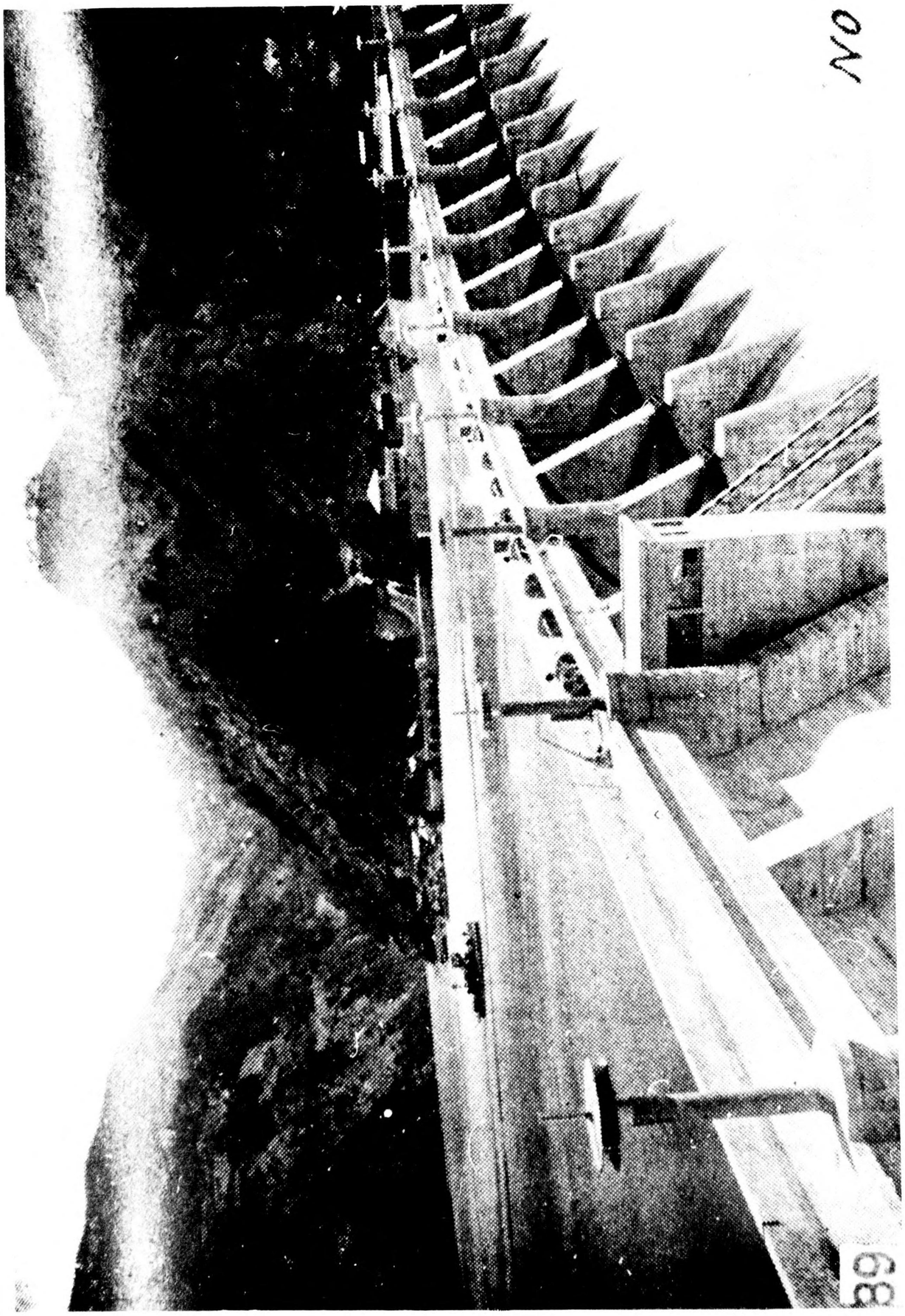
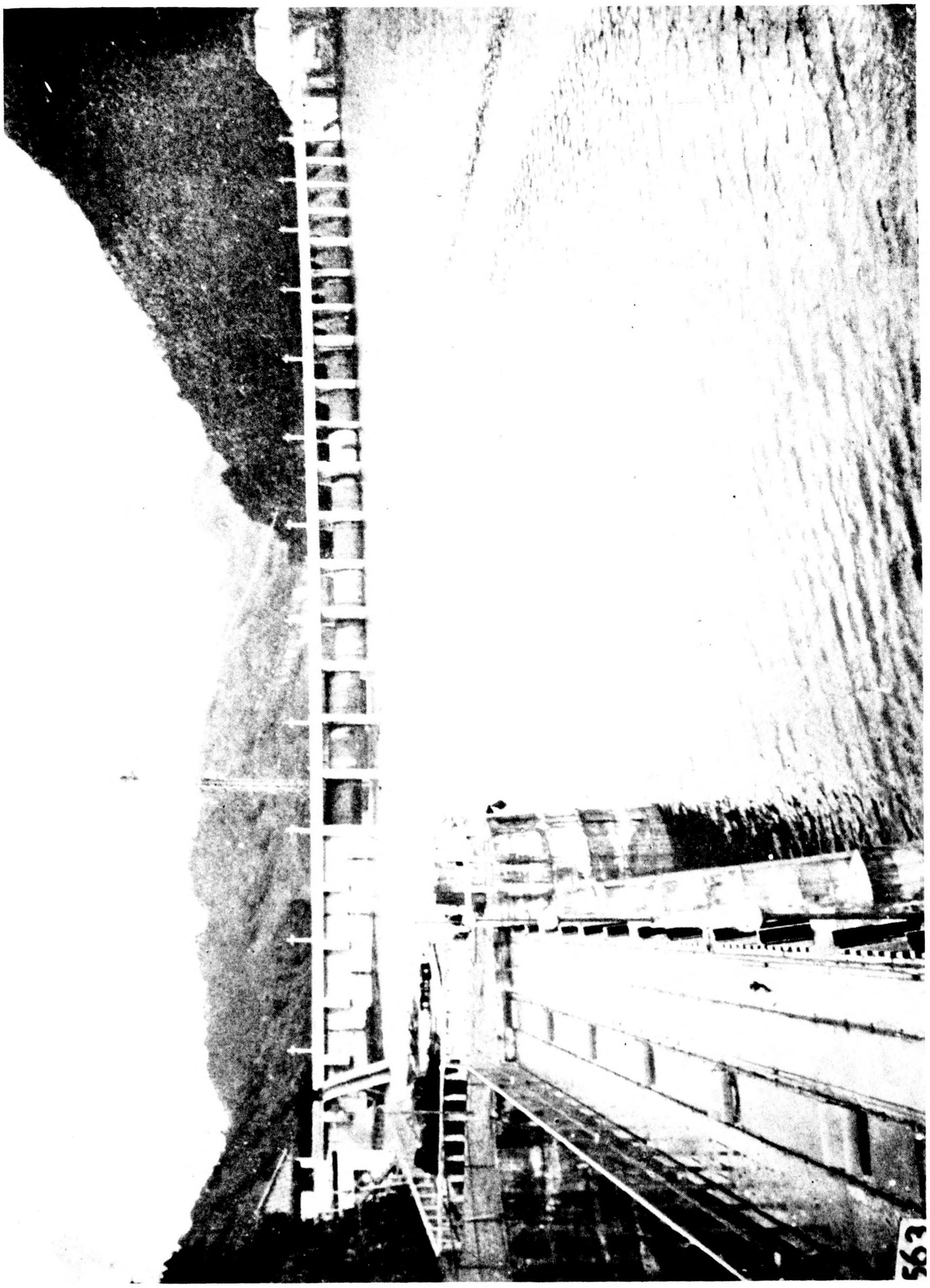


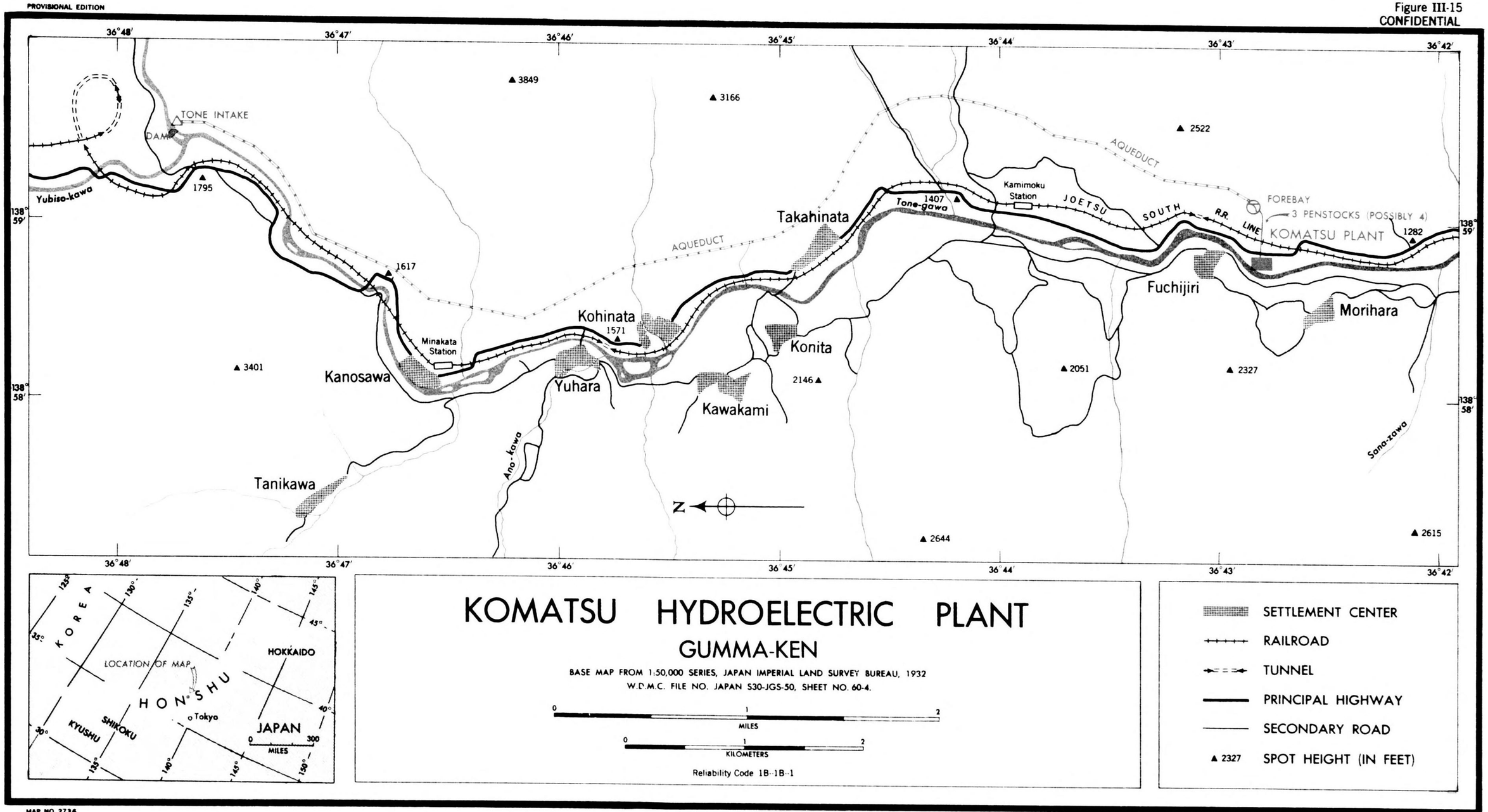
Photograph No. III-70 Komaki Hydro Plant dam in 1932



Photograph No. III-71 Komaki Hydro Plant dam and reservoir from upstream

PROVISIONAL EDITION

Figure III-15
CONFIDENTIAL



KOMATSU HYDROELECTRIC PLANT

GUMMA-KEN

BASE MAP FROM 1:50,000 SERIES, JAPAN IMPERIAL LAND SURVEY BUREAU, 1932
W.D.M.C. FILE NO. JAPAN S30-JGS-50, SHEET NO. 60-4.

0 1 2 MILES

0 1 2 KILOMETERS

Reliability Code 1B-1B-1

SETTLEMENT CENTER
RAILROAD
TUNNEL
PRINCIPAL HIGHWAY
SECONDARY ROAD
▲ 2327 SPOT HEIGHT (IN FEET)

MAP NO. 2736
18 NOVEMBER 1943

COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

Importance: Rank in Japan - 250 + ; rank in Shikoku supply area - 15 +

Date of Construction: Founded Feb 1920; in operation Dec 1938

Details: Particular capacities (in kw) - 1000 supp
Plant, external features - Of brick construction
Plant, equipment -
Boilers - 1 @ Heine-type, 180 lbs/in^2, 5280 ft^2, Heine-make
1 @ Heine-type, 200 lbs/in^2, 5425 ft^2
Turbines - 1 @ 1500 hp, Zoelly-type, EW-make
Generators - 1 @ 1250 kva, 3-ph, 3300 v, 3600 rpm, 60 cyc, Hitachi-make
Transformers - 3 @ 450 kva, 1-ph, 3.5,3.35,3.2/24 kv, D-D conn, water-cooled, 60 cyc, shell-type, Kawakita-make

Sources: ZKT 1939 p.1650; Ohm 12/27 p.540; DJY 1927; DJY 1929 pp.268,354

386. KOMBU HYDRO PLANT Approx. Lat. 42°48'
Long. 140°36'

Company: Hokkai Suiryoku Denki KK

Location: Plant - Minami Shiribetsu-mura, Isoya-gun, Hokkaido

Capacity Commonly in Use (in kw): 9000 (see Date of Construction)

Importance: Rank in Japan - 246; rank in Hokkaido supply area - 12

Source of Power: Shiribetsu-kawa

Date of Construction: Construction was begun Sept 1937, partly completed and in operation Dec 1938, and probably fully completed in 1939; in full operation Mar 1940

Details: Particular capacities (in kw) - *9000 installed cap; 2740 reg; 6260 spec
Eff head - 25.85 m; flow - 21.5 m^3/sec
Plant, equipment -
Turbines - 2 @ 4700 kw, vertical-shaft, Dengyosha-make
Generators - 2 @ 5625 kva, 3-ph, 3300 v, 200/240 rpm, 50/60 cyc, Shibaura-make
Transformers - At least 1 @ 5500 kva, 3-ph, 50/60 cyc, Shibaura-make

Sources: DnN 1940; Ohm 12/37 p.1456, 3/39 p.295; SR 1/39 p.4, 5/39 p.(1)

387. KOMI HYDRO PLANT Approx. Lat. 36°34'30"
Long. 137°23'

Company: Toyama-ken

Location: Plant - 905, Ienotaka-wari, Komi-oaza, Oyama-mura, Kami Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 11,900, as of Dec 1936

Importance: Rank in Japan - 194 ; rank in Osaka-Nagoya supply area - 83

Source of Power: Shomyo-gawa and Joganji-gawa

Date of Construction: Construction was begun Aug 1931 and completed Sept 1932; in operation Mar 1940

Details: Particular capacities (in kw) - *15,000 installed cap; 7000 reg; 4900 spec
Layout - Aqueduct-type
Eff head - 154.55 m; flow - 9.461 m^3/sec
Dam - Fixed part: of concrete construction, 25 m long, 1.3 m wide at top, and 3 m high above river bed
Intake and settling basin - 14.1 m wide, 39.7 m long, 4.2 m deep
Aqueducts - Main: tunnel 5403 m long, of concrete and reinforced concrete construction; culvert 115 m long, of reinforced concrete construction. Branch: tunnel 871 m long and culvert 318 m long, of reinforced concrete
Forebay - 18 m wide, 5.1 m deep, 46 m long
Penstocks - 1 @ 274 m long, dividing into 2 @ 5.638 m long
Plant, external features - Of reinforced concrete, 2 and 3 stories, 9.16 m x 19.56 m, and 15 m high; extensive switchgear directly in front of plant.
Plant, equipment -
Turbines - 2 @ 10,500 hp, Francis-type, vertical-shaft, Hitachi-make
Generators - 2 @ 9375 kva, 3-ph, 11,000 v, 600 rpm, 60 cyc, Hitachi-make
Transformers - 4 @ 9500 kva, 1-ph, 11/69,66,63 kv, D-Y conn, self-cooled, core-type, Hitachi-make
Other equipment - 2 exciters @ 60 kw; 1 crane @ 50-ton cap
Tail race - 479.08 m long, of reinforced concrete construction
Area served - Osaka and Nagoya

See: Photographs No. III-72, III-73, III-74, III-75, III-76
Figure No. III-11

Sources: DnN 1940; DnK; ZKT 1939 p.1909; Ohm 11/31 p.570, 10/32 p.561, 1/33 p.17, 2/33 p.123; Ohm-sha Guide 1933 p.17; DGS 5/33 p.353

388. KOMORO HYDRO PLANT

Approx. Lat. 36°19'30"
Long. 138°25'

Company: Toshin Denki KK

Location: Plant - Believed to be on the right bank of the Chikuma-gawa at 2170, Shiroshita-oaza, Komoro-machi, Kita Saku-gun, Nagano-ken

Capacity Commonly in Use (in kw): 13,400, as of Dec 1936

Importance: Rank in Japan - 166 ; rank in Tokyo supply area - 65

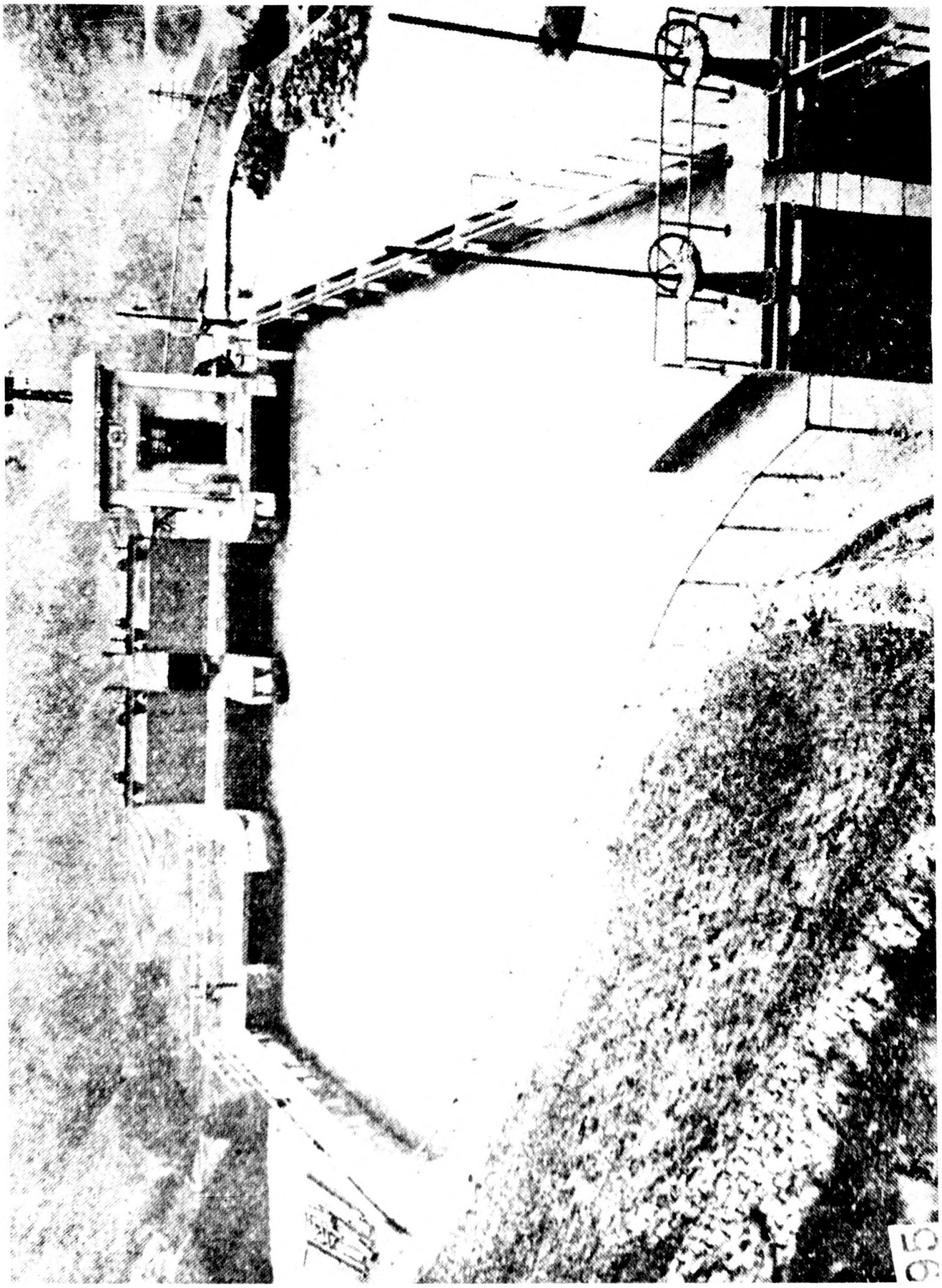
Source of Power: Chikuma-gawa and Yuno-gawa of the Shinano-gawa system

Date of Construction: Completed Nov 1927; in operation Mar 1940

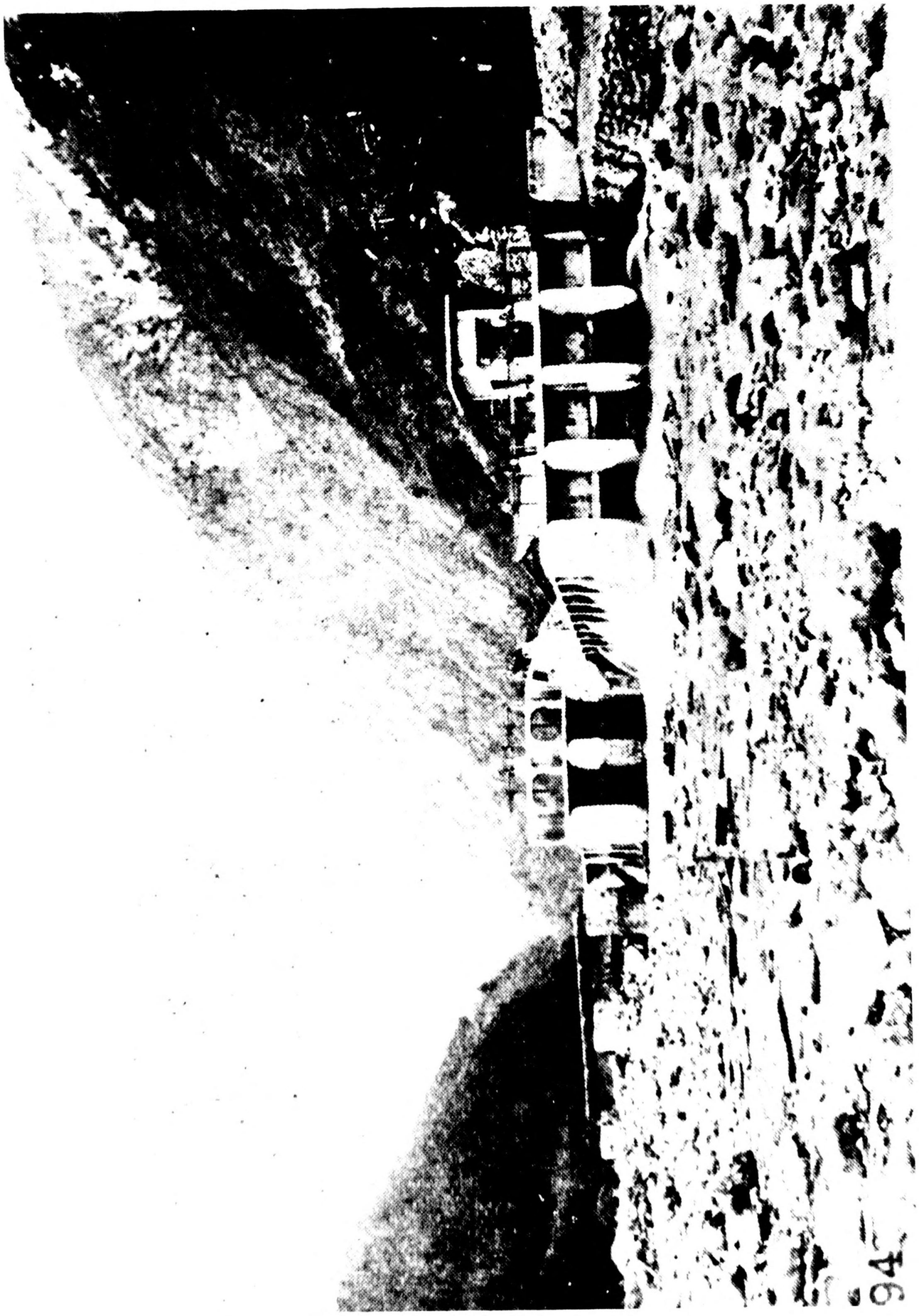
Photograph No. III-72 Komi Hydro Plant in 1933

Photograph No. III-73 Komi Hydro Plant in 1933, from the rear

Photograph No. III-74 Komi Hydro Plant in 1933



Photograph No. III-75 Komi Hydro Plant forebay in 1933



Photograph No. III-76 Komi Hydro Plant dam of the branch aqueduct in 1933

Details: Particular capacities (in kw) - *22,200 installed cap; 7400 reg; 6000 spec; 14,800 reg pk
Layout - Aqueduct-type
Eff head - 65 m; flow - 27.82 m^3/sec
Aqueduct - Siphon with inner diam 3.78 m crosses Kuriya-gawa
Penstocks - 2
Plant, external features - Of concrete construction, 4 stories high, with peaked roof, surrounded by cultivated fields in an open flat area
Plant, equipment -
Turbines - 3 @ 10,700 hp, reaction-type, vertical-shaft, Hitachi-make
Generators - 3 @ 9250 kva, 3-ph, 6600 v, 333 rpm, 50 cyc, Hitachi-make
Other equipment - 3 exciters @ 70 kw; pumping apparatus installed

See: Photographs No. III-77, III-78

Sources: DnN 1940; DJY 1929 p.295; DnK; Ohm 11/27 pp.462,504, 2/28 p.134, 6/31 supp p.6, 3/33 p.130, 10/33 opp p.561; Ohm-sha Guide 1933 p.10; HSG p.211

389. KONAGAI HYDRO PLANT

Company: Tokyo Dento KK

Location: Plant - Shizuoka-ken; exact location unknown

Capacity Commonly in Use (in kw): 92,000 (see Date of Construction)

Importance: If completed, would be 14th largest plant in Japan

Source of Power: Unknown

Date of Construction: Under construction Dec 1933; no evidence of completion has been received

Sources: Ohm 6/34 p.401; TD Map

390. KONAKASHIMA NO. 3 HYDRO PLANT Approx. Lat. 40°22'30" Long. 141°17'

Company: Aomori-ken; formerly Hachinoe Suiryoku Denki KK

Location: Plant - 57, Kawara-aza, Umechi-oaza, Tomesaki-mura, Sannoe-gun, Aomori-ken

Capacity Commonly in Use (in kw): 1200, as of June 1928

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 20 +

Source of Power: Mabuchi-gawa

Date of Construction: Founded Jan 1922; in operation Mar 1940

Details: Particular capacities (in kw) - 1200 installed cap; 800 reg; 400 spec
Eff head - 31 ft
Plant, equipment -
Turbines - 2 @ 1150 hp, Francis-type, Dengyosha-make
Generators - 2 @ 600 kw, 3-ph, 3500 v, 231 rpm, 50 cyc, Shibaura-make
Transformers - 4 (incl 1 res) @ 500 kva, 1-ph, 3.5,3.3/33,22 kv, D-D conn, water-cooled, 50 cyc, shell-type, Shibaura-make

Sources: DnN 1940; ZKT 1939 p.1910; Ohm 5/28 p.267; DJY 1927; DJY 1929 p.400

KORIKAWA HYDRO PLANT - See HIKAWA HYDRO PLANT

KOSAKA HYDRO PLANT - See OSAKA HYDRO PLANT

KOSAWA HYDRO PLANT - See KOZAWA HYDRO PLANT

391. KOSHIDO HYDRO PLANT

Approx. Lat. 35°06'30"
Long. 137°11'30"

Company: Chuo Denryoku KK; formerly Mikawa Suiryoku Denki KK

Location: Plant - On the right bank of the Yahagi-gawa at 23, Namiiwa-aza, Koshido-oaza, Sarunage-mura, Nishi Kamo-gun, Aichi-ken

Capacity Commonly in Use (in kw): 7500, as of Dec 1936

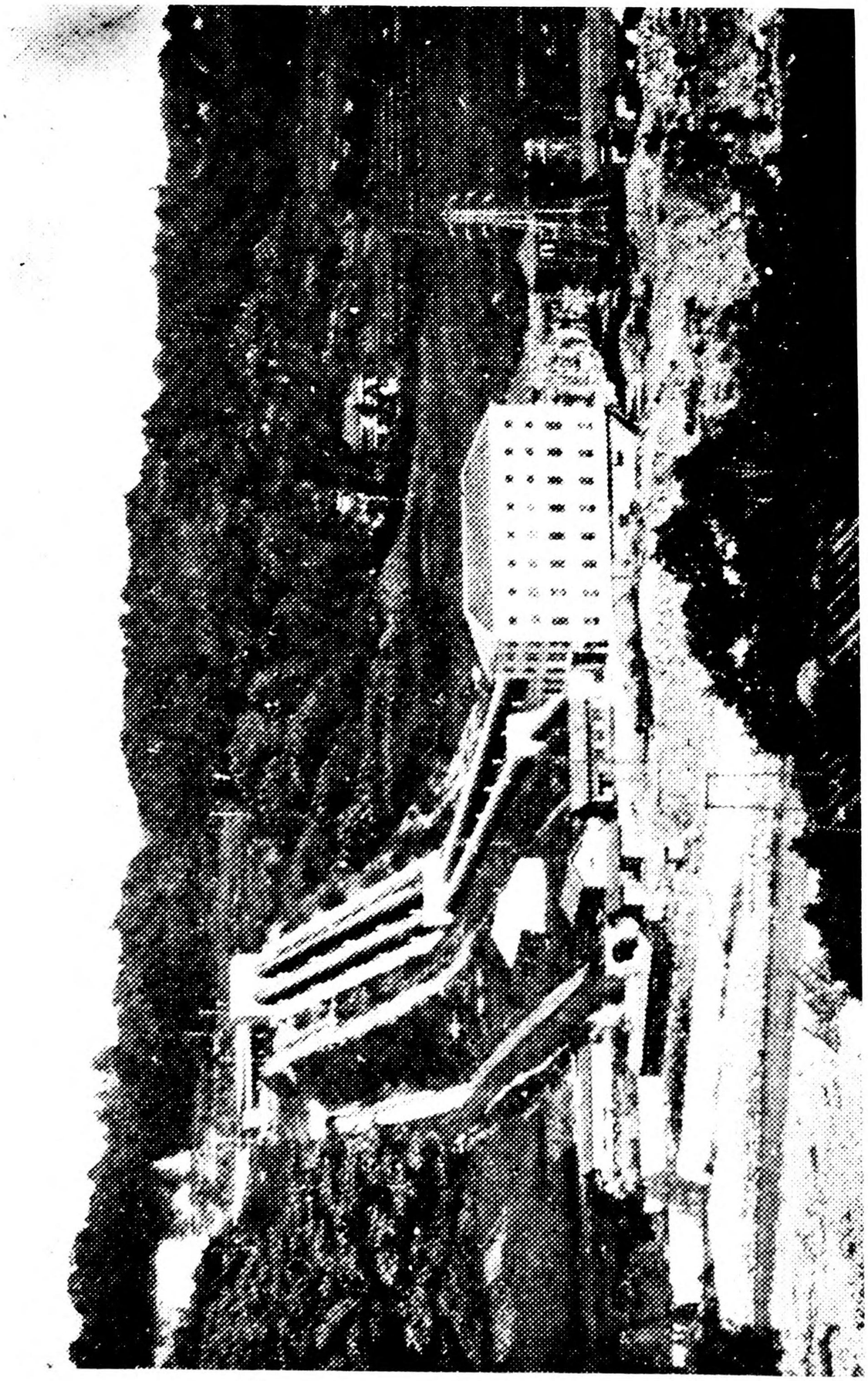
Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area - 100 +

Source of Power: Main course of the Yahagi-gawa

Date of Construction: Completed Nov 1929; in operation Mar 1940

Details: Particular capacities (in kw) - 9200 installed cap; 5500 reg; 2000 spec; 7500 reg pk
Layout - Aqueduct-type
Eff head - 18.8 m; flow - 51.10 m^3/sec
Aqueduct - 600 m culvert
Penstocks - 2
Plant, equipment -
Turbines - 2 @ 7200 hp, Francis-type, vertical-shaft, Dengyosha-make

Photograph No. III-77 Komoro Hydro Plant in 1927



Photograph No. III-78 Komoro Hydro Plant

Generators - 2 @ 5000 kva, 90% pf, 3-ph, 6600 v, 150 rpm, 60 cyc, Shibaura-make
Transformers - 4 @ 3500 kva, 1-ph, 6.6/36,35,34 kv, D-D conn, water-cooled, core-type, Shibaura-make
Other equipment - 2 exciters @ 60 kw
Area served - Aichi-ken, as of 1933

Sources: DnN 1940; ZKT 1939 p.1644; SR 6/30 p.349; Ohm 4/30 p.215, 6/31 supp p.6; DnK; DGS 1934; Ohm-sha Guide 1933 p.29, HSG pp.287,330

392. KOSHIKANO HYDRO PLANT — Approx. Lat. 31°48' Long. 130°46'30"

Company: Kyushu Denki KK: formerly Kagoshima Denki KK

Location: Plant - 436, Mochimatsu-oaza, Makisono-mura, Aira-gun, Kagoshima-ken

Capacity Commonly in Use (in kw): 2160, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: A branch of the Kanayama-gawa

Date of Construction: Unknown; in operation as early as Dec 1934 and as recently as Mar 1940

Sources: DnN 1940; DnK; ZKT 1939 p.1651

393. KOSHIKATA HYDRO PLANT — Approx. Lat. 33°58' Long. 135°21'30"

Company: Toho Denryoku KK; formerly Godo Denki KK, Keihan Denki Tetsudo KK

Location: Plant - 41, Tsuyudani-aza, Kami Koshikata-oaza, Kawakami-mura, Hitaka-gun, Wakayama-ken

Capacity Commonly in Use (in kw): 2000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100 +

Source of Power: Hitaka-gawa

Date of Construction: Founded 1907; in operation Mar 1940

Details: Particular capacities (in kw) - *2000 installed cap; 850 reg; 1150 spec
Eff head - 76 ft
Plant, equipment -
Turbines - 4 @ 730 hp, Francis-type, horizontal-shaft
Generators - 4 @ 625 kva, 3-ph, 11,500 v, 450 rpm, 60 cyc, BBC-make
Transformers - 3 @ 900 kva, 1-ph, 11.5/33 kv, D-D conn, water-cooled, 60 cyc, shell-type, Shibaura-make

Sources: DnN 1940; ZKT 1939 p.1645; DnK; DJY 1927; DJY 1929 pp.266,352; TD Map

394. KOTAKEGAWA NO. 3 HYDRO PLANT Approx. Lat. 35°45' Long. 138°23'

Company: Keihin Denryoku KK; formerly Kotakegawa Denryoku KK

Location: Plant - Miyawaki-aza, Takekawa-mura, Kita Koma-gun, Yamanashi-ken

Capacity Commonly in Use (in kw): 1990, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 + ; rank in Osaka-Nagoya supply area - 100 +

Source of Power: Kotake-gawa of the Fuji-kawa system

Date of Construction: Completed Nov 1927; in operation Mar 1940

Details: Particular capacities (in kw) - *2240 installed cap
Eff head - 743 ft
Dam - Gravity, overflow-type, 15 m high
Plant, equipment -
Turbines - 2 @ 1670 hp, Pelton-type, horizontal-shaft
Generators - 1 @ 2800 kva, 3-ph, 9900 v, 600 rpm, 50/60 cyc
Other equipment - Semi-automatic equipment installed

Sources: DnN 1940; DnGZ 6/30 p.694; DGS 8/33 p.676

395. KOTAKEGAWA NO. 4 HYDRO PLANT Approx. Lat. 35°46' Long. 138°24'

Company: Keihin Denryoku KK

Location: Plant - Kami Marui-oaza, Maruno-mura, Kita Koma-gun, Yamanashi-ken

Capacity Commonly in Use (in kw): 1060, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Kotake-gawa of the Fuji-kawa system

Date of Construction: Unknown; in operation as early as Dec 1934 and as recently as Mar 1940

Details: This plant operates on 50 cyc

Sources: DnN 1940; KDHJ 1936

396. KOTAKIGAWA HYDRO PLANT Approx. Lat. 36°55' Long. 137°50'

Company: Kurobegawa Denryoku KK; formerly Denki Kagaku Kogyo KK

Location: 4515, Kotaki-mura, Nishi Kubiki-gun, Niigata-ken

Capacity Commonly in Use (in kw): 4000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Kotaki-gawa of the Hime-kawa system

Date of Construction: Founded Dec 1922; in operation Dec 1939

Details: Particular capacities (in kw) - *4000 installed cap; 1600 reg; 2400 spec
Eff head - 334 ft
Plant, equipment -
Turbines - 2 @ 3000 hp, Francis-type, EW-make
Generators - 2 @ 2500 kva, 3-ph, 3300 v, 600 rpm, 50 cyc, W-make
Transformers - 3 @ 2000 kva, 1-ph, 6.6,6.3/68,66,64 kv, D-D conn, water-cooled, 50 cyc, shell-type, Hitachi-make

Sources: DnN 1940; DnK; ZKT 1939 p.1648; DJY 1927; DJY 1929 p.390; TD Map

397. KOTAMAGAWA NO. 2 HYDRO PLANT — Approx. Lat. 37°08'30" Long. 140°48'30"

Company: Taira Denryoku KK; formerly Nihonmatsu Denki KK

Location: Plant - 250, Doyajo-aza, Shimo Nagai-oaza, Nagato-mura, Iwaki-gun, Fukushima-ken

Capacity Commonly in Use (in kw): 1140, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 20 +

Source of Power: Kotama-gawa of the Natsui-kawa system

Date of Construction: Construction was begun Nov 1934 and completed July 1935; in operation Mar 1940

Details: Particular capacities (in kw) - 3500 installed cap; 490 reg; 650 spec; 1950 reg pk; 2920 max pk
Layout - Aqueduct-type
Eff head - 77 m; flow - 5.01 m^3/sec
Dam - Of concrete construction, gravity-type, 15.15 m high, 86 m long
Aqueduct - 1690.8 m long
Penstocks - 1 @ 271.37 m long
Plant, external features - Of reinforced concrete construction
Plant, equipment -
Turbines - 1 @ 4800 hp, Hitachi-make
Generators - 1 @ 3500 kw, 3-ph, 6600 v, 720 rpm, 60 cyc, Hitachi-make

Sources: DnN 1940; Ohm 1/35 p.119, 12/35 p.1219, 2/36 p.303; DGS 3/36 p.340; DnGZ 7/37

398. KOTONOURA STEAM PLANT — Approx. Lat. 34°13'30" Long. 135°09'30"

Company: Toho Denryoku KK; formerly Godo Denki KK, Keihan Denki Tetsudo KK

Location: 1436, Umase-aza, Momi-oaza, Kimiitera-machi, Wakayama-shi, Wakayama-ken

Installed Capacity (in kw): 16,300, as of Dec 1936

Importance: Rank in Japan - 138 ; rank in Osaka-Nagoya supply area - 64

Date of Construction: Completed 1922 and extended July 1926; in operation Mar 1940

Details: Plant, external features - At least 2 chimneys
Plant, equipment -
Fuel supply - Coal handling equipment (skip hoist and belt conveyor) @ 40 ton/hr cap
Boilers - 8 (incl 2 res) @ B&W-type, 220 lbs/in^2, 5370 ft^2, B&W-make
Turbines - 1 @ 7500 hp, combined-type, BBC-make
2 @ 10,000 hp, Ljungstrom-type, Mitsubishi-make
Generators - 1 @ 6250 kva, 3-ph, 11,000 v, 3000 rpm, 50 cyc, BBC-make
2 @ 8750 kva, 3-ph, 3500 v, 3600 rpm, 60 cyc, Mitsubishi-make
Transformers - 11 @ 2500 kva, 1-ph, 3.5/34,33,32 kv, D-D conn, water-cooled, shell-type, Hitachi-make
Other equipment - 1 exciter @ 34 kw and 1 exciter @ 60 kw; 3 condensers; 8 superheaters; 8 chain-grate stokers; 2 economizers
Area served - Wakayama-shi and environs, as of 1933

See: Photograph No. III-79

Sources: DnN 1940; DnK; DJY 1927; DJY 1929 pp.267,352; Ohm 1/27 p.8, 6/31 supp p.6; Ohm-sha Guide 1928, 1933 p.43; ZKT 1939 p.1645

399. KOWAKIYOMIZU HYDRO PLANT

Approx. Lat. 36°01'
Long. 136°21'

Company: Kyoto Dento KK

Location: Plant - Kowakiyomizu-oaza, Shimo Usaka-Mura, Asuwa-gun, Fukui-ken

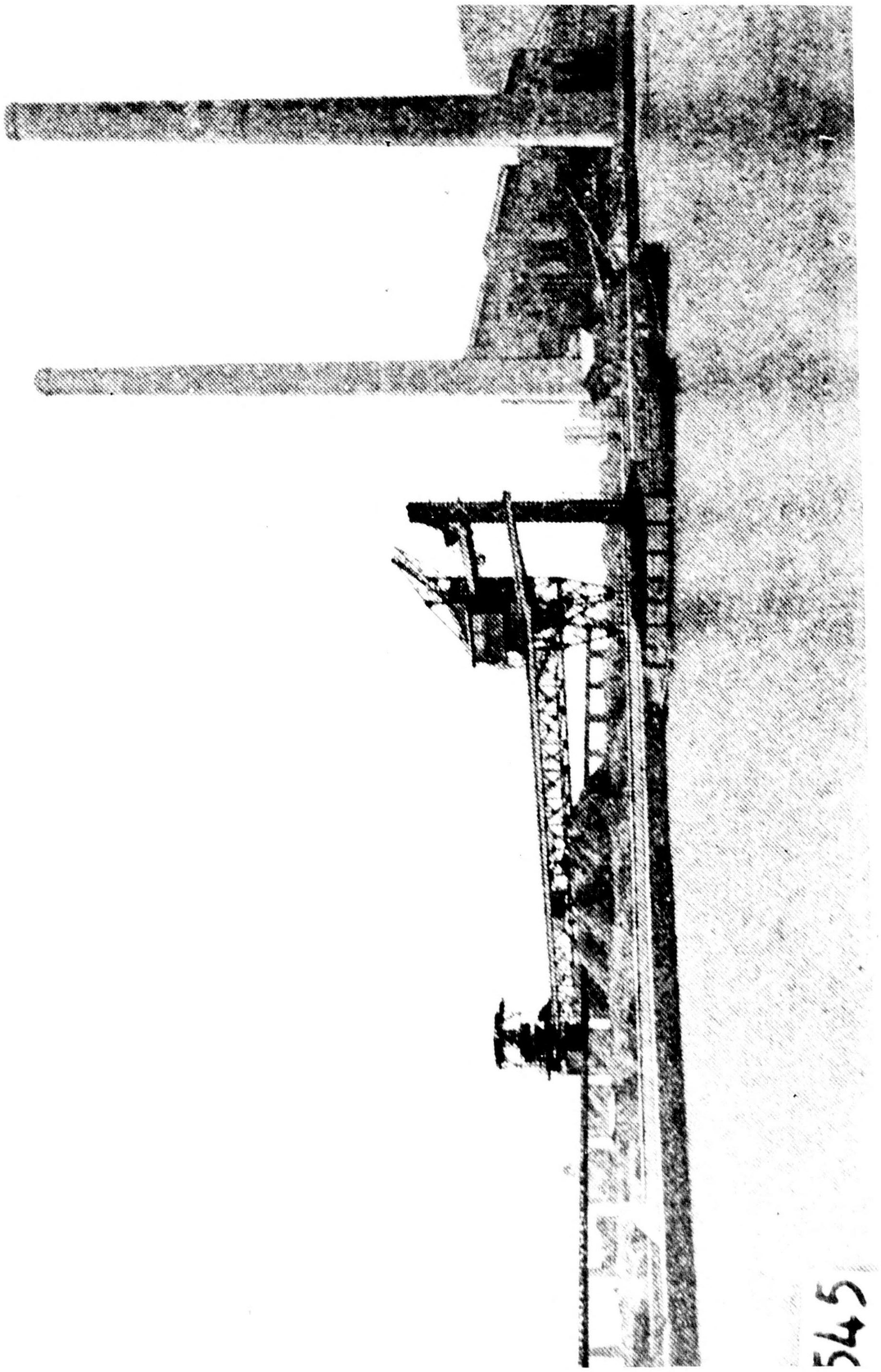
Capacity Commonly in Use (in kw): 1500, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100 +

Source of Power: Asuwa-gawa, a branch of the Kyuzuryu-gawa

Date of Construction: Founded Apr 1911; in operation May 1940

Details: Particular capacities (in kw) - *1320 installed cap; 900 reg; 600 spec
Eff head - 115.5 ft
Plant, equipment -
Turbines - 1 @ 870 hp, Francis-type, Okumura-make
2 @ 700 hp, Francis-type, Voith-make
Generators - 1 @ 750 kva, 3-ph, 3500 v, 600 rpm, 60 cyc, Okumura-make
2 @ 450 kva, 3-ph, 3500 v, 600 rpm, 60 cyc, GE-make



Photograph No. III-79 Kotonoura Steam Plant in 1935

[illegible]. [illegible] STEAM STATION [illegible]

Ownership: Tokyo Electric [illegible]

Location: [illegible] - [illegible]

Generating Capacity in Use: [illegible]

Importance: If completed, would be [illegible]

Source of Power: [illegible]

Date of Construction: Under construction [illegible] completion has been [illegible]

Sources: Ohm 6/ [illegible], TD Map

401. KOZUO HYDRO PLANT

Ownership: Tokyo Electric [illegible]; [illegible] Tokyo Electric Co

Location: [illegible] Prefecture

Generating Capacity in Use: [illegible]

Importance: [illegible]

Date of Construction: [illegible]

Date of Completion: [illegible]

Details: [illegible]

Transformers - 4 (incl 1 res) @ 400 kva, 1-ph, 3.3,3.15,3/34.5,33,31.5 kv, D-D conn, water-cooled, 60 cyc, shell-type, Hitachi-make
7 (incl 1 res) @ 900 kva, 1-ph, 11.5/33 kv, D-D conn, water-cooled, 60 cyc, shell-type, Shibaura-make
4 (incl 1 res) @ 500 kva, 1-ph, 33/35.6,35, 34.3 kv, D-D conn, water-cooled, 60 cyc, shell-type, Hitachi-make

Sources: DnN 1940; DJY 1927; DJY 1929 p.352; ZKT 1939 p.1645

KUBICHI HYDRO PLANT - See TOCHI HYDRO PLANT

402. KUBOZAWA HYDRO PLANT Approx. Lat. 35°35' Long. 139°18'

Company: Kanagawa-ken

Location: Plant - On the left bank of the Sagami-gawa at 706, Kubozawa-aza, Tanigahara-oaza, Kawajiri-mura, Tsukui-gun, Kanagawa-ken
Dam - Chigira-aza, Kawajiri-mura, Tsukui-gun, Kanagawa-ken

Capacity Commonly in Use (in kw): 18,450 (see Date of Construction)

Importance: Rank in Japan - 126 ; rank in Tokyo supply area - 51

Source of Power: Sagami-gawa

Date of Construction: Construction was begun Feb 1939 at which time completion was scheduled for 1942; probably now in operation

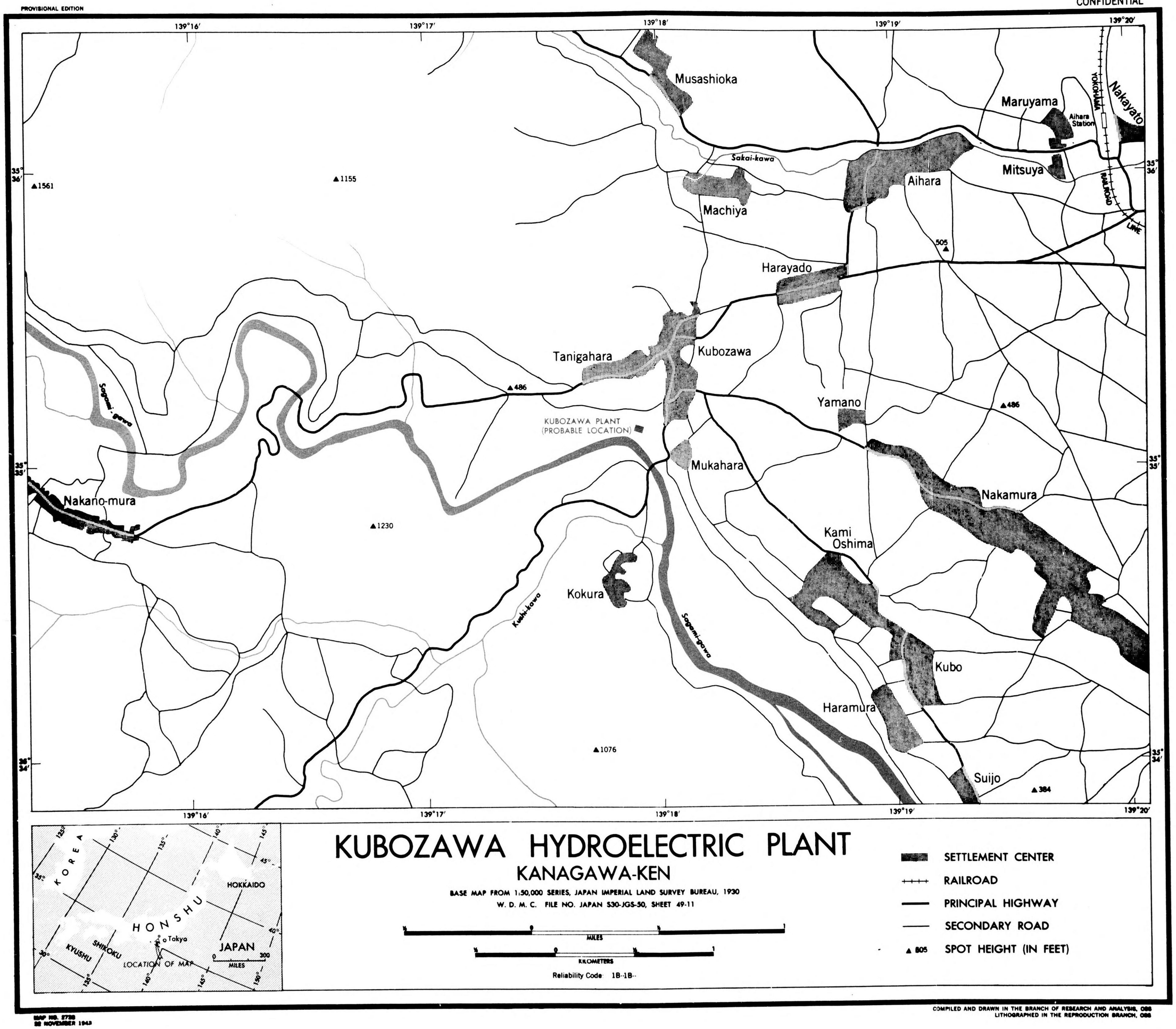
Details: Particular capacities (in kw) - 22,000 installed cap; 6300 reg; 12,150 spec
Layout - Aqueduct-type
Eff head - 35.5 m; flow - 47.25 m^3/sec
Dam - 25 m high, 95 m long with 5 tainter gates at 8 m high, 9 m wide
Aqueduct - 8 km long, between Chigira and Kubozawa
Penstocks - 2
Plant, equipment -
Turbines - 2 @ unknown cap
Generators - 2 @ 11,000 kw, 3-ph
Tail race - 250 m long, of reinforced concrete construction

See: Figure No. III-16

Sources: DGS 3/38 p.312; Ohm 2/39 p.204

KUDA HYDRO PLANT - See KUTA HYDRO PLANT

PROVISIONAL EDITION



KUBOZAWA HYDROELECTRIC PLANT

KANAGAWA-KEN

BASE MAP FROM 1:50,000 SERIES, JAPAN IMPERIAL LAND SURVEY BUREAU, 1930
W. D. M. C. FILE NO. JAPAN S30-JGS-50, SHEET 49-11

MILES

KILOMETERS

Reliability Code: 1B--1B--

SETTLEMENT CENTER
RAILROAD
PRINCIPAL HIGHWAY
SECONDARY ROAD
▲ 805 SPOT HEIGHT (IN FEET)

MAP NO. 2739
22 NOVEMBER 1943

COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

403. KUJO NO. 1 STEAM PLANT Approx. Lat. 34°40'30" Long. 135°28'

Company: Osaka-shi

Location: 796, 1-chome, Kujo Minami-dori, Minato-ku, Osaka-shi, Osaka-fu; believed to be on right bank of Shirinashi-kawa

Installed Capacity (in kw): 6000, as of June 1928

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100 +

Date of Construction: Founded July 1908; in operation Mar 1940

Details: Plant, equipment -
Boilers - 6 (incl 2 res) @ B&W-type, 160 lbs/in^2, 4092 sq ft, B&W-make
8 (incl 4 res) @ B&W-type, 160 lbs/in^2, 4092 sq ft, B&W-make
Turbines - 3 (incl 1 res) @ 1500 hp, Curtis-type, vertical-shaft, GE-make
3 (incl 1 res) @ 3000 hp, Curtis-type, vertical-shaft, GE-make
Generators - 3 (incl 1 res) @ 1000 kva, 3-ph, 3450 v, 1500 rpm, GE-make
3 (incl 1 res) @ 2000 kva, 3-ph, 3450 v, 750 rpm, GE-make
In 1926 this plant generated power at 25 cyc frequency; it has since been changed and in Mar 1940 operated at 60 cyc frequency.

See: Map of the City of Osaka

Sources: DnN 1940; DJY 1927; DJY 1929 p.340; ZKT 1939 p.1907

404. KUJO NO. 2 STEAM PLANT Approx. Lat. 34°40'30" Long. 135°28'

Company: Nippon Hassoden KK; formerly Osaka-shi

Location: 761, 1-chome, Kujo Minami-dori, Minato-ku, Osaka-shi, Osaka-fu; believed to be located on the right bank of the Shirinashi-kawa

Installed Capacity (in kw): *40,000 (see Date of Construction)

Importance: Rank in Japan - 56 ; rank in Osaka-Nagoya supply area - 24

Date of Construction: Completed in July 1923 with installed capacity of *20,000 kw and additional units of *10,000 kw each were installed in April 1927 and Mar 1933. In Nov 1935 license to increase capacity from 30,000 kw to 38,000 kw was issued, but it is not believed that this necessitated new equipment.

Details: Particular capacities (in kw) - 23,000 reg; 15,000 res
Plant, equipment -
Boilers - 20 @ B&W water-tube-type, 15.8 kg/cm^2, 575 m^2, 309° C, B&W-make
Turbines - 3 @ 13,750 hp, Curtis-type, horizontal-shaft, GE-make
1 @ 13,750 hp, impulse-type, horizontal-shaft, EE-make

Generators - 3 @ 12,500 kva, 3-ph, 11,000 v, 1800 rpm, 60 cyc, GE-make
1 @ 12,500 kva, 3-ph, 11,000 v, 1800 rpm, 60 cyc, GE-make
Other equipment - 4 exciters @ 2000 kw; 4 surface condensers; 40 chain-grate stokers; 8 economizers

See: Map of the City of Osaka

Sources: DnN 1940; Ohm 7/27 cover and p.306, 4/28 p.191, 6/31 supp p.7, 2/36 p.212; Ohm-sha Guide 1933 p.38; DJY 1927; DJY 1929 pp.259,340; DnK; ZKT 1939 p.1907

405. KUMAGAWA NO. 1 HYDRO PLANT

Approx. Lat. 36°31'30"
Long. 138°37'30"

Company: Tokyo Dento KK

Location: Plant - Yokiya-aza, Naganohara-machi, Azuma-gun, Gumma-ken

Capacity Commonly in Use (in kw): 2340, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Completed Mar 1922; in operation Mar 1940

Source of Power: Kuma-gawa of the Tone-gawa system

Date of Construction: Completed Mar 1922; in operation Mar 1940

Details: Particular capacities (in kw) - 2400 installed cap; 1170 reg; 1170 spec
Layout - Aqueduct-type
Eff head - 141 m; flow - 2.23 m^3/sec
Dam - 33.7 m long, 4.84 m high, of rubble concrete construction with stone pitching
Intake - 1 gate
Settling basin - 9.04 m long, 4.55 m wide
Aqueducts - 764.39 m open channel, 199.3 m culvert, 1353.78 m tunnel, 97.91 m aqueduct bridge
Forebay - 60.6 m^2 water surface
Penstocks - 1 @ 314.51 m long
Excess water spillway - 350.6 m long
Plant, external features - Of reinforced concrete construction, 1 story high; about 15 wooden shacks are also located on the premises
Plant, equipment -
Turbines - 1 @ 4600 hp, Francis-type, horizontal-shaft, EW-make
Generators - 1 @ 3000 kva, 80% pf, 3-ph, 6600 v, 600 rpm, 50 cyc, W-make
Transformers - 4 (incl 1 res) @ 2000 kva, 1-ph, 6.6,6.2/40 kv, D-Y conn, water-cooled, 50 cyc, shell-type, Okumura-make
Other equipment - 2 exciters @ 50 kw; 1 crane @ 10.16-ton cap

Sources: DnN 1940; DnK; DJY 1927; DJY 1929 p.300

406. KUMAGAWA NO. 2 HYDRO PLANT Approx. Lat. 36°32' Long. 138°37'30"

Company: Tokyo Dento KK

Location: Plant - Yokiya-aza, Naganohara-mura, Azuma-gun, Gumma-ken

Capacity Commonly in Use (in kw): 1540, as of May 1936

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Kuma-gawa of the Tone-gawa system

Date of Construction: Completed Dec 1923; in operation Mar 1940

Details: Particular capacities (in kw) - 1600 installed cap; 770 reg; 770 spec
Layout - Aqueduct-type
Eff head - 89.56 m; flow - 2.23 m^3/sec
Dam - 36.7 m long, 2.88 m high, of concrete construction with stone pitching
Intake - 2 gates -
Settling basin - 14.5 m long and 3.3 m wide
Aqueducts - 124.4 m open channel, 2222.3 m tunnel
Forebay - 7.64 m long, 3.64 m wide
Penstocks - 1 @ 255 m long
Excess water spillway - 355 m long
Plant, external features - Of reinforced concrete construction, 1 story high; about 10 wooden shacks are situated on the premises
Plant, equipment -
Turbines - 1 @ 2500 hp, Francis-type, horizontal-shaft, Dengyosha-make
Generators - 1 @ 2000 kva, 3-ph, 7000 v, 600 rpm, 50 cyc, Shibaura-make
Tail race - 6.1 m long

Sources: DnN 1940; DJY 1927; DJY 1929 p.300

407. KUMAMI HYDRO PLANT Approx. Lat. 34°49'30" Long. 132°43'

Company: Hiroshima Denki KK

Location: Plant - On the left bank of the Eno-kawa at 2 of 148, Shimono-aza, Kayodo-oaza, Sakugi-mura, Futami-gun, Hiroshima-ken

Capacity Commonly in Use (in kw): 11,200, as of Dec 1936

Importance: Rank in Japan - 197; rank in Chugoku supply area - 15

Source of Power: Eno-kawa of the Eno-kawa system

Date of Construction: Completed Oct 1927; in operation Mar 1940

Details: Particular capacities (in kw) - *11,000 installed cap; 4500 reg; 6700 spec
Layout - Aqueduct-type
Eff head - 31 m; flow - 28 m^3/sec
Dam - Overflow-type, 7.27 m high
Penstocks - 2

Plant, external features - Of concrete construction, 3 stories high, with extensive switch-gear at side of plant
Plant, equipment -
Turbines - 2 @ 8700 hp, Francis-type, Dengyosha-make
Generators - 2 (incl 1 res) @ 6875 kva, 3-ph, 11,000 v, 211.76 rpm, 60 cyc, Shibaura-make
Transformers - 4 (incl 1 res) @ 4800 kva, 1-ph, 11/63.6,62,60, 58,31.8,30,29 kv, D-Y conn, water-cooled, 60 cyc, core-type, Shibaura-make
4 (incl 1 res) @ 100 kva, 1-ph, 22,21,11,10.5/3.5,3.4,3.3 kv, D-D conn, water-cooled, 60 cyc, core-type, Shibaura-make
Other equipment - 2 exciters @ 80 kw
Area served - Hiroshima district, as of 1933

See: Photographs No. III-80, III-81, III-82, III-83
Figure No. III-17

Sources: DnN 1940; ZKT 1939 p.1649; Ohm 1/28 p.5, 3/28 p.180, 6/31 supp p.6, 12/32 p.667; Ohm-sha Guide 1933 p.24; SR 6/28 front p.; Dnk: DJY 1929 pp.269,358; TD Map; DGS 8/33 p.672

408. KUMANOGAWA NO. 1 HYDRO PLANT Approx. Lat. 36°35' Long. 137°19'

Company: Nippon-kai Denki KK; formerly Chuetsu Suiden KK and Toyama Denki KK

Location: Plant - Kirekomi-wari, Nishi Komata-oaza, Oyama-mura, Kami Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 1300, as of June 1928

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100 +

Source of Power: Kumano-gawa of the Jintsu-gawa system

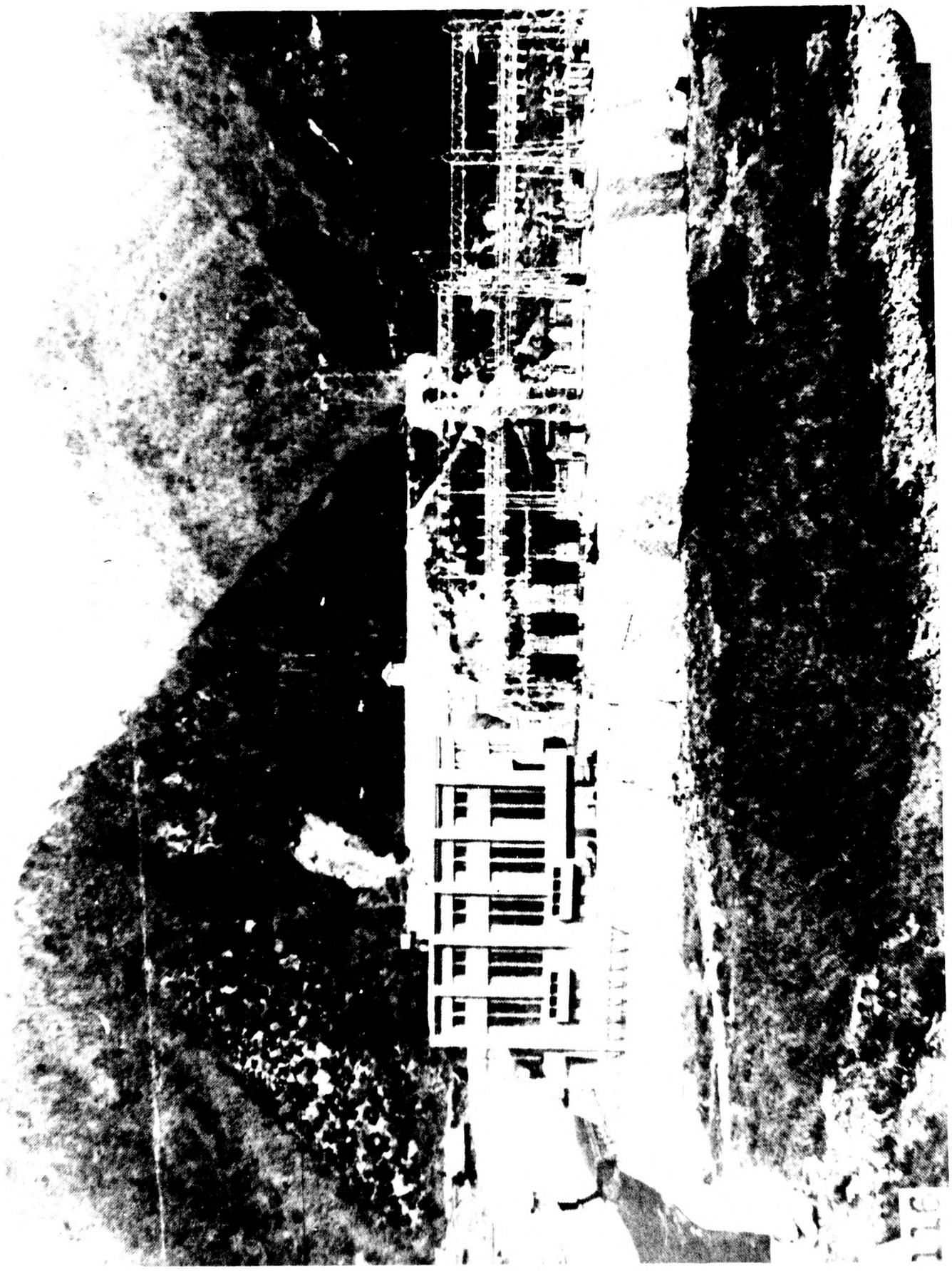
Date of Construction: Founded Jan 1920; in operation Mar 1940

Details: Particular capacities (in kw) - *1800 installed cap; 700 reg; 600 spec; 1100 reg pk; 1800 max pk
Eff head - 338 ft
Plant, equipment -
Turbines - 1 @ 2600 hp, Francis-type, horizontal-shaft, Hitachi-make
Generators - 1 @ 2250 kva, 3-ph, 3500 v, 720 rpm, 60 cyc, Hitachi-make
Transformers - 7 (incl 1 res) @ 375 kva, 1-ph, 3.5,3.4/44,22 kv, D-D conn, self-cooled, 60 cyc, Shibaura-make

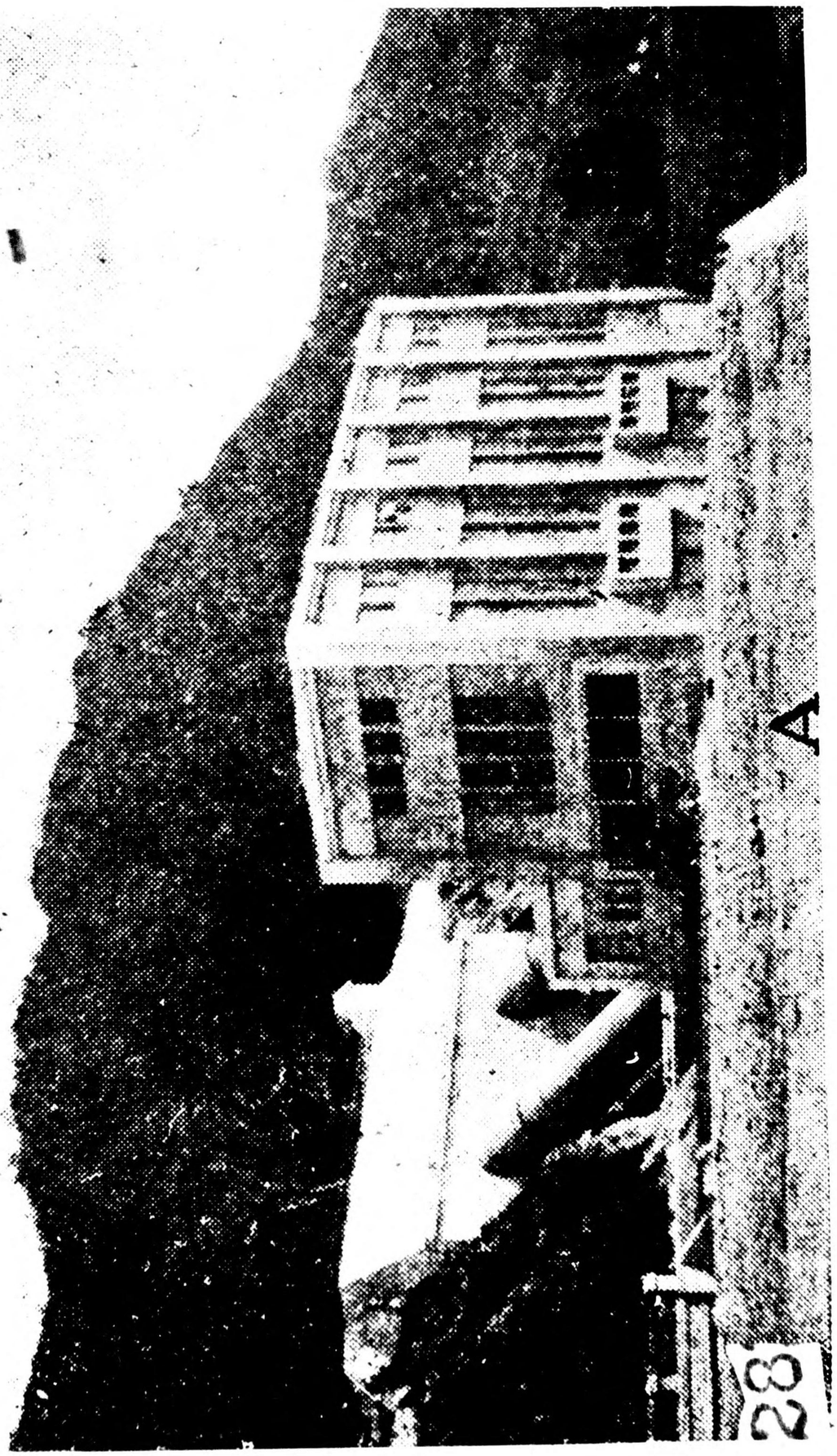
Sources: DnN 1940; Ohm 2/28 p.134, 12/28 p.623; ZKT 1939 p.1647; DJY 1929 pp.258,338

409. KUMANOGAWA NO. 3 HYDRO PLANT Approx. Lat. 36°32' Long. 137°19'

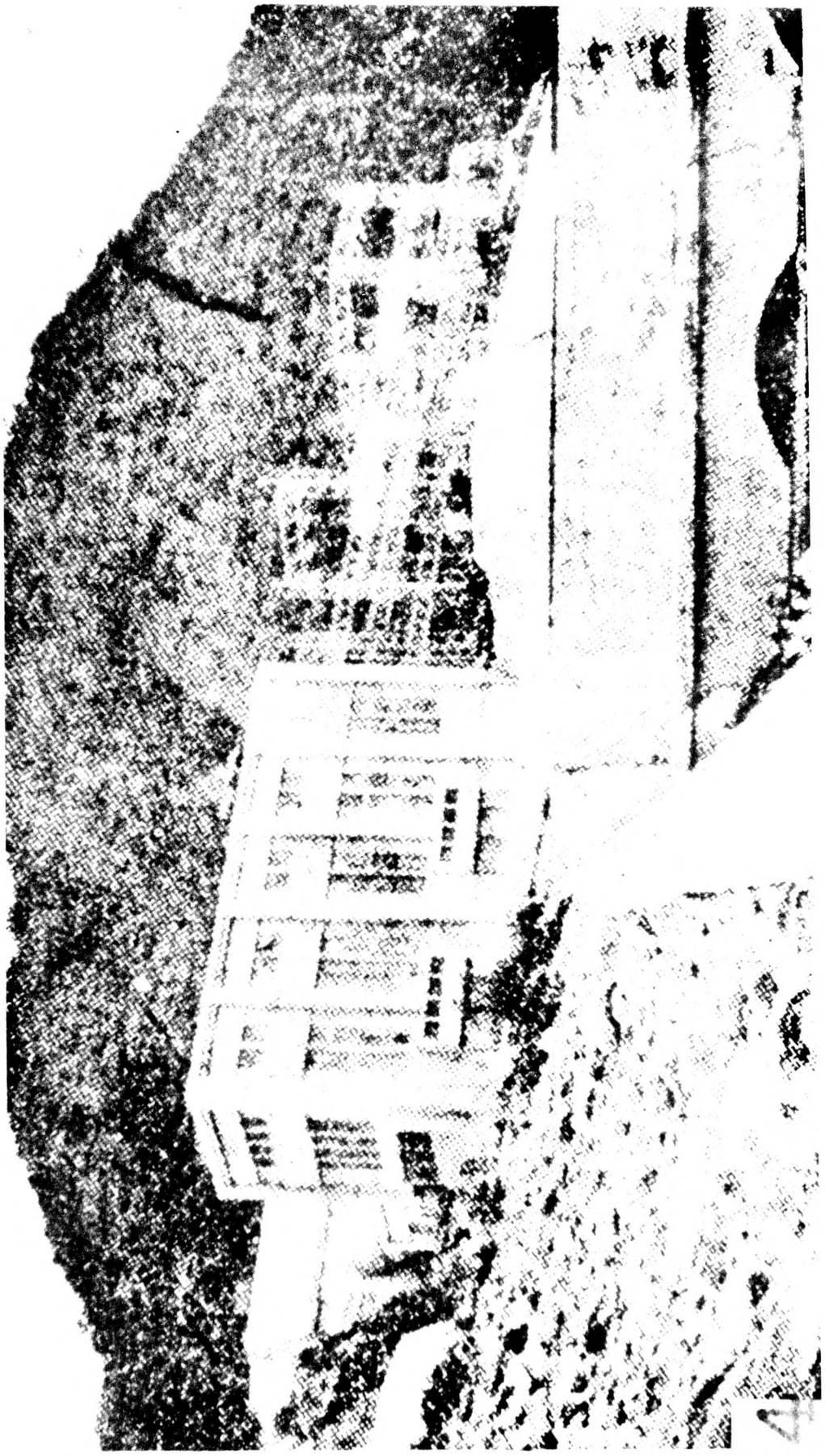
Company: Nippon-kai Denki KK; formerly Toyama Denki KK



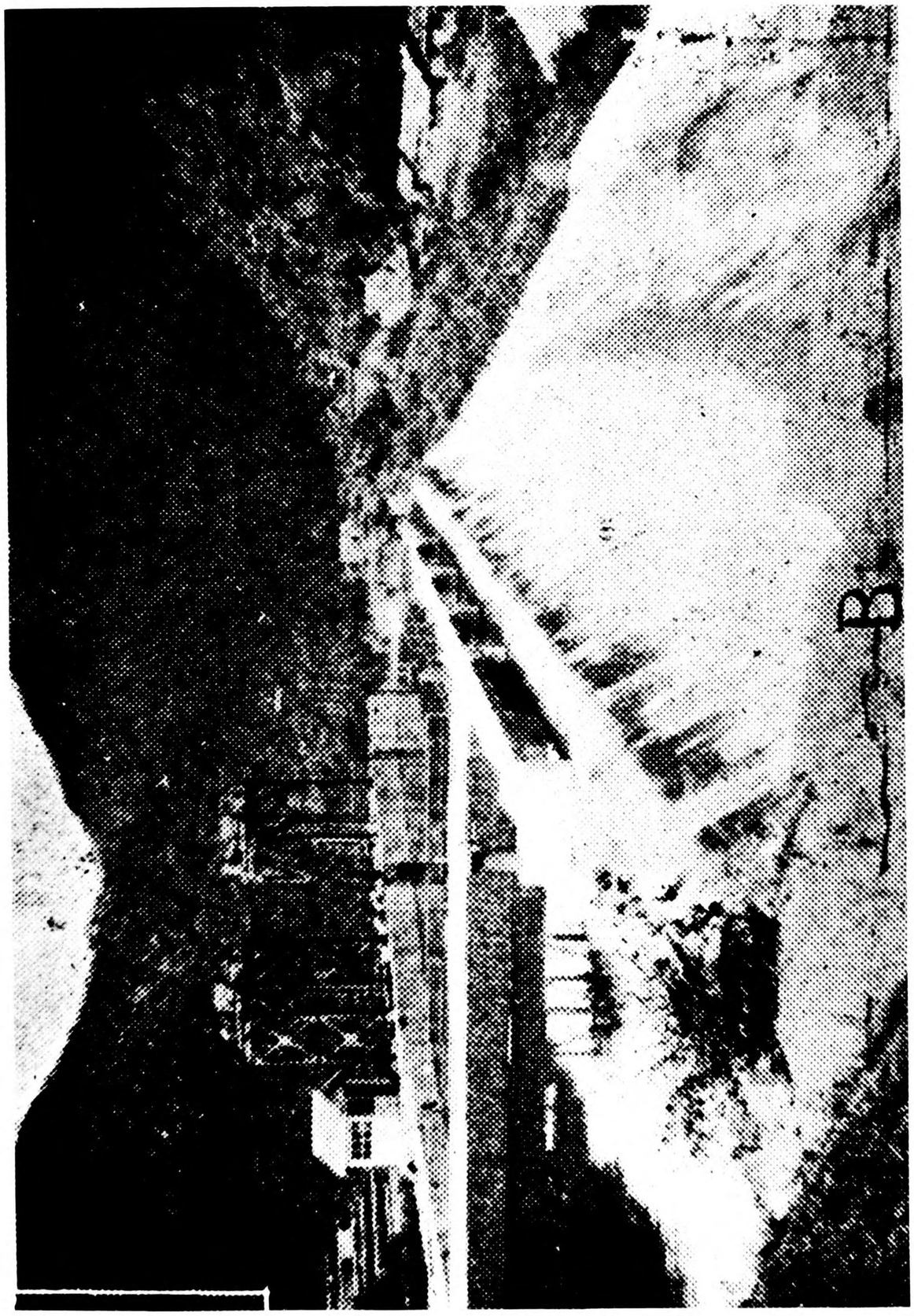
Photograph No. III-80 Kumami Hydro Plant in 1928



Photograph No. III-81 Kumami Hydro Plant in 1928

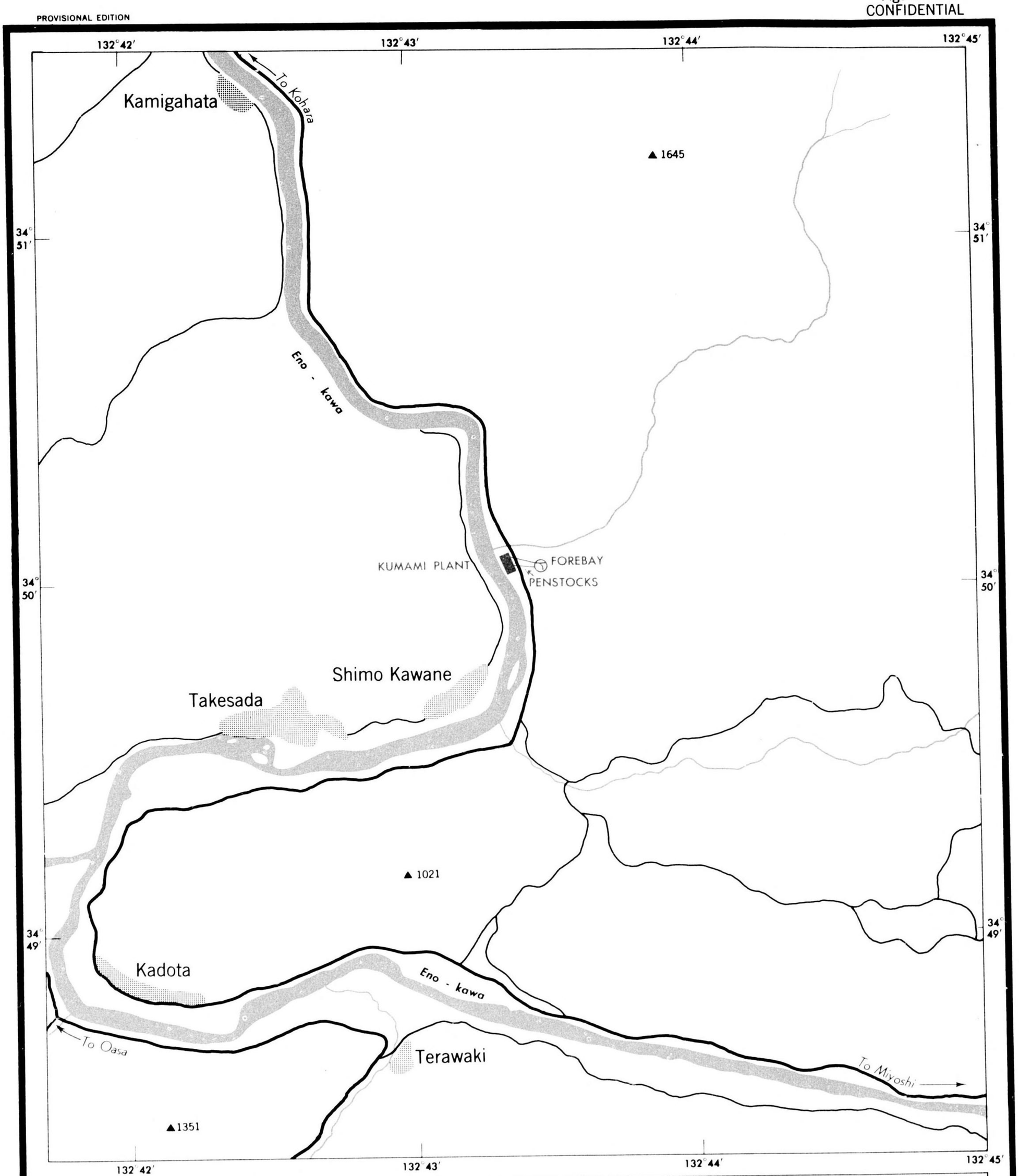


Photograph No. III-82 Kumami Hydro Plant in 1928



Photograph No. III-83 Kumami Hydro Plant dam in 1928

PROVISIONAL EDITION

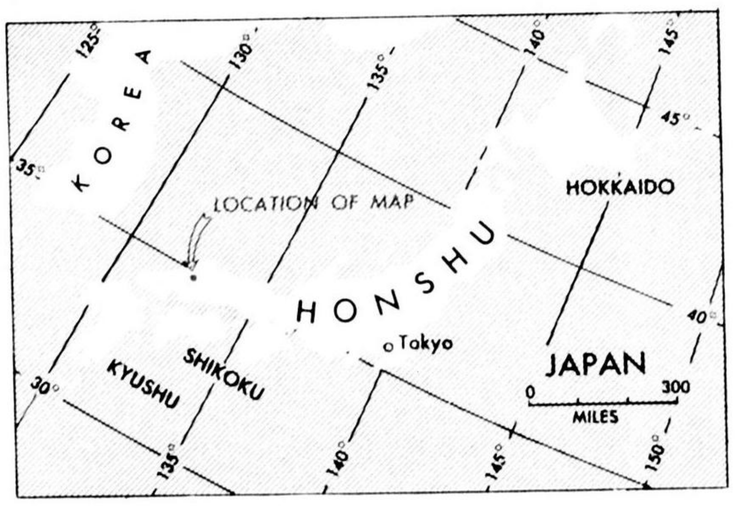


KUMAMI HYDROELECTRIC PLANT

HIROSHIMA-KEN

BASE MAP FROM 1:50,000 SERIES, JAPAN IMPERIAL LAND SURVEY BUREAU, 1935

W. D. M. C. FILE NO. JAPAN S30-JGS-50, SHEETS 33-7, 8.



SETTLEMENT

PRINCIPAL HIGHWAY

SECONDARY ROAD

▲ 1645 SPOT HEIGHT (IN FEET)

½ 0 ½ 1
MILES

½ 0 ½ 1
KILOMETERS

Reliability Code 1B-1B-1

MAP NO. 2820
18 NOVEMBER 1943

COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

Location: Plant - Koyafuta-wari, Kawachi-oaza, Oyama-mura, Kami Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 1150, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kumano-gawa of the Jintsu-gawa system

Date of Construction: Founded Nov 1926; in operation Mar 1940

Details: Particular capacities (in kw) - *1200 installed cap; 750 reg; 400 spec
Eff head - 987 ft
Plant, equipment -
Turbines - 1 @ 1650 hp, impulse-type, horizontal-shaft, Hitachi-make
Generators - 1 @ 1500 kva, 3-ph, 6600 v, 600 rpm, 60 cyc, Hitachi-make
Transformers - 1 @ 150 kva, 3-ph, 6.6/33 kv, D-D conn, water-cooled, 60 cyc, core-type, Shibaura-make
4 (incl 1 res) @ 1000 kva, 1-ph, 6.6/44 kv, D-D conn, water-cooled, 60 cyc, core-type, Hitachi-make

Sources: DnN 1940; ZKT 1939 p.1643; DJY 1929 pp.258,338

410. KUMATAKE HYDRO PLANT Approx. Lat. 38°04' Long. 140°40'

Company: Tohoku Shinko Denryoku KK

Location: Plant - Miya-mura, Katta-gun, Miyagi-ken; near Kumatake

Capacity Commonly in Use (in kw): 6310 (see Date of Construction)

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 18
Power was to be transmitted to the Sandai sub-station

Source of Power: Matsu-kawa of the Abukuma-gawa system

Date of Construction: Under construction Aug 1940 at which time its completion was scheduled before end of the year. The plant was probably completed on schedule.

Sources: DnN 1940; TKS 8/10/40 p.46; Ohm 8/38 pp.863-868

411. KUMOJI STEAM PLANT Approx. Lat. 26°12' Long. 127°40'

Company: Okinawa Denki KK

Location: Kumoji-cho, Naha-shi, Okinawa-ken, on Onokinawa-jima

Installed Capacity (in kw): 1000, as of 1933

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Date of Construction: Unknown; in operation 1933

Details: Particular capacities (in kw) - 800 reg

Sources: Ohm 8/33 p.473

412. KUNESUGAWA NO. 1 HYDRO PLANT — Approx. Lat. 36°30' Long. 137°12'

Company: Kansai Denryoku KK

Location: Plant - 1, Aoi-aza, Kiriyama-oaza, Unohana-mura, Nei-gun, Toyama-ken

Capacity Commonly in Use (in kw): Est 3600, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kunesu-gawa of the Jintsu-gawa system

Date of Construction: Founded 1925; in operation Dec 1938

Sources: DnK; ZKT 1939 p.1648

413. KUNESUGAWA NO. 2 HYDRO PLANT — Approx. Lat. 36°31' Long. 137°12'

Company: Kansai Denryoku KK; formerly Hietsu Denki KK

Location: Plant - Aoi-aza, Aitaniyama-oaza, Unohana-mura, Nei-gun, Toyama-ken

Capacity Commonly in Use (in kw): 3750 (see Date of Construction)

Importance: Rank in Japan - 250+ ; rank in Osaka-Nagoya supply area -100+

Source of Power: Kunesu-gawa of the Jintsu-gawa system

Date of Construction: Construction was begun June 1935 at which time completion was anticipated in 1938; probably completed and in operation since.

Details: Particular capacities (in kw) - 1610 reg; 2140 spec

Sources: KN 1939 p.166; Kampo, Communications Dept. 8/41/59; Ohm 9/35 p.914

KURAGURA HYDRO PLANT - See ZOZO HYDRO PLANT

414. KURASAWA HYDRO PLANT

Approx. Lat. 38°31'
Long. 139°47'

Company: Tsurugaoka Suiryoku Denki KK

Location: Plant - Kurasawa-oaza, Oizumi-mura, Higashi Tagawa-gun, Yamagata-ken

Capacity Commonly in Use (in kw): 3112, as of 1930

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 20 +

Source of Power: Otori-gawa

Date of Construction: Construction was begun Sept 1928 and is believed to have been completed before Nov 1930

Details: Particular capacities (in kw) - 1582 reg; 1530 spec

Sources: Ohm 12/28 p.623, 2/31 p.111

415. KURASHIKI STEAM PLANT

Approx. Lat. 34°29'30"
Long. 133°20'30"

Company: Chugoku Godo Denki KK

Location: Kurashiki-shi, Okayama-ken

Installed Capacity (in kw): Est 3250, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Chugoku supply area - 25 +

Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as Dec 1934

Details: Particular capacities (in kw) - 3250 supp
Plant, equipment -
Boilers - Unknown no @ B&W-type, 150 lbs/in^2, 750° F, 3240 ft^2, B&W-make
Turbines - 2 @ 1500 hp, Zoelly-type, EW-make
1 @ 1800 hp, Curtis-type, GE-make
Generators - 2 @ 1250 kva, 3-ph, 2300 v, 3600 rpm, 60 cyc, SS-make
1 @ 1550 kva, 3-ph, 2300 v, 3600 rpm, 60 cyc, GE-make

Sources: Ohm 9/32 p.505; DJY 1927; DJY 1929 pp.271,362; TD Map

KURETSUBO HYDRO PLANT - See HAYAKAWA NO. 1 HYDRO PLANT

416. KURIKOMA HYDRO PLANT Approx. Lat. 38°53'
Long. 140°57'

Company: Miyagi-ken; formerly Tohoku Dento KK

Location: Plant - Numagura-aza, Kurikoma-mura, Kurihara-gun, Miyagi-ken

Capacity Commonly in Use (in kw): 1762, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 20 +

Source of Power: Sannohazama-kawa

Date of Construction: Founded Sept 1921; in operation Mar 1940

Details: Particular capacities (in kw) - *1440 installed cap; 1036 reg; 726 spec
Plant, equipment -
Turbines - 2 @ unknown cap
Generators - 2 @ 900 kva, 3-ph, 3500 v, 50 cyc
Transformers - 4 (incl 1 res) @ 750 kva, 3.5/15.8,13.1 kv, D-Y conn

Sources: DnN 1940; ZKT 1939 p.1910; DJY 1929 pp.282,386

417. KURISUMIGAWA HYDRO PLANT Approx. Lat. 34°22'30"
Long. 132°08'30"

Company: Hiroshima Denki KK

Location: Plant - 5 of 188, Kita Kami-aza, Kurisumi-oaza, Shiwa-mura, Saeki-gun, Hiroshims-ken

Capacity Commonly in Use (in kw): 1700, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Chugoku supply area - 25 +

Source of Power: Kurouchi-gawa, Nakamichi-gawa, and Akutani-gawa

Date of Construction: Completed Dec 1932; in operation Mar 1940

Details: Particular capacities (in kw): *2500 installed cap; 330 reg 1370 spec
Layout - Aqueduct-type
Eff head - 197 m
Penstocks - 1
Plant, equipment -
Turbines - 1 @ 4000 hp, Pelton-type
Generators - 1 @ 3125 kva, 3-ph, 514 rpm, 60 cyc
Other equipment - Semi-automatic (1-man control) equipment is installed

Sources: DnN 1940; Ohm 2/30 p.121, 12/31 p.623, 1/33 pp.3,36, 3/33 p.177

418. KUROBE NO. 2 HYDRO PLANT — Approx. Lat. 36°45'00" Long. 137°38'15"

Company: Nippon Denryoku KK

Location: Plant - At the intake of the Yanagawara Hydro Plant on the left bank of the Kurobe-gawa in the Kanetsuri channel at Ochiai-aza, Nekomatatani-oaza, Uchiyama-mura, Shimo Niikawa-gun, Toyama-ken
Dam - Koyadaira-oaza, Uchiyama-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 65,200, as of Dec 1936

Importance: Rank in Japan - 22 ; rank in Osaka-Nagoya supply area - 10 ; rank in Tokyo supply area - 8

Source of Power: Kurobe-gawa

Date of Construction: Construction was begun May 1933 and completed Oct 1936; in operation Mar 1940

Details: Particular capacities (in kw) - *73,000 installed cap; 20,300 reg; 44,900 spec
Layout - Aqueduct-type
Eff head - 180.5 m; flow - 41.74 m^3/sec
Dam - 49.4 m high, 117.05 m long, straight-line gravity-type, of concrete construction; with 2 gates @ 6.5 m high, 31 m wide; 3 caterpillar gates (incl 2 on left bank and 1 on right bank) @ 3.5 m wide and 3.0 m high; and 1 roller gate for waste and ice @ 3.5 m wide and 5.5 m high
Intake - 6 gates on left bank above dam
Settling basin - Ave 122.75 m long, 30.5 m wide at widest point
Aqueduct - 4403.73 m long pressure tunnel
Surge tank - 9 m diam, 43.3 m deep
Penstocks - 3
Plant, external features - Of reinforced concrete construction, 5 stories high, 29 m x 47.8 m; a steel bridge is located just below plant
Plant, equipment -
Turbines - 3 @ 35,000 hp, Francis-type, vertical-shaft, Dengyosha-make
Generators - 3 @ 26,500/24,000 kva, 91.7% pf, 3-ph, 11,000 v, 450/375 rpm, 60/50 cyc, Shibaura-make
Transformers - 3 @ 24,000 kva
Other equipment - 3 exciters @ 250 kw

See: Photographs No. III-84, III-85, III-86, III-87
Figures No. III-18, III-19

Sources: DnN 1940; DnK; DGS Kaimu 1936 p.111; DGS 10/34 p.1242; DnGZ 12/36 p.(89), 4/37 p.(2); Ohm 1/34 p.71, 6/34 pp.401,446, 9/36 pp.818, 821 and cover, 1/37 p.118; SR 4/36 p.127, 2/37 pp.(1),46, 1/37 p.3; HSG pp.33,161,198

419. KUROBE NO. 3 HYDRO PLANT — Approx. Lat. 36°41'50" Long. 137°39'30"

Company: Nippon Denryoku KK

Location: Plant - On the left bank of the Kurobe-gawa at Ochiai Chisen, Sobo-tani, Uchiyama-mura, Shimo Niikawa-gun, Toyama-ken
Dam - Senjin-tani, Uchiyama-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 90,000, as of July 1939

Importance: Rank in Japan - 14 ; rank in Osaka-Nagoya supply area - 6 ; rank in Tokyo supply area - 5

Source of Power: Kurobe-gawa

Date of Construction: Construction was begun in 1936 and completed in the early part of 1941; in operation Aug 1941

Details: Particular capacities (in kw) - 108,000 (at 90% pf) installed cap; 20,200 reg; 69,800 spec
Layout - Aqueduct-type
Eff head - 277.5 m; flow - 37.8 m^3/sec
Dam - 41 m high, 69 m long, overflow gravity-type, of concrete construction
Intake - On left bank above dam
Settling basin - 91.5 m long
1853 Aqueduct - 5559.9 m long pressure tunnel
Surge tank - 1 @ simple chamber-type
Penstocks - 4 @ 1607 m long
Plant, external features - Of concrete construction, 3 stories high, built on a high embankment
Plant, equipment -
Turbines - 4 @ 26,100 kw, Francis-type, vertical-shaft, Dengyosha-make
Generators - 4 @ 30,000 kva, 3-ph, 11,000 v, 500/600 rpm, 50/60 cyc, Shibaura-make. Various reports give the power factor as 90%, 99.2%, and 100%.
Other equipment - 4 exciters @ 160 kw
Tail race - 55.6 m culvert, 9.7 m open channel

See: Photograph No. III-88
Figures No. III-18, III-19

Sources: KN 1939 p.166; DGS 1/37 p.56, 4/37 p.111, 7/39 p.759; DnGZ 9/37 p.(139), 4/40 p.(101), 6/41 p.(21); Ohm 6/34 p.401, 9/36 p.911, 7/40 p.538, 7/41 p.488, 9/41 pp.678 ff; SR 1/39 p.5, 1/40 pp.(1),4, 1/41 p.2, 3/41 pp.98,141; TKS 3/9/40 p.47; HSG p.161

420. KUROBE NO. 4 HYDRO PLANT — Approx. Lat. 36°38'30" Long. 137°41'00"

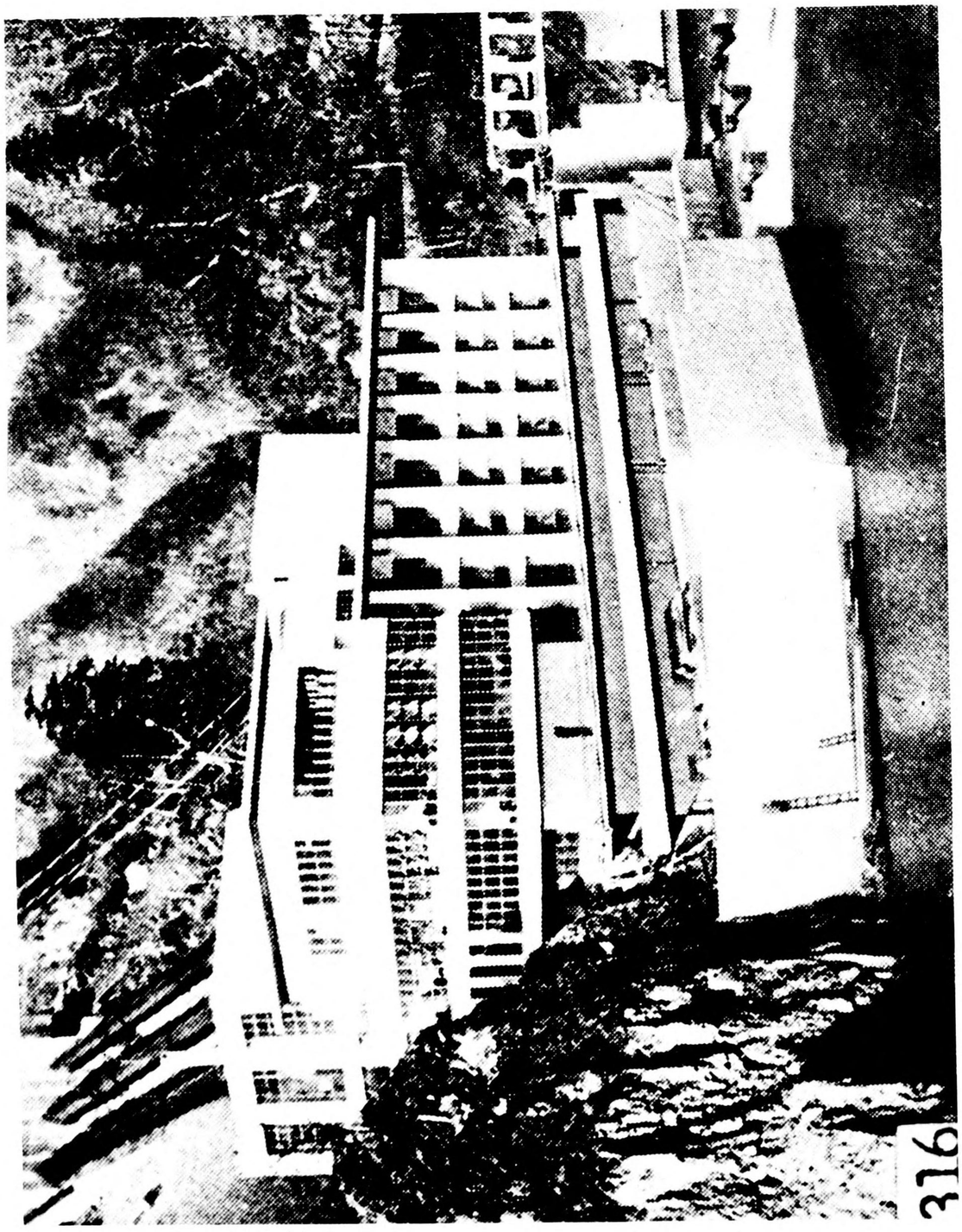
Company: Nippon Denryoku KK

Location: Plant - On the right bank of the Kurobe-gawa opposite Senjin-tani in Tateyama-mura, Naka Niikawa-gun, Toyama-ken
Dam - Near Omaezawa in Tateyama-mura, Naka Niikawa-gun, Toyama-ken

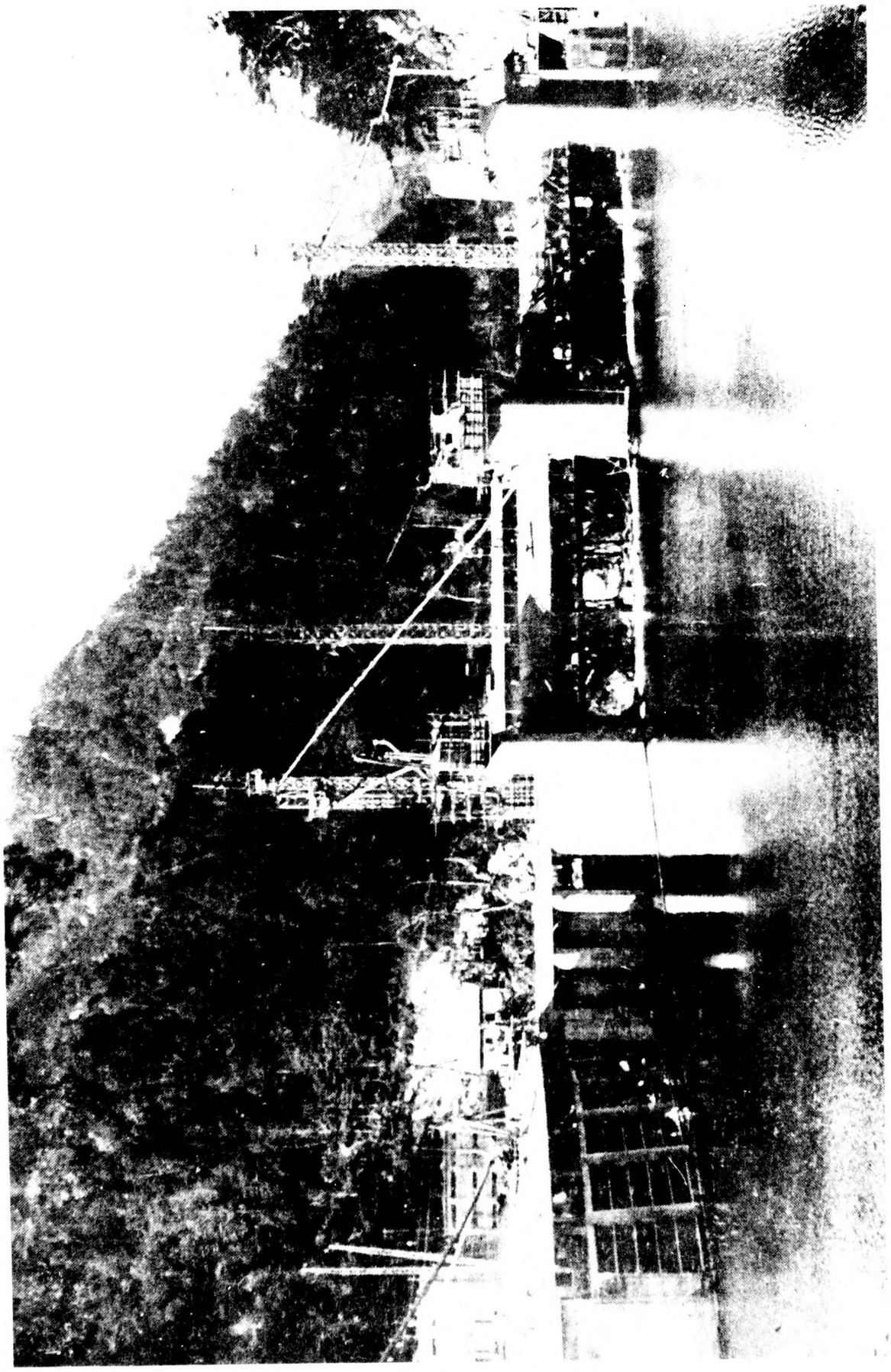
Capacity Commonly in Use (in kw): 92,800 (see Date of Construction)

Importance: If completed, would be 14th largest plant in Japan

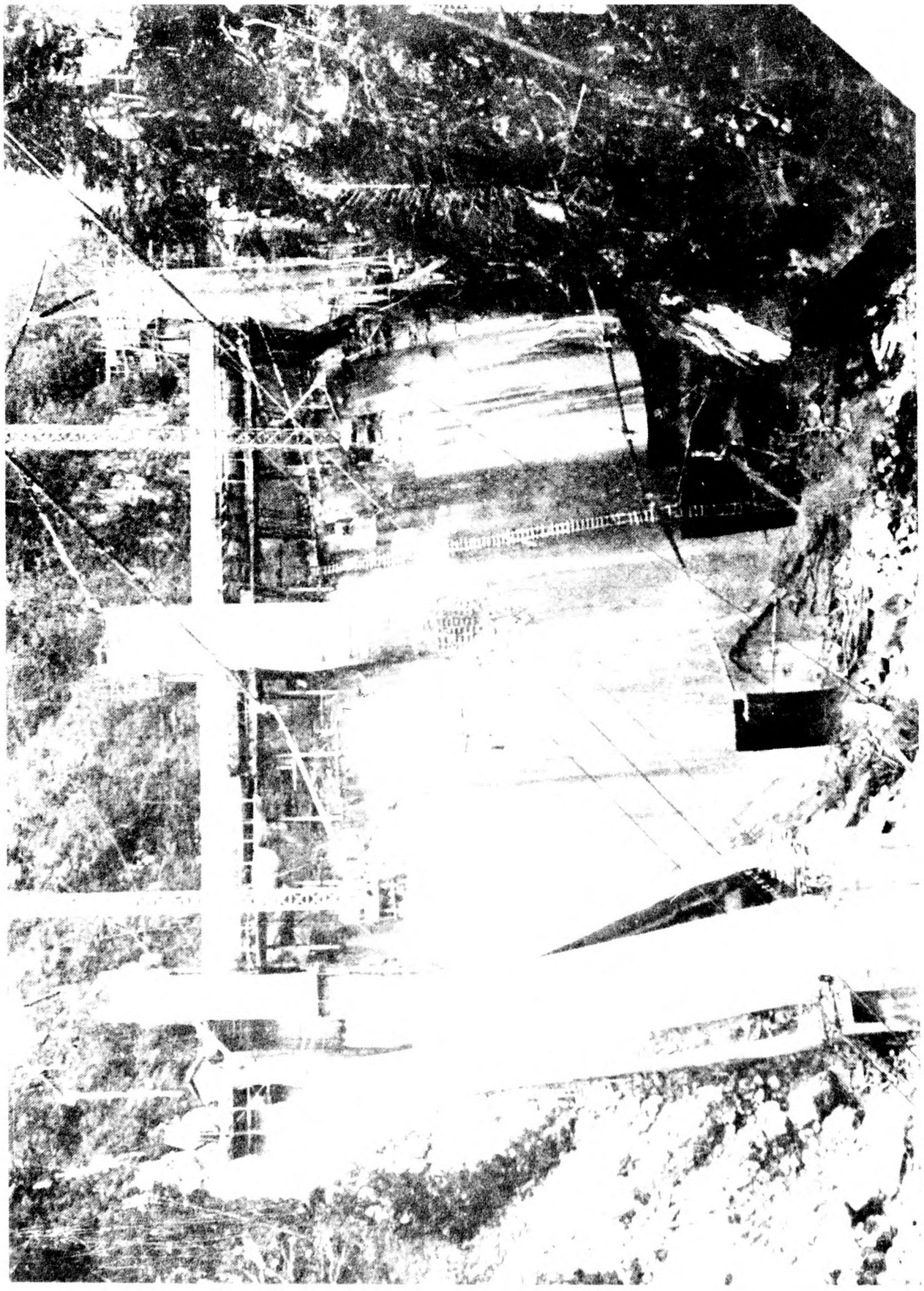
Photograph No. III-84 Kurobe No. 2 Hydro Plant
(Nippon Denryoku KK) in 1937



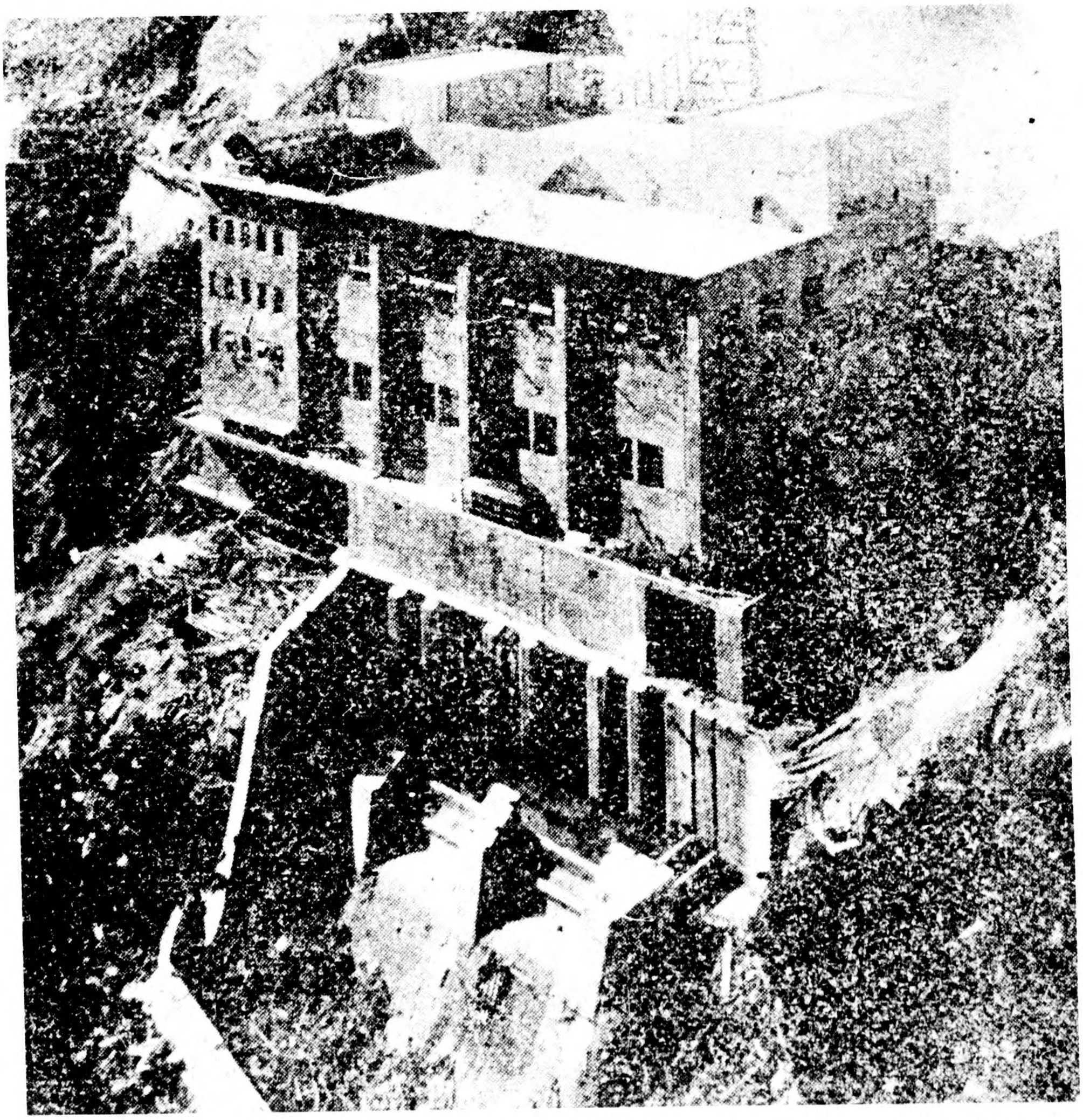
Photograph No. III-85 Kurobe No. 2 Hydro Plant
(Nippon Denryoku KK) in 1938



Photograph No. III-86 Kurobe No. 2 Hydro Plant Koyadaira Dam
(Nippon Denryoku KK) under construction
in 1936, from upstream



Photograph No. III-87 Kurobe No. 2 Hydro Plant Koyadaira Dam
(Nippon Denryoku KK) under construction
in 1936, from downstream

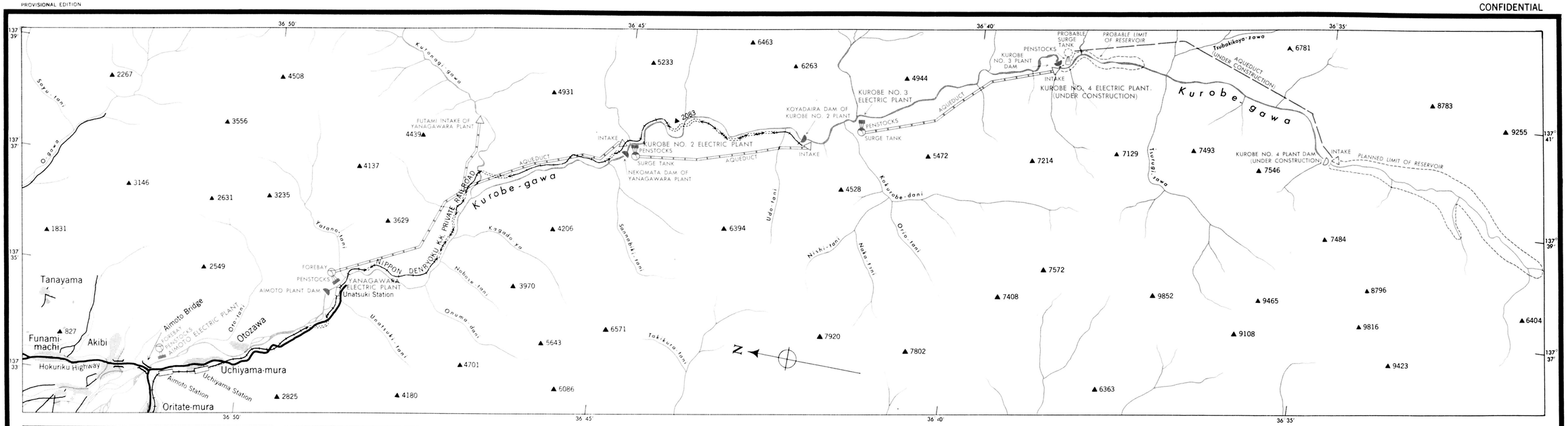


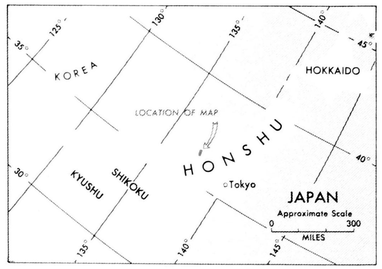
Photograph No. III-88 Kurobe No. 3 Hydro Plant
(Nippon Denryoku KK) in 1941

PROVISIONAL EDITION

Figure III-18

CONFIDENTIAL





HYDRO PLANTS ON THE KUROBE-GAWA

TOYAMA-KEN

0 1 2 3 4 5 MILES

0 1 2 3 4 5 KILOMETERS

BASE MAP FROM 1:50,000 SERIES, JAPAN IMPERIAL LAND SURVEY BUREAU, 1930
W. D. M. C. FILE NO. JAPAN S30-JGS-50, SHEETS 59-7, 59-8, 54-5.

Reliability Code: 2B-1B-1

SETTLEMENT
RAILROAD
LIGHT RAILROAD
TUNNEL
PRINCIPAL HIGHWAY
SECONDARY ROAD
BRIDGE - SELECTED
▲9816 SPOT HEIGHT (IN FEET)

MAP NO. 2610
6 OCTOBER 1943

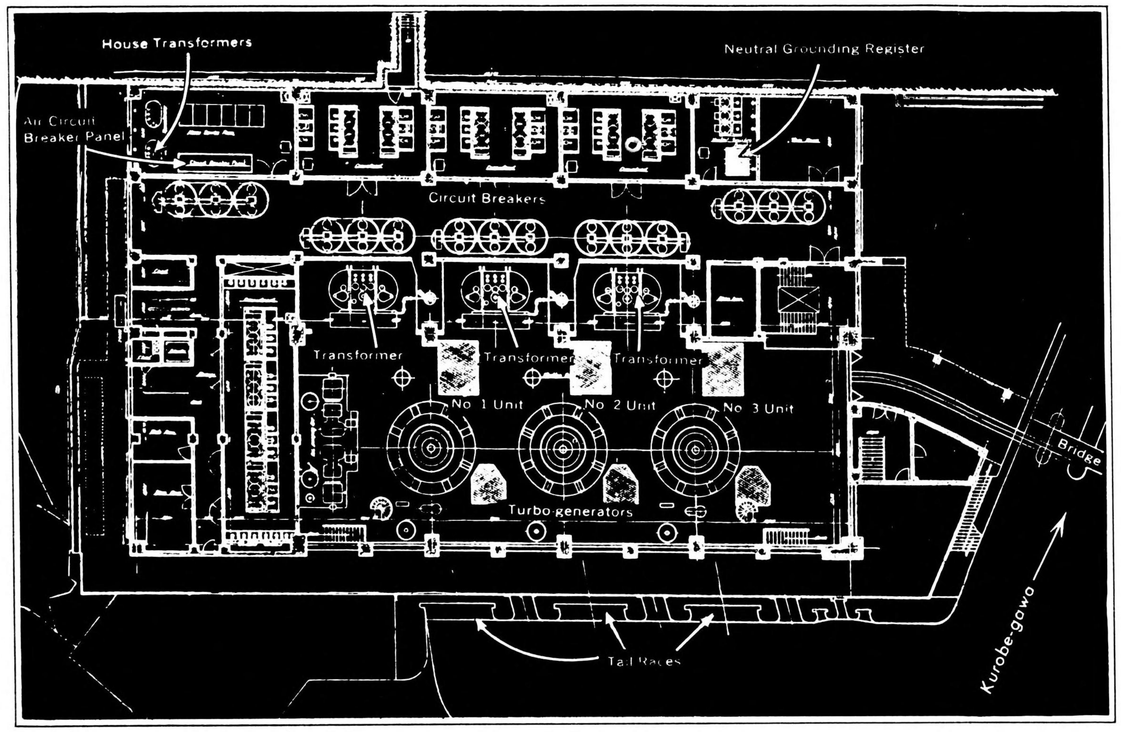
COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

KUROBE NO. 2 AND NO. 3 HYDROELECTRIC PLANTS

TOYAMA-KEN

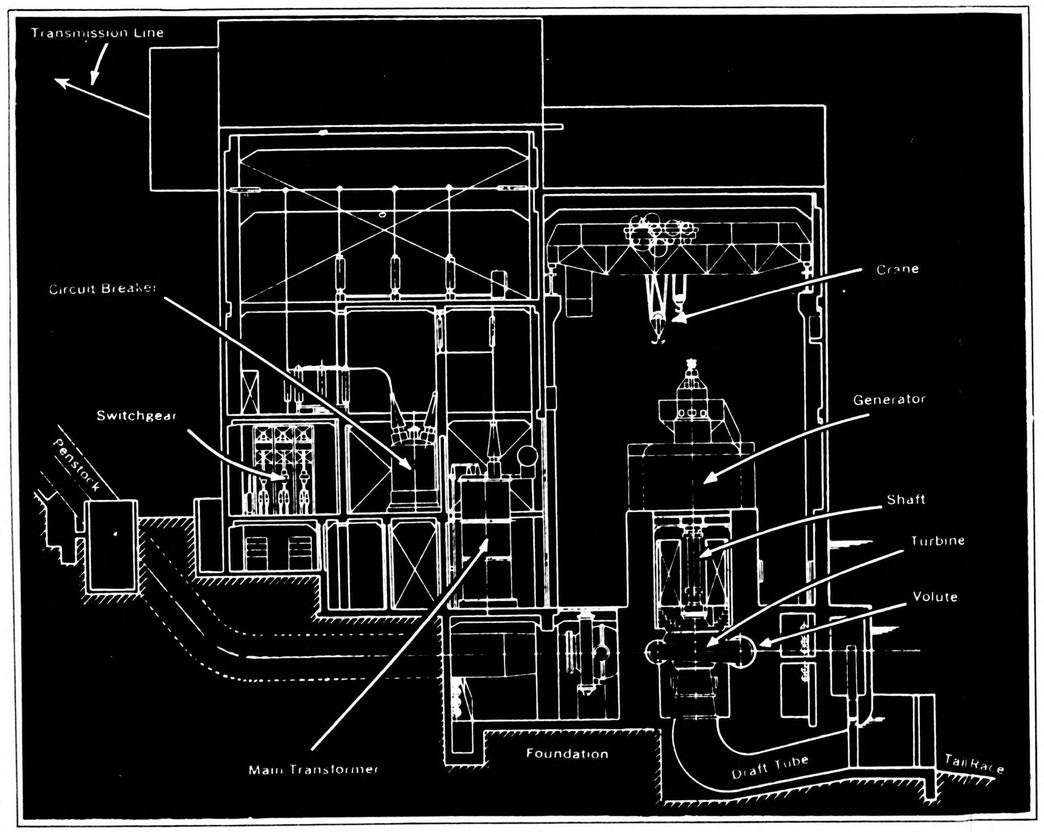
KUROBE NO. 2 PLANT—FLOOR PLAN

Source: DENKI GAKKAI ZASSHI, APRIL, 1937 p. 6



KUROBE NO. 2 PLANT—SIDE ELEVATION

Source: SHIBAURA REVYU, FEBRUARY, 1937, p. 46



KUROBE NO. 3 PLANT—FLOOR PLAN

Source: DENKI GAKKAI ZASSHI, APRIL, 1941, p. 278

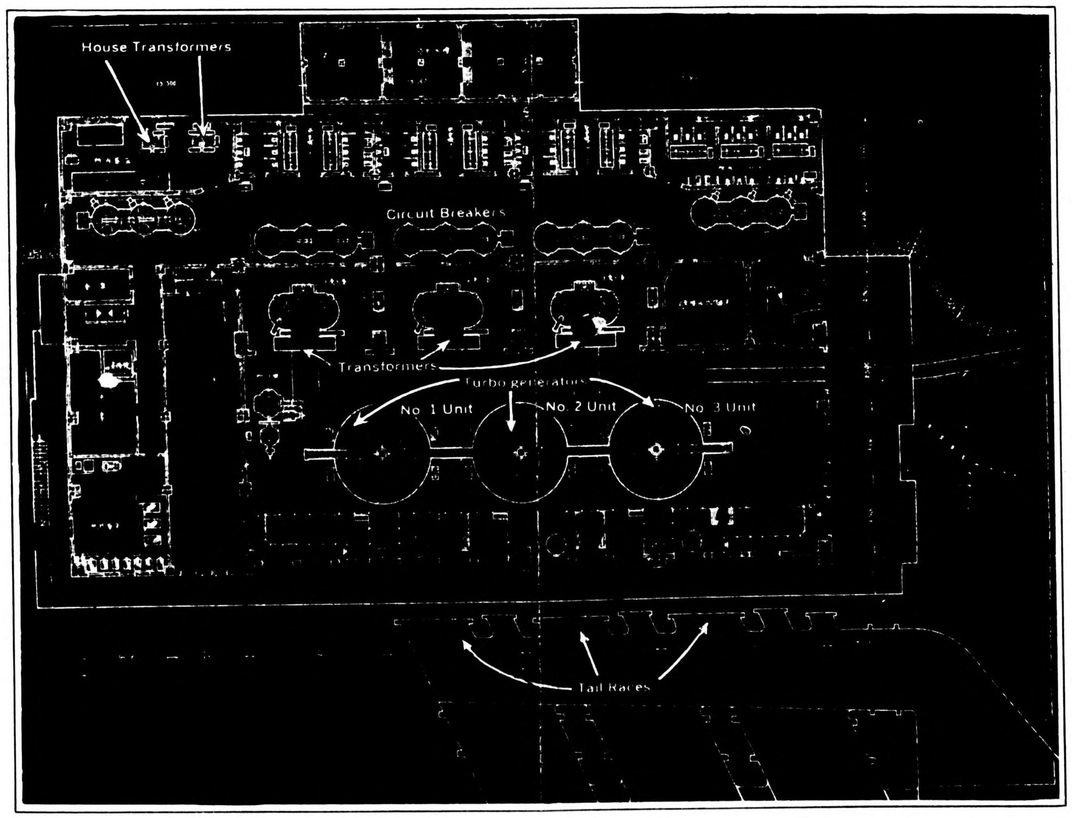
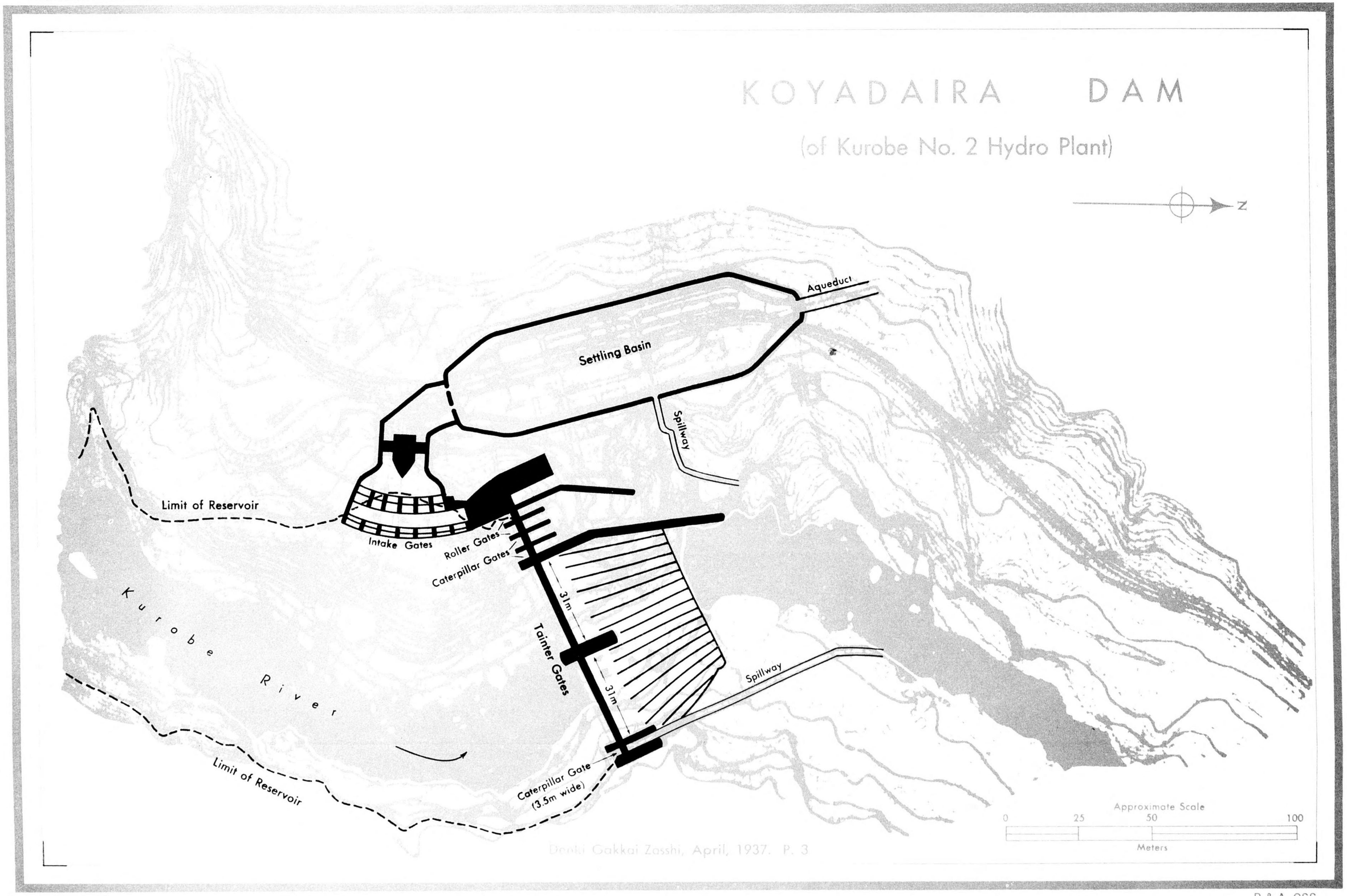


Figure III-19b
CONFIDENTIAL



R & A, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

Source of Power: Under construction as early as Dec 1933 and as recently as 1941

Details: Particular capacities (in kw) - 81,000 installed cap
Layout - Aqueduct-type
Reservoir - About 6 km in length and more than ½ km ave width

See: Figure No. III-18

Sources: Ohm 6/34 p.401; SR 4/41 p.141; DGS 7/39 p.760

421. KUROBEGAWA NO. 1 HYDRO PLANT — Approx. Lat. 36°52' Long. 137°32'

Company: Kurobegawa Denryoku KK

Location: Plant - On the right bank of the Kurobe-gawa at 1 of 4149, Sakashimo-aza, Shimo Yama-oaza, Araya-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 7760, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kurobe-gawa

Date of Construction: Founded June 1926; in operation Mar 1940

Details: Particular capacities (in kw) - *7760 installed cap
Layout - Aqueduct-type
Eff head - 90 ft
Plant, equipment -
Turbines - 2 @ 3000 hp, Voith-make
1 @ 5100 hp, Hitachi-make
Generators - 2 @ 2600 kva
1 @ 4500 kva

See:

Sources: DnN 1940; ZKT 1939 p.1648; Ohm 8/28 p.403; DnK

422. KUROBEGAWA NO. 2 HYDRO PLANT — Approx. Lat. 36°52'30" Long. 137°31'30"

Company: Kurobegawa Denryoku KK

Location: Plant - On the right bank of the Kurobe-gawa at 2 of 364, Kumiyaba-aza, Shimo Yama-oaza, Araya-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 6330, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kurobe-gawa

Date of Construction: Founded June 1926; in operation Mar 1940

Details: Particular capacities (in kw) - *6320 installed cap
Layout - Aqueduct-type
Eff head - 76 ft
Plant, equipment -
Turbines - 1 @ 4100 hp, Francis-type, horizontal-shaft, Hitachi-make
2 @ 2500 hp, Voith-make
Generators - 1 @ 3600 kva, 3-ph, 360 rpm, 60 cyc
2 @ 2150 kva, 3-ph, 360 rpm, 60 cyc
Other equipment - Semi-automatic equipment has been installed

See:

Sources: DnN 1940; Ohm 8/28 cover and p.403; DnK; DnGZ 6/30 p.695; ZKT 1939 p.1648

423. KUROBEGAWA NO. 3 HYDRO PLANT — Approx. Lat. 36°51'30" Long. 137°33'

Company: Kurobegawa Denryoku KK

Location: Plant - 762, Nakafukuyama-hayashi, Nakanoguchi-oaza, Aimoto-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 5140, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kurobe-gawa

Date of Construction: Completed Jan 1934; in operation Mar 1940

Details: Particular capacities (in kw) - *6000 installed cap; 1300 reg; 3840 spec
Eff head - 44 ft
Plant, equipment -
Turbines - 3 @ 3100 hp, Pelton-type, 2-nozzle, horizontal-shaft, Hitachi-make
Generators - 3 @ 2500 kva, 3-ph, 240 rpm, 60 cyc

Sources: DnN 1940; DnK; DnGZ 6/30 p.695; Ohm 8/28 p.403, 4/34 p.281

424. KUROBEGAWA NO. 4 HYDRO PLANT — Approx. Lat. 36°52'45" Long. 137°31'

Company: Kurobegawa Denryoku KK

Location: Plant - Tanaka-oaza, Wakakuri-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 5580, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kurobe-gawa

Date of Construction: Unknown; in operation as early as Dec 1936 and as recently as Mar 1940

Details: Plant operates on 60 cyc

Sources: DnN 1940; DnK

425. KUROBEGAWA NO. 5 HYDRO PLANT — Approx. Lat. 36°53'30" Long. 137°30'

Company: Kurobegawa Denryoku KK

Location: Plant - 700 yards from left bank of Kurobe-gawa in Wakakuri-mura, Shimo Niikawa-gun, Toyama-ken
Dam - Tanaka-oaza, Wakakuri-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 1490 (see Date of Construction)

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kurobe-gawa

Date of Construction: Construction was begun Aug 1936 and completed in Dec 1938; in operation June 1939

Details: Particular capacities (in kw) - 1520 installed cap; 830 reg; 660 spec
Layout - Aqueduct-type
Eff head - 21.2 m; flow - 8.9 m^3/sec
Aqueduct - 957 m long
Surge tank - 61 ft high
Penstocks - 1 @ 26 m long, 2.18 m inner diam
Plant, external features - Of concrete construction, 3 stories high, with surge tank directly in back of plant
Plant, equipment -
Turbines - 1 @ 1600 kw, Kaplan propeller-type, vertical-shaft, Dengyosha-make
Generators - 1 @ 1900 kva, 80% pf, 3-ph, 6900 v, 360 rpm, 60 cyc, Shibaura-make

See: Photograph No. III-89
Figure No.

Sources: KN 1939 p.166; Ohm 7/37 p.793, 3/39 p.295; SR 6/39 p.217

426. KUROBEGAWA NO. 6 HYDRO PLANT — Approx. Lat. 36°53'30" Long. 137°29'

Company: Kurobegawa Denryoku KK

Location: Plant - 500 yards from the left bank of the Kurobe-gawa at 11508, Oshima-aza, Ogiu-oaza, Ogiu-mura, Shimo Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 1210, as of Dec 1938

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kurobe-gawa

Date of Construction: Construction was begun Apr 1937 and completed Dec 1938; in operation June 1939

Details: Particular capacities (in kw) - 1200 installed cap; 380 reg; 830 spec
Layout - Aqueduct-type
Eff head - 13.9 m; flow - 11.13 m^3/sec
Aqueduct - 1255 m long from discharge of Kurobegawa No. 5 Hydro Plant
Plant, external features - Of concrete construction, 3 stories high
Plant, equipment -
Turbines - 1 @ 1300 kw, Kaplan propeller-type, vertical-shaft, Dengyosha-make
Generators - 1 @ 1500 kva, 80% pf, 3-ph, 6900 v, 400 rpm, 60 cyc, Shibaura-make

See: Photograph No. III-90

Sources: KN 1939 p.166; SR 6/39 p.217; Ohm 7/37 p.793, 3/39 p.295

427. KURODA HYDRO PLANT

Approx. Lat. 35°12'30"
Long. 137°29'

Company: Yahagi Suiryoku KK

Location: Plant - On the left bank of the Kuroda-gawa at 341, Nishi Ogawa-aza, Kuroda-oaza, Busetsu-mura, Kita Shitara-gun, Aichi-ken
Dam - Kuroda-oaza, Busetsu-mura, Kita Shitara-gun, Aichi-ken

Capacity Commonly in Use (in kw): 3100, as of Dec 1936

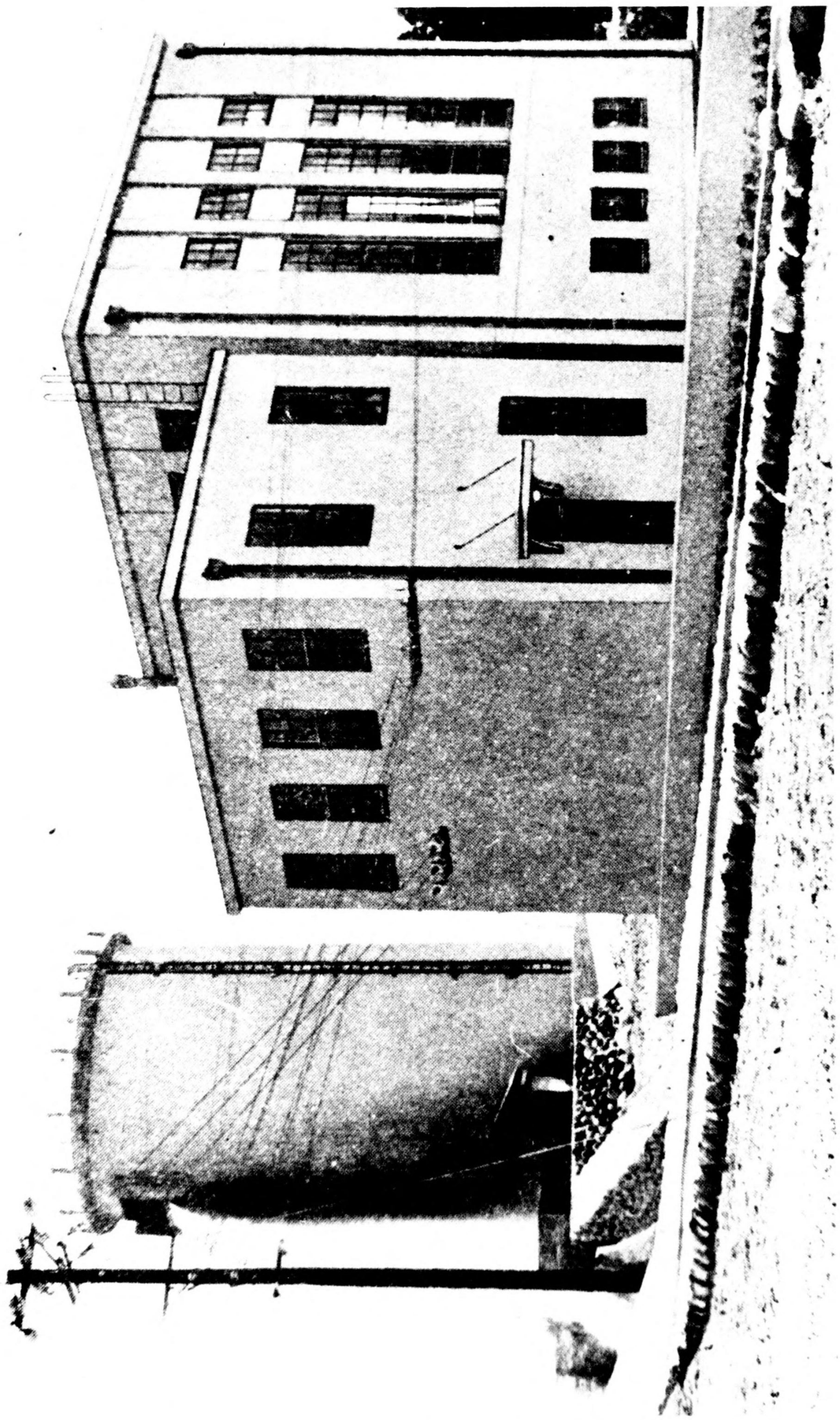
Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kuroda-gawa, a branch of the Nagura-gawa of the Yahagi-gawa system

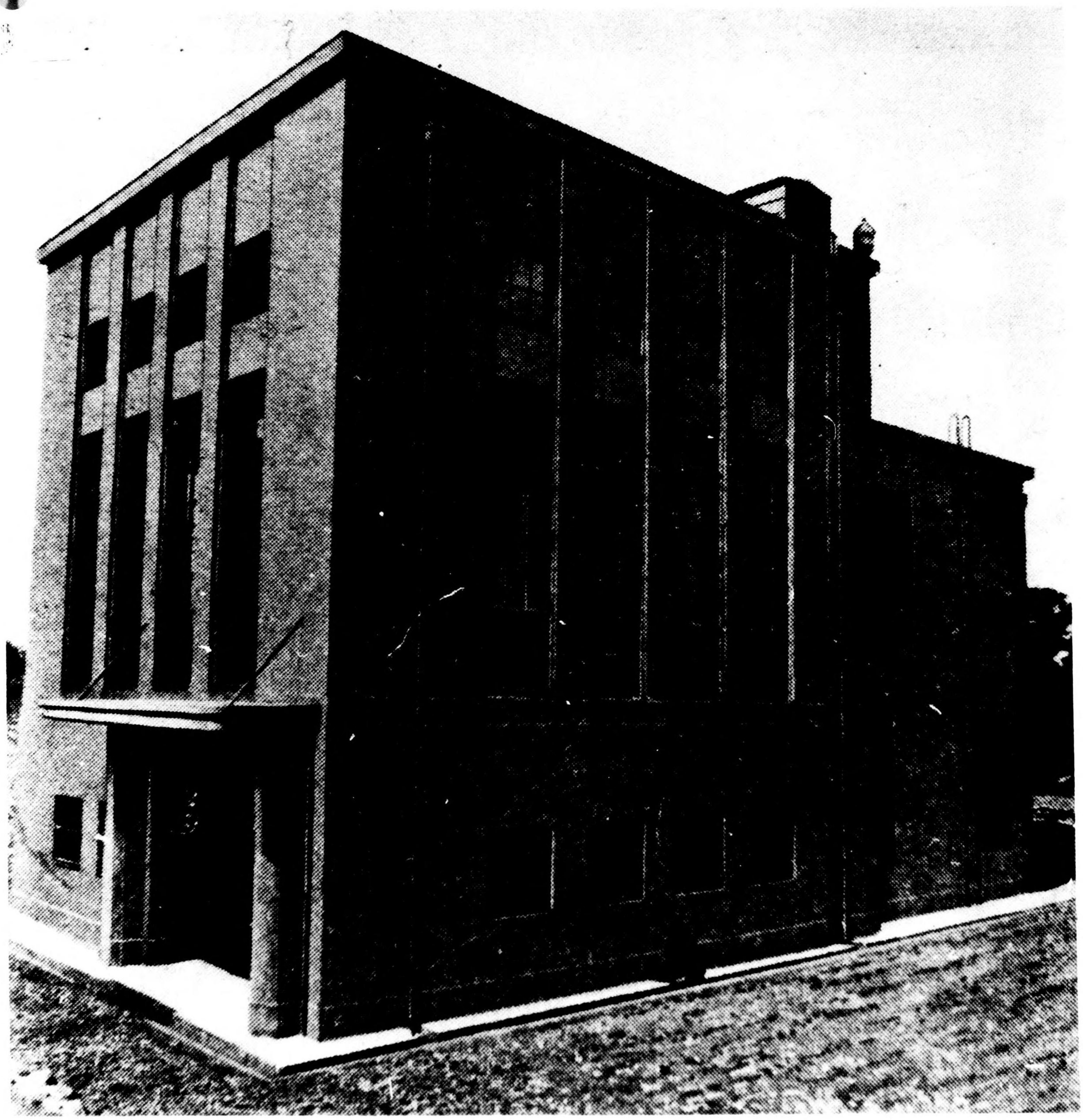
Date of Construction: Construction was begun Aug 1933 and completed July 1934; in operation Mar 1940

Details: Particular capacities (in kw) - *3200 installed cap; 3100 spec
Layout - Aqueduct-type
Eff head - 219 m; flow - 1.81 m^3/sec
Dam - 36.5 m high, 150 m long
Penstocks - 1
Plant, equipment -
Turbines - 1 @ unknown cap, Dengyosha-make
Generators - 1 @ 4000 kva, 3-ph, 6600 v, 360 rpm, 60 cyc, Shibaura-make

See:



Photograph No. III-89 Kurobegawa No. 5 Hydro Plant (Kurobegawa Denryoku KK) in 1939. The surge tank is directly behind the plant.



Photograph No. III-90 Kurobegawa No. 6 Hydro Plant
(Kurobegawa Denryoku KK) in 1939

Sources: DnN 1940; DnK; ZKT 1939 p.1644; DGS 4/33 p.263; Ohm 11/33 p.651, 10/34 p.751; SR 1/34; DnGZ 7/37

428. KUROFUCHI HYDRO PLANT — Approx. Lat. 33°07'30" Long. 131°02'

Company: Kyushu Suiryoku Denki KK; formerly Tsuetate Suiryoku Denki KK

Location: Plant - Imono-aza, Kurofuchi-oaza, Koguni-machi, Aso-gun, Kumamoto-ken

Capacity Commonly in Use (in kw): 7000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 43

Source of Power: Tsue-gawa of the Tsuetate-gawa system

Date of Construction: Completed May 1932; in operation Mar 1940

Details: Particular capacities (in kw) - *7200 installed cap; 3275 reg; 3275 spec
Plant, equipment -
Turbines - 2 @ unknown cap, vertical-shaft, Dengyosha-make
Generators - 2 @ 4500 kva, 3-ph, 11,000 v, 50/60 cyc, Shibaura-make
Other equipment - Automatic equipment installed

Sources: DnN 1940; DnK; Ohm 8/28 p.406, 8/32 p.451

429. KUROGAWA NO. 1 HYDRO PLANT — Approx. Lat. 33°32'30" Long. 133°00'30"

Company: Iyo Tetsudo Denki KK

Location: Plant - On the right bank of the Kuro-gawa at 1495, Sukiyaki-aza, Yanaigawa-oaza, Yanagidani-mura, Kami Ukena-gun, Ehime-ken

Capacity Commonly in Use (in kw): 1200, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Shikoku supply area - 15 +

Source of Power: Kuro-gawa of the Niyodo-gawa system

Date of Construction: Founded Jan 1911; in operation Mar 1940

Details: Particular capacities (in kw) - *1200 installed cap; 1200 reg
Eff head - 136 ft
Plant, equipment -
Turbines - 2 @ 900 hp, Francis-type, horizontal-shaft, Voith-make
Generators - 2 @ 750 kva, 3-ph, 3300 v, 600 rpm, 60 cyc, BBC-make
Transformers - 6 @ 250 kva, 1-ph, 3.3/30 kv, D-D conn, water-cooled, 60 cyc, core-type, BBC-make

Sources: DnN 1940; ZKT 1939 p.1650; DJY 1927; DJY 1929 p.366

430. KUROGAWA NO. 2 HYDRO PLANT Approx. Lat. 33°33' Long. 133°00'30"

Company: Iyo Tetsudo Denki KK

Location: Plant - On the right bank of the Kuro-gawa at 3531, Miyanoshita-aza, Yanaigawa-oaza, Yanagidani-mura, Kami Ukena-gun, Ehime-ken

Capacity Commonly in Use (in kw): 3750, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Shikoku supply area - 15 +

Source of Power: Kuro-gawa of the Niyodo-gawa system

Date of Construction: Founded Mar 1922; in operation Mar 1940

Details: Particular capacities (in kw) - *4100 installed cap; 3750 reg
Eff head - 530.57 ft
Plant, equipment -
Turbines - 3 @ 1780 hp, impulse-type, EW-make
Generators - 3 @ 1700 kva, 3-ph, 3300 v, 360 rpm, 60 cyc, GE-make
Transformers - 6 @ 1000 kva, 1-ph, 3.3/30 kv, D-D conn, water-cooled, shell-type, GE-make

Sources: DnN 1940; DnK; DJY 1927; DJY 1929 p.366; ZKT 1939 p.1650; Ohm 1/28 p.80

431. KUROGAWA NO. 1 HYDRO PLANT Approx. Lat. 32°52'30" Long. 130°58'

Company: Kumamoto Denki KK

Location: Plant - On the right bank of the Kuro-gawa at 1612, Tateno-oaza, Seta-mura, Kikuchi-gun, Kumamoto-ken

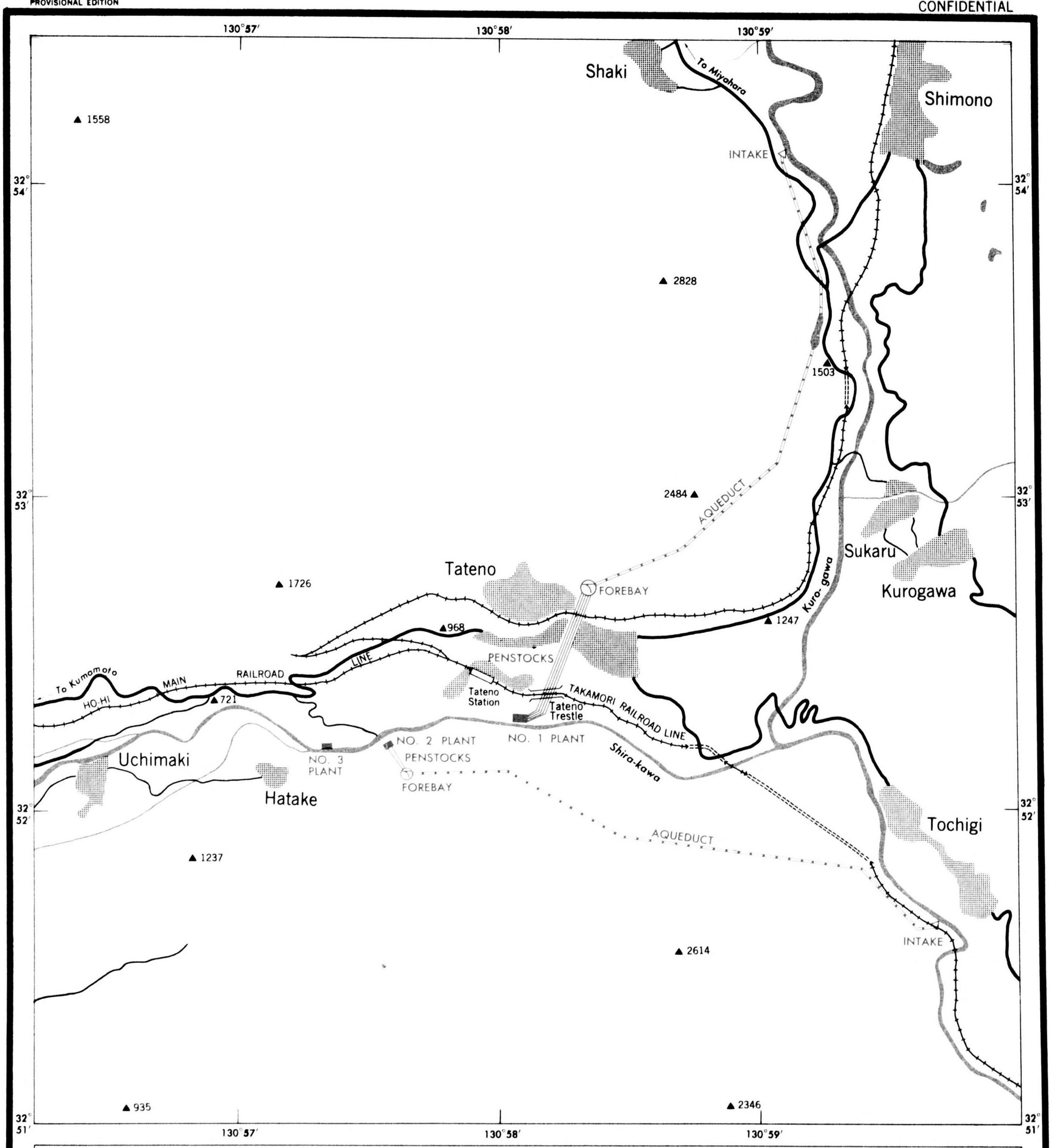
Capacity Commonly in Use (in kw): 15,000, as of Dec 1936

Importance: Rank in Japan - 148 ; rank in Kyushu supply area - 19 -

Source of Power: Kuro-gawa of the Shira-kawa system

Date of Construction: Completed Feb 1918; in operation Mar 1940

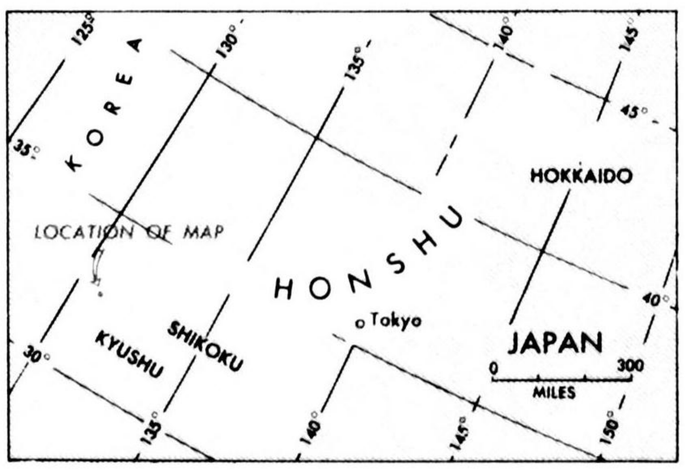
Details: Particular capacities (in kw) - *15,300 installed cap; 10,000 reg; 5000 spec
Layout - Aqueduct-type
Eff head - 243 m; flow - 8.4 m^3/sec
Penstocks - 5



KUROGAWA NOS. 1, 2, AND 3 HYDROELECTRIC PLANTS

KUMAMOTO-KEN

BASE MAP FROM 1:50,000 SERIES, JAPAN IMPERIAL LAND SURVEY BUREAU, 1931.
W.D.M.C. FILE NO. S30-JGS-50, SHEET 11-3



SETTLEMENT CENTER
TUNNEL
PRINCIPAL HIGHWAY
SECONDARY ROAD
▲1503 SPOT HEIGHT (IN FEET)

0 1 2
MILES

0 1 2
KILOMETERS

Reliability Code 1B--1B--1

Plant, external features - Of concrete construction, 3 stories high, with cultivated fields nearby and bridge a short distance upstream
Plant, equipment -
Turbines - 2 (incl 1 res) @ 7500 hp, Pelton-type, B-make
4 @ 2150 hp, Pelton-type, EW-make
Generators - 2 (incl 1 res) @ 6250 kva, 3-ph, 6600 v, 360 rpm, 60 cyc, Shibaura-make
4 @ 1660 kva, 3-ph, 6600 v, 450 rpm, 60 cyc, SS-make
Transformers - 15 (incl 6 res) @ 2200 kva, 1-ph, 6.6/66 kv, D-D conn, water-cooled, 60 cyc, shell-type, Shibaura-make
Other equipment - 2 exciters @ 150 kw; 1 exciter @ 200 kw
Area served - Kumamoto-ken, as of 1933

See: Photograph No. III-91
Figure No. III-20

Sources: DnN 1940; DnK; Ohm-sha Guide 1933 p.17; DJY 1927; DJY 1929 p.370; ZKT 1939 p.1650; Ohm 1/29 p.6, 6/31 supp p.6, 10/33 opp p.561, 1/34 p.4; DnGZ 5/38 adv p.75; TD Map

432. KUROGAWA NO. 2 HYDRO PLANT — Approx. Lat. 32°52'30" Long. 130°56'30"

Company: Kumamoto Denki KK

Location: Plant - On the right bank of the Kuro-gawa in Seta-mura, Kikuchi-gun, Kumamoto-ken

Capacity Commonly in Use (in kw): 1800, as of June 1928

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Shira-kawa and Kuro-gawa of the Shira-kawa system

Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as Mar 1940

Details: Particular capacities (in kw) - *2000 installed cap; 900 reg; 900 spec
Layout - Aqueduct-type
Eff head - 75.4 ft
Penstocks - 2
Plant, external features - 2 stories high with peaked roof and forebay regulating building, 1 story high, directly in back
Plant, equipment -
Turbines - 2 @ 1500 hp, Francis-type, Dengyosha-make
Generators - 2 @ 1250 kva, 3-ph, 6600 v, 600 rpm, 60 cyc, Shibaura-make

See: Photograph No. III-92

Sources: DnN 1940; DJY 1927; DJY 1929 p.370; TD Map

433. KUROGAWA NO. 3 HYDRO PLANT — Approx. Lat. 32°51'30" Long. 130°54'

Company: Kumamoto Denki KK

Location: Plant - On the right bank of the Kuro-gawa in Seta-mura, Kikuchi-gun, Kumamoto-ken

Capacity Commonly in Use (in kw): 2000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Kuro-gawa of the Shira-kawa system

Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as Mar 1940

Details: Particular capacities (in kw) - *2000 installed cap; 1500 reg; 500 spec
Eff head - 66.5 ft
Plant, equipment -
Turbines - 2 @ 1500 hp, Francis-type, Hitachi-make
Generators - 2 @ 1250 kva, 3-ph, 6600 v, 257 rpm, 60 cyc, Hitachi-make

Sources: DnN 1940; DnK; DJY 1927; DJY 1929 p.370; TD Map

434. KUROSAKA HYDRO PLANT Approx. Lat. 35°13' Long. 133°23'30"

Company: Hiroshima Denki KK

Location: Plant - Shimo Kurosaka-oaza, Kurosaka-machi, Hino-gun, Tottori-ken

Capacity Commonly in Use (in kw): 12,000 (see Date of Construction)

Importance: Rank in Japan - 188 ; rank in Chugoku supply area - 12

Source of Power: Hino-kawa

Date of Construction: Under construction as early as Dec 1933 and as recently as Sept 1938; in operation Mar 1940

Sources: DnN 1940; KN 1939 p.166; Ohm 6/34 p.401; TD Map

435. KURUMINO HYDRO PLANT Approx. Lat. 35°21'30" Long. 134°23'30"

Company: Nippon Denryoku KK; formerly Ombata Suiryoku Denki KK

Location: Plant - 132, Ienodaira-aza, Akamatsu-oaza, Wakasa-machi, Yazu-gun, Tottori-ken
Dams - 1 - (Main dam) Kurumino-oaza, Wakasa-mura, Yazu-gun, Tottori
2 - Tsumakano-oaza, Tambi-mura, Yazu-gun, Tottori-ken

Capacity Commonly in Use (in kw): 2620, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Chugoku supply area - 25 +

Photograph No. III-91 Kurogawa No. 1 Hydro Plant
(Kumamoto Denki KK) in 1934

Photograph No. III-92 Kurogawa No. 2 Hydro Plant
(Kumamoto Denki KK) in 1928

Source of Power: Kurumino-gawa and Hosomi-gawa, both of Chiyo-gawa system

Date of Construction: Construction was begun July 1934 and completed Aug 1935; in operation Mar 1940

Details: Particular capacities (in kw) - *2700 installed cap; 420 reg; 2200 spec
Layout - Aqueduct-type
Eff head - 435 ft
Dams - 1 - 29 ft high (of which fixed part is 24.5 ft high) and 165 ft long, of concrete construction with 2 gates @ 4.5 ft high and 27 ft wide, and 3 stony gates @ 9 ft high and 9 ft wide
2 - 19 ft high, 52.3 ft long, overflow gravity-type, of concrete construction, with 1 stony gate @ 3 ft high and 3 ft wide
Intakes - 1 - 10 ft wide
2 - 5 ft wide
Settling basins - 1 - 60 ft long, 20 ft wide
2 - 39.6 ft long, 13 ft wide
Aqueducts - 1 - About 15,300 ft long
2 - 4890 ft long
Forebay - 72 ft long, 12 ft wide
Penstocks - 1 @ 862.6 ft long
Excess water spillway - 890 ft long
Plant, external features - Of reinforced concrete construction, 3 stories high with peaked roof
Plant, equipment -
Turbines - 1 @ 4200 hp, Francis-type, horizontal-shaft, Hitachi-make
Generators - 1 @ 3350 kva, 3-ph, 7000 v, 720 rpm, 60 cyc, Hitachi-make
Tail race - 414 ft long

See: Photograph No. III-93

Sources: DnN 1940; DGS 11/35 p.1652; Ohm 10/34 p.751, 12/35 p.1219

436. KUSANO HYDRO PLANT Approx. Lat. 35°28'30" Long. 136°19'

Company: Ujigawa Denki KK

Location: Plant - Kita Ide-aza, Takayama-oaza, Kami Kusano-mura, Higashi Asai-gun, Shiga-ken

Capacity Commonly in Use (in kw): 2200, as of Oct 1939

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kusano-gawa of the Ane-kawa which flows into Biwa-ko

Date of Construction: Construction was begun Apr 1938 and completed in 1939; in operation Oct 1939

Details: Particular capacities (in kw) - *4400 installed cap; 350 reg; 1850 spec

Eff head - 202.1 m
Plant, equipment -
Turbines - 2 @ 2600 kw, Pelton-type, single-nozzle, Hitachi-make
Generators - 2 @ 2750 kva, 3-ph, 400 rpm, 60 cyc, Hitachi-make

Sources: KN 1939 p.166; HH 1/39 p.7, 1/40 p.6; Ohm 7/38 p.853

437. KUSATSU HYDRO PLANT

Approx. Lat. 38°59'30"
Long. 140°01'

Company: Sakata-shi

Location: Plant - 19, Ashimaki-aza, Kusatsu-oaza, Nichiko-mura, Akumi-gun, Yamagata-ken

Capacity Commonly in Use (in kw): 1720, as of Feb 1933

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 20 +

Source of Power: Nichiko-gawa

Date of Construction: Construction was begun Apr 1931 and completed Feb 1933; in operation Mar 1940

Details: Particular capacities (in kw) - 860 reg; 860 spec

Sources: DnN 1940; Ohm 7/31 p.357, 12/32 p.667, 6/33 p.353

438. KUSHIHARA HYDRO PLANT

Approx. Lat. 35°13'
Long. 137°26'

Company: Nippon Hassoden KK; formerly Daido Denryoku KK

Location: Plant - On the right bank of the Yahagi-gawa at 33 of 1938, Kamai-oaza, Kushihara-mura, Ena-gun, Gifu-ken

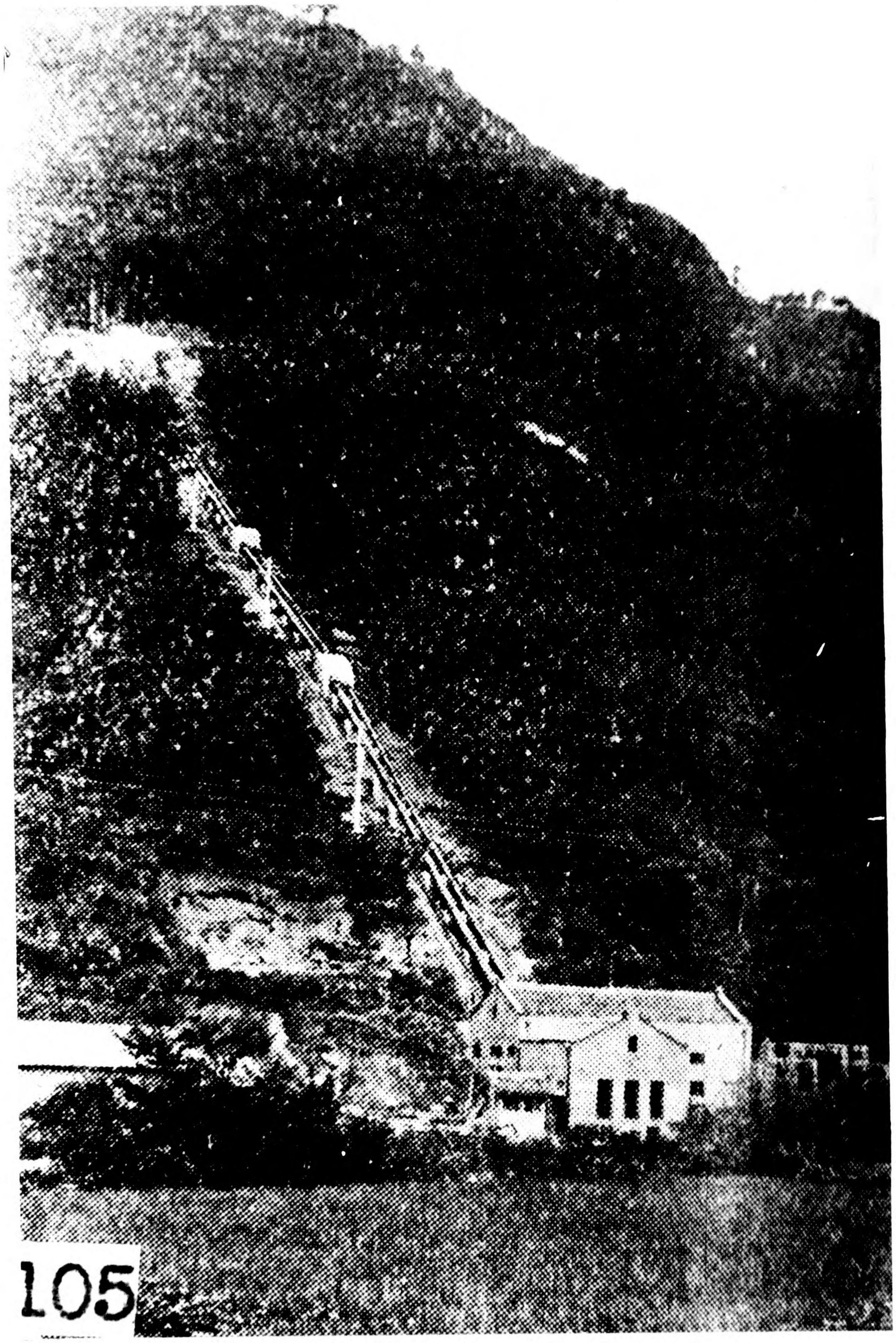
Capacity Commonly in Use (in kw): 5720, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Yahagi-gawa

Date of Construction: Construction was begun Oct 1919 and completed Dec 1921; in operation Mar 1940

Details: Particular capacities (in kw) - *6000 installed cap; 3000 reg; 2720 spec
Layout - Aqueduct-type
Eff head - 70.6 m; flow - 11.54 m^3/sec
Aqueduct - Tunnel - 10,791 ft long
Penstocks - 2
Plant, external features - Of concrete construction, 3 stories high, with 2 peaked roofs at right angles and bridge directly behind plant



Photograph No. III-93 Kurumino Hydro Plant in 1935

Plant, equipment -
Turbines - 2 @ 4300 hp, double-spiral Francis-type, horizontal-shaft, Hitachi-make
Generators - 2 @ 3750 kva, 3-ph, 6600 v, 514 rpm, 60 cyc, Hitachi-make
Transformers - 7 (incl 1 res) @ 1500 kva, 1-ph, 2.3,6.6/77 kv, D-D conn, water-cooled, 60 cyc, core-type, Hitachi-make

See: Photographs No. III-94, III-95

Sources: DnN 1940; DnK; DJY 1927; DJY 1929 p.342; ZKT 1939 p.1645; Ohm 6/31 supp p.7

439. KUTA HYDRO PLANT — Approx. Lat. 35°07'30" Long. 133°53'30"

Company: Chugoku Godo Denki KK

Location: Plant - 1119, Kuta Shimohara-oaza, Kuta-mura, Tomata-gun, Okayama-ken

Capacity Commonly in Use (in kw): 6000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Chugoku supply area - 25 +

Source of Power: Yoshii-kawa system

Date of Construction: Founded Dec 1921; in operation Mar 1940

Details: Particular capacities (in kw) - *6000 installed cap; 3400 reg; 2600 spec; 6000 reg pk
Eff head - 385.4 ft
Plant, equipment -
Turbines - 2 @ 5600 hp, Francis-type, Hitachi-make
Generators - 2 @ 3750 kva, 3-ph, 6600 v, 600 rpm, 60 cyc, Hitachi-make
Transformers - 4 (incl 1 res) @ 2500 kva, 1-ph, 6.6/66 kv, conn, water-cooled, 60 cyc, core-type, Shibaura-make

Sources: DnN 1940; ZKT 1939 p.1649; DnK; DJY 1927; DJY 1929 p.362; Ohm 6/31 supp p.7, 9/32 p.505

440. KUTANI HYDRO PLANT — Approx. Lat. 36°12' Long. 136°25'

Company: Daishojigawa Suiden KK

Location: Plant - Kutani-oaza, Nishi Tani-mura, Enuma-gun, Ishikawa-ken

Capacity Commonly in Use (in kw): 1660, as of July 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Daishoji-gawa

Date of Construction: Completed Sept 1928; in operation Mar 1940

Details: Particular capacities (in kw) - 480 reg; 1180 spec
Plant operates on 60 cyc

Sources: DnN 1940; Ohm 12/28 p.623, 10/36 p.1007

KUZUNEDA HYDRO PLANT - See MORIOKA DENKI NO. 2 HYDRO PLANT

441. KYURAGI HYDRO PLANT

Approx. Lat. 33°12'30"
Long. 130°30'

Company: Toho Denryoku KK

Location: Plant - Tategusa-aza, Hirose-oaza, Kyuragi-mura (also read Kigi-mura), Higashi Matsuura-gun, Saga-ken

Capacity Commonly in Use (in kw): 5230, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Kyuragi-kawa and Tenno-gawa

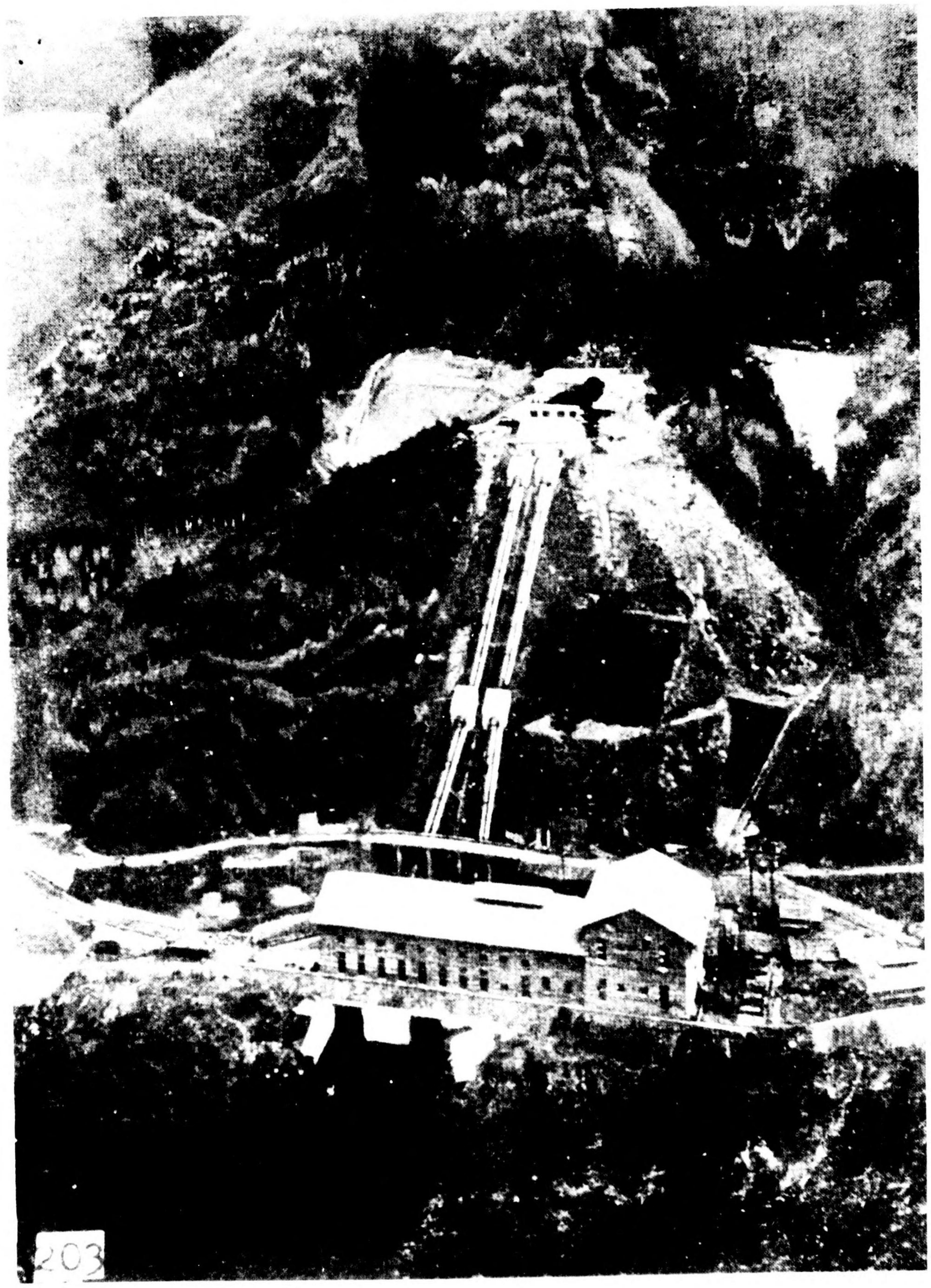
Date of Construction: Construction was begun Oct 1930 and completed Feb 1931; in operation Mar 1940

Details: Particular capacities (in kw) - *5000 installed cap; 900 reg; 4330 spec; 5000 reg pl
Eff head - 193.54 m; flow - 3.34 m^3/sec
Dam - 15.5 m high, 47.4 m long, overflow-type
Plant, external features - The plant is completely out-of-doors.
Plant, equipment -
Turbines - 2 @ 3700 hp, Francis-type, vertical-shaft
Generators - 2 @ 3125 kva, 3-ph, 6600 v, 720 rpm, 60 cyc
Transformers - 3 @ 3000 kva
Other equipment - Automatic equipment installed for remote control from the Higashi Taku transformer station

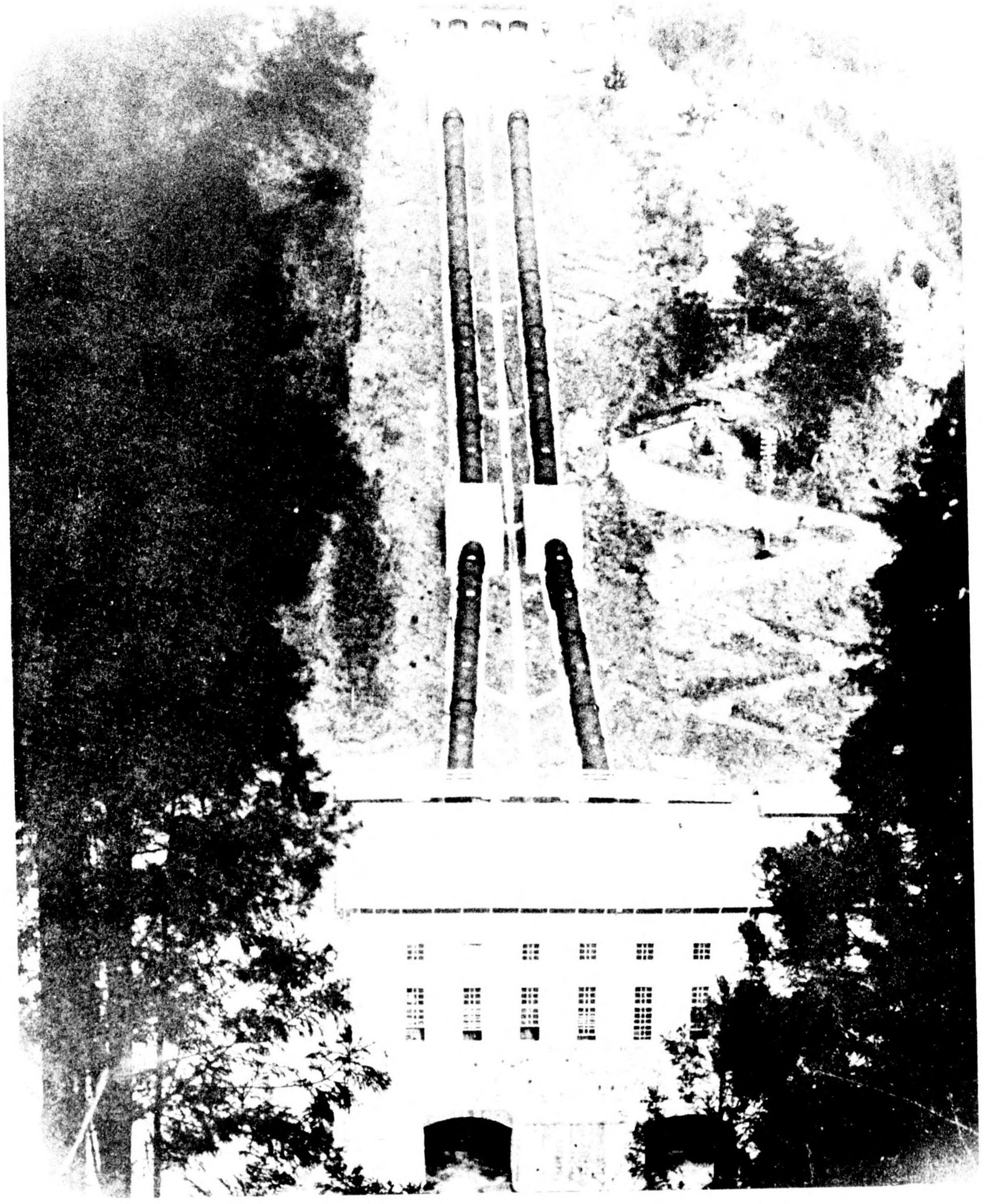
See: Photograph No. III-95a

Sources: DnN 1940; Ohm 1/31 p.61, 2/31 adv p.4, 5/31 p.259; DnGZ 6/30 p.696, 8/32 p.(561), 7/37; DnK; DGS 8/33 p.678

KYUTANI HYDRO PLANT - See KUTANI HYDRO PLANT



Photograph No. III-94 Kushihara Hydro Plant



Photograph No. III-95 Kushihara Hydro Plant

Photograph No. III-95a Kyurapi Hydro Plant

442. MACHIDA NO. 1 HYDRO PLANT

Approx. Lat. 33°12'30"
Long. 131°10'

Company: Kyushu Suiryoku Denki KK

Location: Plant - Minami Yamada-mura, Kusa-gun, Oita-ken

Capacity Commonly in Use (in kw): 1574, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Kusu-kawa and Naruko-gawa of the Chikugo-gawa system

Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as Mar 1940

Details: Particular capacities (in kw) - 1440 installed cap; 1295 reg; 279 spec
Layout - Aqueduct-type
Eff head - 188 ft
Dam - 31.82 m high, of earth
Penstocks - 1
Plant, equipment -
Turbines - 1 @ 2600 hp, Francis-type, Dengyosha-make
Generators - 1 @ 1440 kw, 3-ph, 11,000 v, 600 rpm, 50 cyc, Shibaura-make. This generator is operating above its name-plate capacity.

Sources: DnN 1940; DJY 1927; DJY 1929 p.374; DGS 8/33 p.678

443. MACHIDA NO. 2 HYDRO PLANT

Approx. Lat. 33°12'45"
Long. 131°10'

Company: Kyushu Suiryoku Denki KK

Location: Plant - Minami Yamada-mura, Kusu-gun, Oita-ken

Capacity Commonly in Use (in kw): 6000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Kusu-kawa and Naruko-gawa of the Chikugo-gawa system

Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as Mar 1940

Details: Particular capacities (in kw) - 6000 installed cap; 4940 reg; 1060 spec
Layout - Aqueduct-type
Eff head - 720 ft
Plant, equipment -
Turbines - 2 @ 5250 hp, Pelton-type, Dengyosha-make
Generators - 2 @ 3000 kw, 3-ph, 11,000 v, 500 rpm, 50 cyc, Shibaura-make
Transformers - 4 (incl 1 res) @ 3000 kva, 1-ph, 11.5,11,10.5,10/66,63,60 kv, D-D conn, water-cooled, 50 cyc, shell-type, Shibaura-make

Sources: DnN 1940; DnK; DJY 1927; DJY 1929 p.376; Ohm 6/31 supp p.7; TD Map

MAEBASHI HYDRO PLANT - See HIROSEGAWA HYDRO PLANT

444. MAEKAWA HYDRO PLANT

Approx. Lat. 36°10'
Long. 137°38'30"

Company: Keihin Denryoku KK

Location: Plant - On the left bank of the Ko-ono-gawa, Koonogawa-oaza, Azumi-mura, Minami Azumi-gun, Nagano-ken

Capacity Commonly in Use (in kw): 2100, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 + ; rank in Osaka-Nagoya supply area - 100 +

Source of Power: Ko-ono-gawa

Date of Construction: Unknown; in operation as early as June 1928 and as recently as Mar 1940

Details: Particular capacities (in kw) - 2100 installed cap; 1450 reg; 650 spec
Layout - Aqueduct-type
Eff head - 222 m; flow - 3.45 m^3/sec
Penstocks - 1
Plant, external features - Of concrete construction, 2 stories high
Plant, equipment -
Turbines - 1 @ 3300 hp, horizontal-shaft
Generators - 1 @ 2200 kva, 96% pf, 3-ph, 7000 v, 300/360 rpm, 50/60 cyc
Other equipment - Automatic equipment installed

See: Photograph No. III-96

Sources: DnN 1940; DnK; DnGZ 6/30 p.694; Ohm 8/28 p.407; DJY 1929 p.295; DGS 12/35 p.1287

MAFU HYDRO PLANT - See KAMI ASO HYDRO PLANT

445. MAGAMI HYDRO PLANT

Approx. Lat. 34°05'
Long. 131°45'

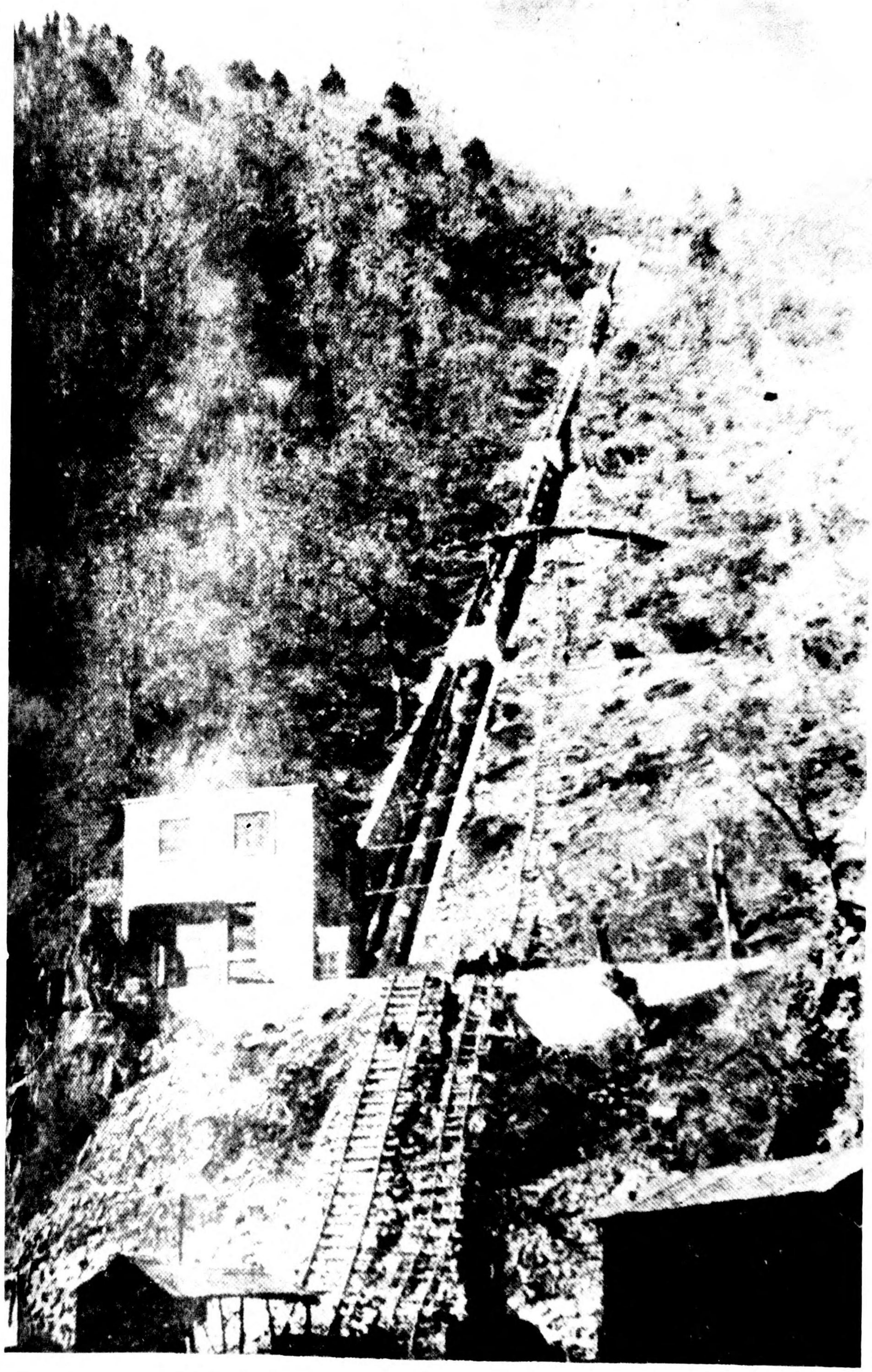
Company: Yamaguchi-ken

Location: Plant - Magami-oaza, Kami-mura, Tsuno-gun, Yamaguchi-ken

Capacity Commonly in Use (in kw): 6100 (see Date of Construction)

Importance: Rank in Japan - 250 + ; rank in Chugoku supply area - 25 +

Source of Power: Nishiki-kawa of the Iwakuni-gawa system



Photograph No. III-96 Maekawa Hydro Plant in 1928

Date of Construction: Construction was begun Feb 1938 at which time completion was scheduled for 1939; plant has probably gone into operation since.

Details: Particular capacities (in kw) - 2800 reg; 3300 spec; 5600 reg pk

Sources: KN 1939 p.166; Ohm 5/38 p.510

446. MAGAWA NO. 1 HYDRO PLANT — Approx. Lat. 36°34'30" Long. 137°27'

Company: Toyama-ken

Location: Plant - On the left bank of the Joganji-gawa at Setogura-wari, Hongu-oaza, Oyama-mura, Kami Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 30,000, as of Dec 1936

Importance: Rank in Japan - 74 ; rank in Osaka-Nagoya supply area - 34

Source of Power: Ma-gawa of the Joganji-gawa system

Date of Construction: Completed Jan 1930; in operation Mar 1940

Details: Particular capacities (in kw) - *33,000 installed cap; 10,000 reg; 20,000 reg pk; 30,000 max pk
Layout - Aqueduct-type
Eff head - 483 m; flow - 8.4 m^3/sec
Penstocks - 1
Plant, external features - Of concrete construction, 3 stories high, with extensive switch-gear and several wooden buildings alongside of plant
Plant, equipment -
Turbines - 2 @ 17,000 hp, Pelton-type, horizontal-shaft, Voith-make
1 @ 17,000 hp, Pelton-type, horizontal-shaft, Hitachi-make
Generators - 3 @ 13,750 kva, 3-ph, 11,000 v, 450 rpm, 60 cyc, Hitachi-make
Transformers - 7 (incl 1 res) @ 7000 kva, 1-ph, 11/68.2,66, 64.2 kv, D-Y conn, core-type, Shibaura-make
Other equipment - 3 exciters @ 100 kw; semi-automatic (1-man control) equipment has been installed

See: Photographs No. III-97, III-98
Figure No. III-11

Sources: DnN 1940; ZKT 1939 p.1909; Ohm 1/30 adv p.8, 6/30 p.267, 3/30 pp.128,130, 5/30 adv p.8, 7/30 p.367, 6/31 supp pp.6,11, 9/41 pp.678 ff; DGS 1/31 p.29, 5/33 p.361; DnGZ 1/30 back cover, 6/30 p.696; Ohm-sha Guide 1933 p.7; DnK

447. MAGAWA NO. 2 HYDRO PLANT — Approx. Lat. 36°32' Long. 137°31'

Company: Toyama-ken

Location: Plant - Setogura-wari, Hongu-aza, Oyama-mura, Kami Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 18,000 (see Date of Construction)

Importance: Rank in Japan - 128 ; rank in Osaka-Nagoya supply area-58

Source of Power: Wada-gawa, Ashitani-kawa, Higashi Sakamoriya-kawa, Otani-gawa, branches of the Joganji-gawa system

Date of Construction: Construction was begun May 1936 and plant in partial operation Aug 1941; probably in full operation since

Details: Particular capacities (in kw) - *30,000 installed cap; 4330 reg; 13,670 spec; 30,000 max pk
Layout - Aqueduct-type
Eff head - 570 m
Dam - 18.2 m high, 73.7 m long
Penstocks - 2
Plant, equipment -
Turbines - 2 @ 17,500 kw, Pelton-type, Hitachi-make
Generators - 2 @ 18,750 kva, 3-ph, 514 rpm, 60 cyc, Hitachi-make

Sources: DnN 1940; KN 1939 p.166; HH 1/39 p.7, 1/40 pp.4,7; DnGZ 7/37, 9/37 p.(139); DGS 4/37 p.111; Ohm 8/36 p.805, 9/41 pp.678 ff

448. MAKI HYDRO PLANT

Approx. Lat. 34°16'
Long. 136°00'

Company: Kyoto Dento KK

Location: Plant - 1129, Fuken-aza, Maki-oaza, Kami Tanakami-mura, Kurita-gun, Shiga-ken

Capacity Commonly in Use (in kw): 1600, as of Dec 1934

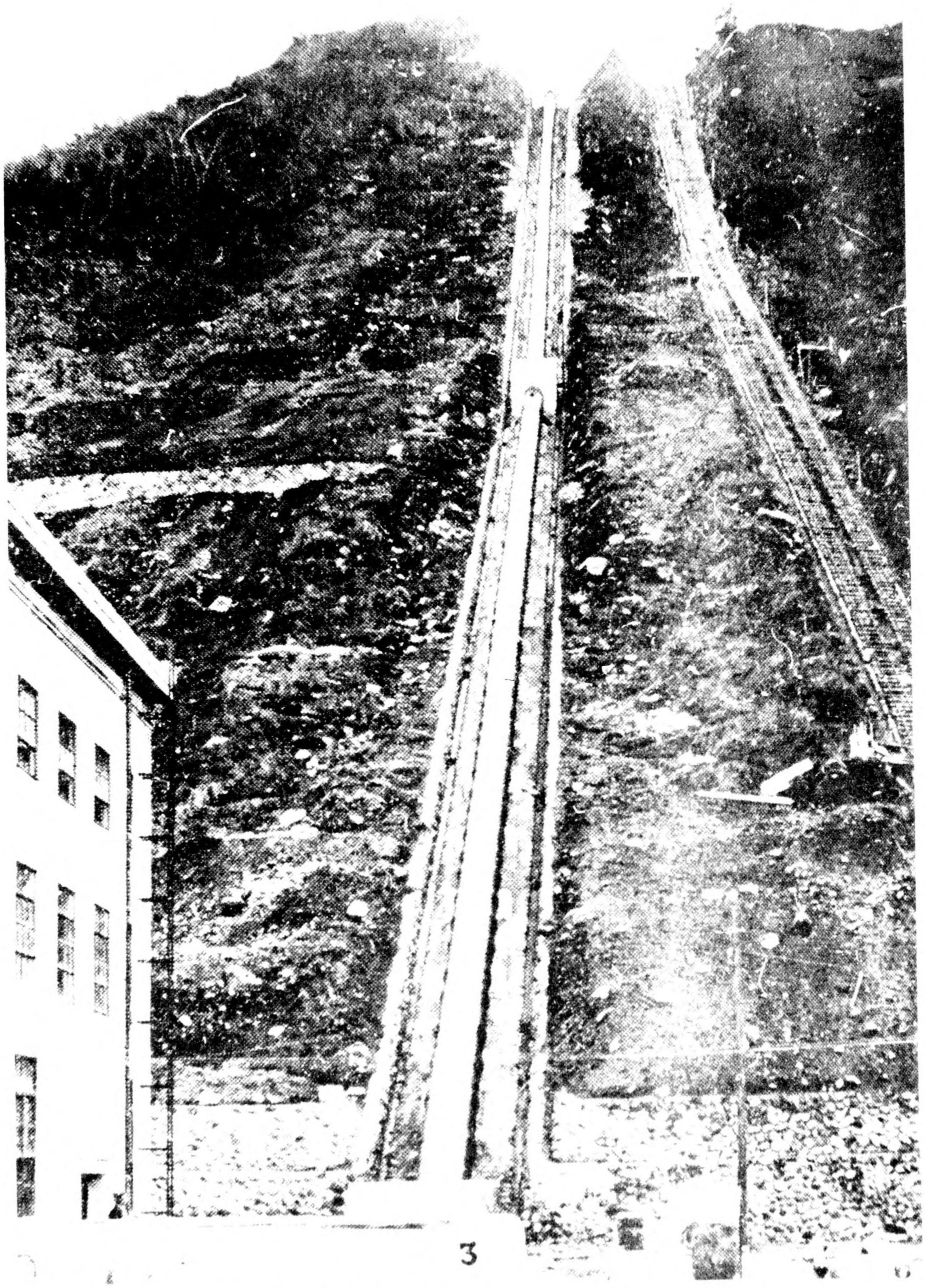
Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Oto-gawa

Date of Construction: Founded Mar 1911; in operation Mar 1940

Details: Particular capacities (in kw) - 1600 installed cap; 1600 reg
Eff head - 244.9 ft
Plant, equipment -
Turbines - 2 @ 1200 hp, Francis-type
Generators - 2 @ 800 kw, 3-ph, 3500 v, 514 rpm, 60 cyc, Okumura-make
Transformers - 4 (incl 1 res) @ 600 kva, 1-ph, 3.5/16.5 kv, D-D conn, water-cooled, 60 cyc, core-type, GE-make

Sources: DnN 1940; ZKT 1939 p.1645; DJY 1927; DJY 1929 p.344



Photograph No. III-97 Magawa No. 1 Hydro Plant in 1930

Photograph No. III-98 Magawa No. 1 Hydro Plant in 1930

449. MAKINOGUCHI HYDRO PLANT Approx. Lat. 32°16' Long. 131°08'

Company: Kumagawa Denki KK

Location: Plant - Matsunoo-aza, Kami Mera-oaza, Nishi Mera-mura, Koyu-gun, Miyazaki-ken

Capacity Commonly in Use (in kw): 5000 (see Date of Construction)

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Mera-gawa of the Hitotsuse-gawa system

Date of Construction: Construction was begun Feb 1938 at which time completion was scheduled for 1940; plant now probably in operation

Details: Particular capacities (in kw) - 1300 reg; 3700 spec

Sources: KN 1939 p.166; Ohm 5/38 p.510

450. MAKUMBETSU HYDRO PLANT Approx. Lat. 43°48' Long. 142°53'

Company: Dai Nippon Denryoku KK

Location: Plant - Futazumibetsu-aza, Kami Kawa-mura, Kami Kawa-gun, Hokkaido

Capacity Commonly in Use (in kw): 16,400 (see Date of Construction)

Importance: Rank in Japan - 137 ; rank in Hokkaido supply area - 7

Source of Power: Ishikari-kawa

Date of Construction: Construction was begun Mar 1938, at which time completion was scheduled for 1940; probably in operation since

Details: Particular capacities (in kw) - *16,800 installed cap; 5200 reg; 11,200 spec
Plant, equipment -
Turbines - 2 @ unknown cap
Generators - 2 @ 10,500 kva, 3-ph, 6600 v, 428 rpm, 50 cyc, Shibaura-make

Sources: SR 1/39 p.5, 1/41 p.3; Ohm 6/38 p.746, 1/39 p.119

451. MAMIHARA HYDRO PLANT Approx. Lat. 32°41' Long. 131°09'

Company: Asahi Bemberg Kenshi KK; formerly Nippon Chisso Hiryo KK

Location: Plant - Mamihara-machi, Aso-gun, Kumamoto-ken

Capacity Commonly in Use (in kw): 4000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Gokase-gawa system

Date of Construction: Unknown; in operation as early as June 1928 and as recently as Mar 1940

Details: Particular capacities (in kw) - 1500 reg; 2500 spec

Sources: DnN 1940; DJY 1929 p.296; DnK; TD Map

452. MANODAIRA HYDRO PLANT

Approx. Lat. 34°32'
Long. 132°24'

Company: Hiroshima Denki KK; formerly Izumo Denki KK

Location: Plant - On the right bank of the Ota-kawa at 6968, Manodaira-aza, Kuchi-mura, Asa-gun, Hiroshima-ken

Capacity Commonly in Use (in kw): 6000, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Chugoku supply area - 50 +

Source of Power: Ota-kawa of the Shibaki-kawa system

Date of Construction: Founded May 1926; in operation Mar 1940

Details: Particular capacities (in kw) - *9000 installed cap; 2000 reg; 4000 spec
Eff head - 156.7 ft
Plant, equipment -
Turbines - 3 (incl 1 res) @ 4500 hp, Francis-type, vertical-shaft, Hitachi-make
Generators - 3 (incl 1 res) @ 3750 kva, 3-ph, 3300 v, 360 rpm, 60 cyc, Hitachi-make
Transformers - 7 (incl 1 res) @ 2100 kva, 1-ph, 3.3/31.8,31/22,21 kv, D-Y conn, water-cooled, 60 cyc, core-type, Hitachi-make

Sources: DnN 1940; DnK; ZKT 1939 p.1649; Ohm 6/31 supp p.6, 4/34 p.281; DJY 1927; DJY 1929 pp.270,362

453. MARUNUMA HYDRO PLANT

Approx. Lat. 36°49'
Long. 139°22'

Company: Jomo Denryoku KK

Location: Plant - Katashina-mura, Tone-gun, Gumma-ken

Capacity Commonly in Use (in kw): 4250, as of Feb 1939 (see Date of Construction)

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Hatcho-taki and Suga-numa of the Tone-gawa system

Date of Construction: In construction as early as Apr 1930 but not completed until Feb 1939 with capacity commonly in use of 4250 kw; second unit to increase capacity to 8280 kw was planned and may have been installed since.

Details: Particular capacities (in kw) - 4000 installed cap; 750 reg; 3500 spec
Eff head - 265 m
Dam - 32.9 m high, 66.7 m long
Reservoir - 12,500,000 m^3 cap, natural lake
Plant, equipment -
Turbines - 1 @ 5150 kw, Pelton-type, horizontal-shaft, Hitachi-make
Generators - 1 @ 5000 kva, 3-ph, 428.5 rpm, 50 cyc, Hitachi-make
Plant was to be used solely in dry season

Sources: DnN 1940; KN 1939 p.166; HH 1/39 pp.6-7,10, 1/40 pp.3,6; Ohm 7/30 p.367, 7/37 p.737, 6/39 p.582

454. MARUYAMA HYDRO PLANT Approx. Lat. 35°28' Long. 137°10'

Company: Nippon Hassoden KK; formerly Daido Denryoku KK

Location: Plant - On the right bank of the Kiso-gawa in Maruyama-oaza, Yaotsu-mura, Kamo-gun, Gifu-ken

Capacity Commonly in Use (in kw): 44,500 (see Date of Construction)

Importance: If completed, would be 49th largest plant in Japan

Source of Power: Kiso-gawa

Date of Construction: In planning stage Nov 1937; no evidence of completion has been received.

Details: Layout - Probably dam-type

See: Figure No. III-28

Sources: Ohm 12/37 p.1390

455. MASUDA KARYOKU DIESEL PLANT Approx. Lat. 39°12' Long. 140°33'

Company: Masuda Suiryoku Denki KK

Location: Masuda-machi, Hiraga-gun, Akita-ken

Installed Capacity (in kw): 1000, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Tohoku supply area - 20 +

Fuel: Diesel oil

Date of Construction: Unknown; in operation as early as Feb 1931 and as recently as Dec 1934

Details: Plant, equipment - Generators - 2 @ 500 kw

Sources: Ohm 5/31 p.259; Ohm 6/32 p.318

456. MATSUDOME HYDRO PLANT

Approx. Lat. 35°37'
Long. 139°06'

Company: Tokyo Dento KK

Location: Plant - Matsudome-aza, Iwao-mura, Kita Tsuru-gun, Yamanashi-ken
Dam and intake - At tail race of Yatsuzawa Hydro Plant in Yatsuzawa-aza, Iwao-mura, Kita Tsuru-gun, Yamanashi-ken

Capacity Commonly in Use (in kw): 1440, as of May 1936

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Katsura-kawa of the Sagami-gawa system

Date of Construction: Completed Apr 1928; in operation Mar 1940

Details: Particular capacities (in kw) - 1440 installed cap; 1140 supp
Layout - Aqueduct-type
Eff head - 4.24 m; flow - 41.78 m^3/sec
Forebay - 642.6 m^2 water surface
Plant - external features - Of steel frame construction, 1 story high
Plant, equipment -
Turbines - 1 @ 2050 hp, Kaplan-type, vertical-shaft, EW-make
Generators - 1 @ 1600 kva, 90% pf, 3-ph, 6700 v, 107 rpm, 50 cyc, Okumura-make
Other equipment - 1 exciter @ 27 kw; 1 crane @ 36-ton cap
Tail race - 28.8 m long

Sources: DnN 1940; DJY 1929 pp.233,298; Ohm 1/27 pp.8,50, 9/28 p.479, 4/32 p.238

457. MATSUE STEAM PLANT

Approx. Lat. 35°28'
Long. 133°04'

Company: Nippon Hassoden KK; formerly Izumo Denki KK

Location: 129, 134, 135, 136, Kozawa-aza, Nishi Tsuda-oaza, Higashi Tsuda-cho, Matsue-shi, Shimane-ken

Installed Capacity (in kw): 14,000 (see Date of Construction)

Importance: Rank in Japan - 158 ; rank in Chugoku supply area - 9

Date of Construction: Construction was begun Jan 1935 and completed June 1936 with an installed capacity of 7000 kw. Increased capacity of 7000 kw was under construction Sept 1937 and has probably been completed since. Plant was in operation Mar 1940.

Details: Plant, equipment -
Boilers - Equipment for estimated 7000 kw was ordered from B&W in 1937

Sources: DnN 1940; ZKT 1939 p.1649; Ohm 4/35 p.389, 9/36 p.911, 11/36 p.1136; DnGZ 10/37 p.(143)

MATSUGAWA HYDRO PLANT (MIYAGI-KEN) - See KUMATAKE HYDRO PLANT

458. MATSUGAWA NO. 3 HYDRO PLANT — Approx. Lat. 35°32'30" Long. 137°46'

Company: Ina Denki Tetsudo KK

Location: Plant - On the right bank of the Matsu-gawa at Jingazawa-aza, Kami Iida-oaza, Iida-shi, Shimo Ina-gun, Nagano-ken

Capacity Commonly in Use (in kw): 1040, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Matsu-gawa

Date of Construction: Completed Jan 1929; in operation Mar 1940

Details: Particular capacities (in kw) - 520 reg; 520 spec; 920 reg pk
Layout - Aqueduct-type
Eff head - 64.55 ft; flow - 2.23 m^3/sec
Plant operates on 50 cyc

Sources: DnN 1940; Ohm 5/29 p.260; DGS 12/35 p.1287

459. MATSUGAWA NO. 4 HYDRO PLANT — Approx. Lat. 35°31' Long. 137°47'30"

Company: Ina Denki Tetsudo KK

Location: Plant - On the left bank of the Matsu-gawa in Kami Iida-oaza, Iida-shi, Shimo Ina-gun, Nagano-ken

Capacity Commonly in Use (in kw): 1860, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Matsu-gawa and Jinga-zawa

Date of Construction: Construction was begun Nov 1928 and completed Feb 1931; in operation Mar 1940

Details: Particular capacities (in kw) - 930 reg; 930 spec; 1830 reg pk
Layout - Aqueduct-type
Eff head - 113.33 m; flow - 2.28 m^3/sec
Plant operates on 50 cyc

Sources: DnN 1940; Ohm 2/29 p.121, 5/31 p.259; DGS 12/35 p.1287

460. MATSUNOKI HYDRO PLANT

Approx. Lat. 36°34'30"
Long. 138°21'

Company: Toyama-ken

Location: Plant - On the left bank of the Joganji-gawa at 553, Oshimo-aza, Matsunoki-oaza, Oyama-mura, Kami Niikawa-gun, Toyama-ken

Capacity Commonly in Use (in kw): 4600, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Joganji-gawa

Date of Construction: Founded May 1924; in operation Mar 1940

Details: Particular capacities (in kw) - *5200 installed cap; 3350 reg; 1250 spec
Layout - Aqueduct-type
Eff head - 138 ft
Settling basin - 130.9 m long, 27.3 m wide
Penstocks - 2 @ 326.5 ft long
Plant, equipment -
Turbines - 2 @ 4000 hp, Francis-type, Hitachi-make
Generators - 2 @ 3250 kva, 6600 v, 450 rpm, 60 cyc, Hitachi-make
Transformers - 4 (incl 1 res) @ 3400 kva, 1-ph, 6.6/68,66,64 kv, D-D conn, water-cooled, 60 cyc, core-type, Shibaura-make

See: Figure No. III-11

Sources: DnN 1940; DnK; ZKT 1939 p.1909; DJY 1927; DJY 1929 p.338; DGS 5/33 p.361; TD Map; HSG p.221

461. MATSUYA HYDRO PLANT

Approx. Lat. 36°34'
Long. 138°42'30"

Company: Gumma Suiden KK

Location: Plant - On the left bank of the Agatsuma-gawa at Matsuya-oaza, Iwashima-mura, Azuma-gun, Gumma-ken

Capacity Commonly in Use (in kw): 21,800, as of July 1935

Importance: Rank in Japan - 106 ; rank in Tokyo supply area - 43

Source of Power: Su-kawa of the Agatsuma-gawa of the Tone-gawa system

Date of Construction: Completed Oct 1929; in operation Mar 1940

Details: Particular capacities (in kw) - *24,000 installed cap
Layout - Aqueduct-type
Eff head - 114.7 m; flow - 23.65 m^3/sec
Dam - Overflow-type, 37.9 m high, 90.9 m long, 31 m wide at base
Surge tank - 13.257 m inner diam, 21 m high
Penstocks - 2
Plant, equipment -
Turbines - 2 @ 21,000 hp, Francis-type, vertical-chaft, Dengyosha-make
Generators - 2 @ 15,000 kva, 3-ph, 11,000 v, 375 rpm, 50 cyc, Shibaura-make
Transformers - 5 (incl 2 res) @ 15,000 kva, 1-ph, 11,22/32.9,34.7,36.4,38.1,39.9,41.6,57,60,63,66,69,72 kv, water-cooled, core-type, Shibaura-make
Other equipment - 2 exciters @ 100 kw

See: Figure No. III-9

Sources: DnN 1940; HSG opp p.4; DnK; Ohm 7/29 adv p.17, 6/31 supp p.6, 7/35 p.724; Ohm-sha Guide 1933 p.8; DGS 8/33 p.676

462. MATSUYAMA HYDRO PLANT — Approx. Lat. 31°34' Long. 131°02'

Company: Hikuma Denryoku KK

Location: Plant - 2089, Nokuo-aza, Nihashi-oaza, Matsuyama-mura, So-gun, Kagoshima-ken

Capacity Commonly in Use (in kw): 1490 (see Date of Construction)

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Hishita-gawa

Date of Construction: Construction was begun Nov 1936, at which time completion was scheduled for 1937. Plant was reported still under construction Sept 1938 but has probably been completed since.

Details: Particular capacities (in kw) - 360 reg; 1130 spec

Sources: KN 1939 p.166; Ohm 2/27 p.216

463. MAYUMI HYDRO PLANT — Approx. Lat. 35°15' Long. 137°29'

Company: Yahagi Suiryoku KK

Location: Plant - On the left bank of the Nagura-kawa at 35, Shimo Shiro-aza, Kawate-oaza, Busetsu-mura, Kita Shitara-gun, Aichi-ken

Capacity Commonly in Use (in kw): 5100, as of Dec 1936

Importance: Rank in Japan - 250 + ; rank in Osaka-Nagoya supply area-100+

Source of Power: Kuroda-gawa and Nagura-kawa of the Yahagi-gawa system

Date of Construction: Founded May 1923; in operation May 1940

Details: Particular capacities (in kw) - *6,400 installed cap; 3900 reg; 1200 spec
Layout - Aqueduct-type
Eff head - 177.27 m; flow - 3.9 m^3/sec
Dam - Overflow-type, 35 m high
Penstocks - 2
Plant, equipment -
Turbines - 2 @ 5000 hp, impulse-type, horizontal-shaft, Voith-make
Generators - 2 @ 4000 kva, 3-ph, 6600 v, 450 rpm, 60 cyc, SS-make
Transformers - 4 (incl 1 res) @ 2750 kva, 1-ph, 6.64,6.35, 6.06/77 kv, D-D conn, water-cooled, 60 cyc, shell-type, SS (3) and Shibaura (1)-makes

Sources: DnN 1940; ZKT 1939 p.1644; Ohm 6/31 supp p.7, 12/31 p.623; DnK; DJY 1927; DJY 1929 p.322; DGS 8/35 p.674

464. MEGURIFUCHI HYDRO PLANT

Approx. Lat. 32°41'
Long. 131°12'

Company: Kyushu Soden KK

Location: Plant - 7255, Nishi-aza, Kuwanouchi-oaza, Sangasho-mura, Nishi Usuki-gun, Miyazaki-ken

Capacity Commonly in Use (in kw): 1050, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Sangasho-kawa of the Gokase-kawa system

Date of Construction: Construction was begun Nov 1930 and completed 1933; in operation Mar 1940

Details: Particular capacities (in kw) - 400 reg; 650 spec
Plant, equipment -
Turbines - 1 @ unknown cap, 3-ph, 6600 v, Shibaura-make

Sources: Ohm 5/33 p.293, 1/31 p.61; DnGZ 2/33 p.159; DnN 1940

465. MEIKO STEAM PLANT

Approx. Lat. 35°07'
Long. 136°54'

Company: Nippon Hassoden KK; formerly Chubu Kyodo Karyoku Hatsuden KK

Location: On the right bank of the Arako-kawa at its mouth in Nagoya-ko, at 548 Inangawa Shinden, Minato-ku, Nagoya-shi, Aichi-ken

Installed Capacity (in kw): 212,000 (if plans have been carried out, 318,000; see Date of Construction)

Importance: Rank in Japan - 3 ; rank in Osaka-Nagoya supply area - 3

Date of Construction: Construction was begun in July 1936 and was completed in sections of 53,000 kw each as follows: No. 1 unit in Apr 1938 or shortly before; No. 2 unit in Jan 1939; No. 3 unit in Apr 1940; No. 4 unit in early 1941. Two additional units of 53,000 kw were scheduled for ultimate installation and may be in operation now.

Details: Plant, external features - Of reinforced concrete construction, 3 to 6 stories high, with 4 chimneys in early 1941 and possibly 6 chimneys as of Jan 1943. At least 3 transmission towers are situated just west of the plant.

Plant, equipment -

Fuel supply - Coal freighters tie up alongside in a dredged channel of the Arako-kawa in 7.5 m depths. 2 dock cranes, 2 skip hoists and 1 belt conveyor @ 250 t/hr help convey coal to plant. A coal storage yard lies between plant and Arako-kawa.

Feedwater - From Nagoya-ko

Boilers - 6 @ sectional water-tube type, 46 kg/cm^2, 900 m^2, Mitsubishi-type for units No. 1, 2, and 3. Probably unit No. 4 uses additional boilers of similar size. Additional boiler plant may have been installed to accompany units No. 5 and 6.

Turbines - Unit No. 1 - 1 @ 50,000 kw, Zoelly impulse-type, horizontal-shaft, Mitsubishi-make, and 1 @ 3000 kw, Zoelly impulse-type, horizontal-shaft, Mitsubishi-make

Unit No. 2 - 1 @ 53,000 kw, Zoelly impulse-type, horizontal-shaft, Mitsubishi-make

Unit No. 3 - 1 @ 53,000 kw, reaction-type, horizontal-shaft, Hitachi-make

Unit No. 4 - 1 @ 53,000 kw, Mitsubishi-make

Units No. 5 and 6 @ 53,000 kw turbines may have been installed.

Generators - Units No. 1, 2, 4 - 3 @ 63,500 kva, 80% pf, 3-ph, 13,200 v, 1800 rpm, 60 cyc, Mitsubishi-make, and 3 @ 4290 kva, 70% pf, 3-ph, 3450 v, 1800 rpm, 60 cyc, Mitsubishi-make

Unit No. 3 - 1 @ 62,500 kva, 80% pf, 3-ph, 13,200 v, 1800 rpm, 60 cyc, Hitachi-make, and 1 @ 4290 kva, 70% pf, 3-ph, 3450 v, 1800 rpm, 60 cyc, Hitachi-make

Units No. 5 and 6 with similar size generating equipment may have been installed.

Transformers - 3 @ 63,000 kva, 13.2,12.6/77,73.5,70 kv, self-cooled, Shibaura-make. Additional transformer equipment has probably been installed.

Other equipment - 6 furnaces @ 615 m^3 with pulverized coal firing; 6 superheaters @ 980 m^2, 457° C; economizers @ 1800 m^2; air heaters @ 5600 m^2; 3 exciters @ 220 kw. This equipment is auxiliary to units No. 1-3; additional equipment of these types has since been added.

Area served - Nagoya-shi and environs, as of 1941

See: Photograph No. III-99
Map of the City of Nagoya
Figure No. III-21

Sources: DnN 1940; HH 1/39 pp.15,21, 1/40 p.10, 6/40 p.9; DnGZ 10/37 p.(143), 4/41 back cover; DGS Kaimu 1939 p.59; Ohm 10/36 p.1007, 4/39 p.312

MEIWA STEAM PLANT - See KOFU KARYOKU STEAM PLANT

MIBO STEAM PLANT - See GOBO STEAM PLANT

466. MICHIYAHARA HYDRO PLANT Approx. Lat. 36°46' Long. 139°45'

Company: Tokyo Dento KK; formerly Teikoku Dento KK

Location: Plant - 6730, Michiyahara-aza, Funifu-mura, Shioya-gun, Tochigi-ken

Capacity Commonly in Use (in kw): 1592, as of May 1936

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Kinu-gawa

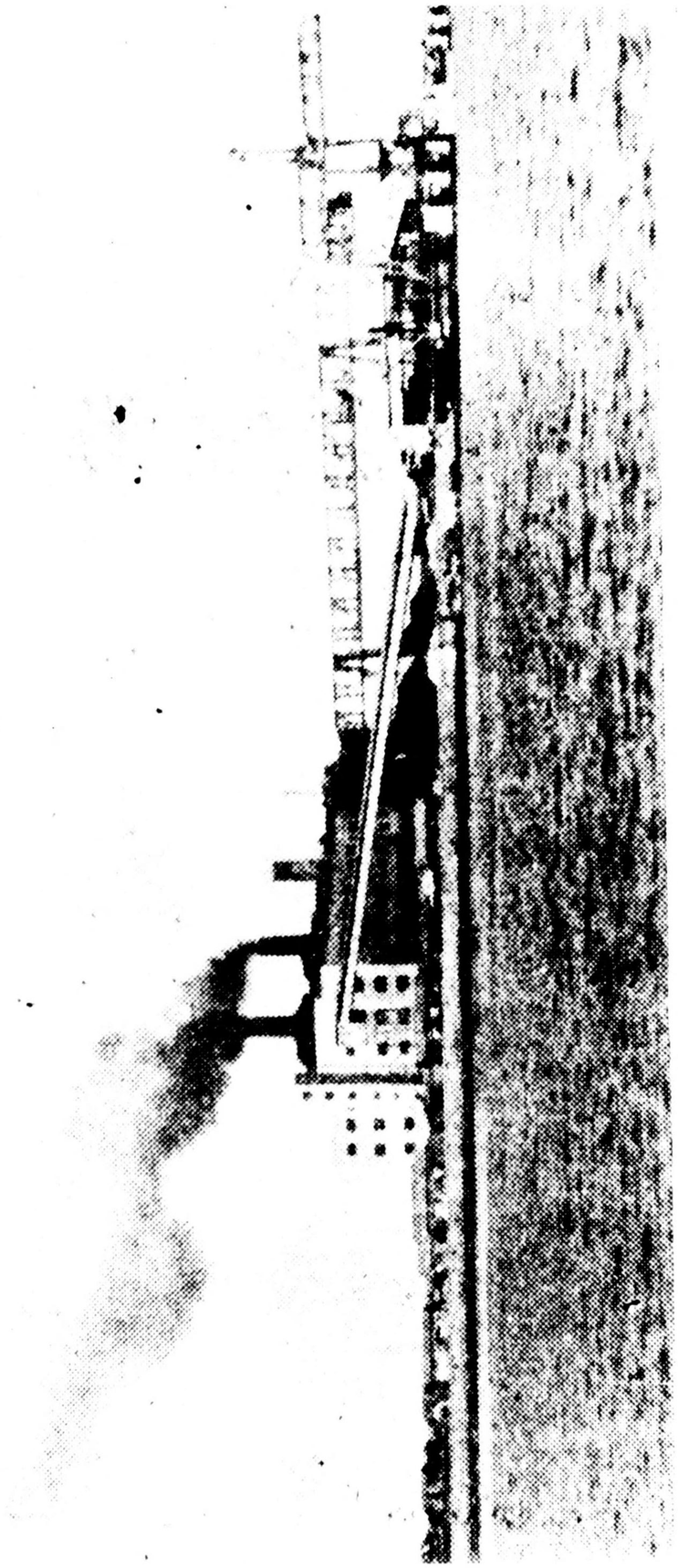
Date of Construction: Completed Aug 1922; in operation Mar 1940

Details: Particular capacities (in kw) - 2300 installed cap; 1592 reg
Layout - Aqueduct-type
Eff head - 19.37 m; flow - 11.13 m^3/sec
Dam - 93.64 m long, 4.24 m high, of rubble concrete construction with stone pitching
Intake - 5 gates
Settling basins - 1 @ 383 m^2 water surface and 1 @ 287 m^2 water surface
Aqueduct - 1939 m open channel, 858 m culvert, 964 m tunnel, 16.37 m aqueduct
Forebay - 252 m^2 water surface
Penstocks - 2 @ 39.35 m long
Excess water spillway - 31.28 m long
Plant, external features - Of stone construction, 1 story high; about 10 wooden shacks are situated nearby.
Plant, equipment -
Turbines - 2 @ 2000 hp, Francis-type, horizontal-shaft, EW-make
Generators - 1 @ 1250 kva, 80% pf, 3-ph, 3300 v, 428 rpm, 50 cyc, GE-make
1 @ 1625 kva, 80% pf, 3-ph, 3300 v, 428 rpm, 50 cyc
Transformers - 4 (incl 1 res) @ 850 kva, 1-ph, 3.45,3.3,3.5, 3/33 kv, D-D conn, water-cooled, 50 cyc, shell-type, GE-make
Tail race - 229 m long

Sources: DnN 1940; DJY 1927; DJY 1929 p.312

467. MIDORIKAWA HYDRO PLANT Approx. Lat. 32°38' Long. 130°53'

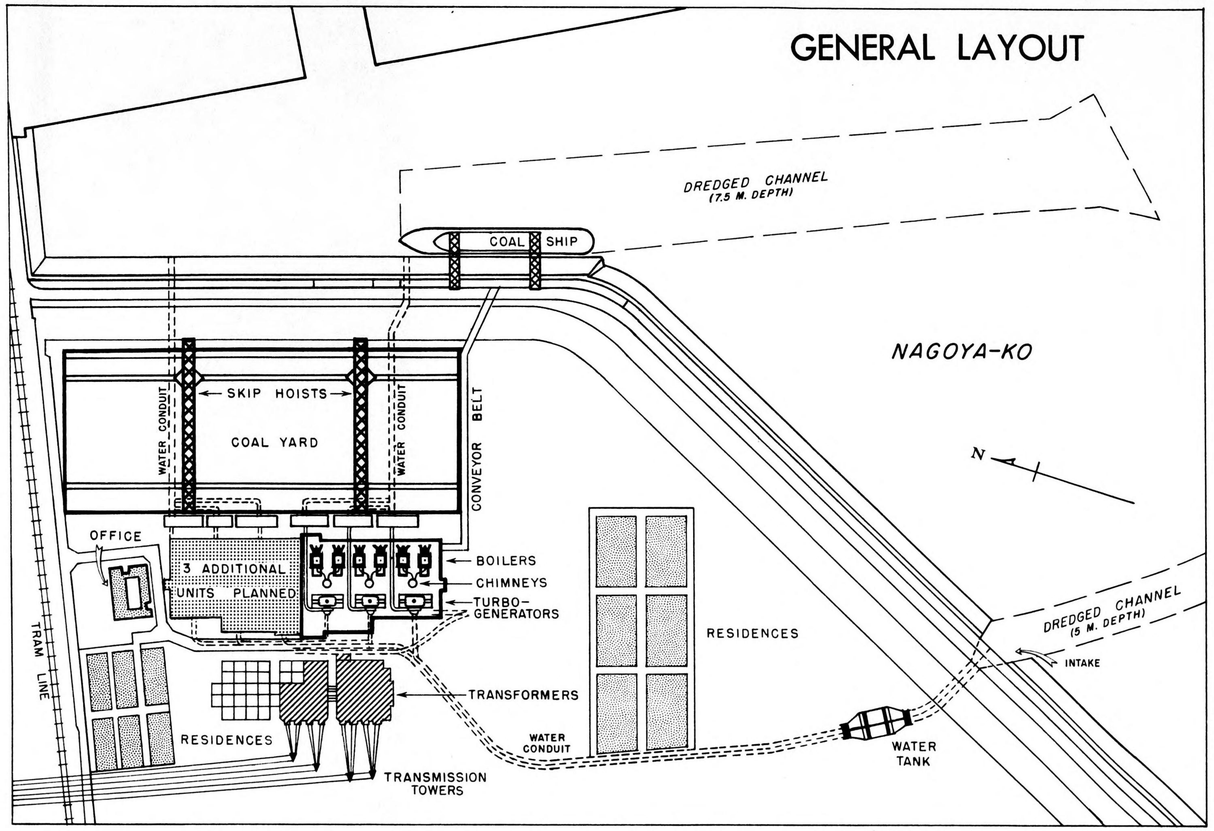
Company: Nippon Chisso Hiryo KK

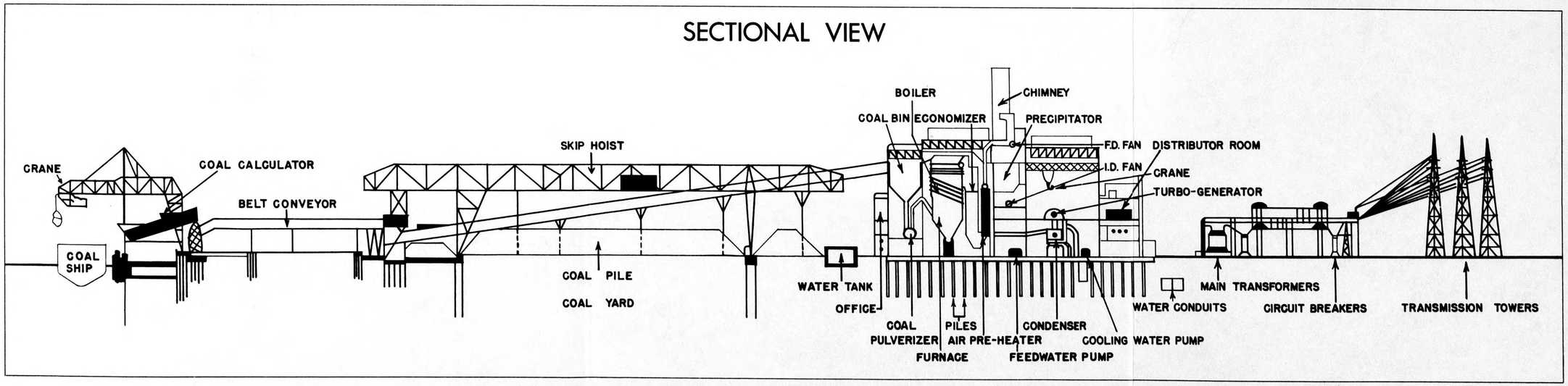


Photograph No. III-99 Meiko Steam Plant in 1939; three units have been installed and a fourth unit is under construction.

MEIKO STEAM ELECTRIC PLANT

(IN 1939)





COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

Location: Plant - Higashi Tomochi-mura, Shimo Mashiki-gun, Kumamoto-ken

Capacity Commonly in Use (in kw): 4700, as of June 1928

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Midori-kawa

Date of Construction: Unknown; in operation as early as June 1928 and as recently as Mar 1940

Details: Plant operates on 50 cyc

Sources: DnN 1940; DJY 1929 p.296; TD Map

468. MIGITA HYDRO PLANT — Approx. Lat. 33°14' Long. 131°10'

Company: Kyushu Suiryoku Denki KK

Location: Plant - On the right bank of the Nogami-gawa in Migita-oaza, Higashi Handa-mura, Kusu-gun, Oita-ken

Capacity Commonly in Use (in kw): 1450, as of Dec 1934

Importance: Rank in Japan - 250 + ; rank in Kyushu supply area - 50 +

Source of Power: Nogami-gawa of the Chikugo-gawa system

Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as Mar 1940

Details: Particular capacities (in kw) - *1670 installed cap; 1450 reg
Eff head - 114 ft
Plant, equipment -
Turbines - 1 @ 3000 hp, Francis-type, Dengyosha-make
Generators - 1 @ 2100 kva, 3-ph, 11,000 v, 600 rpm, 50 cyc, Shibaura-make

Sources: DnN 1940; DJY 1927; DJY 1929 p.374

469. MIHARA FACTORY STEAM PLANT — Approx. Lat. 34°23'30" Long. 133°05'30"

Company: Teikoku Jinzo Kenshi KK

Location: On the waterfront in Mihara-machi, Mitsuki-gun, Hiroshima-ken

Installed Capacity (in kw): Est 16,000, as of Nov 1936

Importance: Rank in Japan - 141 ; rank in Chugoku supply area - 7

Date of Construction: Unknown; plant in operation Nov 1936

Details: Plant, equipment -
Turbines - 2 (incl 1 res) @ 12,500 kw, Zoelly extraction-type, Mitsubishi-make
Generators - 2 (incl 1 res) @ unknown cap, 3-ph, 3600 rpm, 60 cyc

See: Photographs No. III-100, III-100a
Figure No. III-22

Sources: DnN 1940 part II pp.311-312; Ohm 5/33 p.296, 8/33 p.424, 9/33 p.505

MIIKE GASU PLANT - See OURA STEAM PLANT

MIIKE KOZAN STEAM PLANT - See OURA STEAM PLANT

MIIKE KOGYO-SHO STEAM PLANT - See OURA STEAM PLANT

470. MIKAGE STEAM PLANT

Approx. Lat. 34°42'
Long. 135°15'30"

Company: Hanshin Denki Tetsudo KK

Location: Mikage-oaza, Mikage-machi, Muko-gun, Hyogo-ken

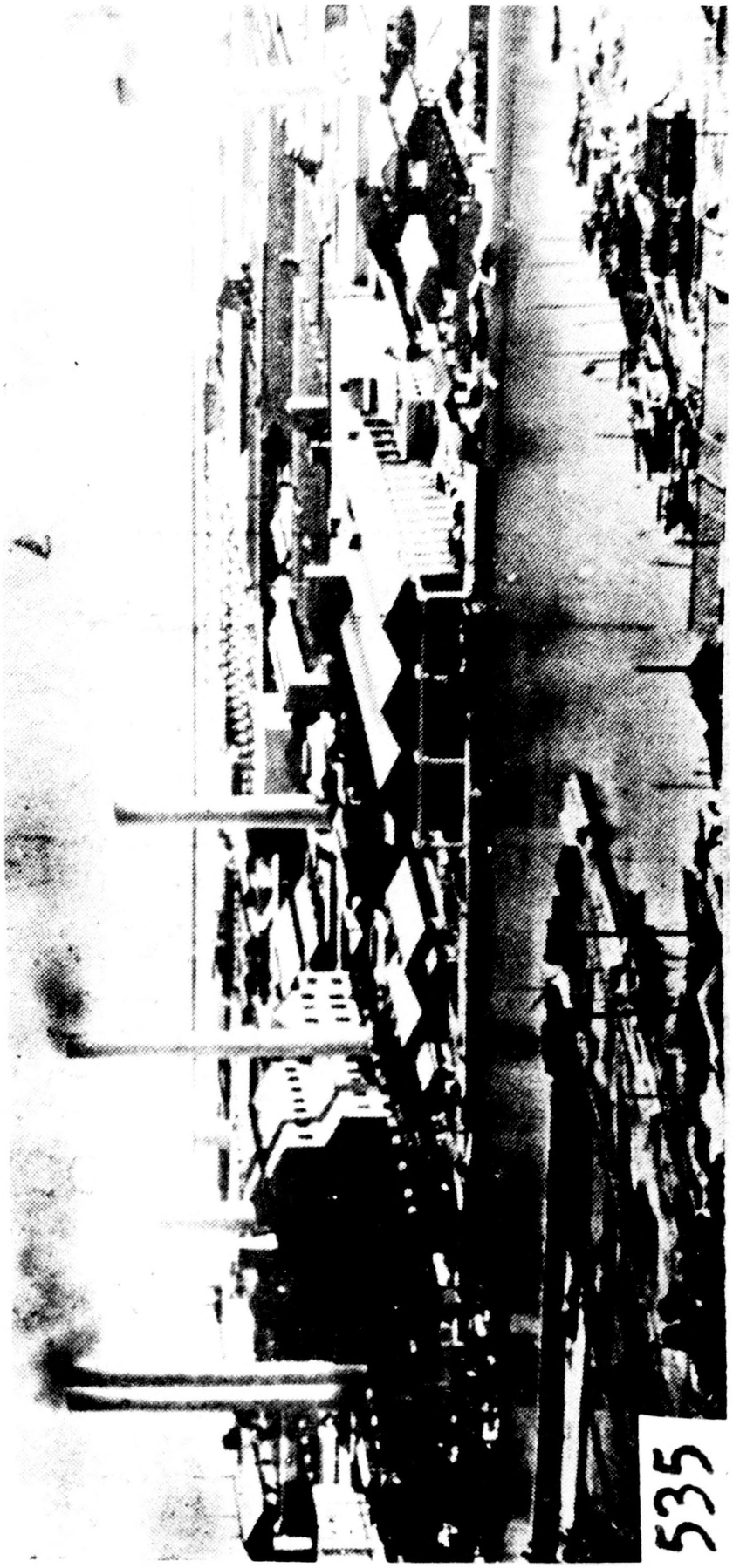
Installed Capacity (in kw): 2800, as of June 1928

Importance: Rank in Japan - 250 - ; rank in Osaka-Nagoya supply area-100

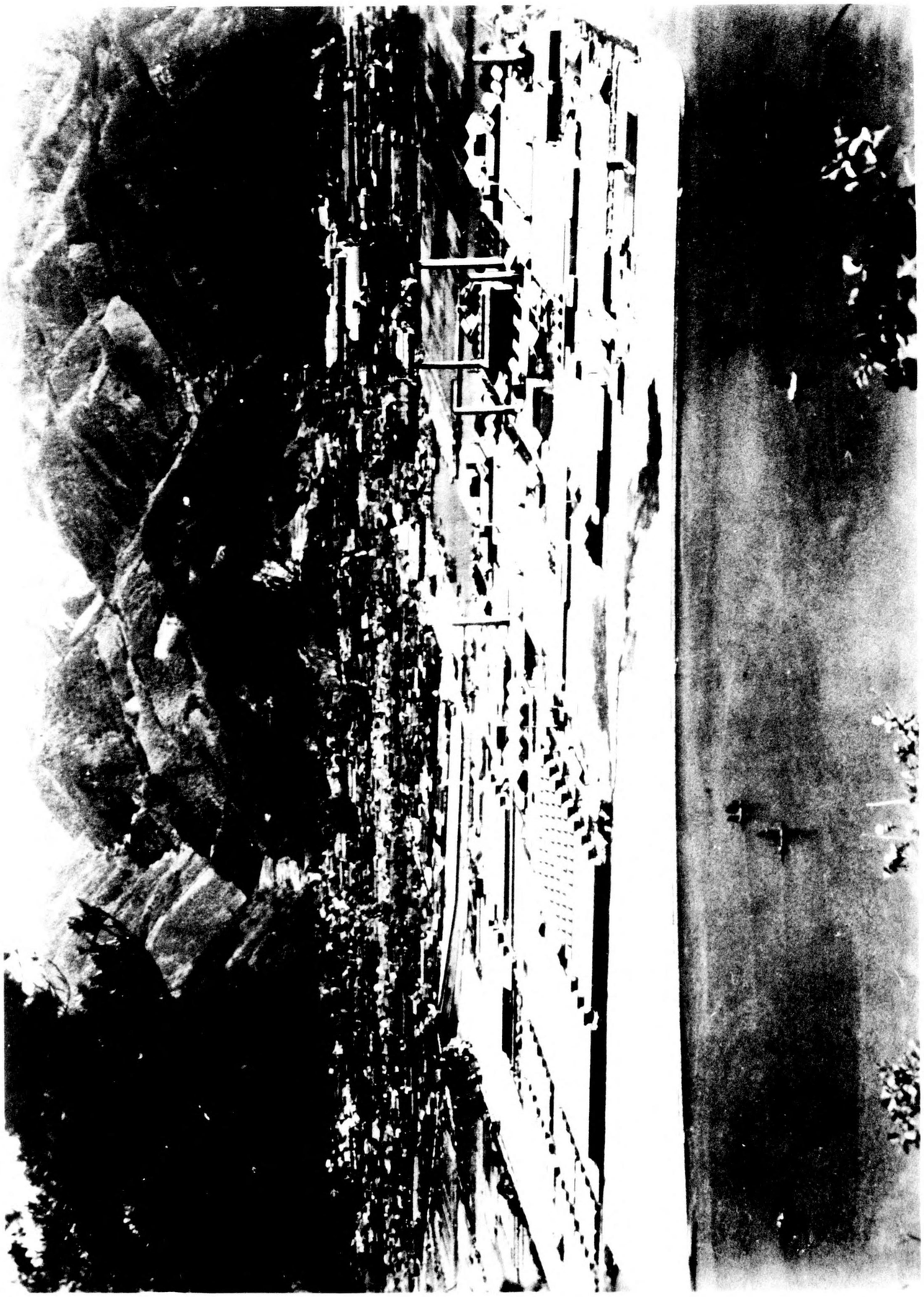
Date of Construction: Unknown; in operation as early as Dec 1926 and as recently as June 1928

Details: Particular capacities (in kw) - 2800 reg
Plant, equipment -
Boilers - 10 @ B&W-type, 150 lbs/in^2, 2531 ft^2
Turbines - 2 @ 1000 hp, Parsons-type, Parsons-make
2 @ 400 hp, Mackintosh-type, Mackintosh-make
Generators - 2 @ 1000 kw, 3-ph, 3500 v, 3000 rpm, 50 cyc, Parsons-make
2 @ 400 kw, dc, 600 v, 1500 rpm, GE-make

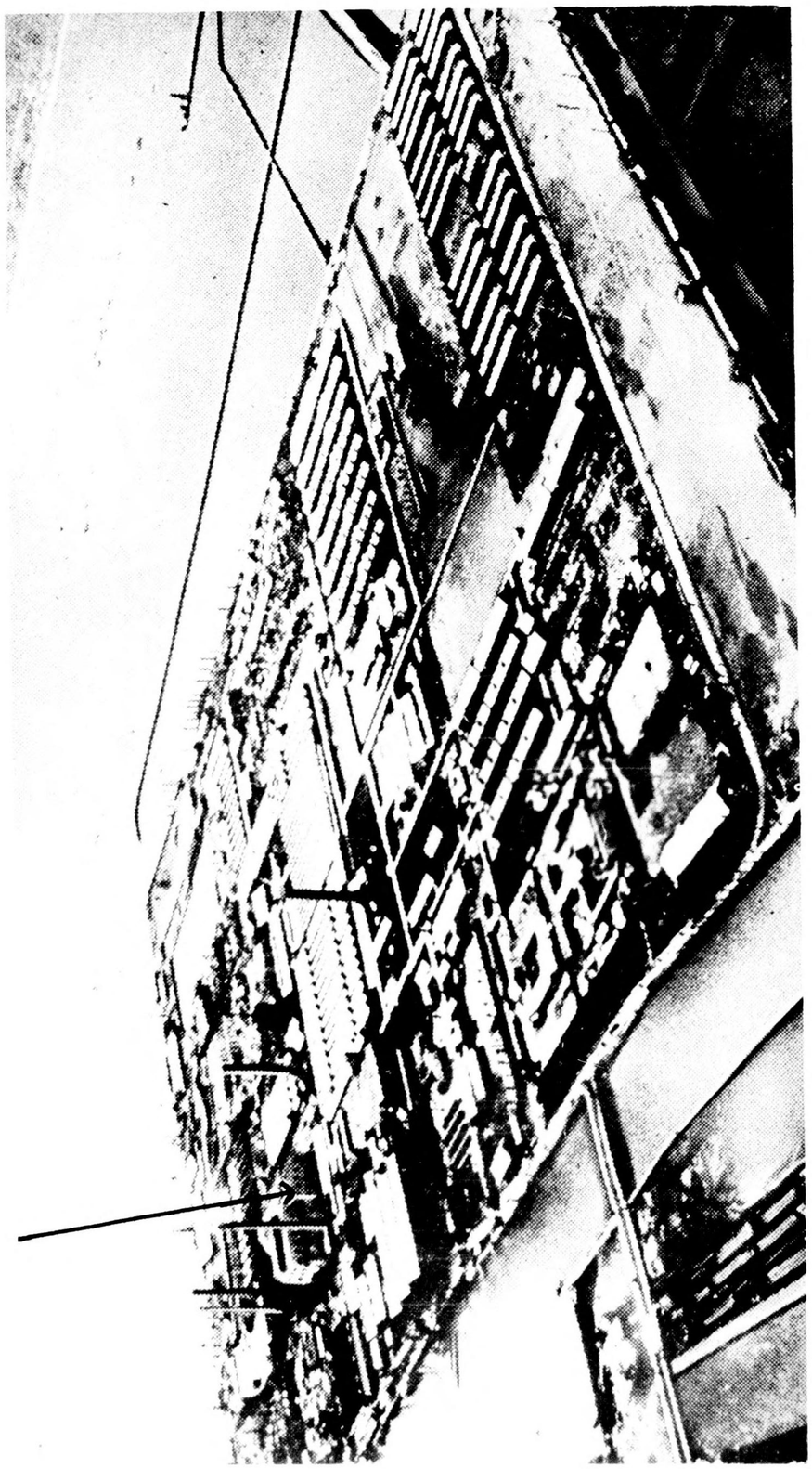
Sources: DJY 1927; DJY 1929 p.346; TD Map



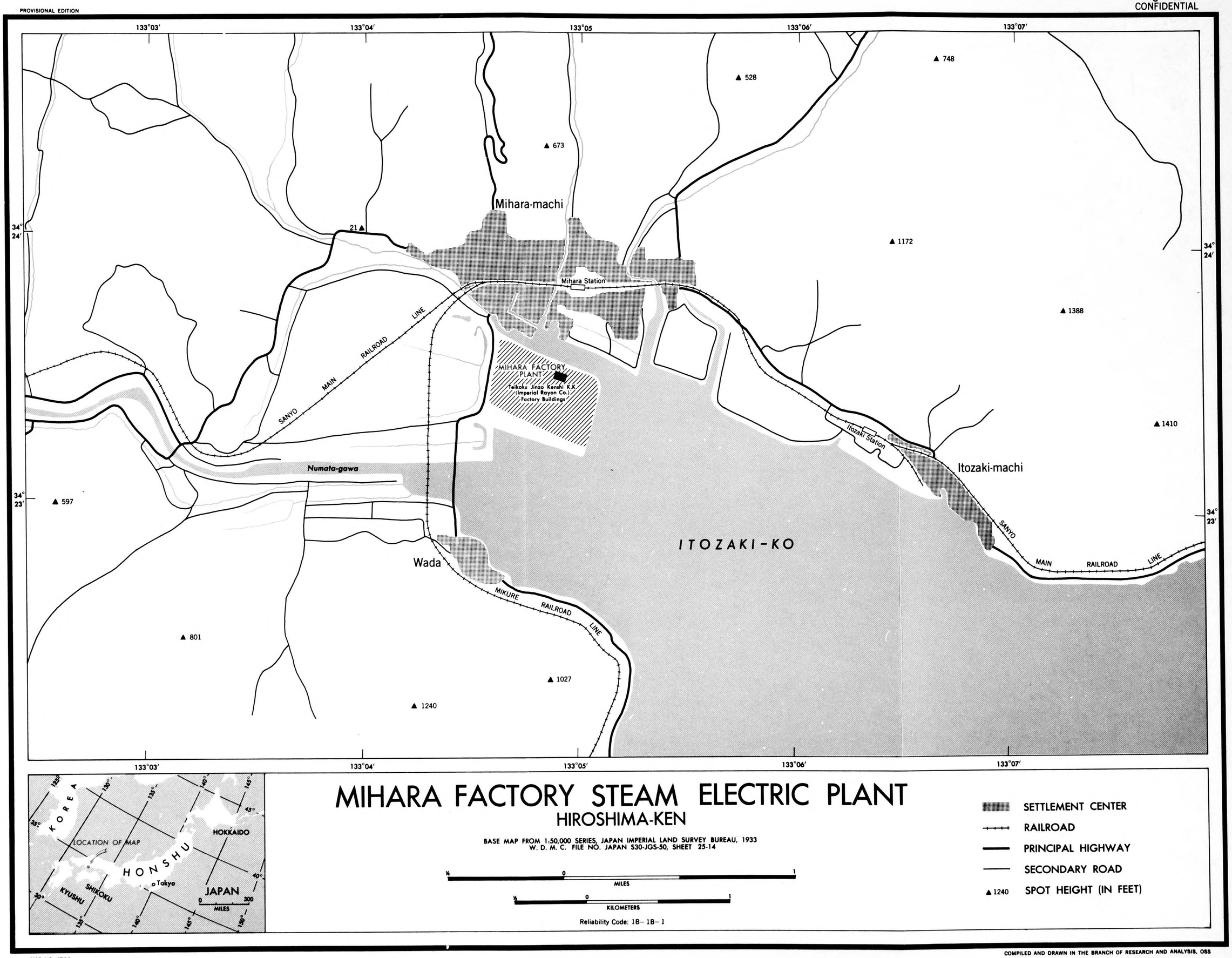
Photograph No. III-100 Mihara Factory Steam Plant
(Teikoku Jinzo Kenshi KK)



Photograph No. III-100a Mihara Factory Steam Plant of Teikoku Jinzo Kenshi KK



Photograph No.III-100b Mihara Factory Steam Plant (arrow) of the Teikoku Jinzo Kenshi KK. The area bounded by the breakwater in the background is now reclaimed land.



MAP NO. 2724
22 DECEMBER 1943

COMPILED AND DRAWN IN THE BRANCH OF RESEARCH AND ANALYSIS, OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

471. MINAKATA HYDRO PLANT

Approx. Lat. 35°37'
Long. 137°56'

Company: Yahagi Suiryoku KK; formerly Tenryugawa Denryoku KK

Location: Plant - On the left bank of the Tenryu-gawa just above its junction with the Koshibu-kawa at 938, Kuzushima-oaza, Minakata-mura, Kami Ina-gun, Nagano-ken; near the Oshima station of the Ina Denki Tetsudo (Ina Electric Railway)
Dam - Hokuden-aza, Yoshise-oaza, Nakazawa-mura, Kami Ina-gun, Nagano-ken

Capacity Commonly in Use (in kw): 24,100, as of Dec 1936

Importance: Rank in Japan - 95 ; rank in Tokyo supply area - 35 ; rank in Osaka-Nagoya supply area - 44

Source of Power: Tenryu-gawa

Date of Construction: Construction was begun July 1927 and completed Feb 1929; in operation Mar 1940

Details: Particular capacities (in kw) - 36,000 installed cap; 20,200 reg; 2900 spec; 24,100 reg pk
Layout - Aqueduct-type
Eff head - 261.86 ft; flow - 1350 ft^3/sec
Dam - Solid gravity-type, 31 ft high (fixed part), of concrete construction with 4 rolling gates @ 10 ft high, 81 ft long
Intake - 6 ports @ 9 x 11 ft, 6 steel sliding control gates @ 12 ft 4 in x 9 ft 10 in
Settling basin - 423.49 ft long
Aqueduct - 34,924 ft long, 18 ft high, 18 ft wide
Penstocks - 3 @ 914 ft long, 10 ft diam, concrete-anchored
Excess water spillway - 1190 ft long
Fishway - 350 ft long, 21 ft wide
Plant, external features - Of reinforced concrete construction, 4 stories high; outdoor banks of transformers, and lightning arresters are situated behind the plant.
Plant, equipment -
Turbines - 2 @ 22,000 hp, Francis-type, vertical-shaft, B-make
1 @ 22,000 hp, Francis-type, vertical-shaft, Dengyosha-make
Generators - 2 @ 15,000 kva, 80% pf, 3-ph, 6600 v, 250/300 rpm, 50/60 cyc, BBC-make
1 @ 15,000 kva, 80% pf, 3-ph, 6600 v, 250/300 rpm, 50/60 cyc, Shibaura-make
Transformers - 3 @ 19,000 kva, 3-ph, 6.6/154,161.7 kv, D-Y conn, 50/60 cyc, water-cooled, core-type, AEG-make
3 @ 1000 kva, 1-ph, 22/6.6 kv, D-D conn, self-cooled, core-type, Shibaura-make
Other equipment - 2 exciters @ 100 kw, 1 exciter @ 125 kw; 2 traveling cranes
Tail race - 2314 ft long

See: Photographs No. III-101, III-102, III-103
Figures No. III-23a, III-23b

Sources: DnN 1940; Ohm 5/29 pp.223,228,260, 6/29 p.280, 9/29 adv p.11, 6/31 supp p.6, 6/36 p.662; ZKT 1939 p.1646; DnK; Ohm-sha Guide 1933 p.5

472. MINAMATA HYDRO PLANT Approx. Lat. 36°44'30"
Long. 137°49'

Company: Shinshu Denki KK; formerly Azumi Denki KK

Location: Plant - On the left bank of Minamatairi-kawa in Minamata-aza, Umayama-oaza, Hokujo-mura, Kita Azumi-gun, Nagano-ken

Capacity Commonly in Use (in kw): 1340, as of May 1930

Importance: Rank in Japan - 250 + ; rank in Tokyo supply area - 100 +

Source of Power: Minamatairi-kawa

Date of Construction: Construction was begun May 1928 and completed shortly after May 1930; in operation Mar 1940

Details: Particular capacities (in kw) - 610 reg; 730 spec; 2200 reg pk
Layout - Aqueduct-type
Plant operates on 50 cyc

Sources: DnN 1940; DnK; Ohm 8/28 p.434, 8/30 p.415

473. MINATO STEAM PLANT Approx. Lat. 33°01'30"
Long. 130°25'

Company: Kyushu Karyoku Hatsuden KK; formerly Kyushu Kyodo Karyoku Hatsuden KK, Mitsui Kozan KK

Location: At the beach near Wakamatsu at Shin Minato-cho, Omuta-shi, Fukuoka-ken

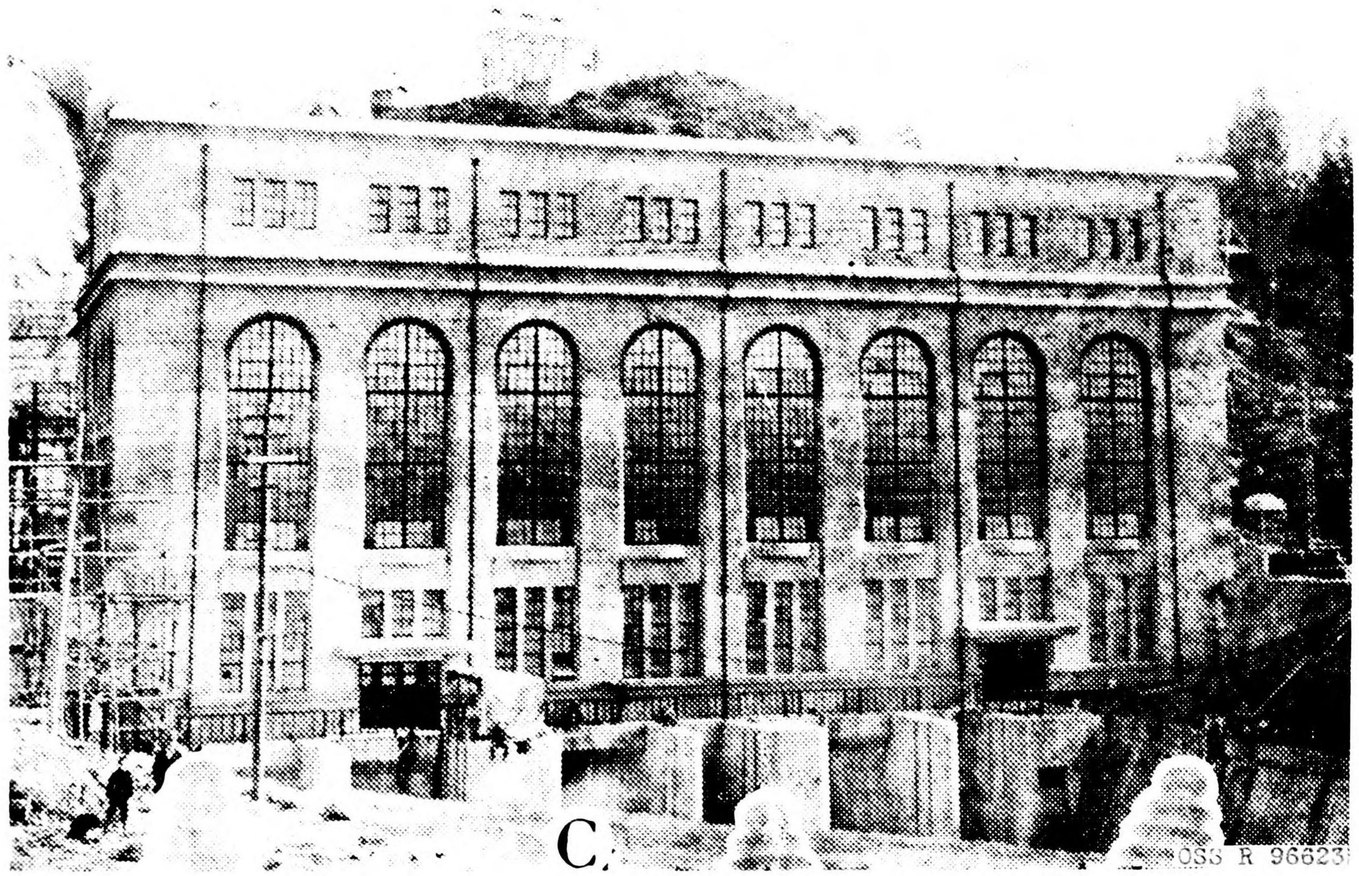
Installed Capacity (in kw): 162,000 (see Date of Construction)

Importance: Rank in Japan - 6 ; rank in Kyushu supply area - 1

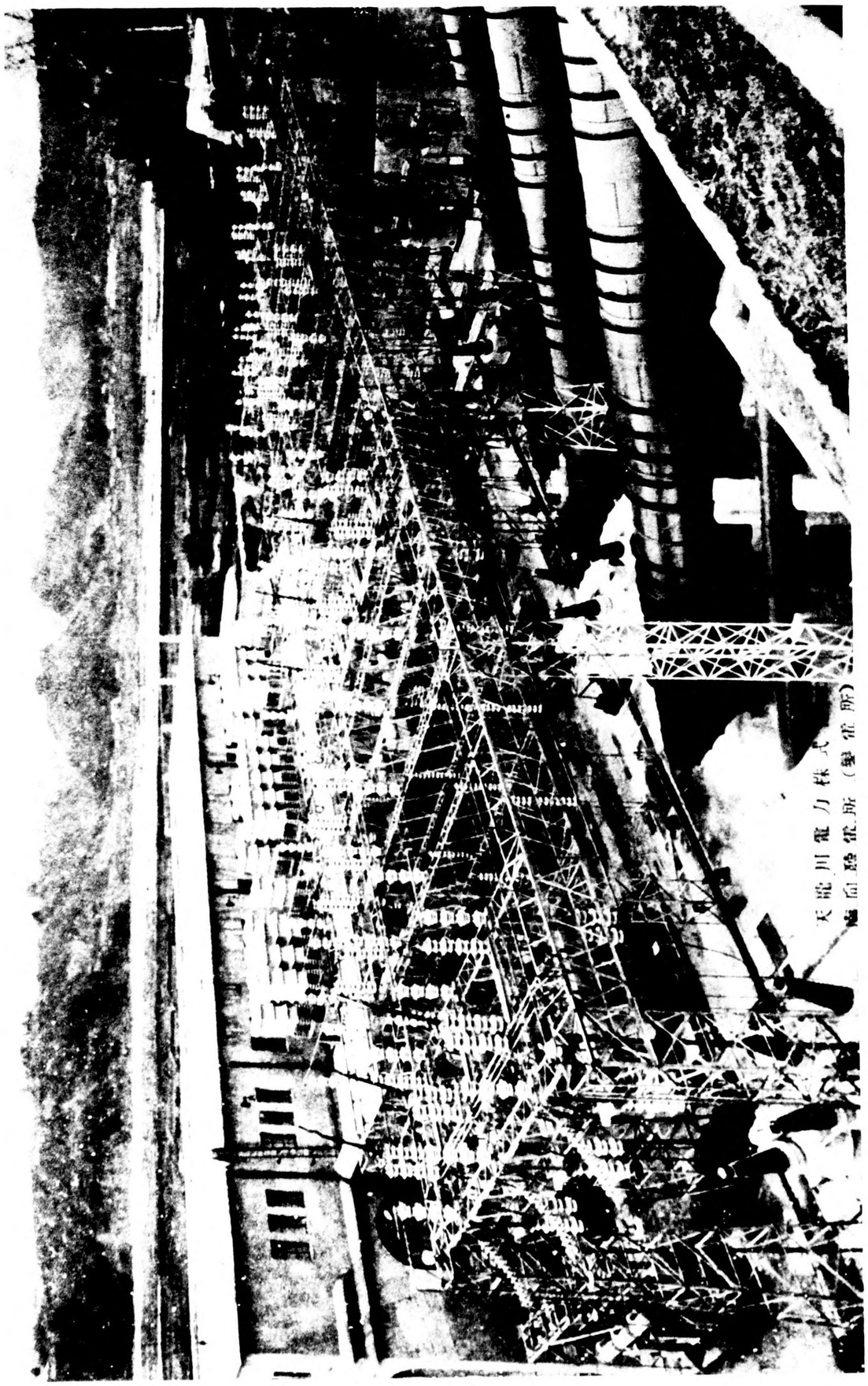
Date of Construction: Plant was constructed in sections as follows: No. 1 and 2 units (7000 kw each) in Sept 1931; No. 3 unit (7000 kw) in 1934 or 1935; No. 4 unit (22,000 kw) in Dec 1935; No. 5 unit (22,000 kw) in Feb 1936; No. 6 unit (22,000 kw) later in 1936; No. 7 unit (25,000 kw) in early 1939; No. 8 and 9 units (25,000 kw each) in late 1939 or in 1940. All 9 units were in operation in late 1940.

Details: Plant, external features - Of steel-frame, reinforced concrete construction, about 200 m x 50 m with 9 chimneys in rows of 6 and 3 with numerous shacks nearby and switchgear to one side.
Plant, equipment -
Fuel supply - Apparently by rail but it is possible that docking facilities have been made available with recent expansion. At least 1 conveyor belt is used.
Feedwater - Probably from nearby Miike-ko.
Boilers - 2 @ B&W-type, 27 kg/cm^2, 190 m^2, B&W-make
1 @ est 190 m^2
At least 6 other larger boilers with pulverized coal firing
Turbines - 2 @ 7000 kw, Ljungstrom-type, horizontal-shaft, STAL-make
1 @ 7000 kw, horizontal-shaft
3 @ 22,000 kw, horizontal-shaft, Dengyosha-make
3 @ 25,000 kw, horizontal-shaft, Dengyosha-make

Photograph No. III-101 Minakata Hydro Plant



Photograph No. III-101a Minakata Hydro Plant



Photograph No. III-102 Minakata Hydro Plant, from the rear, showing switchgear and penstocks

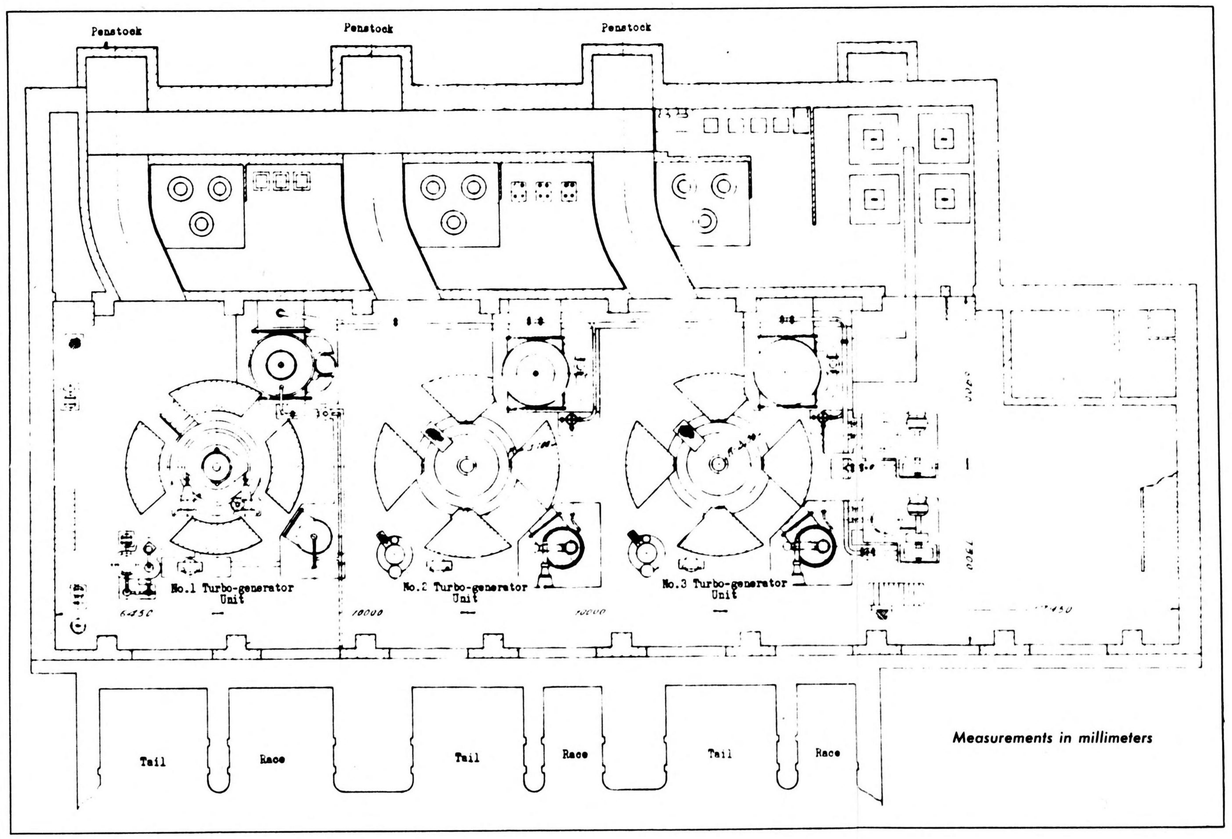
Photograph No. III-103 Minakata Hydro Plant dam, from downstream

Figure No. III-23a
will be found in Volume
IV
following page 151

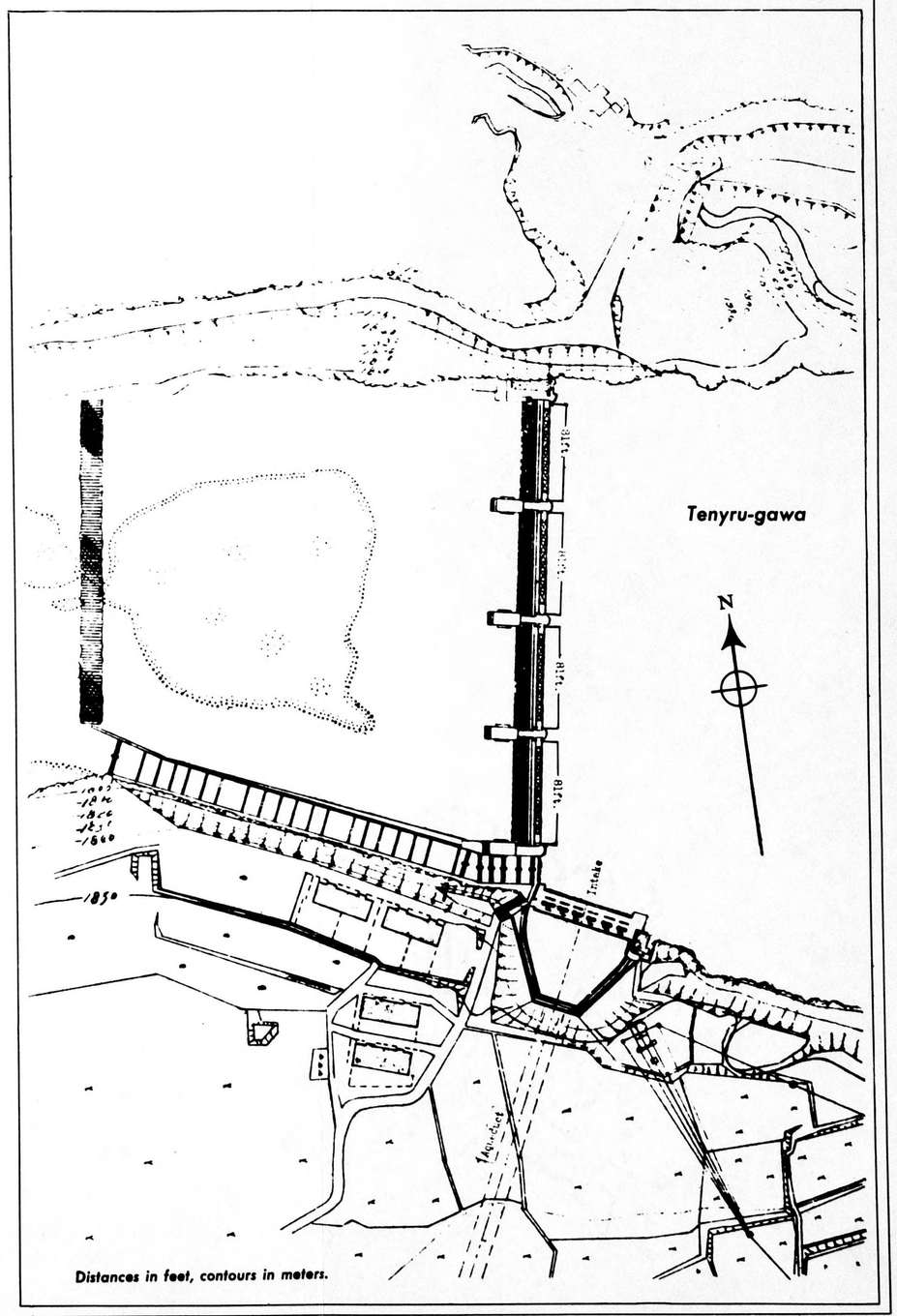
MINAKATA HYDROELECTRIC PLANT AND DAM

NAGANO-KEN

BELOW: MINAKATA PLANT



RIGHT: MINAKATA DAM



R & A OSS
LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

Generators - 3 @ 8750 kva, 3-ph, 11,000 v, 3600 rpm, 60 cyc, Mitsubishi-make
3 @ 27,500 kva, 3-ph, 11,000 v, 3600 rpm, 60 cyc, Shibaura-make
3 @ 31,250 kva, 3-ph, 11,000 v, 3600 rpm, 60 cyc, Shibaura-make
Other equipment - 9 economizers; 6 pulverizers; 6 air heaters; 3 exciters @ 60 kw and 6 other exciters; 9 condensers

See: Photographs No. III-104, III-105, III-106
Map of the City of Omuta
Figure No. III-24

Sources: DnN 1940 p.143; Ohm 6/31 supp p.7, 1/34 p.13, 10/35 p.955, 5/36 p.490; Ohm-sha Guide 1933 p.46; DnK; SR 1/36 p.2, 3/36 p.105, 4/36 pp.(1),137, 1/37 p.2, 1/38, 1/39 p.3

474. MINATOGAWA STEAM PLANT — Approx. Lat. 34°40' Long. 135°11'

Company: Nippon Hassoden KK; formerly Kobe-shi

Location: 2 of 3, 1-chome, Komae-cho, Hayashida-ku, Kobe-shi, Hyogo-ken

Installed Capacity (in kw): *65,960 (see Date of Construction)

Importance: Rank in Japan - 21 ; rank in Osaka-Nagoya supply area - 9

Date of Construction: Constructed in sections as follows: No. 1 and 2 units (*2400 kw each) in Aug 1912; No. 3 unit (*12,480 kw) in Sept 1924; No. 4 unit (*6000 kw) in Sept 1924; No. 5 unit (*12,480 kw) in June 1925; No. 6 (est 30,000 kw) was ordered in 1938 and has probably been installed since.

Details: Plant, external features - Of concrete construction, 2 and 3 stories high, in 4 sections, each with a peaked roof and chimneys; a new concrete extension to one side has probably been constructed recently.
Plant, equipment -
Feedwater - Probably from the Shiminato-gawa
Boilers - 12 @ B&W-type, 170 lbs/in^2, 520° F, 5540 ft^2, B&W-make
8 @ Garbe-type, 250 lbs/in^2, 650° F, 4306 ft^2, Sulzer-make
3 @ B&W-type, 80 tons of steam per hr, B&W-make, have probably been added
Turbines - No. 1 and 2 units - 2 @ 4000 hp, Curtis-type, horizontal-shaft, BTH-make
1 @ 180 hp, compound condensing steam-type, vertical-shaft, W-make
No. 4 unit - 1 @ 8000 hp, reaction-type, horizontal-shaft, W-make
No. 3 unit - 1 @ 18,750 hp, Rateau impulse compound-type, horizontal-shaft, W-make
No. 5 unit - 1 @ 18,750 hp, impulse-reaction-type, horizontal-shaft, MV-make
No. 6 unit - 1 @ 30,000 kw, Dengyosha-make, has probably been installed