
-taki (-daki)	waterfall
-tani (-dani)	valley, stream
-tō (-shima, -jima)	island
-tōge	mountain pass
-uchi	inlet
-umi (-kai)	bay, gulf
-ura	inlet, beach
-wan	bay
-yama (-san, -zan)	mountain, ridge
-yu	mineral spring, spa
-zaki (-saki, -misaki)	cape
-zan (-san, -yama)	mountain, ridge

3636—43—Niigata-Fukushima—8-24-44—First Proof

Target Chart Information for Niigata and Fukushima Areas

INDEX, AAF TARGET AREA BASES, 1:75,000



● 1670—TARGET NUMBERS IN RED

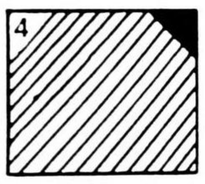
—BASE MAP FILM POSITIVE PUBLISHED AND DISTRIBUTED

—BASE MAP FILM POSITIVE AVAILABLE ON SPECIFIC REQUEST

EXPLANATION: In lieu of the AAF Target Charts which heretofore have been distributed in conjunction with Air Objective Folders, Target Area Bases are being distributed in limited quantities to Theater Air Force Headquarters according to the coverage indicated by this index map. These maps are in the form of color-separation film positives which can be amplified with field intelligence and used as a base for target charts. In the event that the theater is unable to prepare specific charts, these will be prepared by Headquarters, AAF upon request.

PURPOSE AND USE: These film positives provide Theater Air Force Headquarters with the best map compilation of target areas that is available at Headquarters, AAF. Targets are identified by number on the film positives and are coordinated with the targets listed in Air Objective Folders. The maps are on a scale of 1:75,000 and are suitable for use with a bombardier grid in the bombing of obscured targets. Adjacent maps of the area may be joined to form a film positive from which a four-color target chart with a 12-mile radius may be prepared on any target or targets in this Air Objective Folder. These bases also provide ground control for the laying of aerial mosaics.

INDEX: The objective area covered by this Air Objective Folder is indexed for base map coverage in "blocks" bounded by one full degree of latitude and longitude. These blocks are further subdivided into six (6) individual sheets numbered from 1 to 6.



Thus a block is identified by the *reading of the coordinates at its SW corner*, and the sheet by its *individual sheet number*.

FOR EXAMPLE: Sheet 4 in the Index Map above is identified by the block, (the reading at its SW corner is Lat. 37 N., Long. 140 E.) and then the sheet (Sheet 4).

The correct sheet number is therefore "37140-4."

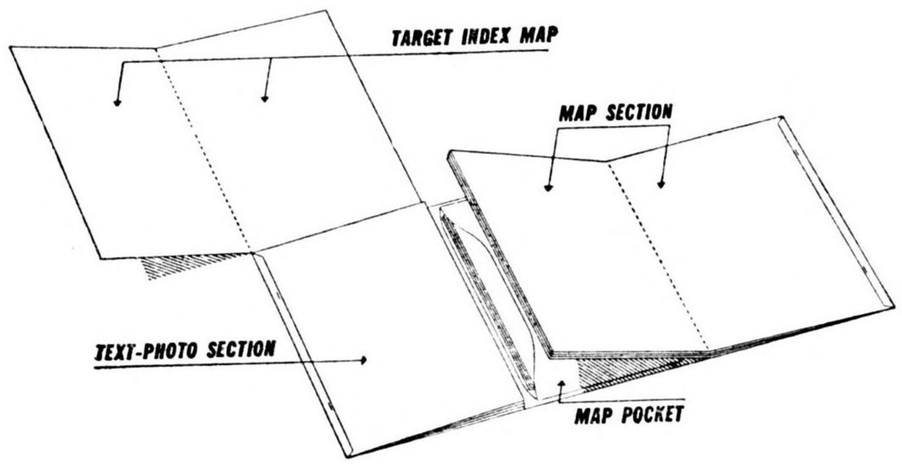
3636—44—Niigata-Fukushima—8-24-44—First Proof

AIR OBJECTIVE FOLDERS

Air Objective Folders are primarily for the use of group and squadron commanders, operations officers, and intelligence officers in the planning of operations and the briefing of crews.

As an aid to staff planning, a summary and evaluation of main divisions within the area is included. Target and objective areas are numbered in a separate series for each country. For example, in this folder: 90.9-1592 indicates JAPAN (90), NIIGATA (9) and TARGET 1592, Shinano Hydro Plant.

Supplementing the Air Objective Folder are Target Area Base Maps, distributed in lieu of AAF Target Charts formerly provided for the use of air crews. These maps are being distributed in limited quantities to Theater Air Force Headquarters and are described on the Target Chart Information page in this folder.



The Air Objective Folder is divided into a Text-Photo Section, a Map Section, and a Map Pocket.

In the Text-Photo Section a Target-Index Map opens upward to form a handy reference in locating ALL TARGETS.

The Map Section unfolds to permit cross-checking with material in the Text-Photo Section.

The Map Pocket contains oversize maps.

There are three quick-reference Index Pages at the beginning of the Text-Photo Section which list targets by classification, by name, or by number. An additional Index of Targets by Classification appears at the beginning of each regional division. Thus in locating a target in the Air Objective Folder you need to know only the classification, name or number of the target.

Target description pages in this folder have been perforated, so that they may be extracted and adapted to any filing system. All text and photo pages are indexed for filing. Individual target descriptions and illustrations are grouped together so that photographs, city plans and orientation maps may be used in a baloptican while briefing the crews.

It will be noted that one photograph may include several targets for orientation purposes. However, in every instance, the best available photograph of a target will *accompany the description of that target.*

NEITHER THE FOLDER NOR ANY PART OF IT MAY BE TAKEN INTO THE AIR ON OFFENSIVE MISSIONS

TARGET INDEX MAP OF
NIIGATA 90.9
FUKUSHIMA 90.10

RAILROADS

ADAPTED FROM RELIEF MAP OF NORTHERN HONSHU—1944
DATE OF ANALYSIS—JULY 1944

FOR ALL TARGETS ALSO SEE MAP ON PAGE M-1

NIIGATA
FOR TARGETS 998, 999, 1000, 1003, 1012 1013, 1023 AND 1670 SEE MAPS ON PAGES.....M-4, M-5

NAGAOKA
FOR TARGETS 1656, 1660, 1661, 1662 AND 1669 SEE MAP ON PAGE M-7

KASHIWAZAKI
FOR TARGETS 1649, 1659 AND 1668 SEE MAP ON PAGE M-8

SENDAI
FOR TARGETS 1104 AND 1671 SEE MAP ON PAGE M-9

KANOSE
FOR TARGETS 1536, 1589 AND 1590 SEE MAP ON PAGE M-10

SENJU
FOR TARGETS 1592 AND 1593 SEE MAPS ON PAGE M-10

FUKUSHIMA
FOR TARGET 1607 SEE MAP ON PAGE M-10
FOR TARGETS 1077 AND 1665 SEE MAPS ON PAGES M-10, M-11

KORIYAMA
FOR TARGETS 1088, 1655 AND 1658 SEE MAP ON PAGE M-12

NAOETSU
FOR TARGETS 1651 AND 1667 SEE MAP ON PAGE M-13

SEA OF JAPAN

PACIFIC OCEAN

TOBI-SHIMA
AWA-SHIMA
Hajiki-saki
SADO
SAKATA
AKITA 90.6
TSURUOKA
Mogami-gawa
MORIOKA 90.7
KAMAISHI
Kitakami-gawa
ISHINOMAKI
Kinka-zaki
SENDAI
M-9
YAMAGATA
1664
NIIGATA
M-4, M-5
NIITSU
YONEZAWA
FUKUSHIMA
M-11
M-10
Agano-gawa
KANOSE
M-10
SANJO
90.9
1588
HIROTA
1666
WAKAMATSU
900
881
Inawashiro-ko
90.10
M-7
NAGAOKA
M-12
KORIYAMA
KASHIWAZAKI
M-8
NAOETSU
M-13
1101
AOMI
TAKADA
SENJU
M-10
M-10
M-10
Shinano-gawa
TAIRA
Shioya-saki
NAGANO 90.12
TAKASAKI 90.13
MITO 90.14
NIKKO

138° 139° 140° 141° 142°
39° 38° 37°

STATUTE MILES 20 0 20 40 60 80 100 120 140 160 180 200

CONFIDENTIAL equals British Confidential

NIIGATA 90.9 FUKUSHIMA 90.10

LOCATING ALL AIRFIELDS AND SEAPLANE BASES

DOUBLE TRACK RAILROADS
SINGLE TRACK RAILROADS
PRINCIPAL ROADS

MEDIUM BOMBER AIRFIELD
FIGHTER AIRFIELD
EMERGENCY LANDING GROUND
FIGHTER LANDING GROUND
SEAPLANE ANCHORAGE

ELEVATIONS IN FEET

ADAPTED FROM RELIEF MAP OF NORTHERN HONSHU—1944

DATE OF ANALYSIS—AUGUST 1944

137° 138° 139° 140° 141°

38° 37°

SEA OF JAPAN

TOYAMA-WAN

NORTH PACIFIC OCEAN

SADO

KAMO LAGOON SAA

RYOTSU

KAWARADA

NIIGATA

YONEZAWA

YONEZAWA EAST

MURAKAMI

YAMAGATA

SENDAI

MASUDA

MATSUSHIMA

SHIOGAMA

OBARA

SENDAI-WAN

FUKUSHIMA

NAGAOKA

OJIYA NORTH

OJIYA SOUTH

TAKADA

SUKAGAWA

YABUKI

KANAZAWA

TOYAMA

NAGANO

Takaoka

Nikko

Utsonomiya

Koriyama

Tanioka

Sukegawa

Haranomachi

Ishinomaki

Onagawa

Matsushima

Shiogama

Kameda

Niitsu

Yoshida

Tsubame

Kamo

Sanjo

Kanose

Nippashi-gawa

Odera

Hirota

Wakamatsu

INAWASHIRO KO

Agano-gawa

Abukuma-gawa

Kashiwazaki

Kakizaki

Nagaoka

Senju

Araio

Aomi

Tenryu-gawa

Hakui

Awashima

Rokugo-saki

Kano-gawa

Shinano-gawa

STATUTE MILES 10 5 0 10 20 30 40 50 60 70 80 90 100 110 120

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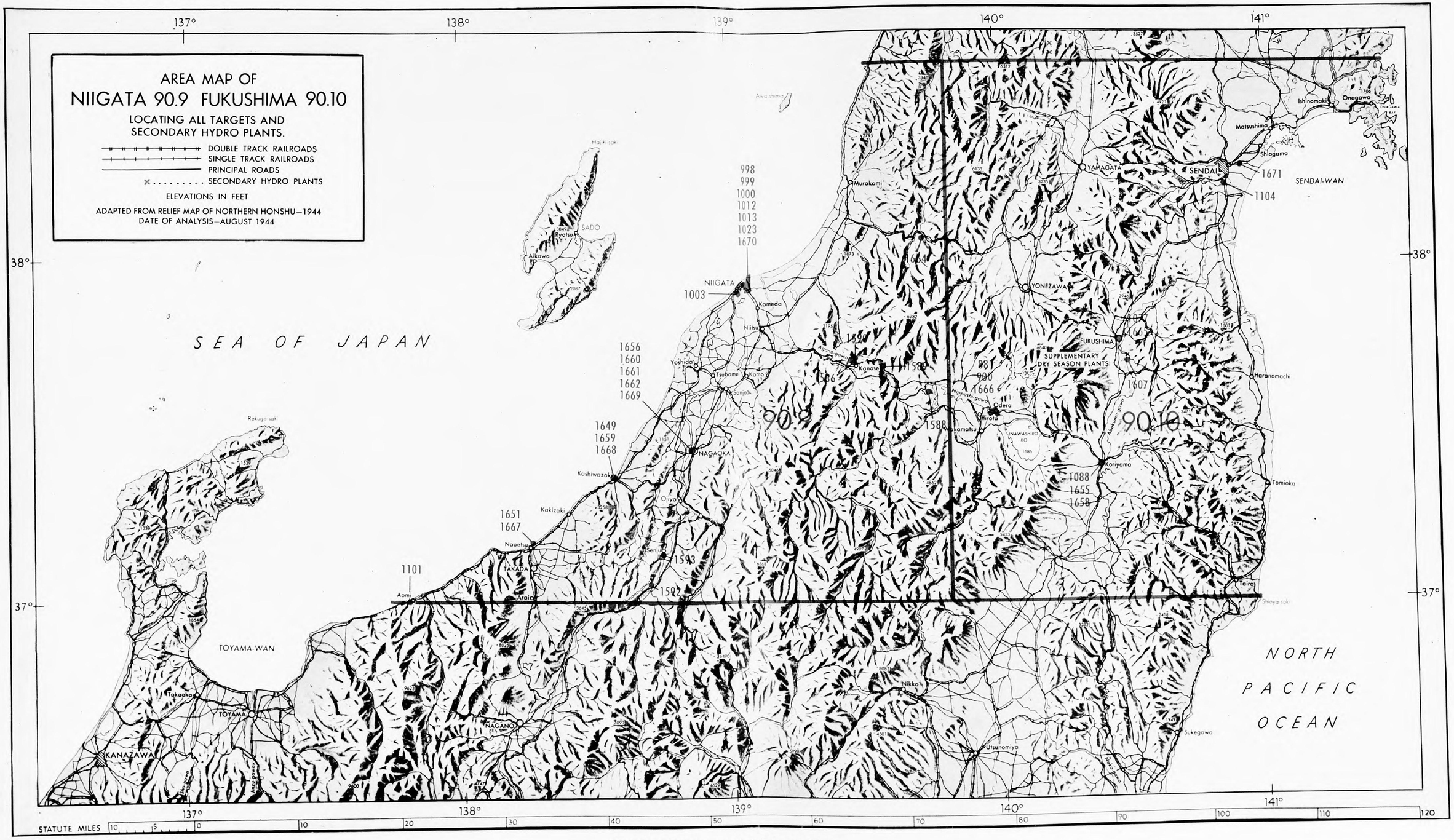

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3636—M-1—Niigata-Fukushima—8-24-44—First Proof

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139°0′10″ 139°7′40″

NIIGATA CITY

ELEVATIONS IN METERS

SINGLE TRACK RAILROADS
PRINCIPAL ROADS
POWER LINES

998 . . NIIGATA IRON WORKS, PLANT NO. 1
999 . . NIIGATA IRON WORKS, PLANT NO. 2
1000 . . NIPPON OIL REFINERY
1003 . . JAPAN LIGHT METALS CO.
1012 . . NIIGATA OIL STORAGE NO. 1
1013 . . NIIGATA OIL STORAGE NO. 2
1023 . . NIIGATA RR YARDS
1670 . . NIIGATA HARBOR

ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY 1:25,000—1935
DATE OF ANALYSIS—AUGUST 1944

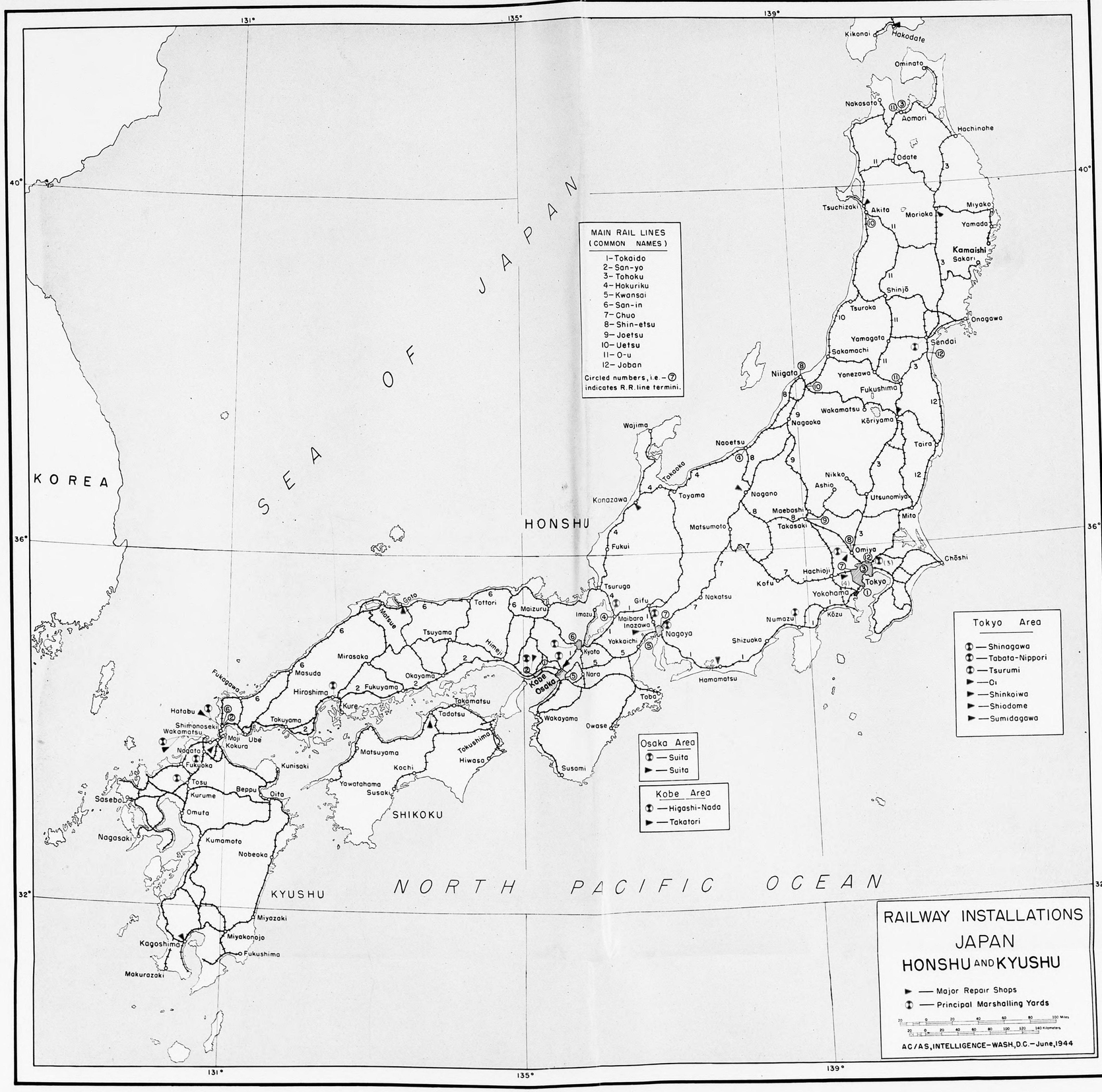
3656—M 3—Niigata

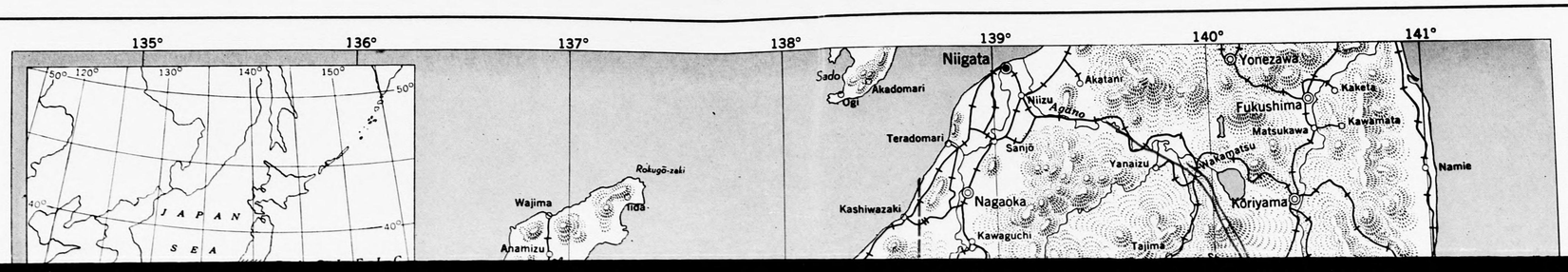
SMALL POWER PLANT
SULPHURIC ACID PLANT
SMALL CARBIDE PLANT
SPINNING MILL
SMALL POWER PLANT
PAPER MILL
TWIN RADIO TOWERS
BANDII BRIDGE
RACE COURSE
SULPHURIC ACID PLANT
HAYAMA OIL REFINERY

37° 55′

139°0′10″ STATUTE MILES 1 0 1 2 3 4 139°7′40″

CONFIDENTIAL equals British Confidential





3636—M.I.S.—Niigata-Fukushima—8-24-44—First Proof

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

INCENDIARY ZONE MAP OF NIIGATA CITY

ZONE 1

ZONE 2

ELEVATIONS IN METERS

SINGLE TRACK RAILROADS
PRINCIPAL ROADS
POWER LINES

998 . . NIIGATA IRON WORKS, PLANT NO. 1
999 . . NIIGATA IRON WORKS, PLANT NO. 2
1000 . . NIPPON OIL REFINERY
1003 . . JAPAN LIGHT METALS CO.
1012 . . NIIGATA OIL STORAGE NO. 1
1013 . . NIIGATA OIL STORAGE NO. 2
1023 . . NIIGATA RR YARDS
1670 . . NIIGATA HARBOR

ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY 1:25,000—1935
DATE OF ANALYSIS—AUGUST 1944

139°0'10"

139°7'40"

37° 55'

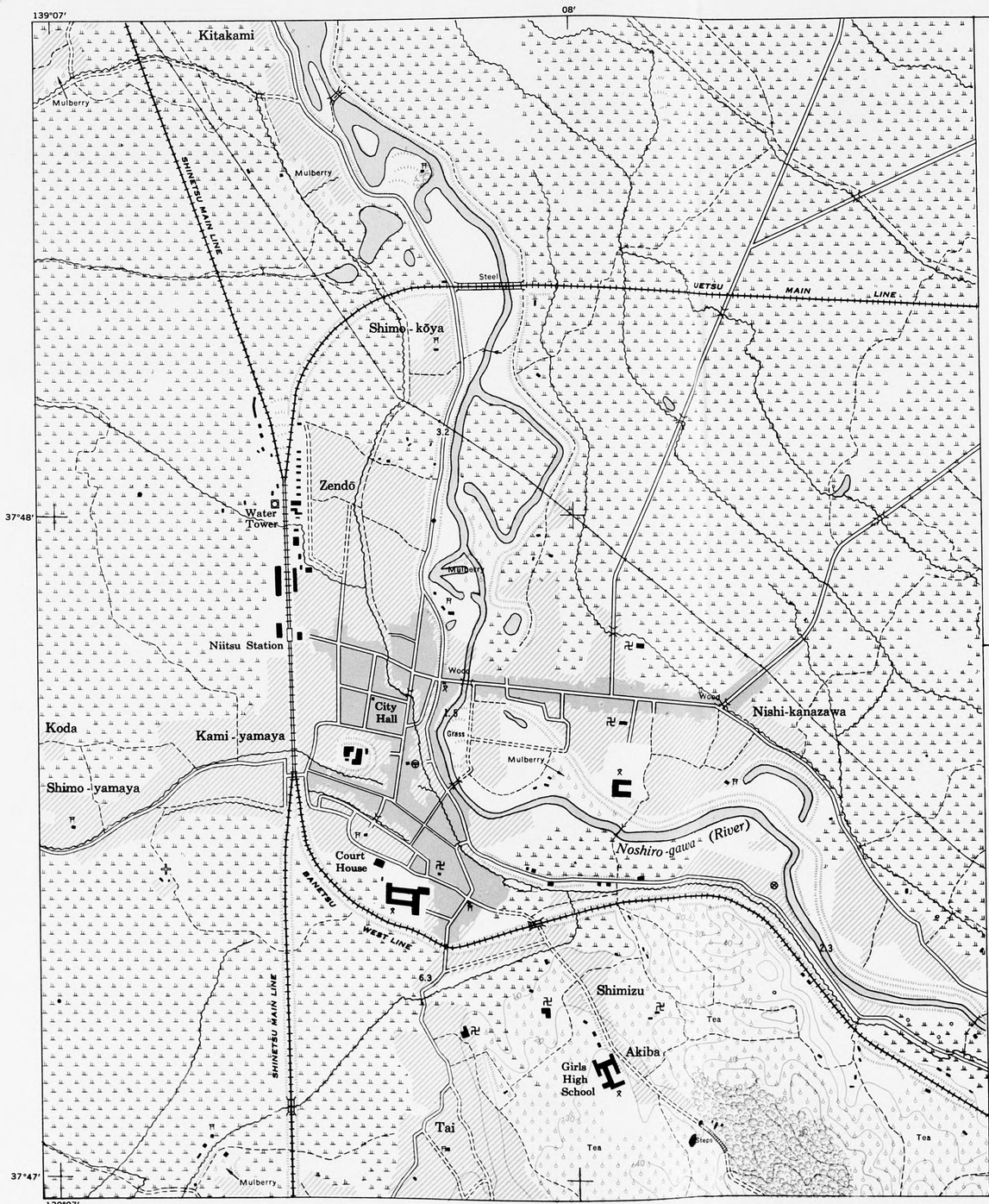
1012
NIITSU OIL REFINERY
999
1013
1670
998
1023
SMALL POWER PLANT
SULPHURIC ACID PLANT
SPINNING MILL
SMALL CARBIDE PLANT
SMALL POWER PLANT
PAPER MILL
1000
TWIN RADIO TOWERS
BANDII BRIDGE
1003
RACE COURSE
SULPHURIC ACID PLANT
HAYAMA OIL REFINERY

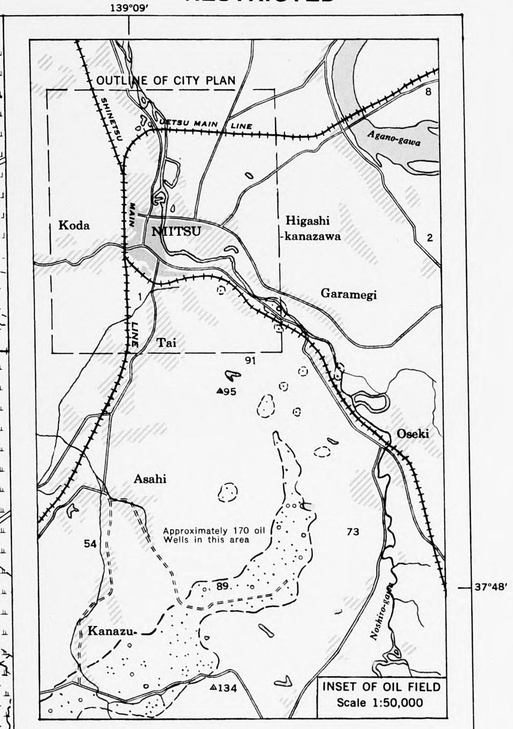
STATUTE MILES 1 0 1 2 3 4

CONFIDENTIAL equals British Confidential

3636—M-5 Niigata Fukushima 8-24-44 First Proof

RESTRICTED





NIITSU

NIIGATA PREFECTURE

HONSHU, JAPAN

Scale 1:12,500

1/4 0 4 Miles

250 0 250 Meters

250 0 250 Yards

POLYCONIC PROJECTION

CONTOUR INTERVAL 10 METERS

Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces,
under the direction of the Aeronautical Chart Service by the Lake Survey Branch, Army Map Service, July 1944
Compiled from:
1. Japanese Imperial Land Survey 1:25,000; Niitsu (1934);
Muramatsu (1934), Kosudo (1934); Yashiroda (1933) - (base map)
2. Japanese Imperial Land Survey 1:50,000; Niitsu (1934) - (inset)
3. Japanese Govt. R.R. Timetable, (1941) (R.R. gauges)
Names transcribed according to modified Hepburn (Romaji) system

LEGEND

School
Hospital
Shrine
Temple
Oil Well
Chimney
Pagoda
Densely Populated
Sparsely Populated
Rice

National or Prefectural Road generally Metalled, over 4 m. wide or streets in city areas
Other roads 2-4 m. wide
Road, Track or Trail less than 2 m. wide
Post Office
Railroads
3'6" Gauge, Double Track
3'6" Gauge, Single Track
Railroad Station
High Tension Power Line
Depth of water 2.5
Monument
Woodland

HEIGHTS AND DEPTHS IN METERS

M-6

RESTRICTED

FOR USE WITH AAF AIR OBJECTIVE FOLDER NIIGATA 90.9

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D.C."

ARMY MAP SERVICE, U.S. ARMY, WASHINGTON, D.C., 340450
8-44 1944

CONFIDENTIAL

[redacted]

138°50′ 51′ 138°52′

37°28′ 37°28′

27′ 27′

Kamino
KAMI - KAWANISHI - MURA
Fujisawa
Shimoyanagi
Ogino
Miyaseki
Township Office
Hasugata
Terajima
Kami-Hasugata
Kashōji
Kozawa
Motooshima
Kitayama
Yanagi-shima
SHINANO GAWA
CHŌSEI-BASHI
NAGAOKA RAILROAD
Nishi-nagaoka Station
OKAMURA-SHIMA
Hokuetsu Chemical Plant
Electric Substation
Kiln
Hokuetsu Paper and Pulp Mills
Kanenomine-jinja
ZAOMACHI
1656 Dougami Atagi Mfg. Co. (probable location)
JŌOKAMACHI
Jōoka Station
ARAMACHI
1652 Osaka Machinery Co. Plant 2 (probable location)
ISHIUCHIMACHI
KITA-NAKAJIMACHŌ
1660 Niigata Iron Works
1661 Osaka Machinery Co. Plant 1
Tank
Filtration Plant
Tower
Commercial School
NAKAJIMACHŌ
Bank
Church
ATAGOCHŌ
Girls' Normal School
NAGACHŌ
Girls' High School
Shimo-nagaoka Station
Shinetsu Main Line
Hoshiba
Niibo
Nagata
Shimo-niibo Station
Electric Substation
Courthouse
DAIKUMACHI
HONMACHI
Telephone Office
Monopoly Office
Bank with Tower
Government Building
City Hall
Public Hall (With tower)
Park
Hirakata-jinja
YAMADACHŌ
TONOMACHI
SENJUCHŌ
ASAHIMACHI
KUSŌZU-MACHI
Tax Office
Government Building
Technical School
Roundhouse
Agricultural Experimental Station
KESASHIROCHŌ
Government Building
Middle School
GAKKŌMACHI
Technical
Kawasaki
Fukushima-e (Ditch)
Tsubame Station
Yoshida Railroad
Shimo-niibo Station
ORCHARD
WOOD
STONE
18.9
3.4
20.65
21.27
22.03
23.13
21.3
22.4
23.1
5.5

NAGAOKA

NIIGATA PREFECTURE, HONSHU, JAPAN

Scale 1:12,500

½ 0 ½ Miles

500 0 500 Meters

500 0 500 Yards

POLYCONIC PROJECTION

CONTOUR INTERVAL 10 METERS

Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces, under the direction of the Aeronautical Chart Service by the Lake Survey Branch, Army Map Service, August, 1944
Compiled from:

1. Japan 1:25,000 Japanese Imperial Land Survey, Nagaoka, (1934) (trigonometric survey)
2. Japan 1:50,000 Japanese Imperial Land Survey, Nagaoka, (1934) (trigonometric survey)
3. Japanese Government Railway Timetable (1941) (railroad gauges)

Names transcribed according to Modified Hepburn (Romaji) System

LEGEND

Factory
Hospital
Shrine
Temple
Chimney
Monument
School
Post Office
Depth of Water
Police Station
Cemetery
Densely Populated
Sparsely Populated
Rice

National or Prefectural Road
generally Metalled, over 4 m. wide
or streets in city area
Other Roads 2.4 m. wide
Road, Track or Trail
less than 2 m. wide

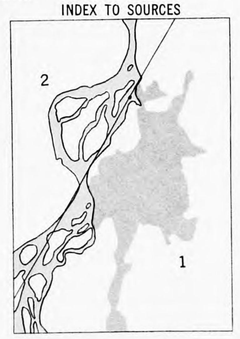
Railroads
Narrow Gauge, Single Track
3'6" Gauge, Single Track
3'6" Gauge, Double Track
Railroad Stations
High Tension Power Line

Woodland
Grassland
Mulberry

GLOSSARY

bashi ..... bridge
gawa, kawa ..... river
jinja ..... shrine
mura ..... township

INDEX TO SOURCES

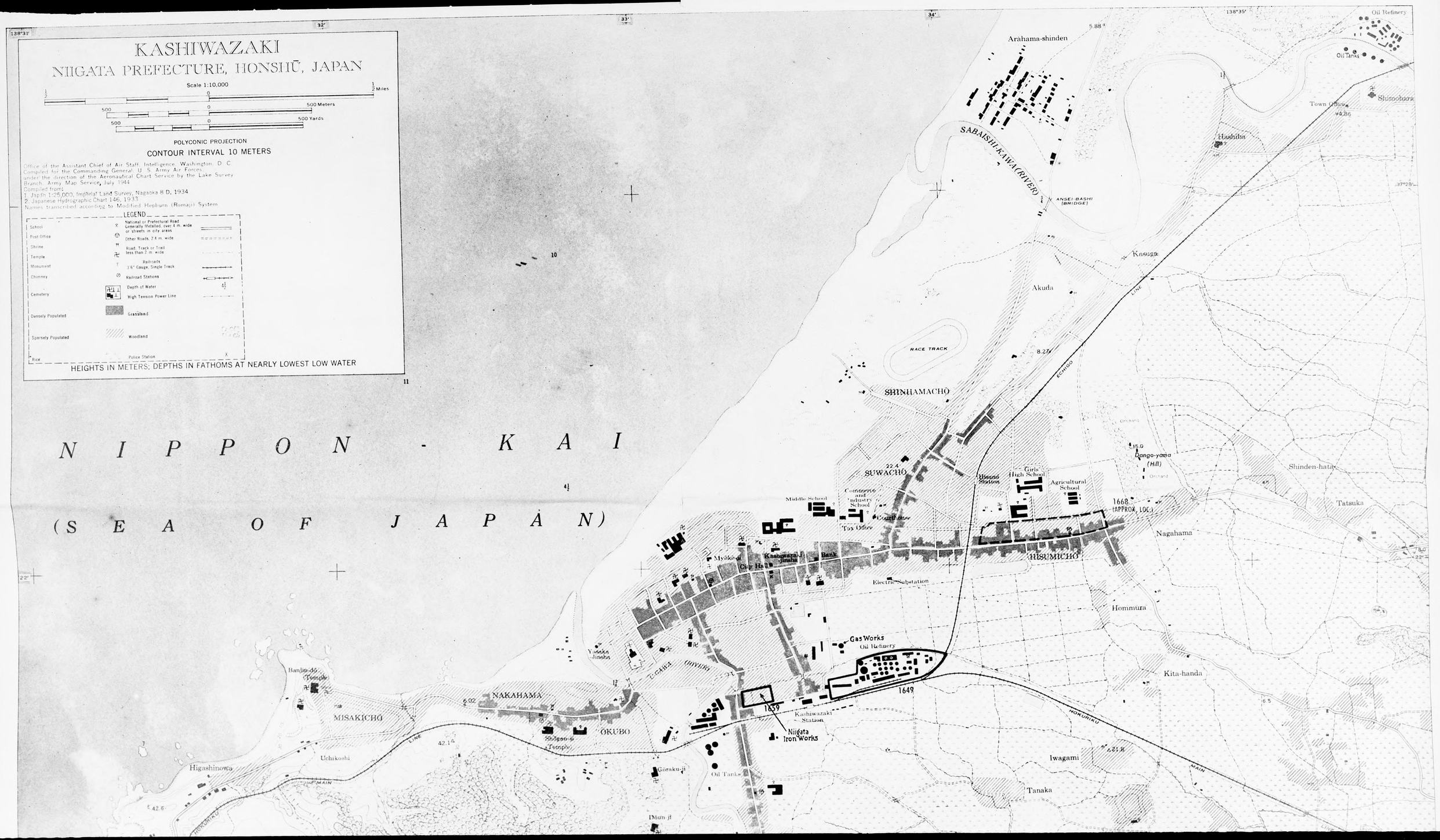


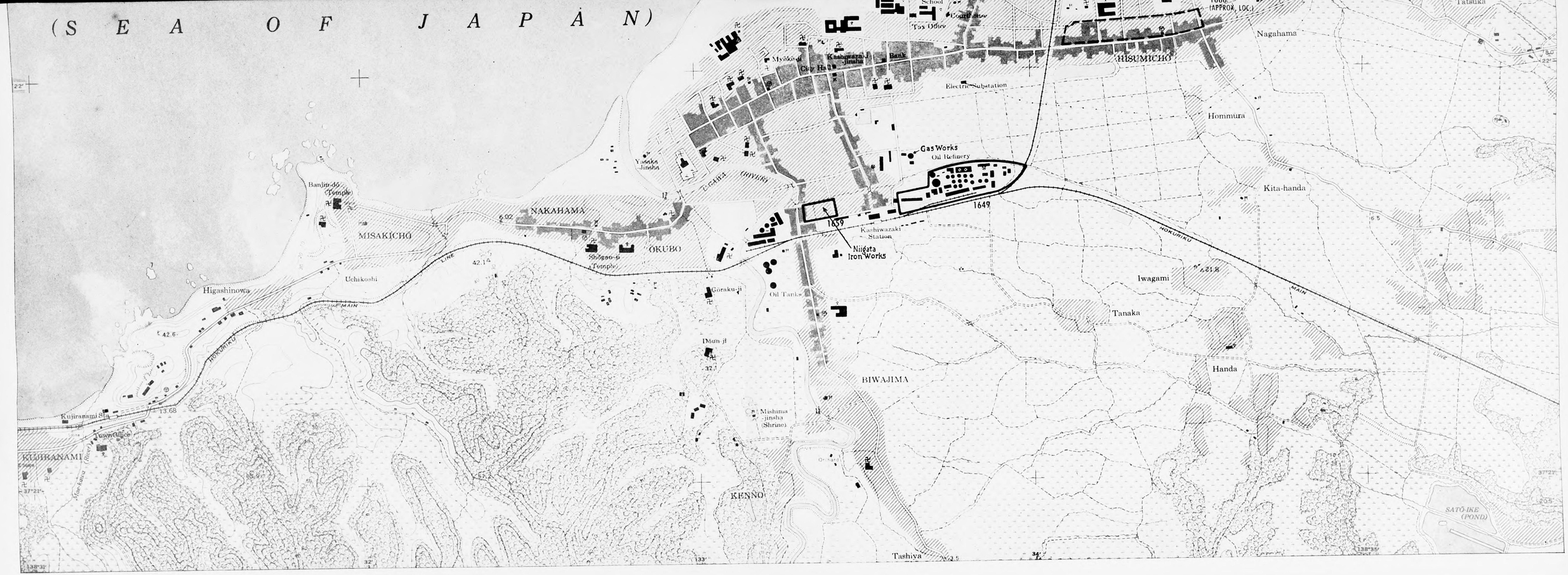
HEIGHTS AND DEPTHS IN METERS

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

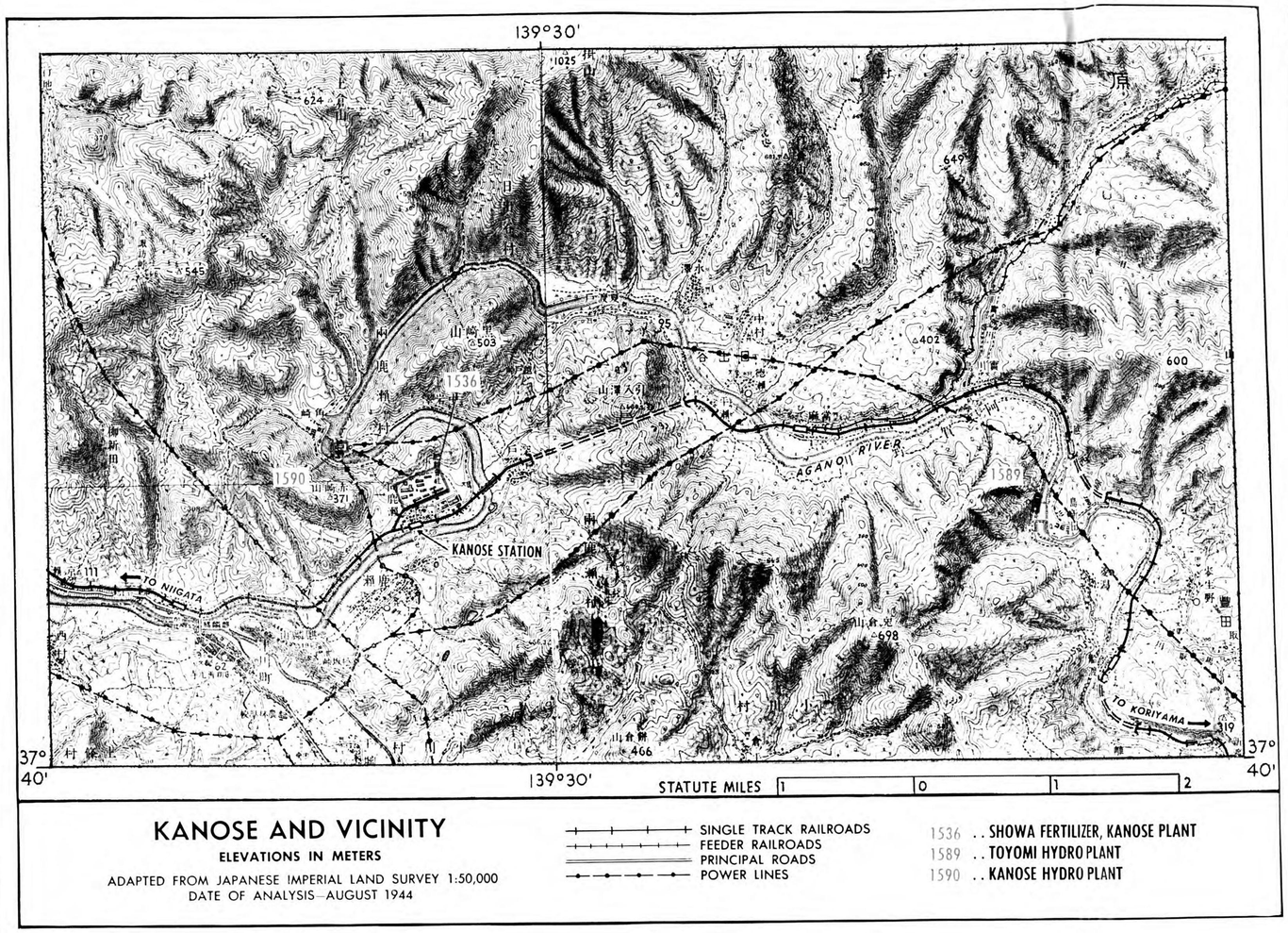
138°52′ ARMY MAP SERVICE, U. S. ARMY, WASHINGTON, D. C. 340454
8-44 1944

M-7 RESTRICTED FOR USE WITH AAF AIR OBJECTIVE FOLDER NIIGATA 90.9 CONFIDENTIAL


KASHIWAZAKI
NIIGATA PREFECTURE, HONSHŪ, JAPAN
Scale 1:10,000
1/2 Miles
500 Meters
500 Yards
POLYCONIC PROJECTION
CONTOUR INTERVAL 10 METERS
Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces,
under the direction of the Aeronautical Chart Service by the Lake Survey
Branch, Army Map Service, July 1944
Compiled from:
1. Japan 1:25,000, Imperial Land Survey, Nagaoka 8 D, 1934
2. Japanese Hydrographic Chart 146, 1933
Names transcribed according to Modified Hepburn (Romaji) System
LEGEND
School
Post Office
Shrine
Temple
Monument
Chimney
Cemetery
Densely Populated
Sparsely Populated
Rice
National or Prefectural Road Generally Metalled, over 4 m. wide or streets in city areas
Other Roads, 2.4 m. wide
Road, Track or Trail less than 2 m. wide
Railroads 3'6" Gauge, Single Track
Railroad Stations
Depth of Water
High Tension Power Line
Grassland
Woodland
Police Station
HEIGHTS IN METERS; DEPTHS IN FATHOMS AT NEARLY LOWEST LOW WATER
NIPPON - KAI
(SEA OF JAPAN)
Arahama-shinden
SABAISHI-KAWA (RIVER)
ANSEI-BASHI (BRIDGE)
Oil Refinery
Oil Tanks
Shimohara
Town Office
Hashiba
Kasuga
Akuda
RACE TRACK
SHINHAMACHO
SUWACHO
Middle School
Commerce and Industry School
Courthouse
Tax Office
Hisumi Station
Girls' High School
Agricultural School
Dango-yama (Hill)
Shinden-hata
Tatsuka
Nagahama
HISUMICHO
Myōkō-ji
Kashiwazaki-jinsha
City Hall
Bank
Electric Substation
Hommura
Gas Works
Oil Refinery
Kita-handa
Yasaka-Jinsha
NAKAHAMA
MISAKICHO
OKUBO
Shōgan-ji Temple
Banjin-dō Temple
Kashiwazaki Station
Niigata Iron Works
Iwagami
Tanaka
Higashinowa
Uchikoshi
Gōraku-ji
Oil Tanks
Dōun-ji
ECHIGO LINE
HOKURIKU MAIN LINE
1668 (APPROX. LOC.)
1649
1659


(SEA OF JAPAN)
Middle School
Industry School
Courthouse
Tax Office
Myōkō-ji
Kashiwazaki-jinsha
Bank
City Hall
Electric Substation
HISUMICHO
1668 (APPROX. LOC.)
Nagahama
Tatsuka
Hommura
Kita-handa
Gas Works
Oil Refinery
1649
1659
Kashiwazaki Station
Niigata Iron Works
Yasaka-Jinsha
U-GAWA (RIVER)
NAKAHAMA
MISAKICHO
OKUBO
Shōgan-ji (Temple)
Banjin-dō (Temple)
Uchikoshi
Higashinowa
Göraku-ji
Oil Tanks
Dōun-ji
BIWAJIMA
Mishima-jinsha (Shrine)
KENNO
Tashiya
Iwagami
Tanaka
Handa
HOKURIKU MAIN LINE
Kujiranami Sta.
Town Office
KUJIRANAMI
Mae-kawa (River)
SATŌ-IKE (POND)
22'
13.68
42.6
42.1
6.02
21.8
6.5
37°21'
138°31'
32'
133'
34'
138°35'

M-8



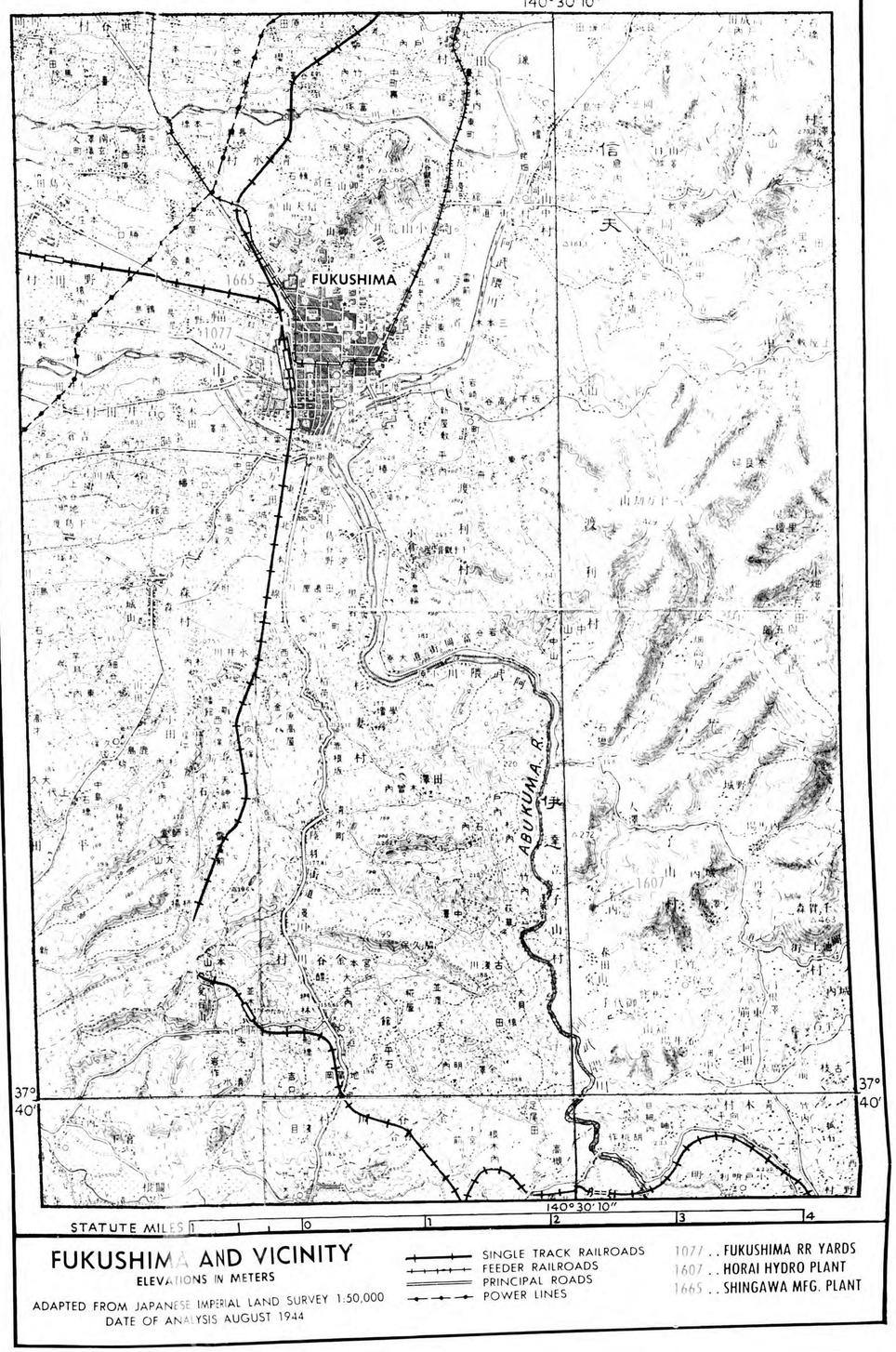
KANOSE AND VICINITY

ELEVATIONS IN METERS

ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY 1:50,000
DATE OF ANALYSIS—AUGUST 1944

SINGLE TRACK RAILROADS
FEEDER RAILROADS
PRINCIPAL ROADS
POWER LINES

1536 . . SHOWA FERTILIZER, KANOSE PLANT
1589 . . TOYOMI HYDRO PLANT
1590 . . KANOSE HYDRO PLANT



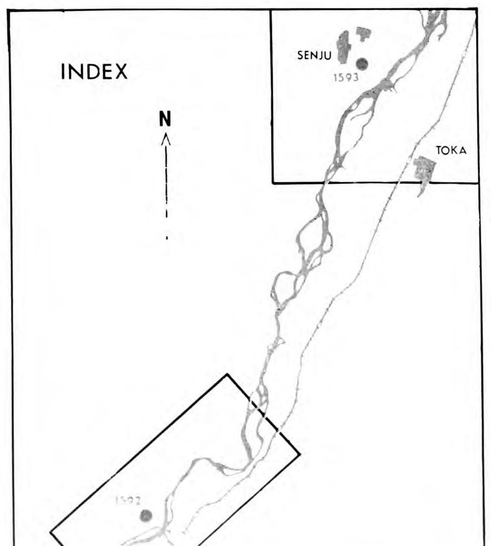
FUKUSHIMA AND VICINITY

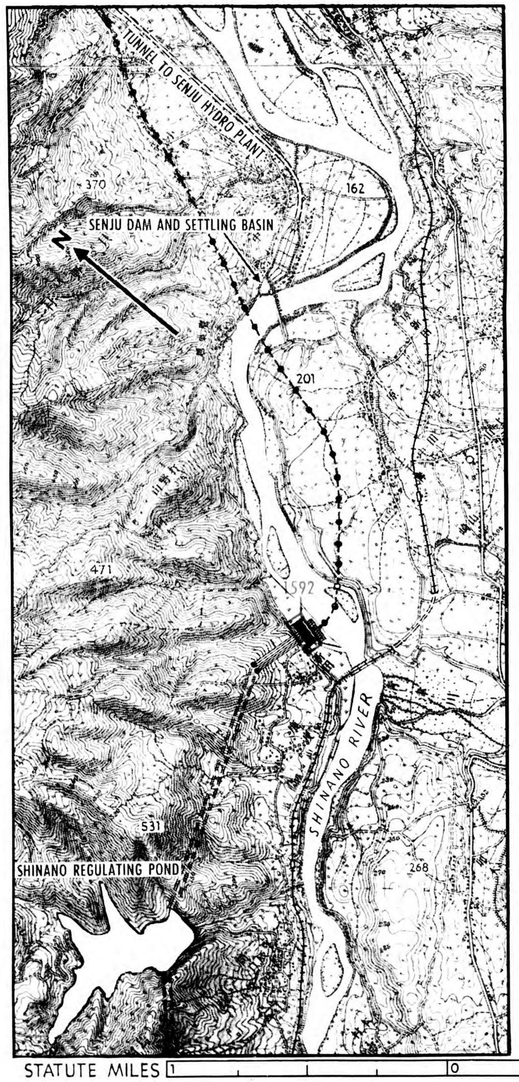
ELEVATIONS IN METERS

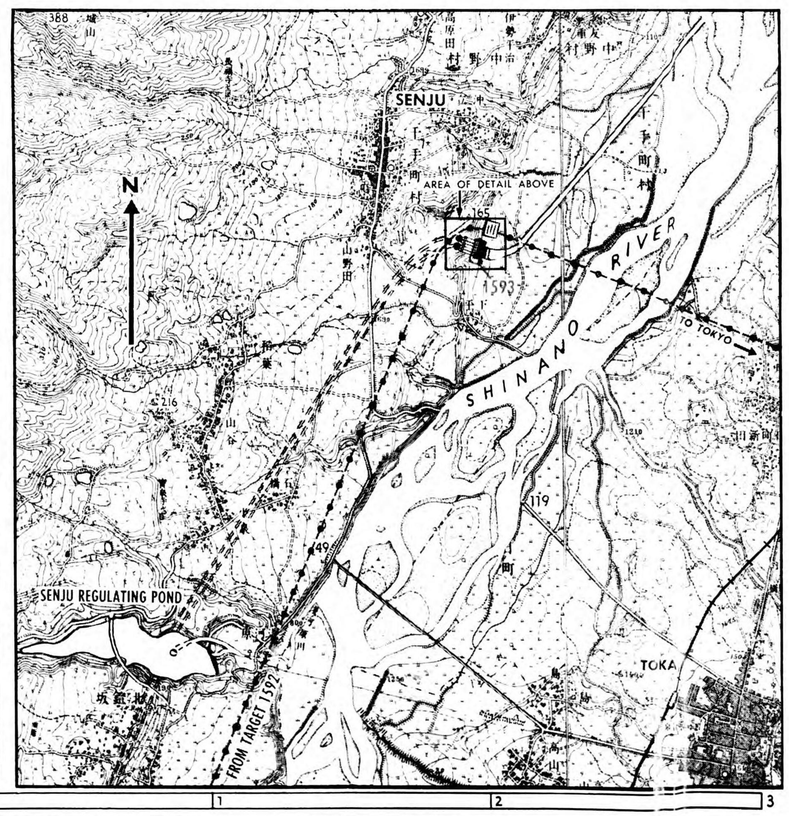
ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY 1:50,000
DATE OF ANALYSIS AUGUST 1944

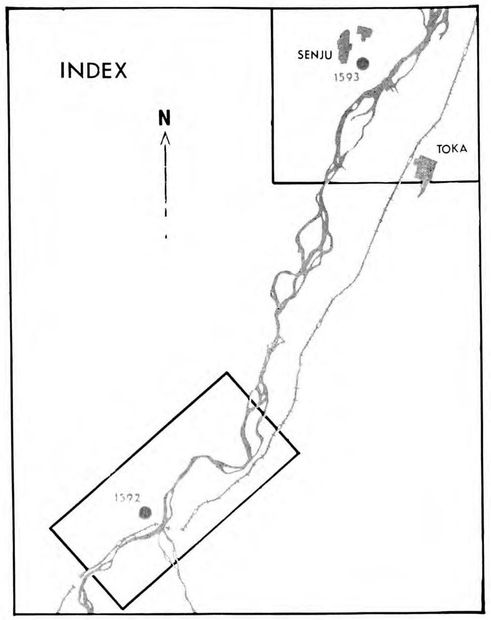
SINGLE TRACK RAILROADS
FEEDER RAILROADS
PRINCIPAL ROADS
POWER LINES

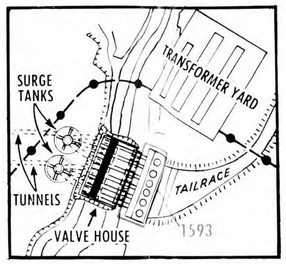
1077 . . FUKUSHIMA RR YARDS
1607 . . HORAI HYDRO PLANT
1665 . . SHINGAWA MFG. PLANT











STATUTE MILES 1 0 1 2 3

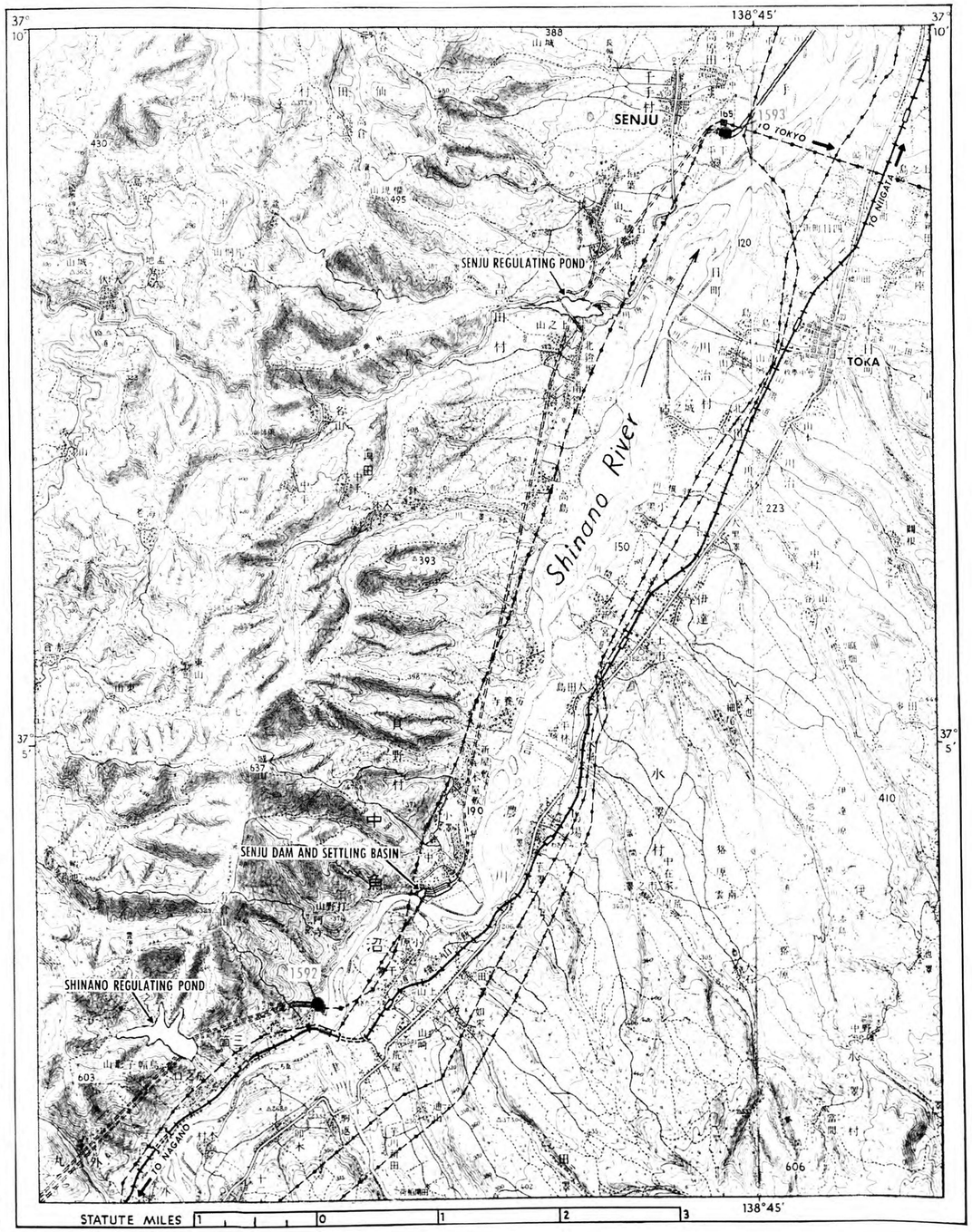
SENJU AND VICINITY

ELEVATIONS IN METERS

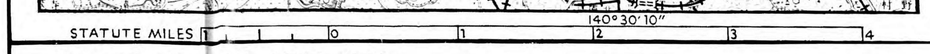
ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY
DATE OF ANALYSIS—AUGUST 1944

SINGLE TRACK RAILROADS
FEEDER RAILROADS
PRINCIPAL ROADS
POWER LINES
PRESSURE TUNNELS

1592 . . SHINANO HYDRO PLANT
1593 . . SENJU HYDRO PLANT



STATUTE MILES 1 0 1 2 3



STATUTE MILES 1 0 1 2 3 4

FUKUSHIMA AND VICINITY

ELEVATIONS IN METERS

ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY 1:50,000
DATE OF ANALYSIS AUGUST 1944

SINGLE TRACK RAILROADS
FEEDER RAILROADS
PRINCIPAL ROADS
POWER LINES

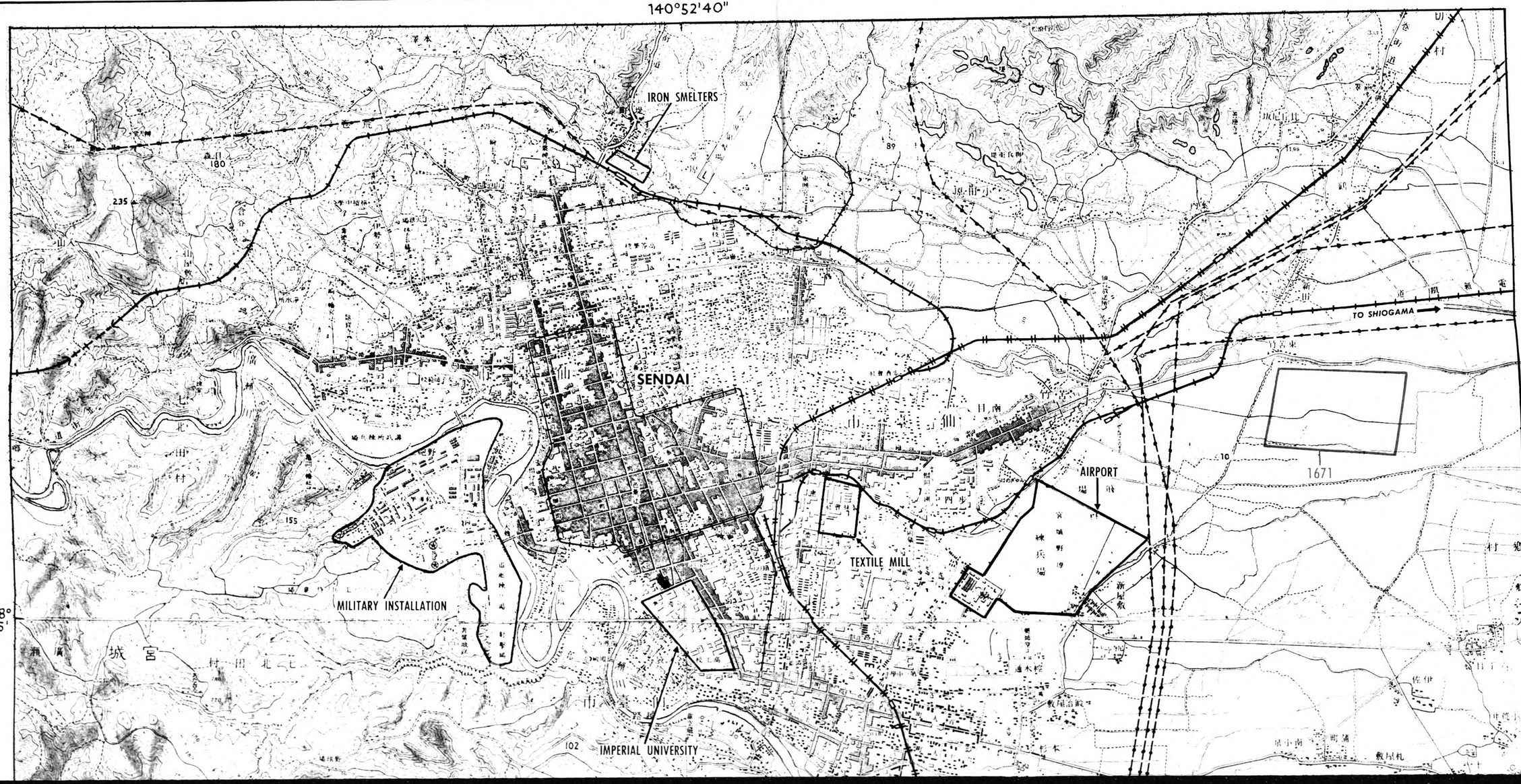
1077 . . FUKUSHIMA RR YARDS
1607 . . HORAI HYDRO PLANT
1665 . . SHINGAWA MFG. PLANT

CONFIDENTIAL equals British Confidential

3636-M-10—Niigata-Fukushima—8-24-44—First Proof

CONFIDENTIAL equals British Confidential

140°52'40"



SENDAI

AIRPORT

TEXTILE MILL

MILITARY INSTALLATION

IMPERIAL UNIVERSITY

TEXTILE MILLS

NAGAMACHI

LARGE NEW UNIDENTIFIED FACTORY

1671

1104

38° 15'

38° 15'

140°52'40"

STATUTE MILES 1 0 1 2

SENDAI AND VICINITY

ELEVATIONS IN METERS

DOUBLE TRACK RAILROADS
SINGLE TRACK RAILROADS
FEEDER RAILROADS
PRINCIPAL ROADS
POWER LINES

1104.. NAGAMACHI MARSHALLING YARDS
1671.. GOVERNMENT AIRCRAFT PARTS PLANT

ADAPTED FROM JAPANESE IMPERIAL LAND SURVEY 1:50,000
DATE OF ANALYSIS—AUGUST 1944

363—M-9—Niigata Fukushima—8-24-44—First Proof

CONFIDENTIAL equals British Confidential

CONFIDENTIAL

FUKUSHIMA

FUKUSHIMA PREFECTURE, HONSHU, JAPAN

Scale 1:12,500

1/2 0 1/2 Miles

500 0 500 Meters

500 0 500 Yards

POLYCONIC PROJECTION

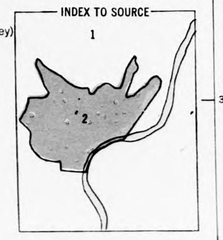
CONTOUR INTERVAL 20 METERS

Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces, .
under the direction of the Aeronautical Chart Service by the Lake Survey Branch.
Army Map Service, August 1944
Compiled from:
1. Japan 1:50,000, Japanese Imperial Land Survey, Fukushima (1933) (Trigonometric survey)
2. City Plan, pub. S. Soichi, Fukushima,1:5000 (1927) (diagrammatic plan)
3. Japanese Government Railway Timetable (1941) (railroad gauges)
Names transcribed according to modified Hepburn (Romaji) system

GLOSSARY

- -ji ..... temple
- -jinja, -jinsha, -sha ..... shrine
- -mura ..... town or village
- -chō, -machi ..... precinct

INDEX TO SOURCE



LEGEND

Factory	National or Prefectural road generally metalled over 4M wide or streets in city area	
Hospital	Other roads 2.4M wide	
Shrine	Road tracks or trails less than 2M wide	
Temple	Railroads	
Monument		
School		
Post Office	Railroad station	
Depth of Water 3.0	3'6" Gauge single track	
Cemetery	High Tension Power Line	
Densely Populated	Woodland	
Sparsely Populated	Rice	
Mulberry		

HEIGHTS AND DEPTHS IN METERS

FUKUSHIMA

FUKUSHIMA PREFECTURE, HONSHU, JAPAN

Scale 1:12,500

1/2 0 1/2 Miles

500 0 500 Meters

500 0 500 Yards

POLYCONIC PROJECTION

CONTOUR INTERVAL 20 METERS

Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces, under the direction of the Aeronautical Chart Service by the Lake Survey Branch.
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3. Japanese Government Railway Timetable (1941) (railroad gauges)
Names transcribed according to modified Hepburn (Romaji) system

GLOSSARY

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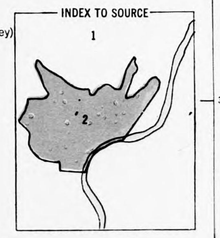
- -jinja, -jinsha, -sha ..... shrine
- -mura ..... town or village
- -chō, -machi ..... precinct

INDEX TO SOURCE



LEGEND

Factory
Hospital
Shrine
Temple
Monument
School
Post Office
Depth of Water
Cemetery
Densely Populated
Sparsely Populated
Mulberry

National or Prefectural road generally metalled over 4M wide or streets in city area
Other roads 2.4M wide
Road tracks or trails less than 2M wide
Railroads
Railroad station
3'6" Gauge single track
High Tension Power Line
Woodland
Rice

HEIGHTS AND DEPTHS IN METERS

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE U.S. ARMY, WASHINGTON, D.C. 340446
9-44 1944

M-11 [redacted]

FOR USE WITH AAF AIR OBJECTIVE FOLDER FUKUSHIMA 90.10

CONFIDENTIAL

CONFIDENTIAL [redacted]

KORIYAMA

FUKUSHIMA PREFECTURE, HONSHU, JAPAN

Scale 1:15,000

½ 0 ½ Miles

500 0 500 Meters

500 0 500 Yards

POLYCONIC PROJECTION

CONTOUR INTERVAL 20 METERS

Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General U. S. Army Air Forces, under the direction of the Aeronautical Chart Service by the Lake Survey Branch, Army Map Service, Detroit, Michigan, August 1944
Compiled from:

1. Japan 1:50,000, Japanese Imperial Land Survey, Koriyama (1933) (trigonometric survey - base map.)
2. City Plan, pub. Gaido-Sha, Koriyama, 1:6,000 (1930) (diagrammatic plan - streets, town area, loc. of buildings)
3. Road map of Fukushima Prefecture, pub. Osaka Mainichi; inset: Koriyama 1:25,000 (1930) (sketch map - streets, location of buildings)
4. Japanese Government Railway Timetable (1941) (railroad gauges)

Names transcribed according to modified Hepburn (Romaji) system

LEGEND

Factory
Hospital
Shrine
Temple
Chimney
School
Pagoda
Water Mill
Post Office
Depth of Water
Police Station
Densely Populated
Sparsely Populated
Woodland

National or Prefectural road generally metalled over 4M wide or streets in city area
Other roads 2.4M wide
Road tracks or trails less than 2M wide
Railroads
3'6" Gauge single track
3'6" Gauge, Double Track
Railroad station
High Tension Power Line
Grassland
Rice
Mulberry

HEIGHTS AND DEPTHS IN METERS

140°21′ 22′ 23′ 24′ 140°25′ 37°25′ 24′ 37°23′

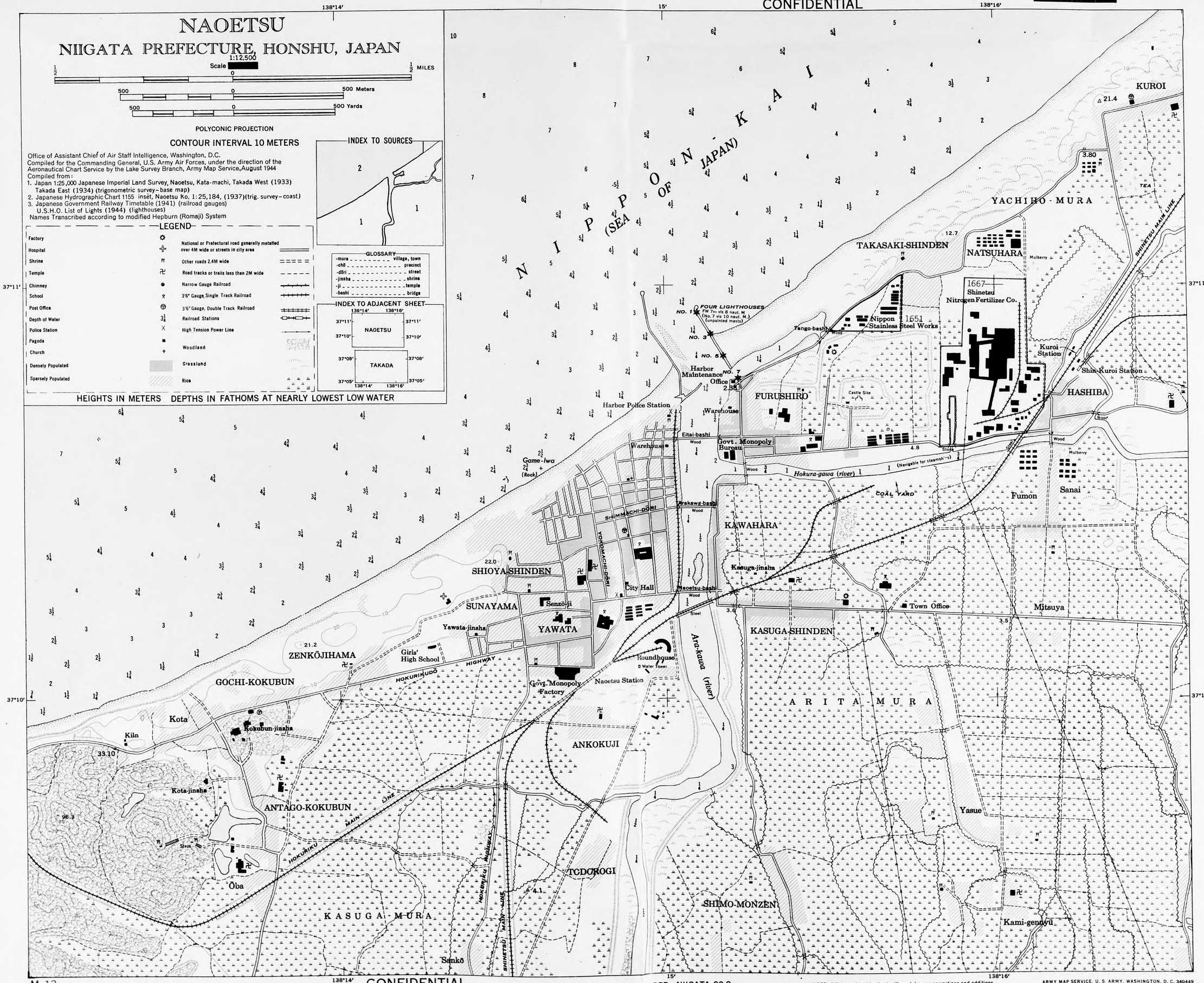
Takarasawa-numa (Pond)
Katsukisawa
Fukuhara
Town Office
Kita-Koizumi
Jimba
Ōkuma-bashi (BRIDGE)
Abukuma-gawa (River)
FUKUYAMA-MACHI
Kitamuki
Akuto
Shin-yashiki
Ōshima
Ōse-gawa (River)
Nishinouchi
Water Pumping Station
Orchard
Kiln
232.12
240.93
248.1
240.0
Wood
Stone
bamboo
0.5
1.6
2.0
TŌHOKU MAIN LINE
BANETSU EAST LINE
ŌTSUKI-ASAKA HIGHWAY
KUBOTA
Akutsu
249.3
Primary School
HOT SPRINGS
MOMOMIDAI
SHIMIZUSAKA
Oguchi Spinning Mill
Shimizudai Prostitution Quarters
226.96
1658
Northeast Aluminum Plant
Koriyama Light & Gas Co.
Standard Vacuum Oil Co.
Rising Sun Petroleum Co.
Yanagi Match Co.
YANAGUCHI
Hodogaya Soda Co.
Yasuhara
Chemical Factory
Government Buildings
Girls' High School
Forestry Office
Government Building
Electric Substation
Nittō Spinning Co. Factory No. 2
Nittō Spinning Co. Factory No. 1
Sara-numa (Pond)
Zendō-ji (Temple)
Primary School
Kōriyama Station
Tsurunosu
Shima
Daijin-gū (Shrine)
RACE TRACK
Kaisei-numa (Pond)
Filtration Bed
City Hall
REPORTED LOCATION OF SMALL BROADCASTING STATION
Public Hall
253.6
PUBLIC PARK
Tax Office
Court of Appeals
DOMAICHO
TANGOSHICHO
TSUTSUMISHITA
HIUCHIDA
AMIDACHO
Yokotsuka
Electric Substation
Kaiseizan
Kaisei Primary School
Taishinden-minami
Asaka Middle School
Government Monopoly Bureau
Primary School
Ara-Ike (Pond)
228.22
Japan Refining Co.
1088
Yokokawa
Dai Nippon Bōseki (Spinning) Co. Katakura Mill
Workers' Houses
SAIKON-YASHIKI
1655
229.01
Railroad Shops
KOHARADA
Haryū
252.0
Abukuma-gawa (River)

M-12 [redacted] CONFIDENTIAL

FOR USE WITH AAF AIR OBJECTIVE FOLDER FUKUSHIMA 90.10

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE, U. S. ARMY, WASHINGTON, D. C. 340453
SEPTEMBER 1944

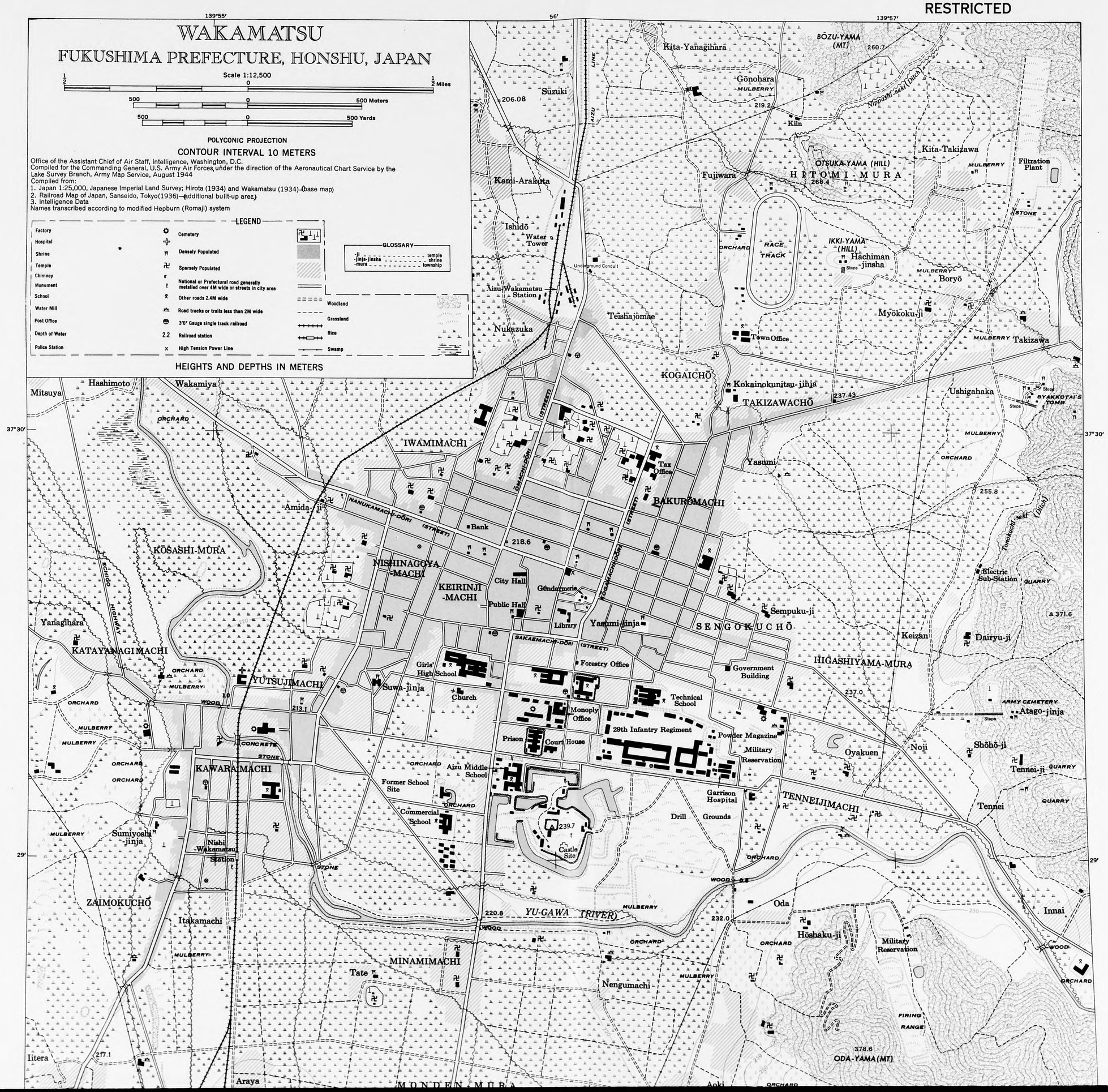


FOR USE WITH AAF AIR OBJECTIVE FOLDER NIIGATA 90.9

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE, U. S. ARMY, WASHINGTON, D. C. 340449
AUGUST, 1944

RESTRICTED


WAKAMATSU
FUKUSHIMA PREFECTURE, HONSHU, JAPAN
Scale 1:12,500
1/2 0 1/2 Miles
500 0 500 Meters
500 0 500 Yards
POLYCONIC PROJECTION
CONTOUR INTERVAL 10 METERS
Office of the Assistant Chief of Air Staff, Intelligence, Washington, D.C.
Compiled for the Commanding General, U.S. Army Air Forces, under the direction of the Aeronautical Chart Service by the Lake Survey Branch, Army Map Service, August 1944
Compiled from:
1. Japan 1:25,000, Japanese Imperial Land Survey; Hirota (1934) and Wakamatsu (1934)—(base map)
2. Railroad Map of Japan, Sanseido, Tokyo(1936)—(additional built-up area)
3. Intelligence Data
Names transcribed according to modified Hepburn (Romaji) system
LEGEND
Factory
Hospital
Shrine
Temple
Chimney
Monument
School
Water Mill
Post Office
Depth of Water
Police Station
Cemetery
Densely Populated
Sparsely Populated
National or Prefectural road generally metalled over 4M wide or streets in city area
Other roads 2.4M wide
Road tracks or trails less than 2M wide
3'6" Gauge single track railroad
2.2 Railroad station
High Tension Power Line
Woodland
Grassland
Rice
Swamp
GLOSSARY
-ji temple
-jinja-jinsha shrine
-mura township
HEIGHTS AND DEPTHS IN METERS
139°55'
56'
139°57'
37°30'
29'
Kita-Yanagihara
BŌZU-YAMA (MT)
260.7
Gōnohara
MULBERRY
219.2
Kiln
Nippashi-seki (Ditch)
Suzuki
206.08
AIZU LINE
Kita-Takizawa
MULBERRY
Filtration Plant
ŌTSUKA-YAMA (HILL)
HITOMI-MURA
268.4
Fujiwara
Kami-Arakuta
Ishidō
Water Tower
ORCHARD
RACE TRACK
IKKI-YAMA (HILL)
Hachiman-jinsha
Steps
STONE
MULBERRY
Boryō
Underground Conduit
Aizu-Wakamatsu Station
Teishajōmae
Myōkoku-ji
Nukazuka
Town Office
MULBERRY
Takizawa
KOGAICHŌ
Kokainokunitsu-jinja
TAKIZAWACHŌ
237.43
Ushigahaka
BYAKKOTAI'S TOMB
Steps
Mitsuya
Hashimoto
Wakamiya
ORCHARD
IWAMIMACHI
ŌMACHI-DŌRI (STREET)
Tax Office
Yasumi
MULBERRY
ORCHARD
255.8
BAKURŌMACHI
Amida-ji
NANUKAMACHI-DŌRI (STREET)
Bank
218.6
KŌSASHI-MURA
NISHINAGOYA-MACHI
KEIRINJI-MACHI
City Hall
Gendarmerie
Public Hall
Library
Yasumi-jinja
KŌGAMACHI-DŌRI (STREET)
Sempuku-ji
Electric Sub-Station
QUARRY
371.6
Tonokuchi-seki (Ditch)
Yanagihara
ECHIGO HIGHWAY
KATAYANAGIMACHI
SAKAEMACHI-DŌRI (STREET)
Forestry Office
Keizan
Dairyu-ji
HIGASHIYAMA-MURA
Girls' High School
Government Building
ORCHARD
MULBERRY
YUTSUJIMACHI
Suwa-jinja
Church
Technical School
237.0
ARMY CEMETERY
Atago-jinja
Steps
WOOD
213.1
Monoply Office
29th Infantry Regiment
Powder Magazine
Military Reservation
MULBERRY
CONCRETE
STONE
Prison
Court House
Oyakuen
Noji
Shōhō-ji
Tennei-ji
QUARRY
KAWARAMACHI
ORCHARD
Aizu Middle School
Former School Site
Garrison Hospital
TENNEIJIMACHI
Tennei
QUARRY
Commercial School
Drill Grounds
MULBERRY
Sumiyoshi-jinja
Nishi-Wakamatsu Station
239.7
Castle Site
ORCHARD
STONE
WOOD
ZAIMOKUCHŌ
Oda
Innai
220.8
YU-GAWA (RIVER)
MULBERRY
232.0
Itakamachi
WOOD
ORCHARD
Hōshaku-ji
Military Reservation
MULBERRY
MINAMIMACHI
Tate
Nengumachi
MULBERRY
ORCHARD
FIRING RANGE
378.6
ODA-YAMA (MT)
Iitera
217.1
Araya
MONDEN-MURA
Aoki
ORCHARD

Post Office
Depth of Water
Police Station
3'6" Gauge single track railroad
2.2 Railroad station
× High Tension Power Line
Rice
Swamp

HEIGHTS AND DEPTHS IN METERS

Nukazuka
Town Office
MULBERRY
Takizawa
KOGAICHŌ
Kokainokunitsu-jinja
TAKIZAWACHŌ
237.43
Ushigahaka
Steps
BYAKKOTAI'S TOMB
Hashimoto
Wakamiya
Mitsuya
ORCHARD
37°30′
IWAMIMACHI
OMACHI-DŌRI (STREET)
Tax Office
Yasumi
MULBERRY
ORCHARD
255.8
BAKUROMACHI
Amida-ji
NANUKAMACHI-DŌRI (STREET)
Bank
218.6
KŌSASHI-MURA
NISHINAGOYA-MACHI
KEIRINJI-MACHI
City Hall
Gendarmerie
Public Hall
Library
KOGAMACHI-DŌRI (STREET)
Yasumi-jinja
Sempuku-ji
Tonokuchi-seki Ditch
Electric Sub-Station
QUARRY
△371.6
SENGOKUCHŌ
Keizan
Dairyu-ji
Yanagihara
KATAYANAGIMACHI
SAKAEMACHI-DŌRI (STREET)
Forestry Office
Government Building
HIGASHIYAMA-MURA
YUTSUJIMACHI
Girls' High School
Suwa-jinja
Church
237.0
ARMY CEMETERY
Atago-jinja
Technical School
Monoply Office
29th Infantry Regiment
Powder Magazine
Military Reservation
Prison
Court House
Oyakuen
Noji
Shōhō-ji
Tennei-ji
QUARRY
KAWARA-MACHI
Aizu Middle School
Former School Site
Garrison Hospital
TENNEIJIMACHI
Tennei
Commercial School
Drill Grounds
239.7
Castle Site
29′
Sumiyoshi-jinja
Nishi-Wakamatsu Station
STONE
WOOD
0.8
ZAIMOKUCHŌ
Itakamachi
220.8
YU-GAWA (RIVER)
Oda
232.0
Hōshaku-ji
Military Reservation
Innai
MINAMIMACHI
Tate
Nengumachi
FIRING RANGE
378.6
ODA-YAMA (MT)
Iitera
217.1
Araya
MONDEN-MURA
219.19
Aoki
Shimmura
AIZU LINE
MULBERRY NIKKO HIGHWAY
Tokuhisa
Nakano
473.0
37°28′
139°55′
56′
139°57′

M-14 RESTRICTED

FOR USE WITH AAF AIR OBJECTIVE FOLDER FUKUSHIMA 90.10

NOTE. Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE, U. S. ARMY, WASHINGTON, D. C. 340452
8-44 1944

RESTRICTED

YAMAGATA

YAMAGATA PREFECTURE, HONSHU, JAPAN

Scale 1:12,500

½ 0 ½ Miles

500 0 500 Meters

500 0 500 Yards

POLYCONIC PROJECTION

CONTOUR INTERVAL 10 METERS

Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces, under the direction of the Aeronautical Chart Service by the Lake Survey Branch, Army Map Service, August, 1944
Compiled from:

1. Japan 1:25,000, Japanese Imperial Land Survey, Yamagata North and South (1934) (trigonometric survey—base map)
2. City Plan, pub. Kozawa, Yamaguchi, 1:6,000 (1932) (diagrammatic sketch—railroad spurs, parks, location of buildings, additional streets and city area)
3. Japanese Government Railway Timetable (1941) (railroad gauges)

Names transcribed according to Modified Hepburn (Romaji) System

LEGEND

Factory
Hospital
Shrine
Temple
Chimney
Monument
School
Water Mill
Post Office
Depth of Water
Police Station
Cemetery
Woodland
Grassland

National or Prefectural road
generally metalled over 4 m wide, or streets in city area
Other roads 2.4 m wide
Road track or trail less than 2 m wide
High tension power line
Railroads
3'6" Gauge, Single Track
3'6" Gauge, Doube Track
0.5 Railroad Station
Densely Populated
Sparsely Populated
Rice
Mulberry

GLOSSARY

-bashi bridge
-mura village, town
-ji temple
-jinsha shrine
-yama mountain

HEIGHTS AND DEPTHS IN METERS

140°20′ 21′ 140°22′ 38°16′ 15′

SHIMOJOMACHI
SAKANAMACHI
KAJIMACHI
YOKKAMACHI
ATHLETIC GROUND
CHITOSE PARK
UMAMIGASAKI BASHI
Town Office
Yambe
Sōtsuki
School for Deaf, Dumb and Blind
Third Primary School
Kita-Yamagata Hotel
Yakushi-dō (Temple)
Primary School
Technical School
Middle School
Electric Substation
133.1
Prefectural Assembly
Prefectural Office
Courthouse
Tax Office
MUIKAMACHI
TSUKIJICHŌ
Infantry 32nd Regiment
POWDER MAGAZINE
Prison
Meteorological Station
Hospital
Library
Athletic Hall
City Hall
Barracks
Military Reservation
Normal School
Bank
Public Hall
Army Hospital
Business Center
Methodist
Yoshida Hospital
SAKAZUKI-YAMA
278.5
15′
TAMANOICHŌ
Regimental and Defense Headquarters
Girls' High School
Senshō-ji
145.93
NANUKAMACHI
Drill Ground
KASUMICHŌ
Methodist Church
First Primary School
Fish Market
Hasegawa Spinning Mill
380.1
Girls' Normal School
Electric Company
KOSHIRAKAWAMACHI
Sixth Primary School
Electro Chemical Plant
TOKAMACHI
Fifth Primary School
Prostitution Quarter
College
Umamigasaki-gawa (River)
Water Tower
Yamagata Station
Tanks
Gas Co
Coal Shed
Government Monopoly Office
PARK
190.4
SASAYA HIGHWAY
Second Primary School
Standard Oil Co
Warehouse
Tank
Forestry Office
Suwa Jinsha
KOSHŌMACHI
Gendarmerie
Rising Sun Petroleum Co
128.03
Sericultural Laboratory
SOIGEN-KLE RESERVOIR
LINE
FINE
Filtration Plant
ITSUKAMACHI
UWAMACHI
YŌKAMACHI
MIKKAMACHI
UEHU HIGHWAY
Hachiman Jinja
Commercial School
TEPPŌMACHI
Kumanobe
Silkworm Propagation Plant
Agricultural Experiment Station
Maeta
Manshō-ji
38°14′
Crematory
IKKAN-SHIMIZU-BASHI
STONE
FIRING RANGE
CHITOSE-YAMA
471.7
MAIN LINE
OU
TAKIYAMA
MURA
ORCHARD
Hirashimizu
537.5
Motoki
Ishitori
1293
Otatsu
QUARRY
140°20′
21′
140°22′

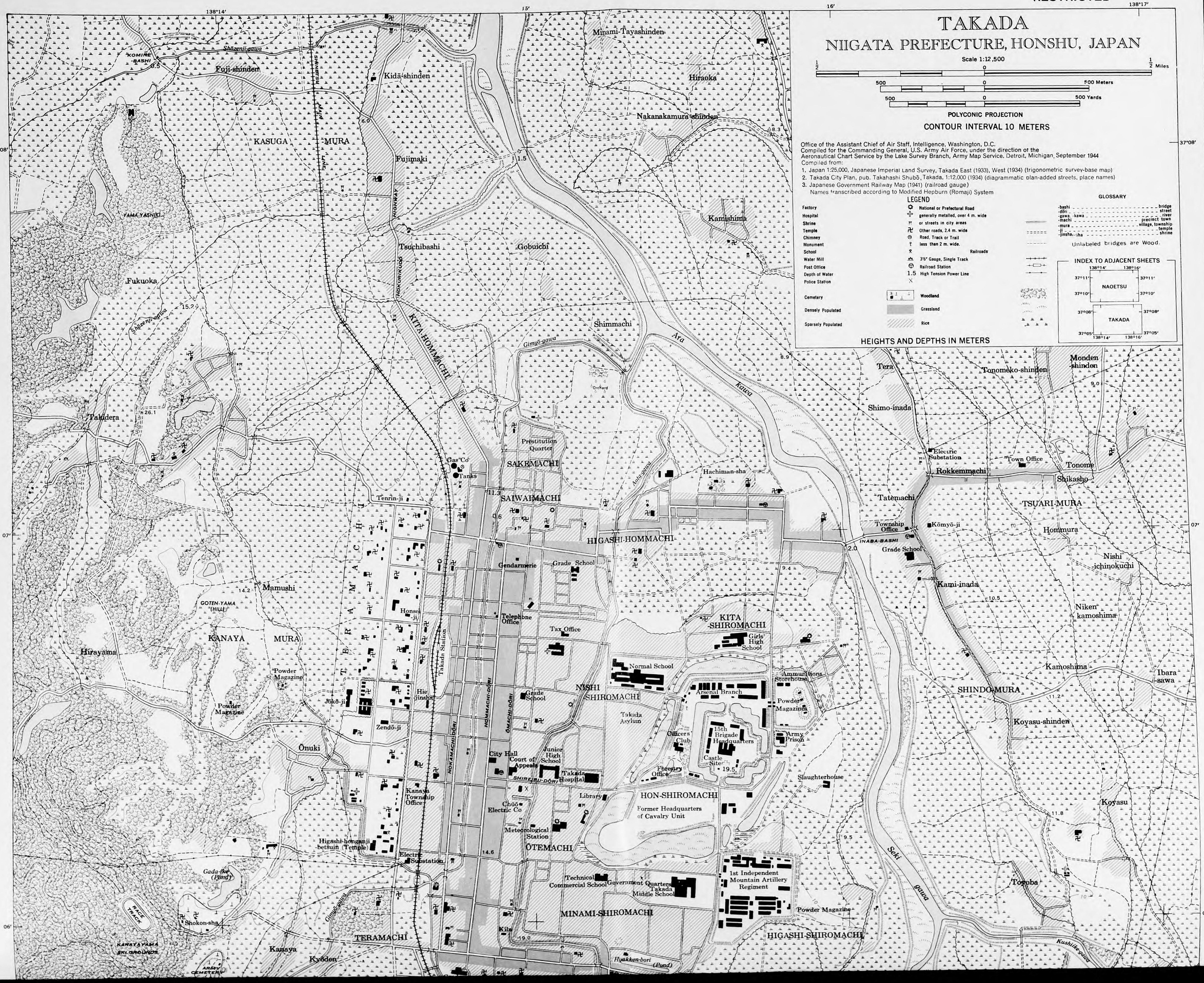
M-15 RESTRICTED

FOR USE WITH AAF AIR OBJECTIVE FOLDER FUKUSHIMA 90.10

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE, U. S. ARMY, WASHINGTON, D. C., 340447
8-44 1944

RESTRICTED



TAKADA
NIIGATA PREFECTURE, HONSHU, JAPAN
Scale 1:12,500
1/2 0 1/2 Miles
500 0 500 Meters
500 0 500 Yards
POLYCONIC PROJECTION
CONTOUR INTERVAL 10 METERS
Office of the Assistant Chief of Air Staff, Intelligence, Washington, D.C.
Compiled for the Commanding General, U.S. Army Air Force, under the direction of the Aeronautical Chart Service by the Lake Survey Branch, Army Map Service, Detroit, Michigan, September 1944
Compiled from:
1. Japan 1:25,000, Japanese Imperial Land Survey, Takada East (1933), West (1934) (trigonometric survey-base map)
2. Takada City Plan, pub. Takahashi Shubō, Takada, 1:12,000 (1934) (diagrammatic plan-added streets, place names)
3. Japanese Government Railway Map (1941) (railroad gauge)
Names transcribed according to Modified Hepburn (Romaji) System
LEGEND
Factory
Hospital
Shrine
Temple
Chimney
Monument
School
Water Mill
Post Office
Depth of Water
Police Station
Cemetery
Densely Populated
Sparsely Populated
National or Prefectural Road
generally metalled, over 4 m. wide
or streets in city areas
Other roads, 2.4 m. wide
Road, Track or Trail
less than 2 m. wide.
Railroads
3'6" Gauge, Single Track
Railroad Station
1.5 High Tension Power Line
Woodland
Grassland
Rice
GLOSSARY
-bashi bridge
-dōri street
-gawa, -kawa river
-machi precinct town
-mura village, township
-ji temple
-jinsha, -sha shrine
Unlabeled bridges are Wood.
INDEX TO ADJACENT SHEETS
NAOETSU
TAKADA
HEIGHTS AND DEPTHS IN METERS
138°14'
138°16'
138°17'
37°08'
37°07'
37°06'
Minami-Tayashinden
Fuji-shinden
Kidā-shinden
Hiraoka
Nakanakamura-shinden
KASUGA MURA
Fujimaki
Kamishima
Tsuchibashi
Gobuichi
Fukuoka
Shimmachi
KITA-HOMMACHI
Ara kawa
Tera
Tonomeko-shinden
Monden-shinden
Shimo-inada
Takidera
Prostitution Quarter
SAKEMACHI
Gas Co
Tanks
Electric Substation
Town Office
Tonome
Rokkemmachi
Shikasho
Hachiman-sha
SAIWAIMACHI
Tatemachi
TSUARI-MURA
Township Office
Kōmyō-ji
Hommura
HIGASHI-HOMMACHI
Grade School
Nishi-ichinokuchi
Gendarmerie
Kami-inada
Mamushi
Telephone Office
Tax Office
KITA-SHIROMACHI
Girls' High School
Niken-kamoshima
KANAYA MURA
Hirayama
Normal School
Kamoshima
Ibara-sawa
Powder Magazine
Ammunitions Storehouse
Arsenal Branch
SHINDO-MURA
Jōkō-ji
Hie-jinsha
NISHI-SHIROMACHI
Takada Asylum
Powder Magazine
Koyasu-shinden
Zendō-ji
Officers' Club
15th Brigade Headquarters
Army Prison
Ōnuki
City Hall
Court of Appeals
Junior High School
Castle Site
Takada Hospital
Forestry Office
Slaughterhouse
Kanaya Township Office
Library
HON-SHIROMACHI
Former Headquarters of Cavalry Unit
Koyasu
Chūō Electric Co
Meteorological Station
Higashi-honganji-betsuin (Temple)
ŌTEMACHI
Electric Substation
Technical Commercial School
Government Quarters
Takada Middle School
1st Independent Mountain Artillery Regiment
Toyoba
Gada-ike (Pond)
Powder Magazine
MINAMI-SHIROMACHI
Shokon-sha
TERAMACHI
HIGASHI-SHIROMACHI
Kanaya
Kyōden
Hyakken-bori (Pond)
Seki gawa
Kushiike-gawa
Takada Station
KOMINE-BASHI
YAMA-YASHIKI
GOTEN-YAMA (HILL)
KANAYAYAMA SKI GROUNDS
ARMY CEMETERY
RACE TRACK

M-16 RESTRICTED

FOR USE WITH AAF AIR OBJECTIVE FOLDER NIIGATA 90.9

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE, U.S. ARMY, WASHINGTON, D.C. 340477
SEPTEMBER, 1944

RESTRICTED

NIIGATA
NIIGATA PREFECTURE, HONSHU, JAPAN
Scale 1:12,500
½ 0 ½ Mile
500 0 500 Meters
500 0 500 Yards
POLYCONIC PROJECTION
CONTOUR INTERVAL 10 METERS
Office of the Assistant Chief of Air Staff, Intelligence, Washington, D. C.
Compiled for the Commanding General, U. S. Army Air Forces,
under the direction of the Aeronautical Chart Service by the Lake Survey Branch,
Army Map Service, Detroit, Michigan, August 1944.
Compiled from:
1. Japan 1:25,000, Japanese Imperial Land Survey, Niigata North and South (1935) (trigonometric survey—base map)
2. Japanese Hydrographic Chart 1155, inset; 1:25,000 (1937) (trigonometric survey—shoreline, river changes, additional streets and built up areas
3. Japanese City Plan 1:11,500 (c.1936) (diagrammatic plan--river changes, harbor development, location of bldgs.)
4. Niigata City Map 1:12,000 (c.1936) (reconnaissance survey-streets, names, buildings, river project)
5. Map of Niigata Harbor, pub. Harbor Development Co.1:10,000 (1928) (Sketch map - buildings, R.R. spurs)
6. Niigata Harbor Development Co. Enterprise guide Map, 1:6,000 (1926) (Sketch map - projected docks)
7. Japanese Government Railway Timetable (1941) (railroad gauges)
8. U.S.H.O. List of Lights (1944) (Lighthouses)
9. Intelligence data, 1944 (Names of industries)
Names transcribed according to Modified Hepburn (Romaji) system
GLOSSARY
-ji temple
-dōri street
-gawa, -kawa river
-jinsha shrine
-chō precinct
INDEX TO SOURCES
LEGEND
Factory
Hospital
Shrine
Temple
Chimney
Monument
School
Post Office
Depth of Water
Police Station
Cemetery
Densely Populated
Sparsely Populated
National or Prefectural Road Generally Metalled over 4m wide, or streets in city area
Other roads 2.4 m wide
Road track or trail less than 2m wide
Railroads
3'6" double track
3'6" single track
Narrow Gauge, Single Track
Railroad Station
High tension power line
Woodland
Grassland
Rice
Marsh
HEIGHTS IN METERS DEPTHS IN FATHOMS AT NEARLY LOWEST LOW WATER
139°01′
02′
03′
04′
139°05′
37°57′
56′
NIPPON-KAI
(SEA OF JAPAN)
HARBOR LIMIT
LIGHTHOUSE OCC.W. EV. 4 SEC., 11M. VIS. 12 NAUT.M. (RED CIRCULAR TOWER)
LIGHTHOUSE (TEMPORARILY DISCONTINUED)
Niigata Oil Storage No. 1
Wharf No. 4
Niigata Chemical Industry Company
Log Pool
Niitsu Oil Refinery
REPORTED RAILROAD
NIIGATA AIRPORT APPROX. 2 MILES
Wharf No. 3
Kuwayama Sawmill
Toa Spinning Co.
Niigata Harbor Development Co
(SPECIAL HARBOR) Wharf No. 2
Wharf No. 1
Government Granaries
REPORTED RAILROAD ALIGNMENT APPROXIMATE
16.0
Nishi-Funami-chō
LOADING ZONE
Wood Working Plant
Briquette Factory
Yamanoshita Station
OLD LIGHTHOUSE
Metreological Station
Radio Tower
7.5
Home Ministry Shinanogawa Kawaguchi Office
10.2
Suya-jinsha
Yamanoshita Grade School
YAMANOSHITA
Niigata Iron Works (Plant No. 2)
CREMATORY
TSUKEFUNOCHŌ
Niigata Iron Works (Plant No. 1)
NORTH PIER
SHIN-KAWA
Niigata Oil Storage No. 2
Steam Generating Plant
Sulphuric Acid Plant
22.7
Niigata Carbide Company
Kiln
LIGHTHOUSE F.R. 5.2M. VIS. 10 NAUT.M. (WHITE CONCRETE TOWER)
Sakae Grade School
HIGORI-YAMA (HILL)
Irifuni Warehouse
Foundry
Gas Co
Tanks
Iribune Primary School
HISAMATSUCHŌ
Seamen's Home
Mie Spinning Mill
21.0
YOTSUYACHŌ
HIGORIYAMA BATHING BEACH
PUBLIC CEMETERY
YOKOSHICHIANCHŌ-DŌRI
Choon-ji
INARICHŌ
Monopoly Bureau
Warehouses
CENTER QUAY
LOADING DOCK
Niigata Steam Power Plant
Stone
Warehouses
Lumber Co
Harbor Office
YAKESHIMA - GATA (Inlet)
Customs Office
HIROKŌJI BATHING BEACH
FOREST RESERVE
Futaba Grade School
NISHI-MINATOMACHI-DŌRI
MINATOMACHI-DŌRI
HIGASHI-MINATOMACHI-DŌRI
Pulp Mill
Monopoly Bureau
Customs House
Hokuetsu Paper Mill
Prison
27.5
Toyoteru Grade School
Warehouses
Shunting Yard
Niitsu Station
YORII BATHING BEACH
NISHI-HORIMAE-DŌRI
FURUMACHI-DŌRI
HIGASHI-HORIMAE-DŌRI
HONCHŌ-DŌRI
KAMI-ŌKAWAMAE-DŌRI
College
Transport Co
REPORTED RECLAIMED
Sewage Plant
Church
Niigata Grade School
Niigata SteamshipCo
Nippon Oil Refinery
Lat. N. 37° 55′ 12.73″
Long. E. 139° 02′ 16.23″
Radio Tower
25.8
Filtration Plant
Red Cross
Library
Air Light in this block Gp FI RWG 36.5 m vis 39 naut m (Iron skeleton tower)
Bank of Japan
FUMOTO
Tax Office
City Hall
Normal School
Radio Tower
Bank
Japan Light Metals Co
Mitarai
Crematory

N I P P O N - K A I

(SEA OF JAPAN)

HARBOR LIMIT

OLD LIGHTHOUSE

Metreological Station

Radio Tower

Home Ministry Shinanogawa Kawaguchi Office

CREMATORY

HIGORI-YAMA (HILL)

HIGORIYAMA BATHING BEACH

HIROKOJI BATHING BEACH

YORI BATHING BEACH

GAKKOCHO BATHING BEACH

Sakae Grade School

YOTSUYACHO

PUBLIC CEMETERY

RESERVE FOREST

YOKOSHIMACHI-DORI

INARICHO

Choon-ji

Futaba Grade School

Prison

Gas Co

Tanks

Iriburo Primary School

Seaman's Home

Monopoly Bureau

Warehouses

Customs Office

Monopoly Bureau

Pulp Mill

NISHI-MINATOMACHI-DORI

MINATOMACHI-DORI

HIGASHI-MINATOMACHI-DORI

KAMIOKAWAMAE-DORI

Toyoten Grade School

Transport Co

Niigata SteamshipCo

College

Church

Niigata Grade School

Red Cross

Tax Office

Library

City Hall

Bank

Bank of Japan

FUMOTO

NISHI-HONMACHI-DORI

HONMACHI-DORI

HIGASHI-HONMACHI-DORI

FURUMACHI-DORI

SHINMACHI-DORI

SHINMACHI-BASHI BRIDGE

Radio Tower

Filtration Plant

Normal School

Medical College

Memorial Shrine

Church

Bank

Fudo-in(Temple)

Niigata Electric Co

Asano Cement Co

Girls' High School

Filtration Plant

Kagamibuchi Grade School

Public Works Office

Court of Appeals

Prefectural Office

PARK

Prefectural Assembly

Commercial School

Hakusan Station

HAKUSANURA

GAWA

SHINANO

Milk Co

POWDER MAGAZINE

POWDER MAGAZINES

RACE TRACK

Aoyama Crematory

Sekiya Station

Oil Refinery

Sulphuric Acid Plant

Stock Yard

Japan Light Metals Co.

ATHLETIC FIELD

Japan Company

Light Aluminium Metals Plant

Niigata Regional RR Office

Niigata Station

Railroad Yards

RYŪSAKUBA

Mulberry

Water Tower

Orchard

Concrete

Wood

NIIGATA ELECTRIC RAILROAD

PROPOSED RECLAIMED LAND

CHANNEL UNDER CONSTRUCTION

PROPOSED RECLAIMED LAND

IMPASSABLE LOCK

REPORTED RAILROAD EXTENSION (ALIGNMENT APPROXIMATE)

KAMI-TOKOROSHIMA

Town Office

REPORTED RECLAIMED

POSSIBLE TUNNEL

Plant

Briquette Factory

Yamanoshita Station

Suya-jinsha

YAMANOSHITA

Yamanoshita Grade School

Niigata Iron Works Plant No. 2

Niigata Oil Storage No. 2

Steam Generating Plant

Sulphuric Acid Plant

Niigata Carbide Company

Kiln

Mie Spinning Mill

Niigata Steam Power Plant

NORTH PIER

SHIN-KAWA

LIGHTHOUSE F.R. 5.2M. VIS. 10 NAUT.M. (WHITE CONCRETE TOWER)

CENTER QUAY

LOADING DOCK

Warehouses

Lumber Co

Harbor Office

YAKESHIMA - GATA (Inlet)

Hokuetsu Paper Mill 1

Shunting Yard

Sewage Plant

Nippon Oil Refinery

Crematory

Japan Light Metals Co

Minami Bori

Kita Bori

NAKAHIRI

UMAKOSHI

NAKAHIRI-DORI

Kambara

Handai Grade School

Girls' High School

Electric Substation

Electric Substation

Hakusan-jinsha

Nuttari Grade School

NAGAMINE

Kambara-jinsha

Shin-Kurinoki-Gawa

Nakahiri

KING FREIGHT LINE

SHINETSU MAIN LINE

Electric Substation

RESTRICTED

FOR USE WITH AAF AIR OBJECTIVE FOLDER NIIGATA 90.9

NOTE: Officers using this chart will mark hereon corrections and additions which come to their attention and mail direct to "AERONAUTICAL CHART SERVICE, HEADQUARTERS ARMY AIR FORCES, WASHINGTON, D. C."

ARMY MAP SERVICE, U.S. ARMY, WASHINGTON, D.C. 340445
SEPTEMBER, 1944

RELIEF MAP
OF
NORTHERN HONSHŪ

Mercator projection

Scale 1:1,000,000 at Latitude 35°

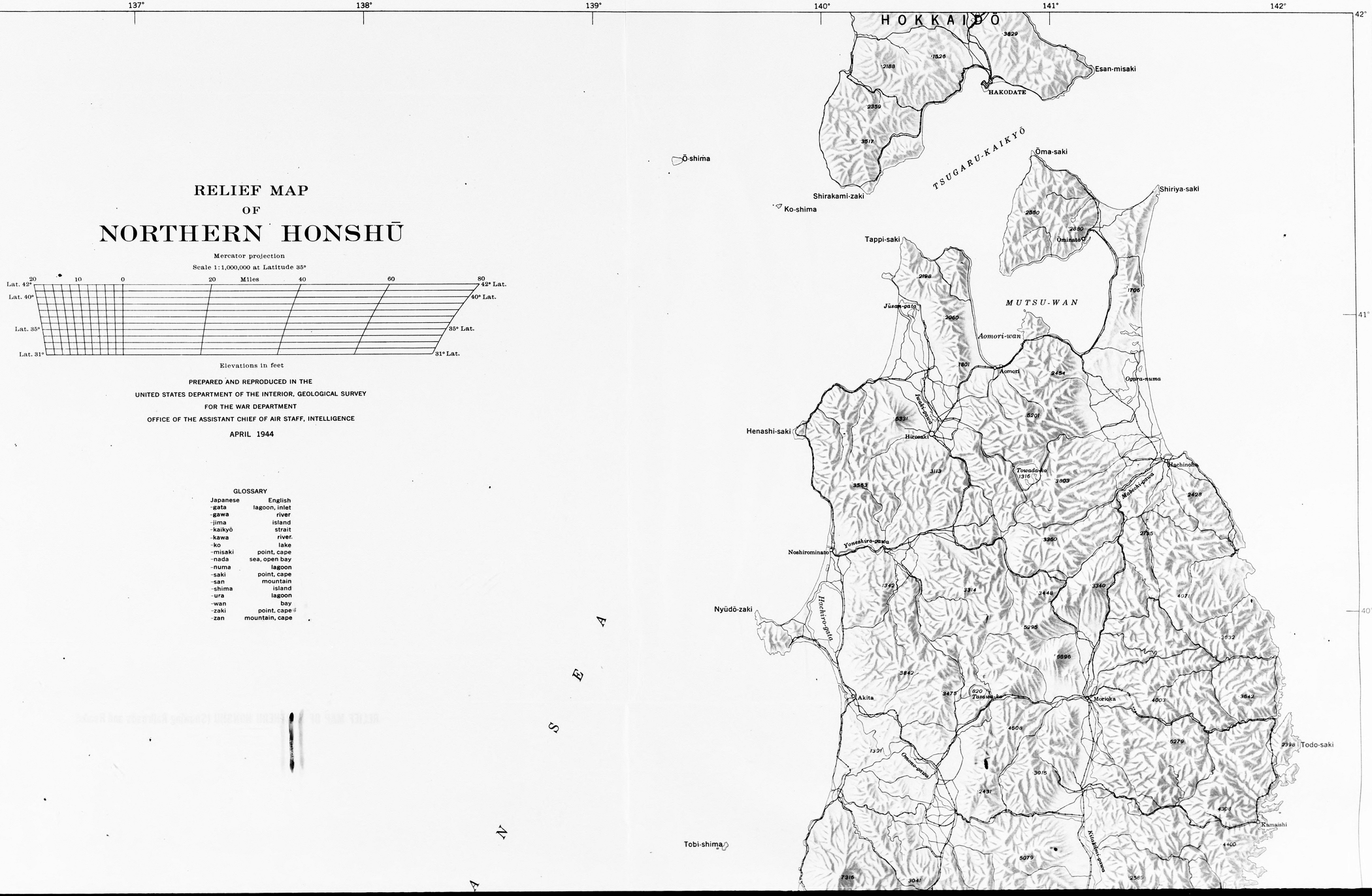
Elevations in feet

PREPARED AND REPRODUCED IN THE
UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY
FOR THE WAR DEPARTMENT
OFFICE OF THE ASSISTANT CHIEF OF AIR STAFF, INTELLIGENCE

APRIL 1944

GLOSSARY

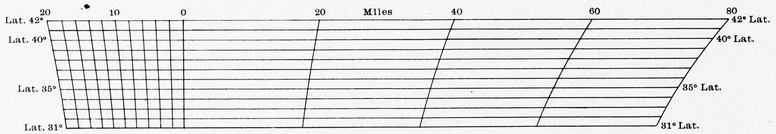
Japanese	English
-gata	lagoon, inlet
-gawa	river
-jima	island
-kaikyō	strait
-kawa	river.
-ko	lake
-misaki	point, cape
-nada	sea, open bay
-numa	lagoon
-saki	point, cape
-san	mountain
-shima	island
-ura	lagoon
-wan	bay
-zaki	point, cape
-zan	mountain, cape



RELIEF MAP
OF
NORTHERN HONSHŪ

Mercator projection

Scale 1:1,000,000 at Latitude 35°



Elevations in feet

PREPARED AND REPRODUCED IN THE

UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY

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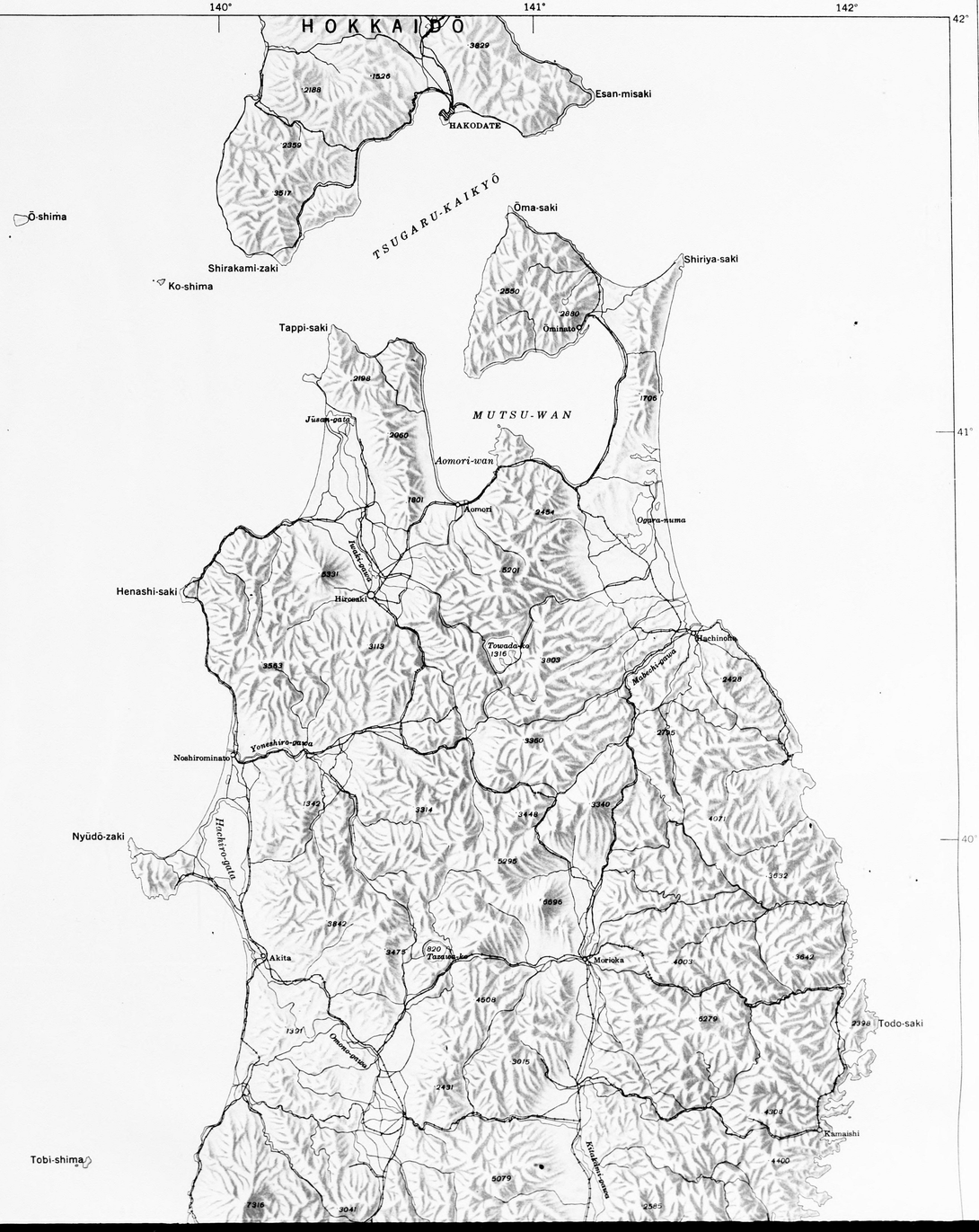

JAPAN SEA

PACIFIC OCEAN

Tobi-shima

Awa-shima

Hajiki-saki

SADO

Rokugō-saki

Toyama-wan

SENDAI-WAN

Todo-saki

Kamaishi

Kinka-zan

Ishinomaki

Shioya-saki

Sakata

Tsuruoka

Yamagata

SENDAI

NIIGATA

Yonezawa

Fukushima

Nagaoka

Wakamatsu

Kōriyama

Takada

Shirasuka

Nagano

Takaoka

Toyama

KANAZAWA

Ueda

Matsumoto

Maebashi

Takasaki

Kōfu

Ashikaga

Tochigi

Utsunomiya

Nikkō

Sukegawa

Mito

39°

38°

37°

Takaoka
Toyama
KANAZAWA
Nagano
Ueda
Matsumoto
Takayama
Fukui
Okaya
Kōfu
Iida
GIFU
Ogaki
Ichinomiya
Hikone
NAGOYA
Seto
Kuwana
Yokkaichi
Okazaki
Tsu
Matsuzaka
Uji-yamada
Toba
Daio-zaki
KUMANO-NADA
ISE-WAN
Mikawa-wan
TOYOHASHI
HAMAMATSU
Omae-saki
ENSHŪ-NADA
SHIZUOKA
Shimizu
Numazu
Fuji-san
12388
SURUGA-WAN
Iro-saki
SAGAMI-WAN
Atami
Hiratsuka
YOKOSUKA
Tateyamahojō
Nojima-zaki
Ō-shima
Nii-shima
Kōzu-shima
Miyake-jima
Mikura-jima
TŌKYŌ
Hachiōji
KAWASAKI
YOKOHAMA
TŌKYŌ-WAN
Chiba
Kawaguchi
Kawagoe
Kumagaya
Takasaki
Maebashi
Kiryū
Utsunomiya
Nikkō
Mito
Tochigi
Ashikaga
Sukegawa
Chōshi
Inubō-saki
PACIFIC OCEAN
BIWA-KO
136°
137°
138°
139°
140°
141°
142°
35°
34°
36°