

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

ELECTRO-CHEMICAL INDUSTRY
OMUTA **JAPAN**

SHEET No. 90.35-1246-TL
DATE 18 May 1945
TARGET No. 90.35-1246
CATEGORY . . . Bsc. Proc. Ind.-Chemicals
COORDINATES . . . 33°02'N 130°26'E
ALTITUDE 20 feet

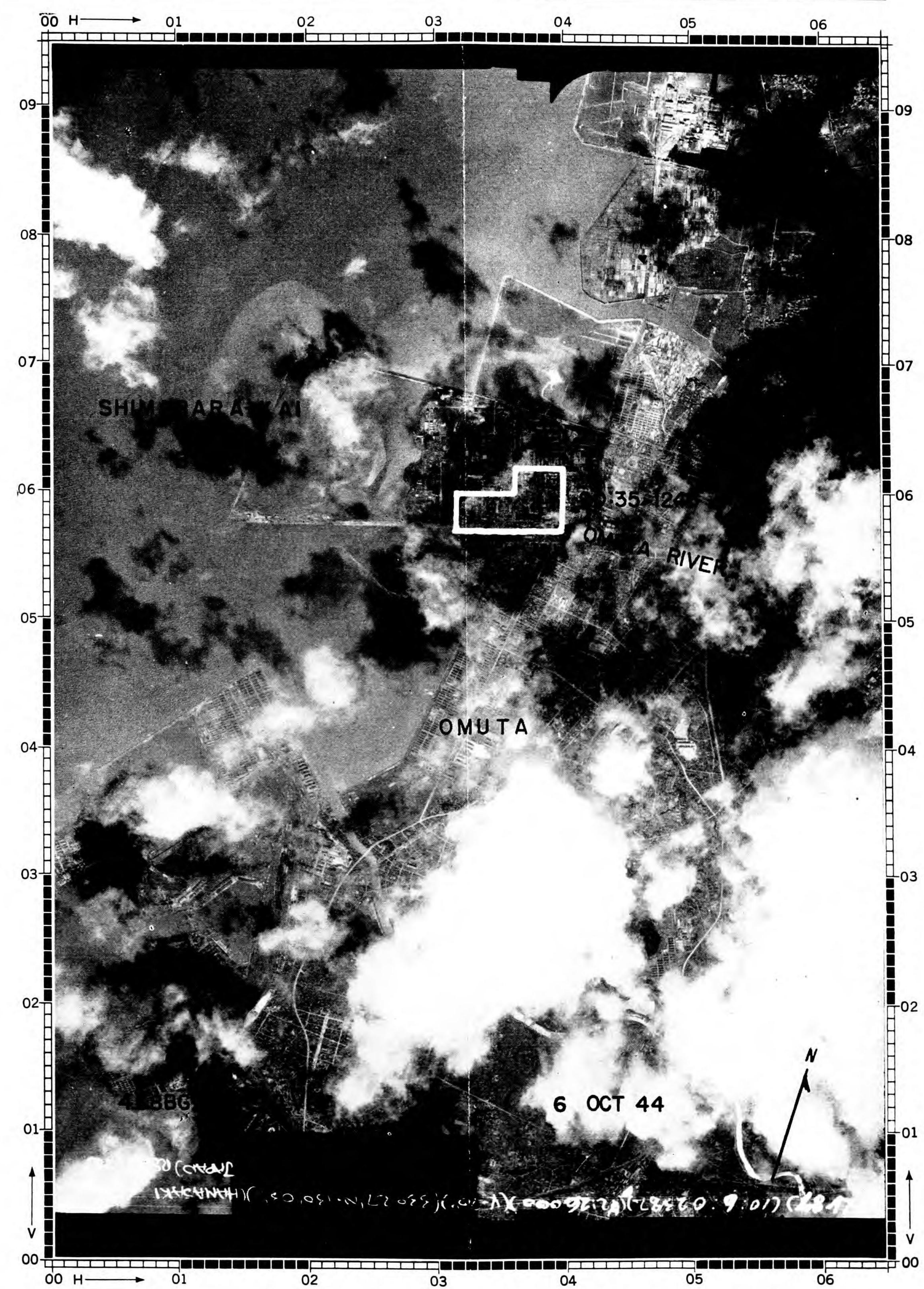
SIGNIFICANCE:

One of six largest calcium carbide plants which together are believed to account for more than 50 percent of total Japanese capacity. Also produces nitrogen by calcium cyanamide process.

Holder of Joint Target Group Folders should insert this sheet in Air Target System Folder: Japanese Chemical Industry.



LARGE SCALE ILLUSTRATION—SCALE APPROX.: 1:15,500



SMALL SCALE ILLUSTRATION—SCALE APPROX.: 1:26,000

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JOINT TARGET GROUP • WASHINGTON, D. C.
15 January 1945

GENERAL NOTE

Material contained in this folder is published in the office of AC/AS, Intelligence, AAF, by combined personnel of United States and British services for the use of Allied Forces.

AIR TARGET INDEX-JAPANESE WAR is a planning reference work which lists identified principal targets according to target systems and according to location by area. Joint Target Group material has been or will be issued for these targets.

The material in this folder is divided into three main parts as follows:

SYSTEM LISTS

These lists are arranged alphabetically in respect of names of plants, separate lists being given for each system.

AREA LISTS

These lists are arranged in numerical order of targets in accordance with the existing designations established by AC/AS, Intelligence, Army Air Forces, separate lists being given for each main area.

MEMORANDA

This section will be the receptacle for General Memoranda issued by Joint Target Group. Certain Memoranda are distributed with the initial issue of the folders.

The key to all target numbers is the document "Key Place Names and Air Objectives Index" prepared by AC/AS, Intelligence, dated July 1944. AAF Objective Folders have also been issued by AC/AS, Intelligence, dealing with a broad range of targets on an area basis. This index is complementary to these documents.

Addenda consisting of revised sheets and additional sheets will be issued from time to time. The folder is designed to permit ready substitution or addition of such material.

Individual sheets are classified as indicated and may be used accordingly. Classification of the folder as a whole is stamped on the cover. Such classification refers to the data in assembled form.

When material has served its purpose it shall be destroyed in accordance with AR 380-5 or Art. 76, Nav. Reg.

Original distribution list is the final page of this folder. Any queries or requests should be addressed to:

Joint Target Group
AC/AS, Intelligence
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JOINT TARGET GROUP, WASHINGTON, D. C.
AIR TARGET INDEX—JAPANESE WAR
PART I—SYSTEM INDEX

Sheet **ATI/1/AC/1**
 Date **5 February 1945**
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AIRCRAFT

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Aichi Aircraft Eng. Wks., Nagoya Plant	Nagoya (Japan)	90.20-2010
Aichi Aircraft Works, Eitoku Plant	Nagoya (Japan)	90.20-1729
Fuji Aircraft, Ofuna Plant	Ofuna (Japan)	90.17-2033
Hiro Naval Aircraft Factory	Hiro (Japan)	90.30-660
Hitachi Aircraft, Tachikawa Plant	Tachikawa (Japan)	90.17-2009
Ishikawajima Engine Plant, Tomioka	Yokohama (Japan)	90.17-1391
Japan International Aircraft, Hiratsuka Plant	Hiratsuka (Japan)	90.17-2015
Japan International Aircraft, Okubo Plant	Okubo (Japan)	90.23-1167
Japan Mus Inst Propeller Plant	Hamamatsu (Japan)	90.21-1219
Kagamigahara Military Airport	Gifu (Japan)	90.20-249
Kanegafuchi Aircraft Parts Plant	Tokyo (Japan)	90.17-1394
Kanoya Naval Air Station	Kanoya (Japan)	90.38-1378
Kasumigaura Naval Air Station	Kasumigaura (Japan)	90.14-1466
Kawanishi Aircraft, Fukae Plant	Fukae (Japan)	90.25-1702
Kawanishi Aircraft, Naruo Plant	Naruo (Japan)	90.25-18
Kawasaki Aircraft, Akashi Plant	Akashi (Japan)	90.25-1547
Kawasaki Aircraft, Kagamigahara Plant	Gifu (Japan)	90.20-240
Kayaba Engineering Co.	Tokyo (Japan)	90.17-1331
Kisarazu Naval Air Station	Kisarazu (Japan)	90.14-373
Manchuria Airplane Mfg. Co., Plant No. 1	Mukden (Manchuria)	93.3-177
Mitsubishi Aircraft, Kagamigahara Plant	Gifu (Japan)	90.20-1833
Mitsubishi Aircraft, Mishima Plant	Tamashima (Japan)	90.27-1681
Mitsubishi Aircraft Engine Works	Nagoya (Japan)	90.20-193
Mitsubishi Aircraft Works	Nagoya (Japan)	90.20-194
Mitsubishi Electric Mfg. Co.	Nagoya (Japan)	90.20-254
Nakajima Aircraft, Ogikubo Plant	Tokyo (Japan)	90.17-356
Nakajima Aircraft, Musashino-Tama Plant	Tokyo (Japan)	90.17-357
Nakajima Aircraft, Tanashi Foundry	Tokyo (Japan)	90.17-539
Nakajima Aircraft, Hamamatsu Plant	Hamamatsu (Japan)	90.21-2012
Nakajima Aircraft, Koizumi Plant	Koizumi (Japan)	90.13-1545
Nakajima Aircraft, New Ota Plant	Ota (Japan)	90.13-1544
Nakajima Aircraft, Handa Plant	Handa (Japan)	90.20-1635
Oita Naval Air Station	Oita (Japan)	90.33-1308
Okayama Aircraft Plant	Okayama (Formosa)	91.6-166
Omura Aircraft Factory	Omura (Japan)	90.36-1627
Saeki Naval Air Station	Saeki (Japan)	90.33-1306
Shizuoka Aircraft Engine Works	Shizuoka (Japan)	90.18-2011
Shoda Aircraft	Mitaka (Japan)	90.17-1395
Showa Aircraft	Tachikawa (Japan)	90.17-791
Suzuka Naval Air Base	Kanbe (Japan)	90.20-1130
Tacharai Army Airfield	Tacharai (Japan)	90.35-1236
Tachikawa Aircraft	Tachikawa (Japan)	90.17-792
Tachikawa Army Air Arsenal	Tachikawa (Japan)	90.17-2008
Tokyo Measuring Instrument Works	Tokyo (Japan)	90.17-919
Watanabe Aircraft Plant (Kyushu Aircraft)	Zasshonoguma (Japan)	90.35-662
Yokosuka Naval Aircraft Factory and Aeronautical Research Center	Tokyo (Japan)	90.17-1392

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 sheet ATI/1/AC

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PART I—SYSTEM INDEX

Sheet **ATI/1/A/2**
 Date **5 April, 1945**
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ARMAMENT

ARMAMENT

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Army Arsenal	Tokyo (Japan)	90.17-206
Army Arsenal & Military Gunpowder Works (1)	Tokyo (Japan)	90.17-205
Army Branch Powder Factory	Tokyo (Japan)	90.17-208
Army Central Clothing Depot	Tokyo (Japan)	90.17-202
Atsuta Factory, Nagoya Arsenal	Nagoya (Japan)	90.20-197
Chigusa Factory, Nagoya Arsenal	Nagoya (Japan)	90.20-196
Chosen Nitrogen Explosives Factory	Konan (Korea)	84.2-2
Diesel Automotive Co., Hino Plant	Hino (Japan)	90.17-2044
Harima Factory, Osaka Arsenal	Arai (Japan)	90.25-2019
Heijo Army Arsenal	Heijo (Korea)	84.3-61
Hikari Naval Arsenal	Shimada (Japan)	90.32-671
Hirakata Factory, Osaka Army Arsenal	Osaka (Japan)	90.25-1723
Hiro Arsenal	Hiro (Japan)	90.30-794
Hitachi Engineering Works, Kameari Plt. (2)	Tokyo (Japan)	90.17-1686
Iwahana Factory, Tokyo Arsenal	Iwahana (Japan)	90.13-2043
Japan Military Goods Co., Tomioka Plant	Yokohama (Japan)	90.17-899
Japan Steel Co., Hiroshima Plant	Hiroshima (Japan)	90.30-1891
Japan Steel Co., Yokohama Plant	Yokohama (Japan)	90.17-2042
Jinsen Army Arsenal	Heijo (Korea)	84.3-207
Kawatana Factory, Sasebo Arsenal	Kawatana (Japan)	90.36-2021
Kokura Arsenal	Kokura (Japan)	90.34-168
Kure Naval Arsenal	Kure (Japan)	90.30-657A
Maizuru Naval Arsenal	Maizuru (Japan)	90.22-1040
Manchuria Iron Works	Mukden (Manchuria)	93.3-166
Military Gunpowder Works	Tokyo (Japan)	90.17-207
Military Works	Tokyo (Japan)	90.17-209
Mitsubishi Steel and Arms Works	Nagasaki (Japan)	90.36-546
Mitsubishi-Urakami Ordnance Plant	Nagasaki (Japan)	90.36-2022
Mukden Arsenal	Mukden (Manchuria)	93.3-46
Navy Arsenal	Hiratsuka (Japan)	90.17-1336
Nihon Steel Works (3)	Muroran (Japan)	90.3-378
Nippon Explosives Works	Taketoyo (Japan)	90.20-1138
Nippon Vehicle Mfg. Co.	Nagoya (Japan)	90.20-241
Nissan Automobile Co.	Yokohama (Japan)	90.17-522
Ordnance Supply Depot	Tokyo (Japan)	90.17-203
Osaka Army Arsenal	Osaka (Japan)	90.25-382
Sagami Arsenal	Ono (Japan)	90.17-1692
Sasebo Naval Arsenal and Engineering Dept.	Sasebo (Japan)	90.36-758
Suzuka Naval Arsenal	Yokkaichi (Japan)	90.20-2020
Takaki Factory, Nagoya Arsenal	Takaki (Japan)	90.20-1691
Toriimatsu Factory, Nagoya Arsenal	Toriimatsu (Japan)	90.20-200
Toyoda Automobile Works, Kariya Plant	Kariya (Japan)	90.20-1140
Toyoda Automobile Works, Koromo Plant	Koromo (Japan)	90.20-1139
Toyokawa Naval Arsenal	Toyokawa (Japan)	90.21-1653
Uji Powder Factory	Uji (Japan)	90.23-1169
Yokosuka Arsenal & Armament Works	Yokosuka (Japan)	90.17-282

(1) See "Chemical Industry"

(2) See "Machine Tool Industry"

(3) See "Coke, Iron and Steel"

Holders of Joint Target Group folders should insert this sheet in Air Target System Folder—Air Target Index—Japanese War in place of Sheet No. ATI/1/A/1.

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AIR TARGET INDEX—JAPANESE WAR
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Sheet **ATI/1/CI/2**
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**CHEMICAL
 INDUSTRY**

CHEMICAL INDUSTRY

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Army Arsenal and Military Gunpowder Works (1)	Tokyo (Japan)	90.17-205
Asahi Bemberg Cuprammonium Plant	Nobeoka (Japan)	90.33-1314
Asahi Glass Co.	Tobata (Japan)	90.34-567
Chosen Chemical Industry	Junsen (Korea)	84.3-59
Chosen Nitrogen Fertilizer Co. (2)	Konan (Korea)	84.2-1
Electro-Chemical Industry	Omuta (Japan)	90.35-1246
Electro-Chemical Industry, Aomi Plant	Aomi (Japan)	90.9-1101
Imperial Dye Works	Fukuyama (Japan)	90.29-1931
Japan Dyestuff Mfg. (Dye Plant)	Osaka (Japan)	90.25-1733
Manchurian Chemical Industry	Kanseishi (Manchuria)	93.5-19
Miike Dyestuffs	Omuta (Japan)	90.35-1243
Motomiya Chemical Plant	Konan (Korea)	84.2-3
Nippon Dye Works	Tsurusaki (Japan)	90.33-1317
Nippon Explosives Works	Taketoyo (Japan)	90.20-1138
Nippon Soda KK, Nihongi	Nihongi (Japan)	90.12-1642
Oriental High Pressure Co., Plant A	Omuta (Japan)	90.35-1244
Oriental High Pressure Co., Plant B	Omuta (Japan)	90.35-1245
Raikan Plant of Nippon Nitrogen Explosives Co.	Nobeoka (Japan)	90.33-1312
Shinetsu Nitrogen Fertilizer Co., Naoetsu Plant	Naoetsu (Japan)	90.9-1667
Showa Fertilizer, Kanose Plant	Kanose (Japan)	90.9-1536
Showa Fertilizer	Kawasaki (Japan)	90.17-137
Showa Soda Plant	Nagoya (Japan)	90.20-467
Sumitomo Chemical Co.	Niihama (Japan)	90.29-923
Tagi Fertilizer Co.	Behu (Japan)	90.25-1713
Tokuyama Soda Co.	Tokuyama (Japan)	90.32-675
Toyo Soda Co.	Tonda (Japan)	90.32-1882
Tsurumi Soda Co.	Yokohama (Japan)	90.17-1396
Ube Nitrogen Fertilizer Co.	Ube (Japan)	90.32-818
Yahagi Electro-Chemical Plant	Nagoya (Japan)	90.20-255

(1) See "Armament."

(2) See "Non-Ferrous Metals."

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COKE, IRON AND STEEL

**COKE, IRON
and
STEEL**

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Asano Iron Works	Kawasaki (Japan)	90.17-51
Daido Electric Steel, Minami Plant	Nagoya (Japan)	90.20-247D
Japan Iron Works, Hirohata Plant	Hirohata (Japan)	90.27-1290
Japan Iron Works, Kamaishi	Kamaishi (Japan)	90.8-189
Japan Iron Works, Kenjiho	Kenjiho (Korea)	84.3-66
Japan Iron Works, Seishin	Seishin (Korea)	84.1-28
Japan Iron Works, Tobata Plant	Tobata (Japan)	90.34-29
Japan Iron Works, Yawata Plant	Yawata (Japan)	90.34-28
Japan Steel Tube Co.	Kawasaki (Japan)	90.17-52
Kobe Steel Works	Kobe (Japan)	90.25-5
Kobe Steel Works	Kobe (Japan)	90.25-6
Kobe Steel Works	Kobe (Japan)	90.25-1768
Kokura Steel Works	Kokura (Japan)	90.34-165
Nakayama Steel Mfg. Co.	Osaka (Japan)	90.25-713
Nihon Steel Co. (1)	Muroran (Japan)	90.3-378
Penhsihu Iron Works, New Plant	Miyanochara (Manchuria)	93.3-171
Penhsihu Iron Works, Old Plant	Penhsihu (Manchuria)	93.3-30
Showa Steel Works	Anshan (Manchuria)	93.3-29
Wanishi Iron Works	Muroran (Japan)	90.3-379

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(1) See "Armament."

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ELECTRICAL EQUIPMENT INDUSTRY

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Aeronautical Experimental Lab.	Tokyo (Japan)	90.17-1393
Hitachi Engineering Wks., Kaigan Plant	Sukegawa (Japan)	90.14-1476
Hitachi Engineering Wks., Kameido Plant	Tokyo (Japan)	90.17-916
Japan Wireless Co., Factory No. 1	Tokyo (Japan)	90.17-1694
Japan Wireless Co., Factory No. 2	Tokyo (Japan)	90.17-1695
Japan Wireless Co., Factory No. 3	Tokyo (Japan)	90.17-1696
Japan Wireless Co., Factory No. 4	Tokyo (Japan)	90.17-1697
Kawanishi Machine Shop	Kobe (Japan)	90.25-1745
Mitsubishi Electric Mfg. Co. (1)	Nagoya (Japan)	90.20-254
Mitsubishi Electric Mfg. Co.	Nagasaki (Japan)	90.36-829
Miyata Mfg. Co.	Tokyo (Japan)	90.17-1693
Nippon Electric Co., Factory No. 2 Mita Plant	Tokyo (Japan)	90.17-326
Nippon Electric Co., Factory No. 1 Tama Plant	Kawasaki (Japan)	90.17-497
Riken Vacuum Tube Co., Factory No. 1	Tokyo (Japan)	90.17-1698
Riken Vacuum Tube Co., Factory No. 2	Mobara-Machi (Japan)	90.14-1699
Riken Vacuum Tube Co., Factory No. 3	Ichikawa (Japan)	90.17-2017
Riken Vacuum Tube Co., Factory No. 4	Odaki-Machi (Japan)	90.14-2018
Shibaura Engineering Works, Ltd. (2)	Yokohama (Japan)	90.17-133
Tokyo-Shibaura Elec. Co., Factory No. 1, Horikawa Plant	Kawasaki (Japan)	90.17-496
Tokyo-Shibaura Elec. Co., Factory No. 2, Yanagi Plant	Kawasaki (Japan)	90.17-488
Tokyo-Shibaura Elec. Co., Factory No. 3, Komukai Plant	Kawasaki (Japan)	90.17-4011

**ELECTRICAL
EQUIPMENT
INDUSTRY**

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(1) See "Machine Tool Industry."
(2) See "Machine Tool Industry."

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ELECTRIC POWER

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Amagasaki Steam Power Plant	Amagasaki (Japan)	90.25-536
Amagasaki Transformer Station	Amagasaki (Japan)	90.25-1629
Asahi Substation	Kawasaki (Japan)	90.17-102
Choshin Hydro Elec. Plant No. 1	Chinkori (Korea)	84.2-4
Choshin Hydro Elec. Plant No. 2	Tokori (Korea)	84.2-5
Fuhsin Steam Power Plant	Fuhsin (Manchuria)	93.3-39
Fusen Hydro Elec. Plant No. 1	Shoko (Korea)	84.2-8
Hodogaya Substation	Yokohama (Japan)	90.17-62
Inawashiro Transforming Station	Tokyo (Japan)	90.17-211
Inuyama Transformer Station	Inuyama (Japan)	90.20-1638
Iwakura Transformer Station	Iwakura (Japan)	90.20-1143
Jitsugetsutan Power Plant No. 1	Lake Jitsugetsutan (Formosa)	91.4-82
Jitsugetsutan Power Plant No. 2	Lake Jitsugetsutan (Formosa)	91.4-83
Kansai Kyodo Steam Power Plant No. 1	Amagasaki (Japan)	90.25-540A
Kansai Kyodo Steam Power Plant No. 2	Amagasaki (Japan)	90.25-540B
Kanseishi Steam Power Plant	Kanseishi (Manchuria)	93.5-8
Kawasaki Elec. Power Plant	Kawasaki (Japan)	90.17-111
Kawasaki Substation No. 1	Kawasaki (Japan)	90.17-105
Kirin Hydro Elec. Plant	Fengmen (Manchuria)	93.2-55
Kizu Transformer Station	Kizu (Japan)	90.25-1632
Kokura Steam Power Plant No. 1	Kokura (Japan)	90.34-1127
Kokura Steam Power Plant No. 2	Kokura (Japan)	90.34-188
Komaki Hydro-Elec. Plant	Sho River (Japan)	90.11-873
Kurobe Hydro-Elec. Plant No. 2	Kurobe River (Japan)	90.11-877
Kurobe Hydro-Elec. Plant No. 3	Kurobe River (Japan)	90.11-1608
Kyosen Hydro Elec. Plant No. 1	Nantai River (40° 45' N, 128° 30' E) (Korea)	84.1-212
Nagoya Steam Power Plant No. 1	Nagoya (Japan)	90.20-195
Nagoya Steam Power Plant No. 2	Nagoya (Japan)	90.20-1598
Osaka Transformer Station	Osaka (Japan)	90.25-1630
Sasazu Transformer Station	Sasazu (Japan)	90.11-1633
Senju Hydro Plant	Shinano River (Japan)	90.9-1593
Senju Steam Power Station	Tokyo (Japan)	90.17-230
Shinano Hydro Plant	Shinano River (Japan)	90.9-1592
Suiho Hydro Elec. Plant	Suiho (Manchuria)	93.2-56
Taikanton Steam Power Plants	Fushun (Manchuria)	93.3-35
Tobata Steam Power Plant	Tobata (Japan)	90.34-1594
Tokyo Elec. Power Sta., Tsurumi Plant	Kawasaki (Japan)	90.17-110
Tokyo Steam Power Plant	Kawasaki (Japan)	90.17-493
Yao Transformer Station	Yao (Japan)	90.25-1631

**ELECTRIC
POWER**

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Sheet **ATI/1/MTI/2**
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MACHINE TOOL INDUSTRY

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Ebara Mfg. Co., Kamata Plant	Tokyo (Japan)	90.17-2026
Ebara Mfg. Co., Kawasaki Plant	Kawasaki (Japan)	90.17-2027
Fujikoshi Steel Products, Toyama Plants	Toyama (Japan)	90.11-941
Hitachi Engineering Wks., Kameari Plant (1)	Tokyo (Japan)	90.17-1686
Hitachi Machine Tool Co.	Kawasaki (Japan)	90.17-1688
Hokoku Machinery Co., Kasedera Plant	Nagoya (Japan)	90.20-1799
Ikegai Iron Works, Mizonoguchi Plant	Kawasaki (Japan)	90.17-2028
Ikegai Machine Foundry	Tokyo (Japan)	90.17-882
Japan Military Goods Co., Shonan Plant	Yokohama (Japan)	90.17-898
Karatsu Iron Works	Karatsu (Japan)	90.36-833
Manchuria Machine Tool Co.	Mukden (Manchuria)	93.3-164
Mitsubishi Electric Mfg. Co. (2)	Nagoya (Japan)	90.20-254
Mitsubishi Electric Mfg. Co.	Hiroshima (Japan)	90.30-1885
Mitsui Machine Tool Co., Okegawa Plant	Okegawa (Japan)	90.17-1687
Mizaguchi Gear Works	Osaka (Japan)	90.25-1634
Niigata Iron Works, Plant No. 1	Niigata (Japan)	90.9-998
Okamoto Machine Tool Co., Kamata Plant	Tokyo (Japan)	90.17-2029
Okuma Iron Works, Hagino Plant	Nagoya (Japan)	90.20-1146
Oriental Precision Machinery Co.	Tokyo (Japan)	90.17-1357
Osaka Chain and Machinery Works	Ibaragi (Japan)	90.25-1773
Osaka Chain and Machinery Works, Maegawa Plant	Osaka (Japan)	90.25-2030
Osaka Machinery Co.	Itami (Japan)	90.25-1780
Osaka Wakayama Iron Works	Fukuizumi (Japan)	90.25-1784
Shibaura Engineering Works, Ltd. (3)	Yokohama (Japan)	90.17-133
Tokyo Gas & Electric Engineering Co.	Tokyo (Japan)	90.17-331
Toyo Industry	Hiroshima (Japan)	90.30-1890
Tsugami-Atagi Mfg. Co.	Nagaoka (Japan)	90.9-1656

**MACHINE
TOOL
INDUSTRY**

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- (1) See "Armament"
- (2) See "Electrical Equipment Industry" and "Aircraft"
- (3) See "Electrical Equipment Industry"

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NON-FERROUS METALS

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Asahi Electro-Chemical Co.	Tokyo (Japan)	90.17-212
Asano Cement Co., Itozaki Plant	Itozaki (Japan)	90.29-1690
Chosen Nitrogen Fertilizer Co. (1)	Konan (Korea)	84.2-1
Chosen Riken Metals Co.	Chinnampo (Korea)	84.3-67
Furukawa Copper Refinery	Kiyotaki (Japan)	90.13-811
Furukawa Copper Smelter	Honzan (Japan)	90.13-810B
Hulutao Lead & Zinc Smelter	Hulutao (Manchuria)	93.3-187
Japan Mining Co. Smelter	Chinnampo (Korea)	84.3-68
Japan Light Metals Co.	Niigata (Japan)	90.9-1003
Japan (Showa) Electro-Chemical Co.	Yokohama (Japan)	90.17-521
Japan Light Metals, Alumina	Shimizu (Japan)	90.18-1176
Japan Light Metals, Aluminum	Kambara (Japan)	90.18-1177
Japan Aluminum Co.	Karenko (Formosa)	91.5-61
Korea Refining Co.	Choko (Korea)	84.6-116
Kokusan Light Metals Co.	Sasazu (Japan)	90.11-1689
Manchuria Light Metals Co., Fushun Plt.	Fushun (Manchuria)	93.3-32
Manchuria Magnesium Industry	Yingkou (Manchuria)	93.3-34
Mitsubishi Copper Refinery	Osaka (Japan)	90.25-697
Mitsui Electrolytic Zinc Refinery	Omuta (Japan)	90.35-1261
Mitsui Zinc Distillery	Omuta (Japan)	90.35-1260
Mitsui Zinc Smelter	Hikoshima (Japan)	90.34-1847
Nichiman Aluminum Co.	Higashi-Iwase (Japan)	90.11-861
Niihama Copper Concentrating Mill	Niihama (Japan)	90.29-925
Nippon Aluminum Co.	Takao (Formosa)	91.6-3
Nippon Aluminum Co.	Kurosaki (Japan)	90.34-1108
Nippon Soda, Odera Refinery	Odera (Japan)	90.10-1666
Nippon Soda Co., Aluminum Plant	Takaoka (Japan)	90.11-866
Onoda Cement Co.	Onoda (Japan)	90.32-822
Riken Metal Co., Ube Plant	Ube (Japan)	90.32-922
Saganoseki Copper Works	Saganoseki (Japan)	90.33-1328
Showa Denko Aluminum, Omachi	Omachi (Japan)	90.12-1100
Sumitomo Alumina Plant	Niihama (Japan)	90.29-1657
Sumitomo Aluminum Reduction Plant	Niihama (Japan)	90.29-924
Toyo Aluminum Co.	Omuta (Japan)	90.35-1877

NON-FERROUS METALS

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(1) See "Chemical Industry."

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JOINT TARGET GROUP, WASHINGTON, D. C.
AIR TARGET INDEX—JAPANESE WAR
PART I—SYSTEM INDEX

Sheet **ATI/1/P/1**
 Date **5 February 1945**
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PETROLEUM

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
Agochi Coal Liquefaction Plant	Agochi (Korea)	84.1-125
Alexandra Tank Farm	Singapore (Malay States)	92.2-70
Amagasaki Jonzo	Amagasaki (Japan)	90.25-1203
Army Oil Storage	Kawasaki (Japan)	90.17-2038
Azuma Oil Storage	Yokosuka (Japan)	90.17-297
Balikpapan Refinery	Balikpapan Borneo	94.4-225
Bukum Island Tank Farm	Singapore (Malay States)	92.2-72
Chinkai Naval Base	Chinkai (Korea)	84.7-101
Chosen Oil Refinery	Genzan (Korea)	84.4-88
Fourth Senoko Oil Depot	Singapore (Malay States)	92.2-17
Hanano Waki Oil Storage	O Shima (Japan)	90.32-669
Hayama Petroleum Refinery	Kawasaki (Japan)	90.17-127
Hitonese Oil Storage	Yeta Shima (Japan)	90.30-659
Hokkaido Synthetic Oil Co.	Rumoi (Japan)	90.2-1561
Iwamizawa Synthetic Oil Plant	Iwamizawa (Japan)	90.3-1564
Jijoke Oil Storage Area	Dairen (Manchuria)	93.5-197
Kanokawa Oil Storage	Nishi Nomi Jima (Japan)	90.30-1907
Kirin Artificial Oil Company	Lungtanshan (Manchuria)	93.2-58
Korean Coal Industry Co.	Eian (Korea)	84.1-126
Koshiha Point Oil Storage	Koshiha Point (Japan)	90.17-2037
Kozaki Point Oil Storages	Nagasaki (Japan)	90.36-545
Kranji Tank Farm	Singapore (Malay States)	92.2-71
Kushiro Synthetic Oil Plant	Kushiro (Japan)	90.2-1049
Lutong Refinery	Lutong (Borneo)	81.1-8
Maizuru Naval Base	Maizuru (Japan)	90.22-1041
Manchuria Coal Liquefaction Co.	Ssuningkai (Manchuria)	93.3-43
Manchuria Petroleum Co.	Kanseishi (Manchuria)	93.5-1
Manchuria Synthetic Fuel Co.	Chinchow (Manchuria)	93.3-175
Maruzen Oil Refinery	Shimotsu (Japan)	90.25-1764
Mitsubishi Coal Liquefaction Plant	Wanishi-Muroran (Japan)	90.3-988
Mitsubishi Oil Refinery	Kawasaki (Japan)	90.17-116
Mitsui Coal Liquefaction Plant	Omota (Japan)	90.35-1262
Naibuchi Synthetic Oil Plant	Naibuchi (Karafuto)	90.1-2039
Niigata Oil Storage Number 1	Niigata (Japan)	90.9-1012
Nippon Oil Company Kudamatsu Plant	Kudamatsu (Japan)	90.32-672
Ominato Naval Base and Air Station	Ominato (Japan)	90.5-996
O Shima Naval Oil Storage	O Shima (Tokuyama) (Japan)	90.32-1884
Ogura Oil Co.	Yokohama (Japan)	90.17-87
Pangkalan Brandan Refinery	Pangkalan Brandan (Sumatra)	94.1-33
Petroleum Center	Shanghai (China)	83.1-124
Petroleum Center	Kawasaki (Japan)	90.17-128
Pladjoe Refinery	Palembang (Sumatra)	94.2-61
Poeloe Samboe Tank Farm	Poeloe Samboe (Sumatra)	94.1-35
Sasebo Oil Storages	Sasebo (Japan)	90.36-755

PETROLEUM

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PETROLEUM—Continued

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	PLACE NAME	TARGET NUMBER
SMR Coal Liquefaction Plant	Fushun (Manchuria)	93.3-41
SMR Shale Oil Plant	Fushun (Manchuria)	93.3-40
Soengei-Gerong Refinery	Palembang (Sumatra, Java, etc.)	94.2-231
Standard Vacuum Oil Storage	Shanghai (China)	83.1-126
Synthetic Plant at Naihoro	Karafuto (Karafuto)	90.1-962
Takikawa Synthetic Oil Plant	Takikawa (Japan)	90.2-1050
Tandjoeng Oeban Oil Storage	Tandjoeng Oeban (Sumatra)	94.1-269
Tarakan Storage Tanks	Tarakan Is. (Sumatra)	94.4-224
Tjepoe Refinery	Tjepoe (Java)	94.3-229
Toho Gas Works Synthetic Oil Plants	Nagoya City (Japan)	90.20-456
Tokuyama Naval Fueling Station	Tokuyama (Japan)	90.32-673
Ube Coal Liquefaction Company	Ube (Japan)	90.32-1841
Utsube River Oil Refinery	Yokkaichi (Japan)	90.20-1684
Wonokromo Refinery	Soerabaja (Java)	94.3-230
Yokose Oil Storage	Yokose (Japan)	90.36-1835

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Sheet ATI/I/RRT

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Joint Target Group, Washington, D. C.

**AIR TARGET INDEX — JAPANESE WAR
PART I — SYSTEM INDEX**

ROAD AND RAIL TRANSPORTATION

Target Name	Place Name	Target Number
Daido River RR. Bridges	Heijo (Korea)	84.3-91
Dairi RR. Yards & Tunnel Entrance	Dairi (Japan)	90.34-1674
East Hiroshima RR. Station	Hiroshima (Japan)	90.30-740
Goryokaku RR. Shops	Hakodate (Japan)	90.4-979
Han River RR. Bridges	Keijo (Korea)	84.6-42
Harbin RR. Yards and Warehouses	Harbin (Manchuria)	93.1-91
Harbin RR. Repair Shops	Harbin (Manchuria)	93.1-114
Hatabu RR. Shops and Yards	Hatabu (Japan)	90.34-1119
Heijo RR. Shops and Yards	Heijo (Korea)	84.3-73
Heijo Shunting Yards	Heijo (Korea)	84.3-74
Hitachi Mfg. Co. (Kasado Plant)	Kudamatsu (Japan)	90.32-825
Huangkutun RR. Repair Shops	Mukden (Manchuria)	93.3-178
Hun River RR. Bridge	Mukden (Manchuria)	93.3-367
Imperial Government Railway Shops	Takatori (Japan)	90.25-538
Imperial Government Railway Shops	Omiya (Japan)	90.17-894
Imperial Government Railway Shops	Hamamatsu (Japan)	90.21-1230
Inasawa Shunting Yards	Inasawa (Japan)	90.20-1133
Kagoshima RR. Repair Shops	Kagoshima (Japan)	90.38-1517
Kammon Railroad Tunnel Viaduct	Hikoshima-Shimono- noseki (Japan)	90.34-772
Kanazawa RR. Shops	Matsuto-Machi (Japan)	90.11-871
Kawasaki Locomotive and Car Co.	Kobe (Japan)	90.25-11
Kokura RR. Shops	Kokura (Japan)	90.34-184
Koriyama RR. Shops	Koriyama (Japan)	90.10-1655
Maibara RR. Yards	Maibara (Japan)	90.23-1160
Morioka RR. Yards and Shops (Shops Only)	Morioka (Japan)	90.7-1074
Nagamachi Marshalling Yards	Sendai (Japan)	90.10-1104
Nagano Government RR. Shops	Nagano (Japan)	90.12-1098
Nagoya Freight Yards	Nagoya (Japan)	90.20-250A
Nagoya Repair Shops	Nagoya (Japan)	90.20-250B
Numazu RR. Yards	Numazu (Japan)	90.18-1181
Oi Railroad Works	Tokyo (Japan)	90.17-370
Rolling Stock Manufacturing Co.	Osaka (Japan)	90.25-548
Ryuzan RR. Shops and Yards	Keijo (Korea)	84.6-43
Sapporo Shops of IGR	Sapporo (Japan)	90.3-990
Shanhaikwan RR. Shops	Shanhaikwan (China)	83.12-40
Shinagawa Railroad Yards	Tokyo (Japan)	90.17-364
Shiodome Freight Yards (IGR Shops)	Tokyo (Japan)	90.17-365
Sobu RR. Bridge, Arakawa River & Shin- koiwa Yard, Junction (IGR Shops only)	Tokyo (Japan)	90.17-1373
South Manchurian Railway Workshops	Dairen (Manchuria)	93.5-16
Suchiatun RR. Junction (Freight Yards)	Suchiatun (Manchuria)	93.3-173
Suita RR. Yards and Shops	Suita (Japan)	90.25-1209

**ROAD AND
RAIL
TRANSPORTATION**

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AIR TARGET INDEX — JAPANESE WAR
PART I — SYSTEM INDEX

ROAD AND RAIL TRANSPORTATION — Continued

Target Name	Place Name	Target Number
Sumida River Bridge and Sumida River Railway Yard of Joban Line (IGR Shops only)	Tokyo (Japan)	90.17-1370
Tabata-Nippori Railroad Yards	Tokyo (Japan)	90.17-224
Tosu RR. Yards & Repair Shops (Yards only)	Tosu (Japan)	90.35-1871
Tsuchizaki RR. Shops	Tsuchizaki (Japan)	90.6-1068
Tsurumi Shunting Yard	Kawasaki (Japan)	90.17-112
Tumen River Bridge No. 1	Nanyo (Korea)	84.1-19
Tumen River Bridge No. 2	Kamisanpo (Korea)	84.1-20
Umekoji Freight Yards	Kyoto (Japan)	90.23-1159
Wakamatsu RR. Shops	Wakamatsu (Japan)	90.34-561
Yalu River RR. Bridges	Antung (Manchuria)	93.2-77

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**AIR TARGET INDEX — JAPANESE WAR
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SHIPPING — PORT FACILITIES

Target Name	Target Number
Aomori, Japan	90.5-993
Balikpapan, Borneo	94.4-3501
Bangkok, Thailand	98.2-3502
Chinkai, Korea	84.7-101
Chinnampo, Korea	84.3-3504
Chinwangtao, China	83.12-24
Dairen, Manchuria	93.5-3506
Funakawa, Japan	90.6-3507
Fusan, Korea	84.7-97
Fushiki, Japan	90.11-867
Genzan, Korea	84.4-3509
Gunzan, Korea	84.8-3510
Hakata (Fukuoka), Japan	90.35-3511
Hakodate, Japan	90.4-3512
Higashi-Iwase, Japan	90.11-862
Hirohata, Japan	90.27-3514
Hongkong-Kowloon, China	83.4-3515
Hulutao, Manchuria	93.3-172
Jinsen, Korea	84.6-3517
Jukong Wharf, China	83.1-112
Kagoshima, Japan	90.38-3519
Kamaishi, Japan	90.8-3520
Kanda, Japan	90.34-1867
Kawasaki, Japan	90.17-3522
Kobe, Japan	90.25-3523
Kokura, Japan	90.34-1866
Kolaka, Celebes	94.5-3525
Konan, Korea	84.2-3526
Kure, Japan	90.30-3527
Laoyao (Lienyun), China	83.11-79
Lutong, Borneo	81.1-3529
Maizuru, Japan	90.22-3530
Masan, Korea	84.7-130
Matsure, Japan	90.34-3536
Miike, Japan	90.35-3532
Moji, Japan	90.34-3533
Moppo, Korea	84.8-99
Muroran, Japan	90.3-381
Nagasaki, Japan	90.36-3537
Nagoya, Japan	90.20-3538
Nanao, Japan	90.11-870
Nanking-Pukow, China	83.1-3540
Niigata, Japan	90.9-3541
Ominato, Japan	90.5-996
Onoda, Japan	90.32-3543

SHIPPING

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Joint Target Group — Washington, D. C.

**AIR TARGET INDEX — JAPANESE WAR
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SHIPPING — PORT FACILITIES — Continued

Target Name	Target Number
Osaka, Japan	90.25-3544
O Shima (Tokuyama), Japan	90.32-3545
Otaru, Japan	90.3-992
Palembang, Sumatra	94.2-53
Rashin, Korea	84.1-14
Reisui, Korea	84.8-98
Saigon, French Indo China	85.2-3550
Sakai, Japan	90.26-3551
Sasebo, Japan	90.36-3552
Seishin, Korea	84.1-13
Shako, Korea	84.1-3554
Shanghai, China	83.1-3555
Shenchiayuan, China	83.8-114
Shihweiyao, China	83.8-115
Shimonoseki, Japan	90.34-3558
Singapore, Malay States	92.2-3559
Si Chang Island, Thailand	98.2-3561
Soerabaja, Java	94.3-3560
Tangku Taku, China	83.12-3562
Tandjoeng Priok, Java	94.4-3563
Tarakan, Borneo	94.4-3572
Tashito, Manchuria	93.2-85
Tatung, Manchuria	93.2-188
Tobata, Japan	90.34-3566
Tokuyama, Japan	90.32-3571
Tokyo, Japan	90.17-3567
Tsingtao, China	83.11-3568
Tsuchizaki, Japan	90.6-3569
Tsuruga, Japan	90.22-1950
Ube, Japan	90.32-3573
Ujina, Japan	90.30-3574
Wakamatsu, Japan	90.34-3575
Whampo, China	83.4-51
Woosung, China	83.1-111
Wuhu, China	83.1-116
Yawata, Japan	90.34-3579
Yingkou, Manchuria	93.3-174
Yokkaichi, Japan	90.20-1737
Yokohama, Japan	90.17-3582
Yuki, Korea	84.1-15

These port area target numbers refer to the entire harbor area, which in many cases includes individual harbor installations to which

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Sheet ATI/I/S
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AIR TARGET INDEX — JAPANESE WAR
PART 1 — SYSTEM INDEX

SHIPPING — PORT FACILITIES — Continued

specific target numbers have already been assigned. The 'Port Area' as designated by these numbers, may also include anchorage areas outside of the breakwaters which are characteristic of Japanese ports.

This list of Port Facilities includes the principal ports available to the Japanese for cargo-handling in support of their war effort. It is not a priority list since priority will depend to a large extent on activity. Not all of the port areas listed are in current use. For instance, Nagoya is included as available although current photo reconnaissance shows no shipping present; on the other hand, many outports of relatively low capacity and useable to by-pass the larger port areas if the need should arise, are excluded for the sake of brevity.

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**AIR TARGET INDEX — JAPANESE WAR
PART I — SYSTEM INDEX**

SHIPPING — SHIPBUILDING AND REPAIR

Target Name	Place Name	Target Number
Asano Dockyard	Yokohama (Japan)	90.17-70
Drydock and West Wall Area	Singapore (Malay States)	92.2-20
Fujinagata Shipbuilding Co.	Osaka (Japan)	90.25-273A
Fujinagata Shipbuilding Co.	Osaka (Japan)	90.25-273B
Habu Shipyards	Innoshima (Japan)	90.29-927A
Hakodate Dockyard	Hakodate (Japan)	90.4-974
Harima Shipyard	Oo (Japan)	90.27-1296
Ishikawajima Dockyard	Tokyo (Japan)	90.17-330
Kasado Dock Co.	Kasado Island (Japan)	90.32-668
Kawanami Industry Co. Shipyard	Koyagi Island (Japan)	90.36-860
Kawasaki Heavy Industry Co.	Kobe (Japan)	90.25-171
Kiangnan Drydocks	Shanghai (China)	83.1-117
Kowloon Dockyard	Kowloon (China)	83.4-55
Kure Naval Shipyard	Kure (Japan)	90.30-657B
Maizuru Naval Base	Maizuru (Japan)	90.22-1041
Manchuria Dockyard	Dairen (Manchuria)	93.5-10
Mitsubishi Shipyard	Hikoshima (Japan)	90.34-1846
Mitsubishi Heavy Industries	Kobe (Japan)	90.25-169
Mitsubishi Dockyard	Nagasaki (Japan)	90.36-543
Mitsui Tama Shipyard	Tama (Japan)	90.27-1295
Muroran Dockyard	Muroran (Japan)	90.3-1683
North Wharf Area	Singapore (Malay States)	92.2-22
Osaka Iron Works	Hikoshima (Japan)	90.34-43B
Osaka Iron Works, Unit No. 1	Osaka (Japan)	90.25-272
Osaka Iron Works, Unit No. 2	Osaka (Japan)	90.25-699
Royal Navy Yard	Hongkong (China)	83.4-54
Sasebo Naval Dockyard	Sasebo (Japan)	90.36-752
Shannosho Shipyards	Innoshima (Japan)	90.29-927B
Taikoo Dockyard	Hongkong (China)	83.4-53
Tategami Shipyard	Nagasaki (Japan)	90.36-544
Tsurumi Steel and Shipbuilding Co.	Kawasaki (Japan)	90.17-122
Uraga Dockyard No. 1	Uraga (Japan)	90.17-1460
Uraga Dockyard No. 2	Uraga (Japan)	90.17-1461
Yokohama Dockyard	Yokohama (Japan)	90.17-69
Yokosuka Navy Yard	Yokosuka (Japan)	90.17-274

**JOINT TARGET GROUP, WASHINGTON, D. C.
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Sheet **ATI/1/UA/1**
Date **5 April 1945**
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URBAN AREAS

ALL PREVIOUS SHEETS CANCELLED

(Urban Areas on which target material
has been issued or is in preparation)

- Hamamatsu
- Nagasaki
- Nagoya
- Osaka — Kobe
- Sasebo
- Shimonoseki
- Shimizu
- Shizuoka
- Tokyo
- Yawata

**URBAN
AREAS**

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JOINT TARGET GROUP, WASHINGTON, D. C.
AIR TARGET INDEX—JAPANESE WAR
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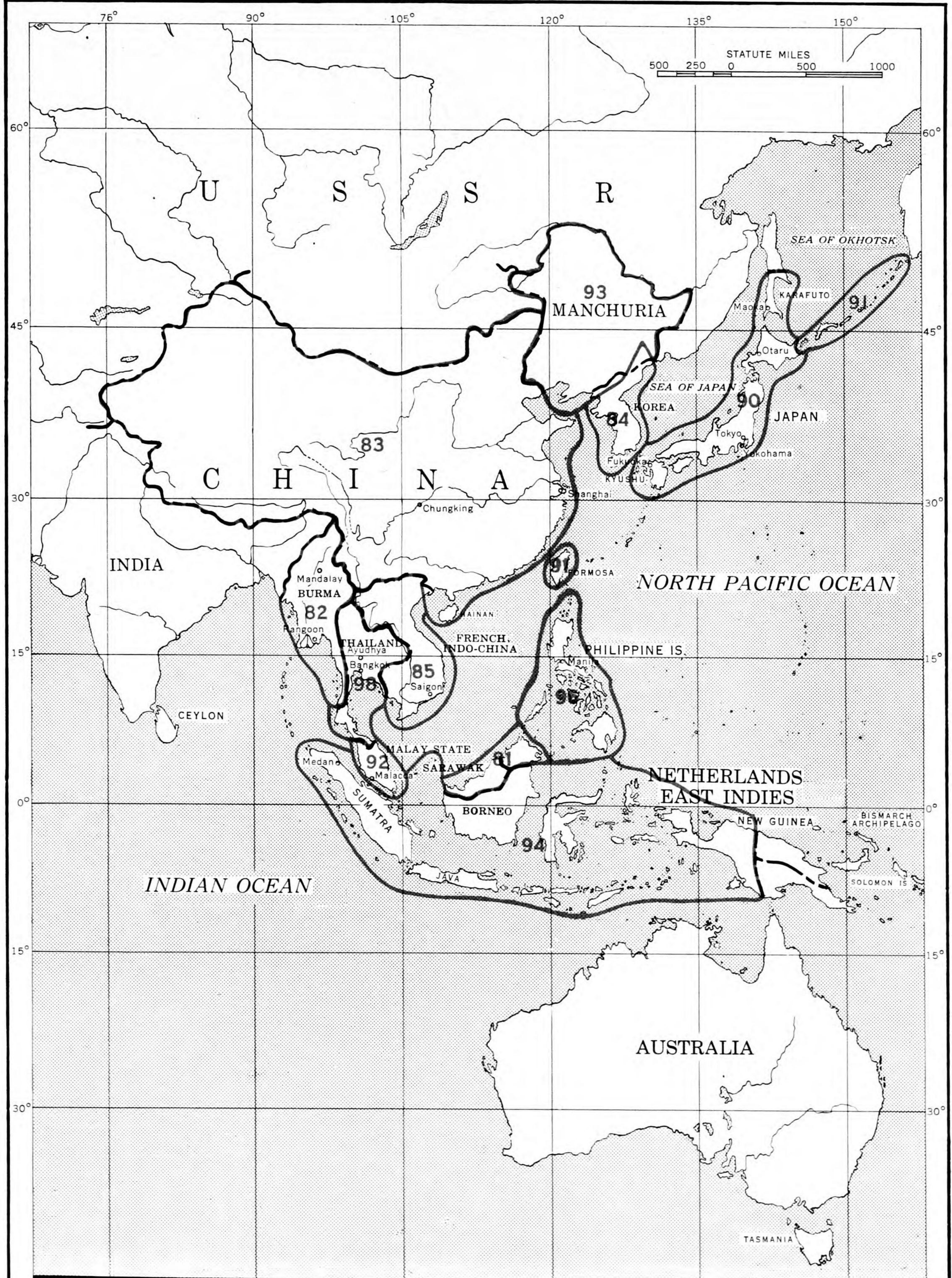
URBAN AREAS—URBAN INDUSTRIAL CONCENTRATIONS

ALL PREVIOUS SHEETS CANCELLED

TARGET NAME	TARGET NUMBER
Amagasaki UIC/1	90.25-3624
Amagasaki UIC/2	90.25-3625
Amagasaki UIC/3	90.25-3626
Amagasaki UIC/4	90.25-3627
Kawasaki UIC/1	90.17-3604
Kawasaki UIC/2	90.17-3605
Kawasaki UIC/3	90.17-3606
Kobe UIC/1	90.25-3628
Kobe UIC/2	90.25-3629
Nagoya UIC/1	90.20-3609
Nagoya UIC/2	90.20-3610
Nagoya UIC/3	90.20-3611
Nagoya UIC/4	90.20-3612
Nagoya UIC/5	90.20-3613
Nagoya UIC/6	90.20-3614
Nagoya UIC/7	90.20-3615
Nagoya UIC/8	90.20-3616
Osaka UIC/1	90.25-3617
Osaka UIC/2	90.25-3618
Osaka UIC/3	90.25-3619
Osaka UIC/4	90.25-3620
Osaka UIC/5	90.25-3621
Osaka UIC/6	90.25-3622
Osaka UIC/7	90.25-3623
Tokyo UIC/1*	90.17-3600
Tokyo UIC/2	90.17-3601
Tokyo UIC/3	90.17-3602
Tokyo UIC/4	90.17-3603
Yawata UIC/1	90.34-3630
Yawata UIC/2	90.34-3631
Yawata UIC/3	90.34-3632
Yokohama UIC/1	90.17-3607
Yokohama UIC/2	90.17-3608

*Abbreviation for Tokyo Urban Industrial Concentration One. Preliminary material carried the designation Tokyo UA/1.

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Part II - Areas

AREA NO.	COUNTRY	AREA NO.	COUNTRY
81	BORNEO NORTH	91	JAPANESE PACIFIC ISLANDS
82	BURMA	92	MALAY STATES
83	CHINA	93	MANCHURIA
84	KOREA	94	NETHERLANDS EAST INDIES
85	INDO-CHINA	96	PHILIPPINES
90	JAPAN	98	THAILAND

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**JOINT TARGET GROUP, WASHINGTON, D. C.
AIR TARGET INDEX—JAPANESE WAR
NEW TARGET NUMBER SHEET**

Sheet **ATI/NTN**
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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
83.11-174	North China Light Metals Co., Changtien Plant	NFM	Tsingtao, China	2 $\frac{3}{4}$ mi South of Changtien (Shantung)	36°47'N 118 03 E	New large alumina plant, using locally-mined shale.
90.13-2043	Iwahana Factory of Tokyo Arsenal	A	Takasaki, Japan	Iwahana	36°18'N 139 05 E	A large explosives and ammunition plant affiliated with the (Tokyo) Army Arsenal and Military Gunpowder Works (90.17-205)
90.17-2042	Japan Steel Co., Yokohama Plant	A	Tokyo, Japan	NW of Yokosuka	35°20'N 139 37 E	A moderately important medium to heavy ordnance plant affiliated with the Osaka Arsenal (90.25-382).
90.17-2044	Diesel Automotive Co., Hino Plant	A	Tokyo, Japan	Hino	35°41'N 139 24 E	A medium size motor vehicle or tank plant.
90.17-2045	Ofuna Naval Fuel Research Plant	P	Tokyo, Japan	Just E of Ofuna Junction	35°22'N 139 33 E	Liquid fuel testing, research and development for Navy.
90.25-2046	Furukawa Electric Industry, New Plant	AC/A	Osaka, Japan	In SW Amagasaki	34°42'N 135 24 E	Large aircraft propeller, dural sheet and cartridge cases output.
90.27-2047	Kawanishi Aircraft, Himeji Plant	AC	Okayama, Japan	In East Himeji	34°50'N 134 42 E	Nippon Keori Textile Mill connected to assembly of GEORGE by Kamani-shi Aircraft.
90.33-2080	Oita Naval Air Depot Engine Section	AC	Kyushu, E. Japan	To west of Oita Airfield	33°14'N 131 39 E	Assembly or overhaul of aircraft engines.
90.33-2081	Oita Naval Air Depot, Airframe Section	AC	Kyushu, E. Japan	To north of Oita Airfield	33°14'N 131 38 E	Manufacturing or overhaul of airframes.
90.35-2078	Kanoya Aircraft Works	AC	Kurume, Japan	SW of Kanoya	31°22'N 130 50 E	Probable assembly plant.
90.35-2079	Fukuoka Seaplane Works	AC	Kurume, Japan	North of Fukuoka	33°39'N 130 26 E	Probable assembly plant.

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**JOINT TARGET GROUP, WASHINGTON, D. C.
AIR TARGET INDEX—JAPANESE WAR
NEW TARGET NUMBER SHEET**

Sheet **ATI/NTN**
Date **5 April 1945**
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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
90.13-2088A	Fukaya Branch of Tokyo No. 1 Arsenal	A	Takasaki, Japan	N of Fukaya	36°12'N 139°18'E	Very large munitions storage and some manufacturing.
90.13-2088B	Fukaya Branch of Tokyo No. 1 Arsenal	A	Takasaki, Japan	N of Fukaya	36°13'N 139°18'E	Very large munitions storage and some manufacturing.
90.17-2082	Japan Optical Mfg. Co., Shiba Plant	A	Tokyo, Japan	1 mi SSW of Imperial Palace	35°39'N 139°45'E	Range finders, optical instruments.
90.17-2083	Municipal Electric Bureau, Shiba Workshops	RRT	Tokyo, Japan	Tokyo Waterfront	35°38'N 139°45'E	Repair center for Tokyo streetcar system.
90.17-2084	Tokyo Gas Co., Senju Works	CIS	Tokyo, Japan	Directly S of 90.17-1370	35°43'N 139°48'E	Large gas works supplying N Tokyo.
90.17-2085	Hitachi Engineering Co., Fukugawa Plant	CIS	Tokyo, Japan	On reclaimed land at head of Tokyo Bay	35°39'N 139°48'E	Alloy steel castings and forgings.
90.17-2086	Mitsubishi Heavy Industry, Fukugawa Plant	S	Tokyo, Japan	On reclaimed land at head of Tokyo Bay	35°39'N 139°47'E	Reported production of marine engines.
90.17-2087	Kami-Seya Munitions Storage	A	Tokyo, Japan	SE of Tsuruma	35°29'N 139°29'E	Large ammunition storage area.
90.17-2089	Tama Branch of Tokyo No. 2 Arsenal	A	Tokyo, Japan	S of Tama River from Fuchu	35°38'N 139°29'E	Very large munitions storage area.
90.17-2095	Kawagoe Branch of Tokyo No. 1 Arsenal	A	Tokyo, Japan	About 3 mi SE of Kawagoe	35°52'N 139°32'E	Large explosive manufacturing and storage area.
90.21-2090	Waji Munitions Storage	A	Hamamatsu, Japan	Just NW of Waji on E side of Hamana Lagoon	34°46'N 137°39'E	Large military storage area (probably munitions).
90.27-2091	Kakogawa Munitions Storage	A	Okayama, Japan	NE of Kakogawa	34°46'N 134°52'E	Medium size munitions storage area.
90.33-2092	Sakanoichi Branch of Tokyo No. 2 Arsenal	A	Kyushu East, Japan	Just E across Ono River	33°14'N 131°44'E	Very large, dispersed munitions storage area.
90.35-2093	East Omuta Munitions Storage	A	Kurume, Japan	In E outskirts of Omuta	33°01'N 130°28'E	Large munitions storage area.
90.35-2094	Arao Branch of Tokyo No. 2 Arsenal	A	Kurume, Japan	Just E of Aro-machi	32°58'N 130°28'E	Large munitions storage area.
93.2-374	Kirin Munitions Storage	A	Manchuria E, Manchuria	About 1 mi N of 93.2-364	43°53'N 126°33'E	Large dispersed area.
93.3-203	Chin-Hsi Oil Plant	P	Mukden, Manchuria	Just S of Chin-Hsi	40°44'N 120°51'E	Refinery and possible synthetic plant.

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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
93.3-369	North Mukden Munitions Storage	A	Mukden, Manchuria	About 5½ mi NNE of center of Mukden	41°54'N 123°27'E	Large dispersed area.
93.3-370	North Mukden Arsenal	A	Mukden, Manchuria	About 5½ mi NE of center of Mukden	41°52'N 123°29'E	Large shop area, function unknown. Munitions storage.
93.3-371	Fushun Explosives Plant No. 1	A	Mukden, Manchuria	About 9000' SSW of 93.3-40	41°49'N 123°50'E	Medium size manufacturing and storage area.
93.3-372	Fushun Explosives Plant No. 2	A	Mukden, Manchuria	About 15,000' ESE of 93.3-40	41°50'N 123°54'E	Medium size manufacturing and storage area.
93.3-373	Ssupingkai Munitions Storage	A	Mukden, Manchuria	About 7½ mi W of Ssupingkai	43°12'N 124°12'E	Medium size storage area with large revetted buildings.
93.3-375	Chinchow Munitions Storage	A	Mukden, Manchuria	About 3 mi NE of Chinchow	41°08'N 121°09'E	Large revetted and dispersed munitions storage area.

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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
84:6-213	Eitoho Munitions Storage	A/MS	Keijo, Korea	About 5 mi SW of Keijo.	37°29'N 126°55'E	Small shell loading and munitions storing area.
84:6-214	Tokyo-Shibaera Electric Co., Jinsen Plant	MMT	Keijo, Korea	On N side of Jinsen on waterfront.	37°29'N 126°38'E	New electrical equipment plant of company. No information on products.
90:13-2131	Nakajima Aircraft, Utsunomiya Plant	AC	Takasaki, Japan	To south of Utsunomiya.	36°32'N 139°52'E	Probable assembly and parts manufacturing.
90:17-2127	Ikegai Iron Works, Kawasaki Plant	MMT	Tokyo, Japan	In Tode-cho adjacent and N of 90:17-58.	35°32'N 139°42'E	New machine tool priority target. Grinders, boring machines, lathes.
90:17-2128	Okamoto Machine Tool Co.	MMT	Tokyo, Japan	In Hiyoshi-mura, about 8,000 ft W of 90:17-112 on highway S of Keio School.	35°33'N 139°39'E	New machine tool priority target. Gear grinders and generators; lathes.
90:20-2129	Mitsubishi Aircraft, Kiorimo Plant	AC	Nagoya, Japan	In West Nagoya.	35°09'N 136°51'E	Aircraft engine parts plant.
90:17-2130	Fujisawa Aircraft Plant	AC	Tokyo, Japan	Just North of Fujisawa.	35°21'N 139°29'E	Probable underground aircraft plant.
90:17-2200	Japan Aircraft, Tomioka Plant	AC	Tokyo, Japan	Adjoins Ishikawajima Engine Plant (90:17-1391).	35°22'N 139°38'E	Probable BAKA manufacturing.
90:18-2179	Abe-gawa RR Bridge (Tokaido Line)	RRT	Shizuoka, Japan		34°58'N 138°22'E	
90:20-2157	Nagoya Aircraft Co.	AC	Nagoya, Japan	1 mile north of Mitsubishi Aircraft Engine Wks (90:20-193).	35°12'N 136°58'E	Medium size plant manufacturing gliders. Does repairs to trainers.
90:20-2158	Toyo Cotton Mill (Mitsubishi Aircraft)	AC	Nagoya, Japan	3000 ft N by W of Mitsubishi Electric Mfg Co (90:20-254).	35°12'N 136°56'E	Converted textile plant, produces aircraft engine components.
90:20-2159	Tokyo Muslin Mill (Mitsubishi Aircraft)	AC	Nagoya, Japan	4000 ft NW of Mitsubishi Electric Mfg Co (90:20-254).	35°12'N 136°56'E	Converted textile plant, produces aircraft engine components.
90:20-2160	Toyoda Automobile Co., Nagoya Plant	TE	Nagoya, Japan	3000 ft N of Aichi Aircraft Eng Wks (90:20-2010).	35°07'N 136°54'E	Auto/truck parts plant.
90:20-2161	Kondo Cotton Mill (Okamoto Aircraft)	AC	Nagoya, Japan	2 miles E by S of Aichi Ordnance Plant (90:20-198).	35°07'N 136°56'E	Converted textile mill, producing aircraft parts.

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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
90:20-2162	Nisshin Textile Mill (Mitsubishi Aircraft)	AC	Nagoya, Japan	1 mile NE of Mitsubishi Aircraft Works (90:20-194).	35°06'N 136°55'E	Converted textile mill, producing aircraft parts.
90:20-2163	Nagoya Yard of Uruga Dock Co.	TE/S	Nagoya, Japan	Directly N of Yahagi Electro Chemical Plant (90:20-255).	35°04'N 136°54'E	Sizeable shipyard.
90:20-2164	Japan Textile Co., Otaka Plant (Nakajima Aircraft)	AC	Nagoya, Japan	3 miles SE of Mitsubishi Aircraft Wks (90:20-194).	35°03'30"N 136°57'E	Converted textile mill, producing aircraft parts.
90:25-2167	Osaka Gas Co., Aji River Plant	CIS	Osaka, Japan	Directly W of Japan Dyestuff Mfg Co (90:20-1733).	34°40'N 135°27'E	Gas works with small coke capacity.
90:25-2199	Hirakata Explosives Works	A/MS	Osaka, Japan	Just SW of Target 1723.	34°48'N 135°39'E	Manufacturing and storage of explosives.
90:26-2175	Gono-kawa RR Bridge (Sanin Line)	RRT	Matsue, Japan		35°01'N 132°14'E	
90:26-2176	Hii-kawa RR Bridge (Sanin Line)	RRT	Matsue, Japan		35°22'N 132°47'E	
90:27-1290A	Japan Iron Works, Hirohata Power Plant	EP	Okayama, Japan		34°47'N 134°38'E	75,000 kw.
90:29-2132	Yokoshima Oil Storage	MS	Niihama, Japan	On SW coast of Yokoshima about 8 mi SE of Onomichi.	34°20'N 133°16'E	About 11 medium size camouflaged tanks.
90:29-2134	Omishima Oil Storage	MS	Niihama, Japan	On NE coast of Omishima.	34°16'N 133°02'E	About 13 camouflaged tanks.
90:30-2133	Hiro Oil Storage	MS	Kure, Japan	Adjoins Kure Air Station to North.	34°14'N 132°37'E	About 120 tanks, from 50 to 80 ft in diameter, partly buried.
90:30-2135	Kurahashi Jima Oil Storage	MS	Kure, Japan	On S shore of bay in SE part of island.	34°06'N 132°34'E	Group of medium sized tanks, many dismantled or apparently in process of dismantling.
90:30-2177	Kono (Oze)-gawa RR Bridges (Sanyo Line)	RRT	Kure, Japan		34°12'N 132°14'E	
90:30-2178	Ota-gawa RR Bridge (Sanyo Line)	RRT	Kure, Japan		34°24'N 132°42'E	
90:33-2185	Yakkan-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		33°34'N 131°22'E	
90:33-2186	Gokase-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		32°35'N 131°41'E	
90:33-2187	Hitosuse-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		32°03'N 131°28'E	

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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
90:33-2188	Hori-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		32°36'N 131°41'E	
90:33-2189	Moto-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		32°40'N 131°42'E	
90:33-2190	Ono-gawa No 1 RR Bridge (Hohi Line)	RRT	Kyushu E., Japan		33°02'N 131°38'E	
90:33-2191	Oita-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		33°14'N 131°38'E	
90:33-2192	Nagashima-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		32°51'N 131°56'E	
90:33-2194	Komaru-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		32°08'N 130°32'E	
90:33-2195	Ono-gawa RR Bridge (Nippo Line)	RRT	Kyushu E., Japan		33°14'N 131°42'E	
90:34-28A	Japan Iron Works, Yawata Power Plants No 3 & 5	EP	Shimono-seki, Japan		33°52'N 130°49'E	72,000 kw.
90:34-28B	Japan Iron Works, Yawata Power Plant No 4	EP	Shimono-seki, Japan		33°52'N 130°49'E	65,000 kw.
90:34-2155	Onga-kawa Bridges (Kagoshima Line)	RRT	Shimono-seki, Japan	West of Orio.	33°52'N 130°40'E	Twin RR bridges on Kagoshima Line.
90:34-2168	Moji Coaling Station Yards	RRT	Shimono-seki, Japan	Directly South of Moji Coaling Station (90:34-44c).	33°56'N 130°57'E	Railroad serving adjacent coaling station.
90:34-2169	Yawata RR Yards	RRT	Shimono-seki, Japan	Yawata.	33°52'N 130°47'E	Yards serving Yawata City.
90:34-2170	Tobata RR Yards	RRT	Shimono-seki, Japan	Tobata Port.	33°53'N 130°49'E	Yards serving Tobata Port area.
90:34-2171	Wakamatsu RR Yards	RRT	Shimono-seki, Japan	At S side of Wakamatsu City.	33°54'N 130°49'E	Yards serving Wakamatsu Port area.
90:34-2173	East Kokura RR Yards	RRT	Shimono-seki, Japan	In Akasaka district of E Kokura.	33°53'N 130°54'E	Yards serving port and city of Kokura.
90:34-2174	Kammon RR Tunnel	RRT	Shimono-seki, Japan		33°55'N 130°56'E	
90:35-2156	Nogata RR Yards	RRT	Kurume, Japan	In Nogata.	33°45'N 130°43'E	Important yard for Chikuho Coal Fields.
90:35-2165	Yoshizuka RR Yards, Fukuoka	RRT	Kurume, Japan	Just E of Hakata Station.	33°36'N 130°25'E	Freight sidings.
90:35-2166	Kurume Freight Yards	RRT	Kurume, Japan	Kurume City.	33°16'N 130°30'E	Freight sidings.

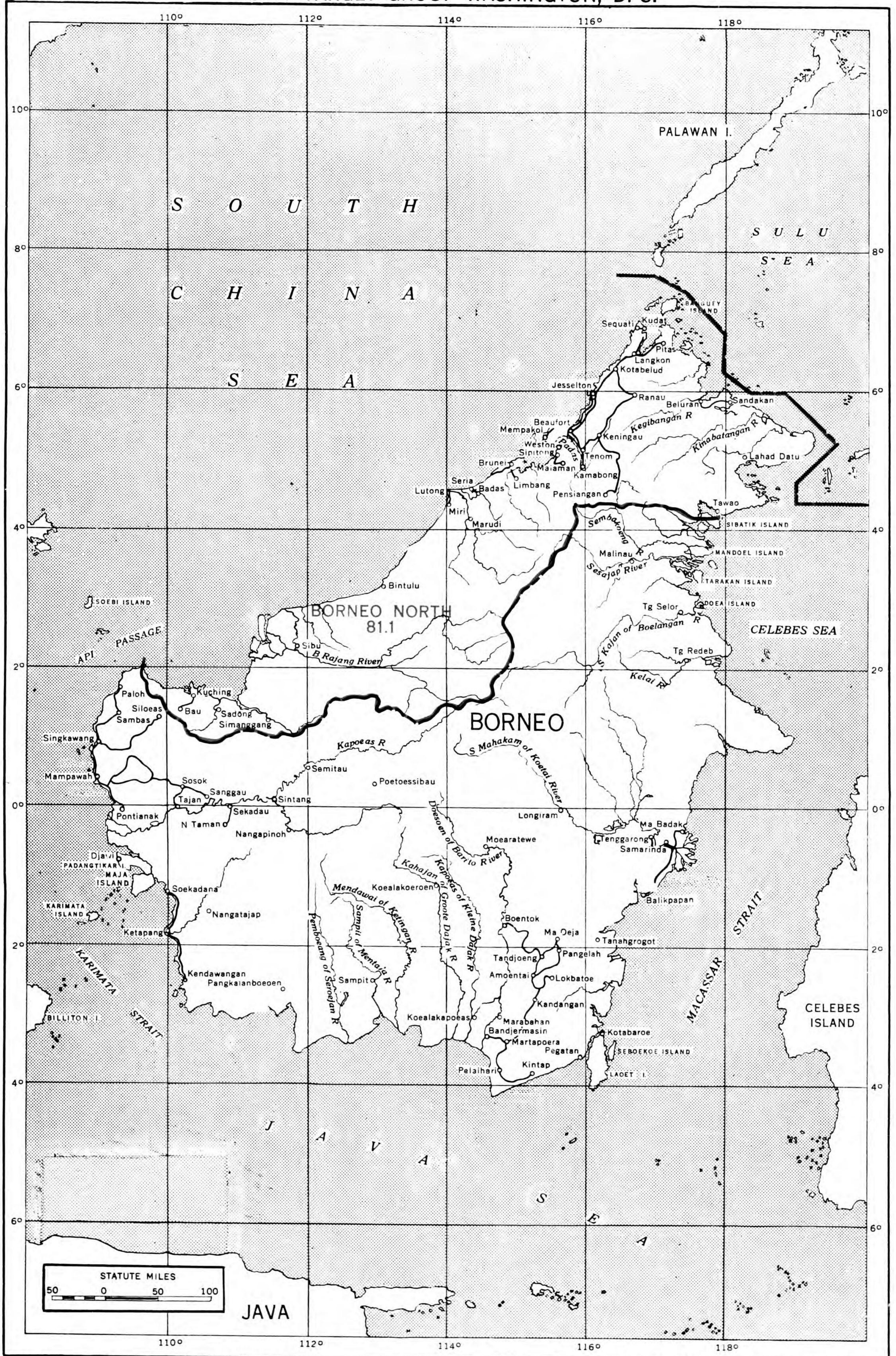
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Number	Name	Air Target System	Area and Country	Place	Coordinates	Comment
90:35-2172	Tatara-gawa RR Bridges (Kagoshima Line)	RRT	Kurume, Japan	Directly NE of Fukuoka.	33°38'N 130°26'E	Bridges on Kagashima Line and local railway.
90:35-2180	Midori-kawa RR Bridge (Kagoshima Line)	RRT	Kurume, Japan		32°43'N 130°40'E	
90:35-2181	Shira-kawa RR Bridge (Kagoshima Line)	RRT	Kurume, Japan		32°46'N 130°41'E	
90:35-2182	Chikugo-gawa RR Bridge (Kagoshima Line)	RRT	Kurume, Japan		33°19'N 130°30'E	
90:35-2183	Chikugo-gawa RR Bridges (Kyushu Elec Exp Line)	RRT	Kurume, Japan		33°19'N 130°32'E	
90:35-2193	Chikugo-gawa RR Bridge (Br Nagasaki Line)	RRT	Kurume, Japan		33°13'N 130°22'E	
90:35-2198	Ima-gawa RR Bridge (Nippo Line)	RRT	Kurume, Japan		33°43'N 130°58'E	
90:37-2196	Kuma-gawa RR Bridge (Kagoshima Line)	RRT	Yatsushiro, Japan		32°29'N 130°38'E	
90:37-2197	Kuma-gawa No 1 RR Bridge (Hisatsu Line)	RRT	Yatsushiro, Japan		32°23'N 130°39'E	
90:38-2184	Oyodo-gawa RR Bridge (Nippo Line)	RRT	Kyushu S., Japan		31°54'N 131°26'E	
93:3-376	Fuji Electric Company	LM	Mukden, Manchuria	In W Mukden industrial district about 2000 ft S of 93:3-50.	41°48'N 123°22'E	Light electrical equipment.

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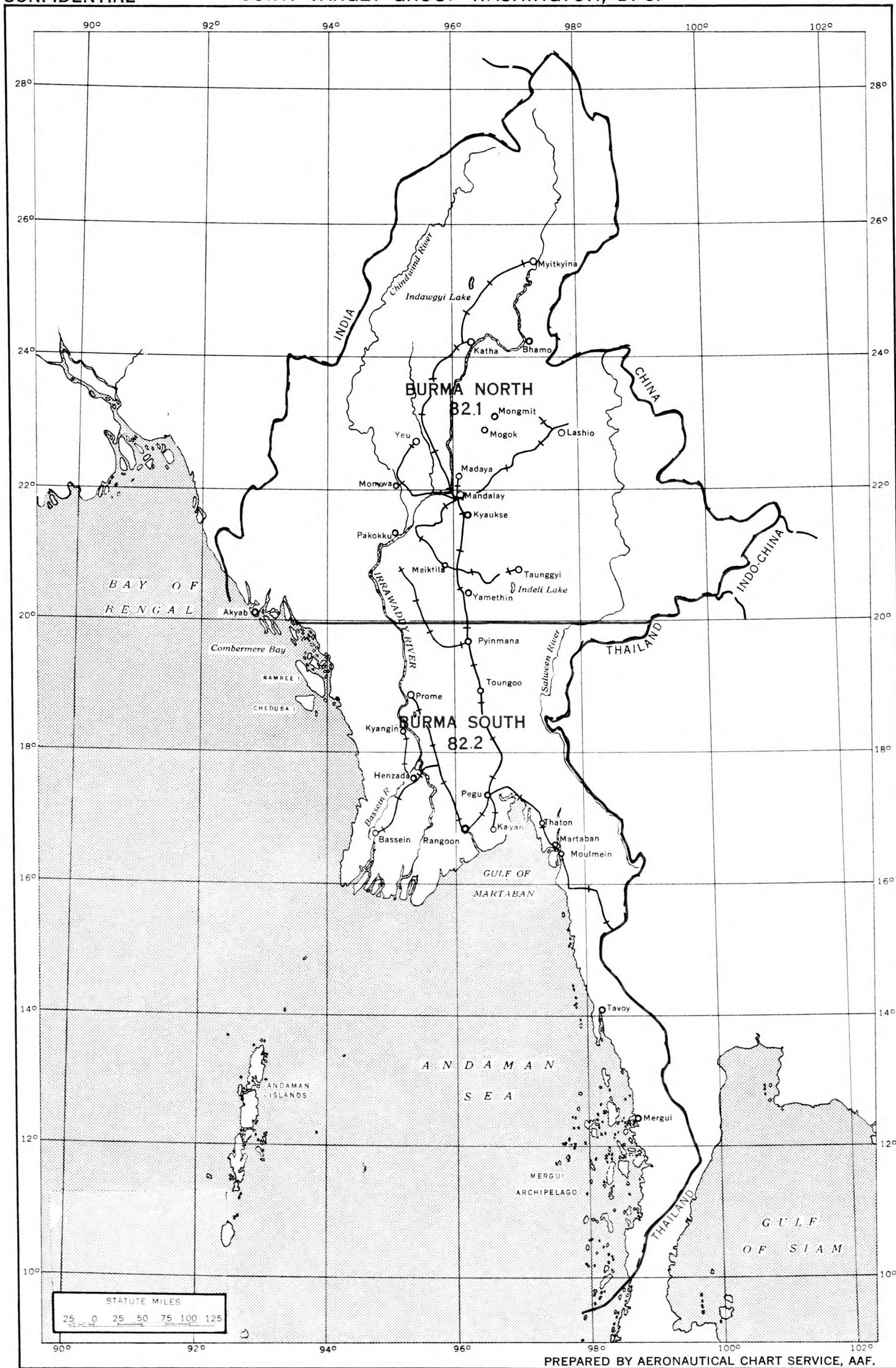
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PART 2 — AREA INDEX**

AREA 81 — BORNEO

Target Number	Place Name	Target Name
81.1-8	Lutong	Lutong Refinery
81.1-3529	Lutong	Port

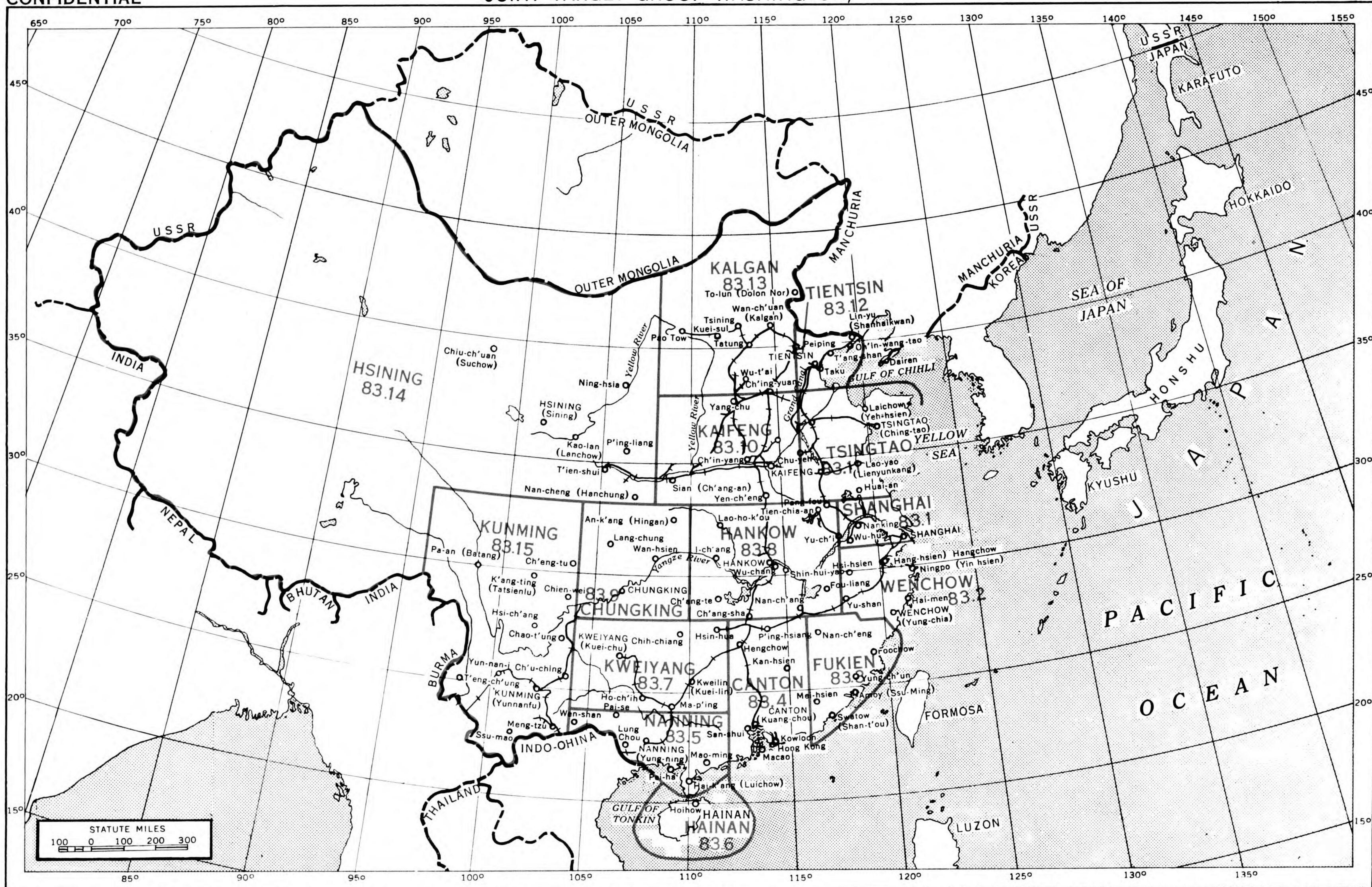
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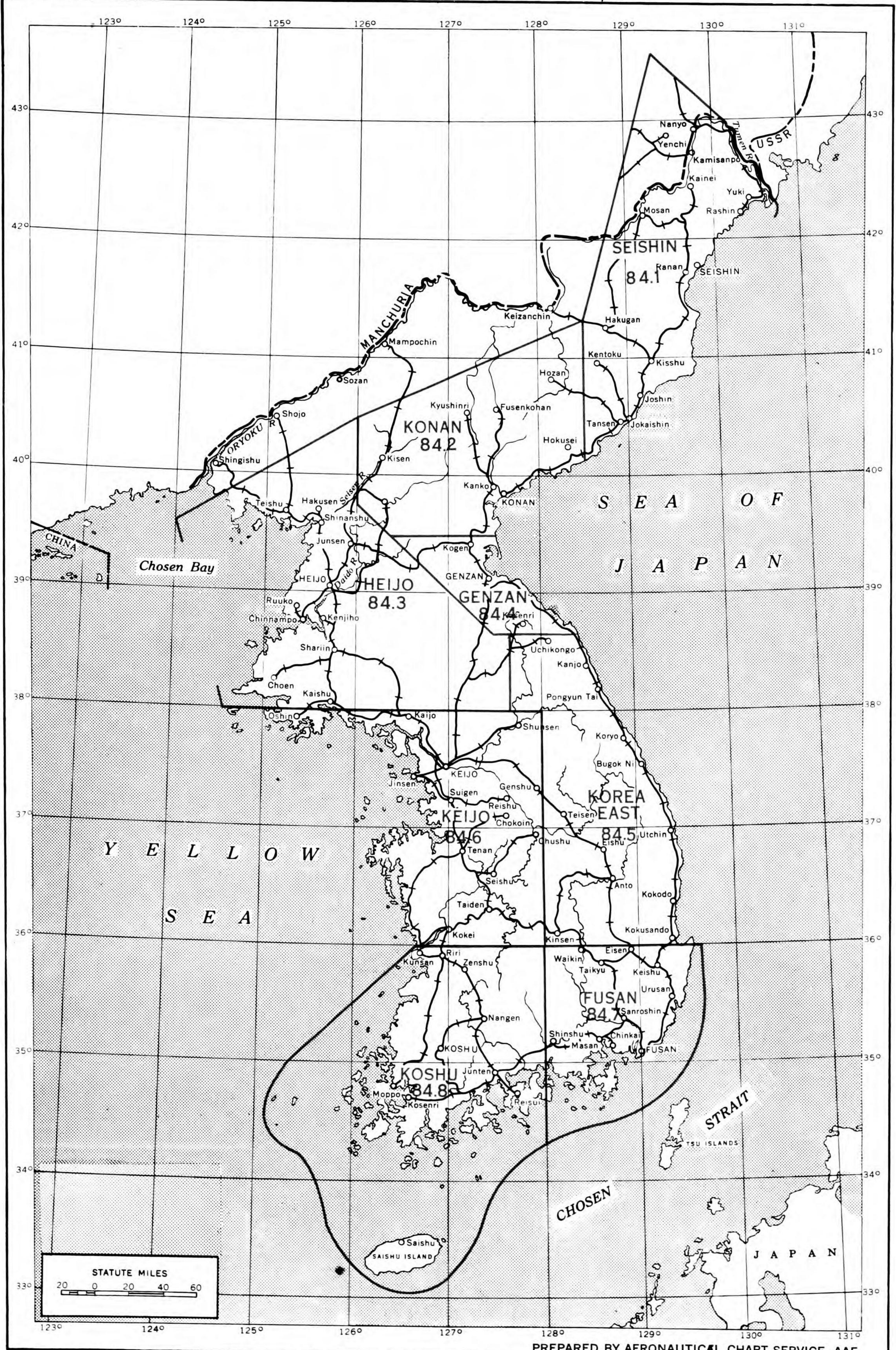
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AREA 83 — CHINA

Target Number	Place Name	Target Name
83.1-111	Woosung	Port
83.1-112	Jukong Wharf	Port
83.1-116	Wuhu	Port
83.1-117	Shanghai	Kiangnan Drydock
83.1-124	Shanghai	Petroleum Center
83.1-126	Shanghai	Standard Vacuum Oil Storage
83.1-3540	Nanking-Pukow	Port
83.1-3555	Shanghai	Port
83.4-51	Whampoa	Port
83.4-53	Hongkong	Taikoo Dockyard
83.4-54	Hongkong	Royal Navy Yard
83.4-55	Kowloon	Kowloon Dockyard
83.4-3515	Hongkong- Kowloon	Port
83.8-114	Shenchiayuan (Tayeh)	Port
83.8-115	Shihhweiyao (Tayeh)	Port
83.11-79	Laoyao (Lienyun)	Port
83.11-3568	Tsingtao	Port
83.12-24	Chinwangtao	Port
83.12-40	Shanhaikwan	Shanhaikwan RR Shops
83.12-3562	Tangku/Taku	Port

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AREA 84 — KOREA

ALL PREVIOUS SHEETS CANCELLED

TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
84.1-13	S	Seishin	Port
84.1-14	S	Rashin	Port
84.1-15	S	Yuki	Port
84.1-19	RRT	Nanyo	Tumen River Bridge No. 1
84.1-20	RRT	Kamisanpo	Tumen River Bridge No. 2
84.1-28	CIS	Seishin	Japan Iron Works, Seishin
84.1-125	P	Agochi	Agochi Coal Liquefaction Plant
84.1-126	P	Eian	Korean Coal Industry Co.
84.1-212	EP	Nantai River (40° 45' N 128°30' E)	Kyosen Hydro Elec. Plant No. 1
84.1-3554	S	Shako	Port
84.2-1	NFM/C1	Konan	Chosen Nitrogen Fertilizer Co.
84.2-2	A	Konan	Chosen Nitrogen Explosives Factory
84.2-3	CI	Konan	Motomiya Chemical Plant
84.2-4	EP	Chinkori	Choshin Hydro Elec. Plant No. 1
84.2-5	EP	Tokori	Choshin Hydro Elec. Plant No. 2
84.2-8	EP	Shoko	Fusen Hydro Elec. Plant No. 1
84.2-3526	S	Konan	Port
84-3-59	CI	Junsen	Chosen Chemical Industry
84.3-61	A	Heijo	Heijo Army Arsenal
84.3-66	CIS	Kenjiho	Japan Iron Works, Kenjiho
84.3-67	NFM	Chinnampo	Chosen Riken Metals Co.
84.3-68	NFM	Chinnampo	Japan Mining Co. Smelter
84.3-73	RRT	Heijo	Heijo RR Shops and Yards
84.3-74	RRT	Heijo	Heijo Shunting Yards
84.3-91	RRT	Heijo	Daido River RR Bridges
84.3-207	A	Heijo	Jinsen Army Arsenal
84.3-3504	S	Chinnampo	Port
84.4-88	P	Genzan	Chosen Oil Refinery
84.4-3509	S	Genzan	Port
84.6-42	RRT	Keijo	Han River RR Bridges
84.6-43	RRT	Keijo	Ryuzan RR Shops and Yards
84.6-116	NFM	Choko	Korea Refining Co.
84.6-3517	S	Jinsen	Port
84.7-97	S	Fusan	Port
84.7-101	PS	Chinkai	Chinkai Naval Base
84.7-130	S	Masan	Port
84.8-98	S	Reisui	Port
84.8-99	S	Moppo	Port
84.8-3510	S	Gunzan	Port

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AREA 85 — INDO CHINA

Target Number	Place Name	Target Name
85.2-3550	Saigon	Port

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Sheet **ATI/2/90/2**
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AREA 90 — JAPAN

ALL PREVIOUS SHEETS CANCELLED

TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
90.1-962	P	Karafuto	Synthetic Plant at Naihoro
90.1-2039	P	Naibuchi	Naibuchi Synthetic Oil Plant
90.2-1049	P	Kushiro	Kushiro Synthetic Oil Plant
90.2-1050	P	Takikawa	Takikawa Synthetic Oil Plant
90.2-1561	P	Rumoi	Hokkaido Synthetic Oil Co.
90.3-378	CIS/A	Muroran	Nihon Steel Works
90.3-379	CIS	Muroran	Wanishi Iron Works
90.3-381	S	Muroran	Port
90.3-988	P	Wanishi- Muroran	Mitsubishi Coal Liquefaction Plant
90.3-990	RRT	Sapporo	Sapporo Shops of IGR
90.3-992	S	Otaru	Port
90.3-1564	P	Iwamizawa	Iwamizawa Synthetic Oil Plant
90.3-1683	S	Muroran	Muroran Dockyards
90.4-974	S	Hakodate	Hakodate Dockyards
90.4-979	RRT	Hakodate	Goryokaku RR Shops
90.4-3512	S	Hakodate	Port
90.5-993	S	Aomori	Port
90.5-996	P/S	Ominato	Ominato Naval Base and Air Station (petroleum)
90.6-1068	RRT	Tsuchizaki	Tsuchizaki RR Shops
90.6-3507	S	Funakawa	Port
90.6-3569	S	Tsuchizaki	Port
90.7-1074	RRT	Morioka	Morioka RR Yards and Shops (Shops only)
90.8-189	CIS	Kamaishi	Japan Iron Works
90.8-3520	S	Kamaishi	Port
90.9-998	MTI	Niigata	Niigata Iron Works, Plant No. 1
90.9-1003	NFM	Niigata	Japan Light Metals Co.
90.9-1012	P	Niigata	Niigata Oil Storage No. 1
90.9-1101	CI	Aomi	Electro-Chemical Industry, Aomi Plant
90.9-1536	CI	Kanose	Showa Fertilizer, Kanose Plant
90.9-1592	EP	Shinano River	Shinano Hydro Plant
90.9-1593	EP	Shinano River	Senju Hydro Plant
90.9-1656	MTI	Nagaoka	Tsugami-Atagi Mfg. Co.
90.9-1667	CI	Naoetsu	Shinetsu Nitrogen Fertilizer Co., Naoetsu Plant
90.9-3541	S	Niigata	Port
90.10-1104	RRT	Sendai	Nagamachi Marshalling Yards
90.10-1655	RRT	Koriyama	Koriyama RR Shops
90.10-1666	NFM	Odera	Nippon Soda, Odera Refinery
90.11-861	NFM	Higashi-Iwase	Nichiman Aluminum Company
90.11-862	S	Higashi-Iwase	Port
90.11-866	NFM	Takaoka	Nippon Soda Co., Aluminum Plant
90.11-867	S	Fushiki	Port
90.11-870	S	Nanao	Port
90.11-871	RRT	Matsuto-Machi	Kanazawa RR Shops

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TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
90.11-873	EP	Sho River	Komaki Hydro-Elec. Plant
90.11-877	EP	Kurobe River	Kurobe Hydro-Elec. Plant No. 2
90.11-941	MTI	Toyama	Fujikoshi Steel Products, Toyama Plants
90.11-1608	EP	Kurobe River	Kurobe Hydro-Elec. Plant No. 3
90.11-1633	EP	Sasazu	Sasazu Transformer Station
90.11-1689	NFM	Sasazu	Kokusan Light Metals Co.
90.12-1098	RRT	Nagano	Nagano Government RR Shops
90.12-1100	NFM	Omachi	Showa Denko Aluminum, Omachi
90.12-1642	CI	Nihongi	Nippon Soda KK, Nihongi
90.13-810B	NFM	Honzan	Furukawa Copper Smelter
90.13-811	NFM	Kiyotaki	Furukawa Copper Refinery
90.13-1544	AC	Ota	Nakajima Aircraft, New Ota Plant
90.13-1545	AC	Koizumi	Nakajima Aircraft, Koizumi Plant
90.13-2043	A	Iwahana	Iwahana Factory, Tokyo Arsenal
90.14-373	AC	Kisarazu	Kisarazu Naval Air Station
90.14-1466	AC	Kasumigaura	Kasumigaura Naval Air Station
90.14-1476	EE	Sukegawa	Hitachi Engineering Works, Kaigan Plant
90.14-1699	EE	Mobara-Machi	Riken Vacuum Tube Co., Factory No. 2
90.14-2018	EE	Odaki-Machi	Riken Vacuum Tube Co., Factory No. 4
90.17-51	CIS	Kawasaki	Asano Iron Works
90.17-52	CIS	Kawasaki	Japan Steel Tube Co.
90.17-62	EP	Yokohama	Hodogaya Substation
90.17-69	S	Yokohama	Yokohama Dockyard
90.17-70	S	Yokohama	Asano Dockyard
90.17-87	P	Yokohama	Ogura Oil Co.
90.17-102	EP	Kawasaki	Asahi Substation
90.17-105	EP	Kawasaki	Kawasaki Substation No. 1
90.17-110	EP	Kawasaki	Tokyo Elec. Power Station, Tsurumi Plant
90.17-111	EP	Kawasaki	Kawasaki Elec. Power Plant
90.17-112	RRT	Kawasaki	Tsurumi Shunting Yard
90.17-116	P	Kawasaki	Mitsubishi Oil Refinery
90.17-122	S	Kawasaki	Tsurumi Steel and Shipbuilding Co.
90.17-127	P	Kawasaki	Hayama Petroleum Refinery
90.17-128	P	Kawasaki	Petroleum Center
90.17-133	EE/MTI	Yokohama	Shibaura Engineering Works, Ltd.
90.17-137	CI	Kawasaki	Showa Fertilizer
90.17-202	A	Tokyo	Army Central Clothing Depot
90.17-203	A	Tokyo	Ordnance Supply Depot
90.17-205	A/CI	Tokyo	Army Arsenal and Military Gunpowder Works
90.17-206	A	Tokyo	Army Arsenal
90.17-207	A	Tokyo	Military Gunpowder Works (Tokyo)
90.17-208	A	Tokyo	Army Branch Powder Factory
90.17-209	A	Tokyo	Military Works
90.17-211	EP	Toyko	Inawashiro Transforming Station
90.17-212	NFM	Tokyo	Asahi Electro-Chemical Co.
90.17-224	RRT	Tokyo	Tabata-Nippori Railroad Yards

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TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
90.17-230	EP	Tokyo	Senju Steam Power Station
90.17-274	S	Yokosuka	Yokosuka Navy Yard
90.17-282	A	Yokosuka	Yokosuka Arsenal & Armament Works
90.17-297	P	Yokosuka	Azuma Oil Storage
90.17-326	EE	Tokyo	Nippon Electric Co., Factory No. 2, Mita Plant
90.17-330	S	Tokyo	Ishikawajima Dockyard
90.17-331	MTI	Tokyo	Tokyo Gas & Electric Engineering Co.
90.17-356	AC	Tokyo	Nakajima Aircraft, Ogikubo Plant
90.17-357	AC	Tokyo	Nakajima Aircraft, Musashino Plant
90.17-364	RRT	Tokyo	Shinagawa Railroad Yards
90.17-365	RRT	Tokyo	Shiodome Freight Yards (IGR shops)
90.17-370	RRT	Tokyo	Oi Railroad Works
90.17-488	EE	Kawasaki	Tokyo-Shibaura Electric Co., Factory No. 2, Yanagi Plant
90.17-493	EP	Kawasaki	Tokyo Steam Power Plant
90.17-496	EE	Kawasaki	Tokyo-Shibaura Electric Co., Factory No. 1, Horikawa Plant
90.17-497	EE	Kawasaki	Nippon Electric Co., Factory No. 1, Tama Plant
90.17-521	NFM	Yokohama	Japan (Showa) Electro-Chemical Co.
90.17-522	A	Yokohama	Nissan Automobile Co.
90.17-539	AC	Tokyo	Nakajima Aircraft, Tanashi Foundry
90.17-791	AC	Tachikawa	Showa Aircraft
90.17-792	AC	Tachikawa	Tachikawa Aircraft
90.17-882	MTI	Tokyo	Ikegai Machine Foundry
90.17-894	RRT	Omiya	Imperial Government Railway Shops
90.17-898	MTI	Yokohama	Japan Military Goods Co., Shonan Plant
90.17-899	A	Yokohama	Japan Military Goods Co., Tomioka Plant
90.17-916	EE	Tokyo	Hitachi Engineering Works, Kameido Plant
90.17-919	AC	Tokyo	Tokyo Measuring Instrument Works
90.17-1331	AC	Tokyo	Kayaba Engineering Co.
90.17-1336	A	Hiratsuka	Navy Arsenal
90.17-1357	MTI	Tokyo	Oriental Precision Machinery Co.
90.17-1370	RRT	Tokyo	Sumida River Bridge and Sumida River Rail- road Yard of Joban Line (IGR Shops only)
90.17-1373	RRT	Tokyo	Sobu RR Bridge, Arakawa River and Shin- koiwa Yard, Junction (IGR Shops only)
90.17-1391	AC	Yokohama	Ishikawajima Engine Plant, Tomioka
90.17-1392	AC	Tokyo	Yokosuka Naval Aircraft Factory and Aeronautical Research Center
90.17-1393	EE	Tokyo	Aeronautical Experimental Lab.
90.17-1394	AC	Tokyo	Kanegafuchi Aircraft Plant
90.17-1395	AC	Tokyo	Shoda Aircraft Co.
90.17-1396	CI	Yokohama	Tsurumi Soda Co.
90.17-1460	S	Uraga	Uraga Dockyard No. 1
90.17-1461	S	Uraga	Uraga Dockyard No. 2
90.17-1686	A/MTI	Tokyo	Hitachi Engineering Works, Kameari Plant
90.17-1687	MTI	Okegawa	Mitsui Machine Tool Co., Okegawa Plant

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TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
90.17-1688	MTI	Kawasaki	Hitachi Machine Tool Co.
90.17-1691	A	Takaki	Takaki Factory of Nagoya Arsenal
90.17-1692	A	Ono	Sagami Arsenal
90.17-1693	EE	Tokyo	Miyata Mfg. Co.
90.17-1694	EE	Tokyo	Japan Wireless Co., Factory No. 1
90.17-1695	EE	Tokyo	Japan Wireless Co., Factory No. 2
90.17-1696	EE	Tokyo	Japan Wireless Co., Factory No. 3
90.17-1697	EE	Tokyo	Japan Wireless Co., Factory No. 4
90.17-1698	EE	Tokyo	Riken Vacuum Tube Co., Factory No. 1
90.17-2008	AC	Tachikawa	Tachikawa Army Air Arsenal
90.17-2009	AC	Tachikawa	Hitachi Aircraft, Tachikawa Plant
90.17-2015	AC	Hiratsuka	Japan International Aircraft, Hiratsuka Plant
90.17-2017	EE	Ichikawa	Riken Vacuum Tube Co., Factory No. 3
90.17-2026	MTI	Tokyo	Ebara Mfg. Co., Kamata Plant
90.17-2027	MTI	Kawasaki	Ebara Mfg. Co., Kawasaki Plant
90.17-2028	MTI	Kawasaki	Ikegai Iron Works, Mizonoguchi Plant
90.17-2029	MTI	Tokyo	Okamoto Machine Tool Co., Kamata Plant
90.17-2033	AC	Ofuna	Fuji Aircraft, Ofuna Plant
90.17-2037	P	Koshiba Point	Koshiba Point Oil Storage
90.17-2038	P	Kawasaki	Army Oil Storage
90.17-2042	A	Yokohama	Japan Steel Co., Yokohama Plant
90.17-2044	A	Hino	Diesel Automotive Co., Hino Plant
90.17-3522	S	Kawasaki	Port
90.17-3567	S	Tokyo	Port
90.17-3582	S	Yokohama	Port
90.17-4011	EE	Kawasaki	Tokyo-Shibaura Electric Co., Factory No. 3, Komukai Plant
90.18-1176	NFM	Shimizu	Japan Light Metals, Alumina Plant
90.18-1177	NFM	Kambara	Japan Light Metals, Aluminum Plant
90.18-1181	RRT	Numazu	Numazu RR Yards
90.18-2011	AC	Shizuoka	Shizuoka Aircraft Engine Works
90.20-193	AC	Nagoya	Mitsubishi Aircraft Engine Works
90.20-194	AC	Nagoya	Mitsubishi Aircraft Works
90.20-195	EP	Nagoya	Nagoya Steam Power Plant No. 1
90.20-196	A	Nagoya	Chigusa Factory, Nagoya Arsenal
90.20-197	A	Nagoya	Atsuta Factory, Nagoya Arsenal
90.20-200	A	Toriimatsu	Toriimatsu Factory of Nagoya Arsenal
90.20-240	AC	Gifu	Kawasaki Aircraft Works, Kagamigahara
90.20-241	A	Nagoya	Nippon Vehicle Mfg. Co.
90.20-247D	CIS	Nagoya	Daido Electric Steel, Minami Plant
90.20-249	AC	Gifu	Kagamigahara Military Airport
90.20-250A	RRT	Nagoya	Nagoya Freight Yards
90.20-250B	RRT	Nagoya	Nagoya Repair Shops
90.20-254	AC/EE/MTI	Nagoya	Mitsubishi Electric Mfg. Co.
90.20-255	CI	Nagoya	Yahagi Electro-Chemical Plant
90.20-456	P	Nagoya City	Toho Gas Works Synthetic Oil Plants
90.20-467	CI	Nagoya	Showa Soda Plant

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90.20-1130	AC	Kanbe	Suzuka Naval Air Base
90.20-1133	RRT	Inasawa	Inasawa Shunting Yards
90.20-1138	CI/A	Takeoyo	Nippon Explosives Works
90.20-1139	A	Koromo	Toyoda Automobile Works, Koromo Plant
90.20-1140	A	Kariya	Toyoda Automobile Works
90.20-1143	EP	Iwakura	Iwakura Transformer Station
90.20-1146	MTI	Nagoya	Okuma Iron Works, Hagino Plant
90.20-1598	EP	Nagoya	Nagoya Steam Power Plant No. 2
90.20-1635	AC	Handa	Nakajima Aircraft Works, Handa
90.20-1638	EP	Inuyama	Inuyama Transfer Station
90.20-1684	P	Yokkaichi	Utsube River Oil Refinery
90.20-1691	A	Takaki	Takaki Factory, Nagoya Arsenal
90.20-1729	AC	Nagoya	Aichi Aircraft Works, Eitoku Plant
90.20-1737	S	Yokkaichi	Port
90.20-1799	MTI	Nagoya	Hokoku Machinery Co., Kasedera Plant
90.20-1833	AC	Gifu	Mitsubishi Aircraft Works, Kagamigahara Plant
90.20-2010	AC	Nagoya	Aichi Aircraft Engine Works, Nagoya Plant
90.20-2020	A	Yokkaichi	Suzuku Naval Arsenal
90.20-3538	S	Nagoya	Port
90.21-1219	AC	Hamamatsu	Japan Musical Instrument, Propeller Plant
90.21-1230	RRT	Hamamatsu	Imperial Government Railway Shops
90.21-1653	A	Toyokawa	Toyokawa Naval Arsenal
90.21-2012	AC	Hamamatsu	Nakajima Aircraft, Hamamatsu Plant
90.22-1040	A	Maizuru	Maizuru Naval Arsenal
90.22-1041	S/P	Maizuru	Maizuru Naval Base
90.22-1950	S	Tsuruga	Port
90.22-3530	S	Maizuru	Port
90.23-1159	RRT	Kyoto	Umekoji Freight Yards
90.23-1160	RRT	Maibara	Maibara RR Yards
90.23-1167	AC	Okubo	Japan International Aircraft, Okubo Plant
90.23-1169	A	Uji	Uji Powder Factory
90.25-5	CIS	Kobe	Kobe Steel Works
90.25-6	CIS	Kobe	Kobe Steel Works
90.25-11	RRT	Kobe	Kawasaki Locomotive and Car Co.
90.25-18	AC	Naruo	Kawanishi Aircraft Co.
90.25-169	S	Kobe	Mitsubishi Heavy Industries
90.25-171	S	Kobe	Kawasaki Heavy Industry Co.
90.25-272	S	Osaka	Osaka Iron Works, Unit No. 1
90.25-273A	S	Osaka	Fujinagata Shipbuilding Co.
90.25-273B	S	Osaka	Fujinagata Shipbuilding Co.
90.25-382	A	Osaka	Osaka Arsenal
90.25-536	EP	Amagasaki	Amagasaki Steam Power Plant
90.25-538	RRT	Takatori	Imperial Government Railway Shops
90.25-540A	EP	Amagasaki	Kansai Kyodo Steam Power Plant No. 1
90.25-540B	EP	Amagasaki	Kansai Kyodo Steam Power Plant No. 2
90.25-548	RRT	Osaka	Rolling Stock Manufacturing Co.

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TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
90.25-697	NFM	Osaka	Mitsubishi Copper Refinery
90.25-699	S	Osaka	Osaka Iron Works, Unit No. 2
90.25-713	CIS	Osaka	Nakayama Steel Mfg. Co.
90.25-1203	P	Amagasaki	Amagasaki Jinzo
90.25-1209	RRT	Suita	Suita RR Yards and Shops
90.25-1547	AC	Akashi	Kawasaki Aircraft, Akashi Plant
90.25-1629	EP	Amagasaki	Amagasaki Transformer Station
90.25-1630	EP	Osaka	Osaka Transformer Station
90.25-1631	EP	Yao	Yao Transformer Station
90.25-1632	EP	Kizu	Kizu Transformer Station
90.25-1634	MTI	Osaka	Mizaguchi Gear Works
90.25-1702	AC	Fukae	Kawanishi Aircraft Co.
90.25-1713	CI	Behu	Tagi Fertilizer Co.
90.25-1723	A	Hirakata	Hirakata Branch, Osaka Army Arsenal
90.25-1733	CI	Osaka	Japan Dyestuff Mfg. (Dye Plant)
90.25-1745	EE	Kobe	Kawanishi Machine Shop
90.25-1764	P	Shimotsu	Maruzen Oil Refinery
90.25-1768	CIS	Kobe	Kobe Steel Works
90.25-1773	MTI	Ibaragi	Osaka Chain and Machinery Works
90.25-1780	MTI	Itami	Osaka Machinery Co.
90.25-1784	MTI	Fukuizumi	Osaka Wakayama Iron Works
90.25-2019	A	Arai	Harima Factory, Osaka Arsenal
90.25-2030	MTI	Osaka	Osaka Chain and Machinery Works, Maegawa Plant
90.25-3523	S	Kobe	Port
90.25-3544	S	Osaka	Port
90.26-3551	S	Sakai	Port
90.27-1290	CIS	Hirohata	Japan Iron Works, Hirohata Plant
90.27-1295	S	Tama	Mitsui Tama Shipyard
90.27-1296	S	Oo	Harima Shipyard
90.27-1681	AC	Tamashima	Mitsubishi Aircraft, Mishima Plant
90.27-3514	S	Hirohata	Port
90.29-923	CI	Niihama	Sumitomo Chemical Co.
90.29-924	NFM	Niihama	Sumitomo Aluminum Reduction Plant
90.29-925	NFM	Niihama	Niihama Copper Concentrating Mill
90.29-927A	S	Innoshima	Habu Shipyards
90.29-927B	S	Innoshima	Shannosho Shipyard
90.29-1657	NFM	Niihama	Sumitomo Alumina Plant
90.29-1690	NFM	Itozaki	Asano Cement Co., Itozaki Plant
90.29-1931	CI	Fukuyama	Imperial Dye Works
90.30-657A	A	Kure	Kure Naval Arsenal
90.30-657B	S	Kure	Kure Naval Shipyard
90.30-659	P	Yeta Shima	Hitonese Oil Storage
90.30-660	AC	Hiro	Hiro Naval Aircraft Factory
90.30-740	RRT	Hiroshima	East Hiroshima RR Station
90.30-794	A	Hiro	Hiro Arsenal
90.30-1885	MTI	Hiroshima	Mitsubishi Electric Mfg. Co.

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90.30-1890	MTI	Hiroshima	Toyo Industry
90.30-1891	A	Hiroshima	Japan Steel Co., Hiroshima Plant
90.30-1907	P	Nishi Nomi Jima	Kanokawa Oil Storage
90.30-3527	S	Kure	Port
90.30-3574	S	Ujina	Port
90.32-668	S	Kasado Is.	Kasado Dock Co.
90.32-669	P	O Shima (Is.)	Hanano Waki Oil Storage
90.32-671	A	Shimada	Hikari Naval Arsenal
90.32-672	P	Kudamatsu	Nippon Oil Company (Kudamatsu Plant)
90.32-673	P	Tokuyama	Tokuyama Naval Fueling Station
90.32-675	CI	Tokuyama	Tokuyama Soda Co.
90.32-818	CI	Ube	Ube Nitrogen Fertilizer Co.
90.32-822	NFM	Onoda	Onoda Cement Co.
90.32-825	RRT	Kudamatsu	Hitachi Mfg. Co. (Kasado Plant)
90.32-922	NFM	Ube	Riken Metal Co., Ube Plant
90.32-1841	P	Ube	Ube Coal Liquefaction Company
90.32-1882	CI	Tonda	Toyo Soda Co.
90.32-1884	P	O Shima (Tokuyama)	O Shima Naval Oil Storage
90.32-3543	S	Onoda	Port
90.32-3545	S	O Shima (Tokuyama)	Port
90.32-3571	S	Tokuyama	Port
90.32-3573	S	Ube	Port
90.33-1306	AC	Saeki	Saeki Naval Air Station
90.33-1308	AC	Oita	Oita Naval Air Station
90.33-1312	CI	Tobata	Raikan Plant of Nippon Nitrogen Explosives Co.
90.33-1314	CI	Nobeoka	Asahi Bemberg Cuprammonium Plant
90.33-1317	CI	Tsurusaki	Nippon Dye Works
90.33-1328	NFM	Saganoseki	Saganoseki Copper Works
90.34-28	CIS	Yawata	Japan Iron Works, Yawata Plant
90.34-29	CIS	Tobata	Japan Iron Works, Tobata Plant
90.34-43B	CIS	Hikoshima	Osaka Iron Works
90.34-165	CIS	Kokura	Kokura Steel Works
90.34-168	A	Kokura	Kokura Arsenal
90.34-184	RRT	Kokura	Kokura RR Shops
90.34-188	EP	Kokura	Kokura Steam Power Plant No. 2
90.34-561	RRT	Wakamatsu	Wakamatsu RR Shops
90.34-567	CI	Tobata	Asahi Glass Co.
90.34-772	RRT	Hikoshima- Shimonoseki	Kammon Railroad Tunnel Viaduct
90.34-1108	NFM	Kurosaki	Nippon Aluminum Co.
90.34-1119	RRT	Hatabu	Hatabu RR Shops and Yards
90.34-1127	EP	Kokura	Kokura Steam Power Plant No. 1

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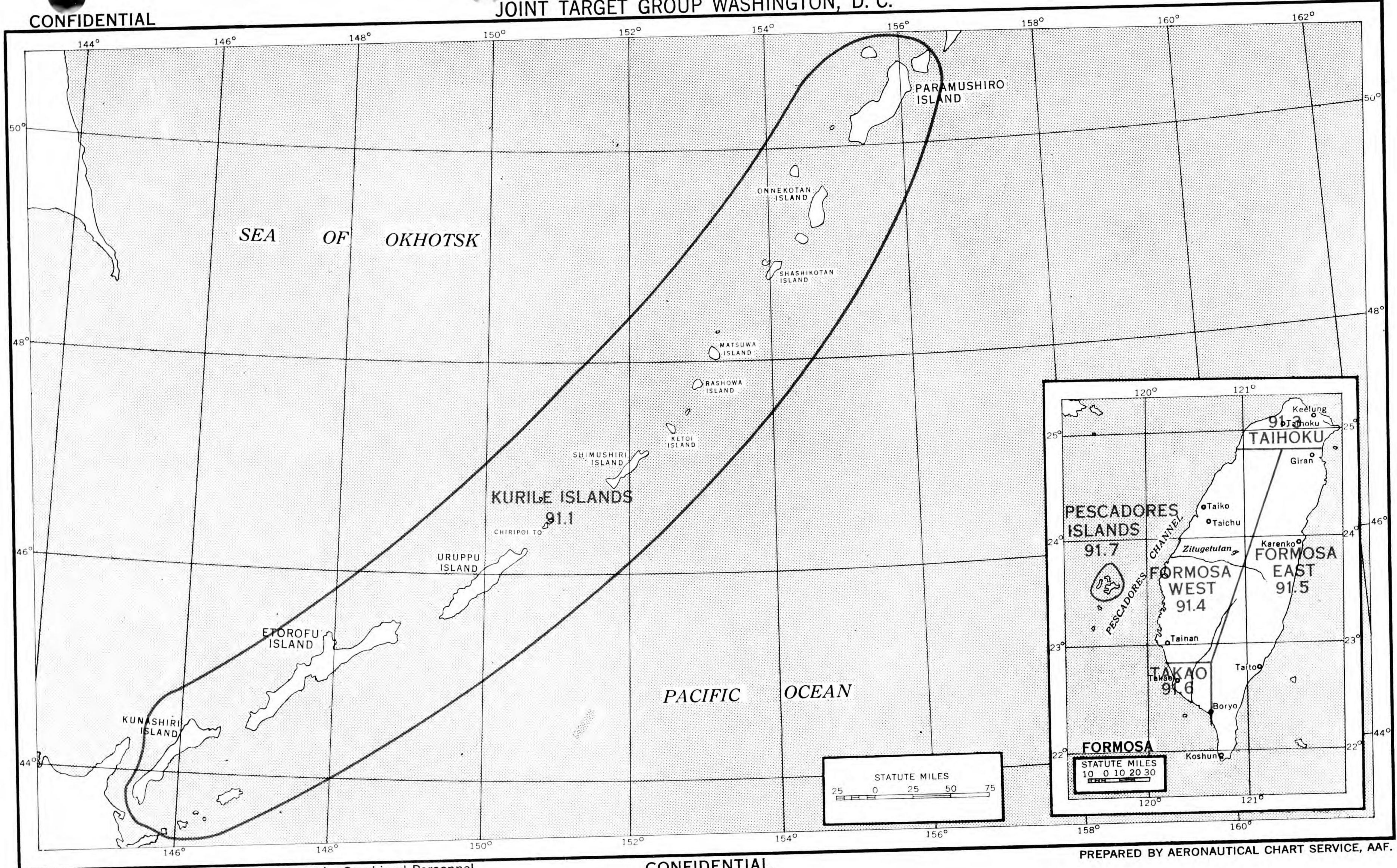
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90.34-1594	EP	Tobata	Tobata Steam Power Plant
90.34-1674	RRT	Dairi	Dairi RR Yards and Tunnel Entrance
90.34-1846	S	Hikoshima	Mitsubishi Shipyard
90.34-1847	NFM	Hikoshima	Mitsui Zinc Smelter
90.34-1866	S	Kokura	Port
90.34-1867	S	Kanda	Port
90.34-3533	S	Moji	Port
90.34-3536	S	Matsure	Port
90.34-3558	S	Shimonoseki	Port
90.34-3566	S	Tobata	Port
90.34-3575	S	Wakamatsu	Port
90.34-3579	S	Yawata	Port
90.35-662	AC	Zasshonoguma	Watanabe Aircraft Plant (Kyushu Hikoki)
90.35-1236	AC	Tacharai	Tacharai Army Airfield
90.35-1243	CI	Omuta	Miike Dyestuffs
90.35-1244	CI	Omuta	Oriental High Pressure Co., Plant A
90.35-1245	CI	Omuta	Oriental High Pressure Co., Plant B
90.35-1246	CI	Omuta	Electro-Chemical Industry
90.35-1260	NFM	Omuta	Mitsui Zinc Distillery
90.35-1261	NFM	Omuta	Mitsui Electrolytic Zinc Refinery
90.35-1262	P	Omuta	Mitsui Coal Liquefaction Plant
90.35-1871	RRT	Tosu	Tosu RR Yards and Repair Shops (Yards only)
90.35-1877	NFM	Omuta	Toyo Aluminum Co.
90.35-3511	S	Hakata (Fukuoka)	Port
90.35-3532	S	Miike	Port
90.36-543	S	Nagasaki	Mitsubishi Dockyard
90.36-544	S	Nagasaki	Tategami Shipyard
90.36-545	P	Nagasaki	Kozaki Point Oil Storages
90.36-546	A	Nagasaki	Mitsubishi Steel and Arms Works
90.36-752	S	Sasebo	Sasebo Naval Dockyard
90.36-755	P	Sasebo	Sasebo Oil Storages
90.36-758	A	Sasebo	Naval Arsenal and Engineering Dept.
90.36-829	EE	Nagasaki	Mitsubishi Elec. Mfg. Co.
90.36-833	MTI	Karatsu	Karatsu Iron Works
90.36-860	S	Koyagi Is.	Kawanami Industry Co., Shipyard
90.36-1627	AC	Omura	Omura Aircraft Factory
90.36-1835	P	Yokose	Yokose Oil Storage
90.36-2021	A	Kawatana	Kawatana Factory, Sasebo Arsenal
90.36-2022	A	Nagasaki	Mitsubishi-Urakami Ordnance Plant
90.36-3537	S	Nagasaki	Port
90.36-3552	S	Sasebo	Port
90.38-1378	AC	Kanoya	Kanoya Naval Air Station
90.38-1517	RRT	Kagoshima	Kagoshima RR Repair Shops
90.38-3519	S	Kagoshima	Port

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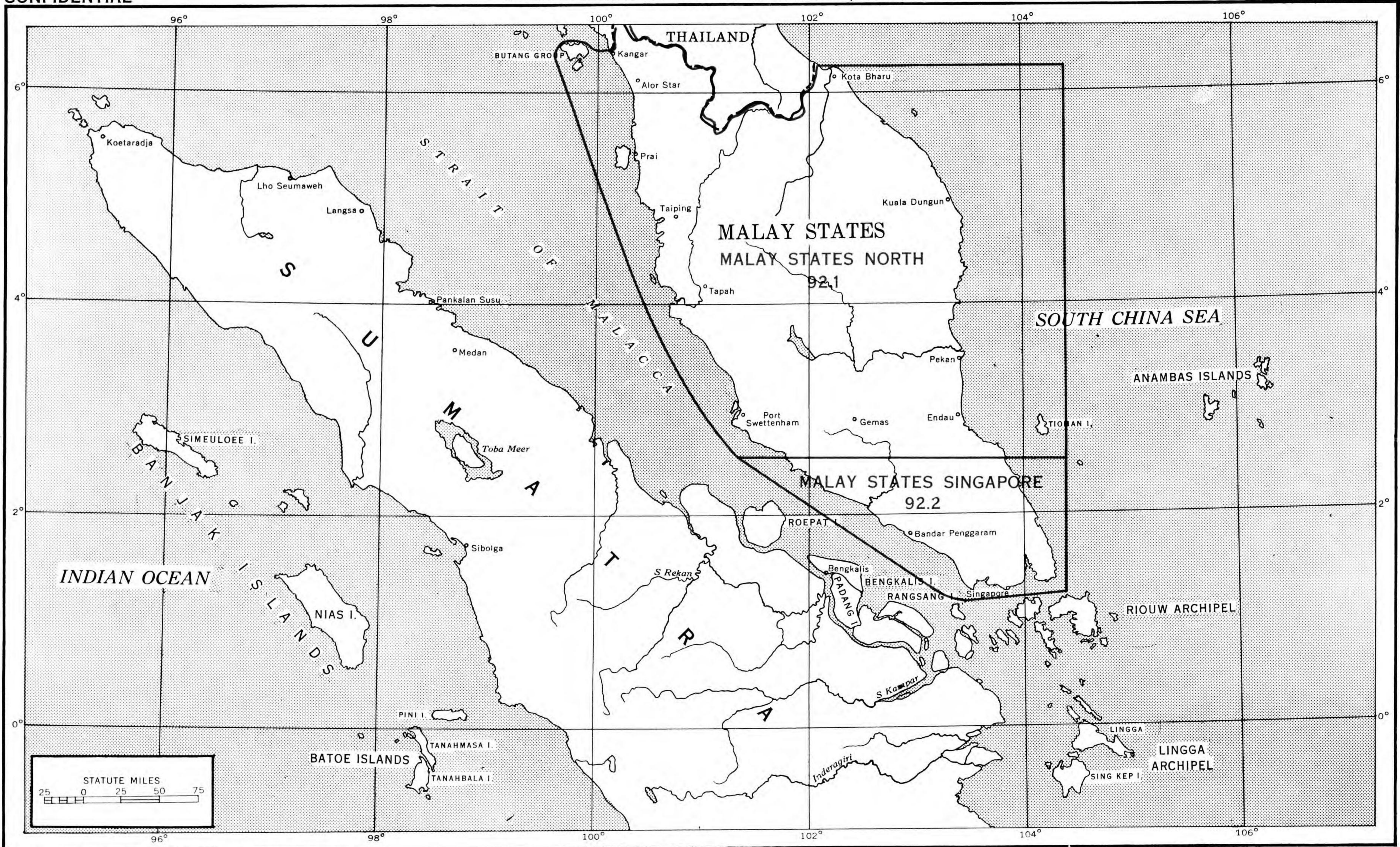
AREA 91 — JAPANESE PACIFIC ISLANDS

Target Number	Place Name	Target Name
91.4-82	Jitsugetsutan Lake	Jitsugetsutan Power Plant No. 1
91.4-83	Jitsugetsutan Lake	Jitsugetsutan Power Plant No. 2
91.5-61	Karenko	Japan Aluminum Co.
91.6-3	Takao	Nippon Aluminum Co.
91.6-166	Okayama	Okayama Aircraft Plant

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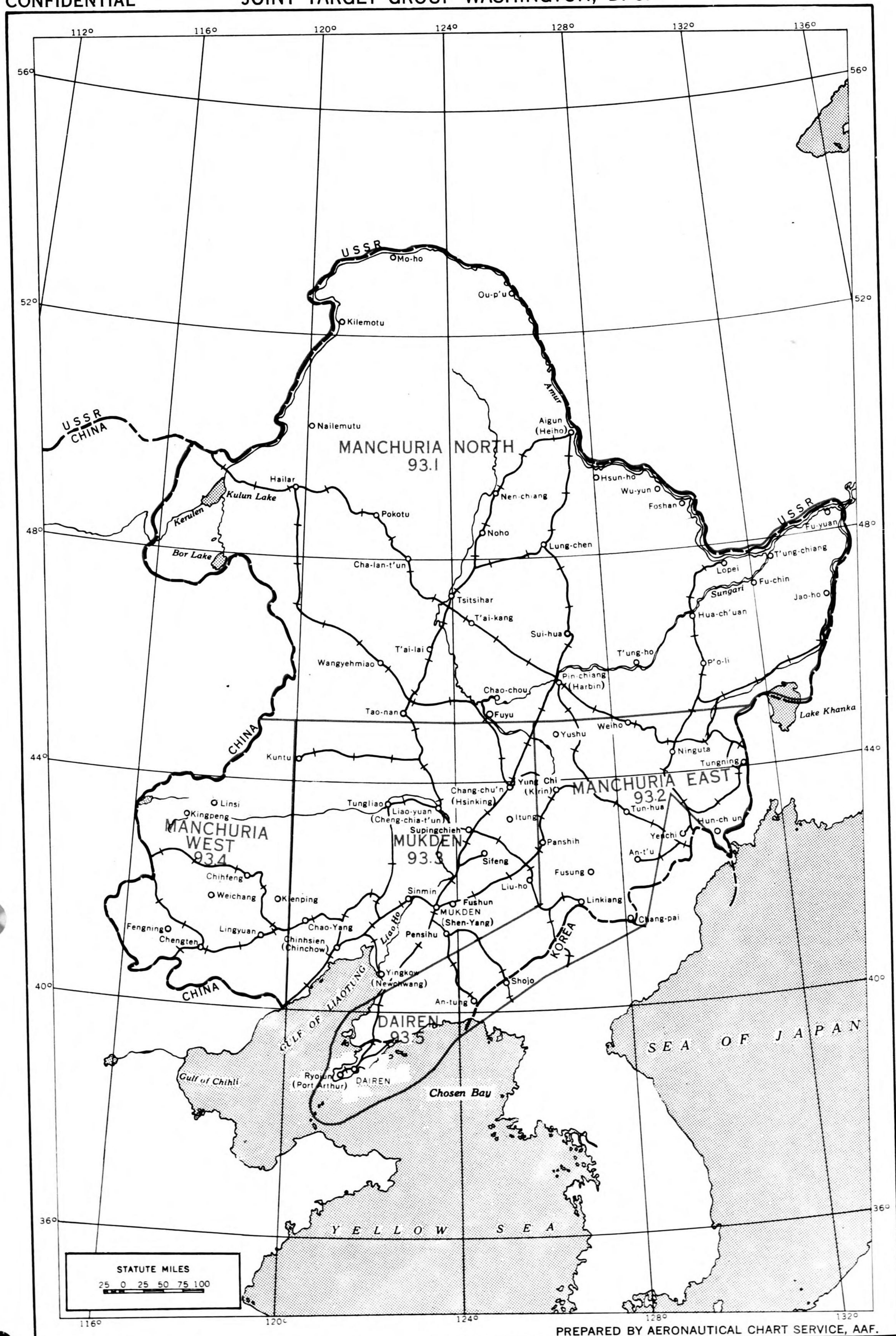
AIR TARGET INDEX — JAPANESE WAR

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AREA 92 — MALAY STATES

Target Number	Place Name	Target Name
92.2-17	Singapore	Fourth Senoko Oil Depot
92.2-20	Singapore	Drydock and West Wall Area
92.2-22	Singapore	North Wharf Area
92.2-70	Singapore	Alexandra Tank Farm
92.2-71	Singapore	Kranji Tank Farm
92.2-72	Singapore	Bukum Island Tank Farm
92.2-3559	Singapore	Port

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93 Manchuria

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AIR TARGET INDEX—JAPANESE WAR
PART 2—AREA INDEX**

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Date **5 April, 1945**
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AREA 93 — MANCHURIA

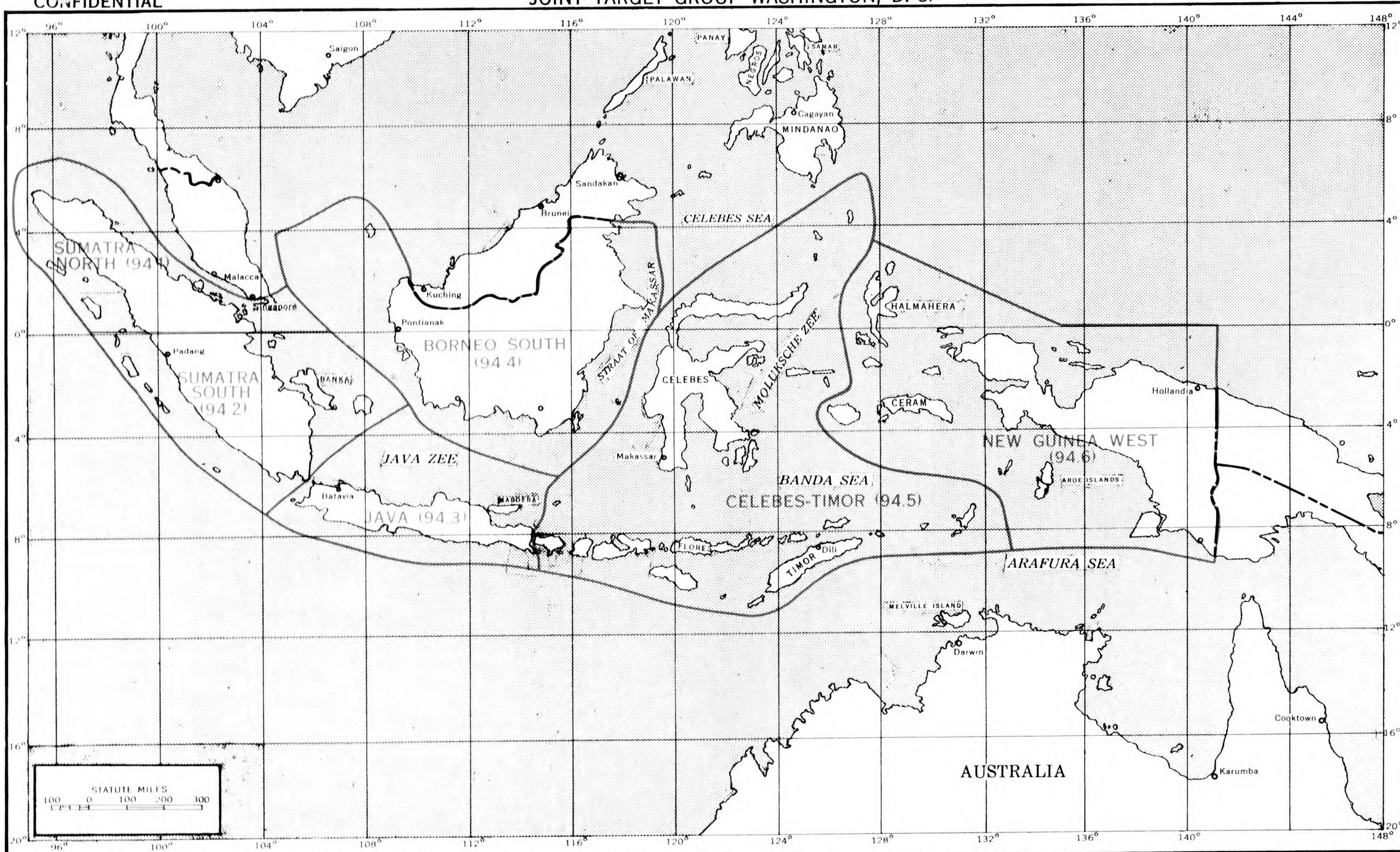
ALL PREVIOUS SHEETS CANCELLED

TARGET NUMBER	SYSTEM	PLACE NAME	TARGET NAME
93.1-91	RRT	Harbin	Harbin RR Yards and Warehouses
93.1-114	RRT	Harbin	Harbin RR Repair Shops
93.2-55	EP	Fengmen	Kirin Hydro Elec. Plant
93.2-56	EP	Suiho	Suiho Hydro Elec. Plant
93.2-58	P	Lungtanshan	Kirin Artificial Oil Co.
93.2-77	RRT	Antung	Yalu River RR Bridges
93.2-85	S	Tashito	Port
93.2-188	S	Tatung	Port
93.3-29	CIS	Anshan	Showa Steel Works
93.3-30	CIS	Penhsihu	Penhsihu Iron Works, Old Plant
93.3-32	NFM	Fushun	Manchuria Light Metals Co., Fushun Plant
93.3-34	NFM	Yingkou	Manchuria Magnesium Industry Co.
93.3-35	EP	Fushun	Taikanton Steam Power Plants
93.3-39	EP	Fuhsin	Fuhsin Steam Power Plant
93.3-40	P	Fushun	SMR Shale Oil Plant
93.3-41	P	Fushun	SMR Coal Liquefaction Plant
93.3-43	P	Ssuningkai	Manchuria Coal Liquefaction Co.
93.3-46	A	Mukden	Mukden Arsenal
93.3-164	MTI	Mukden	Manchuria Machine Tool Co.
93.3-166	A	Mukden	Manchuria Iron Works
93.3-171	CIS	Miyanohara	Penhsihu Iron Works, New Plant
93.3-172	S	Hulutao	Port
93.3-173	RRT	Suchiatun	Suchiatun RR Junction (Freight Yards)
93.3-174	S	Yingkou	Port
93.3-175	P	Chinchow	Manchuria Synthetic Fuel Co.
93.3-177	AC	Mukden	Manchuria Airplane Mfg. Co., Plant No. 1
93.3-178	RRT	Mukden	Huangkutun RR Repair Shops
93.3-187	NFM	Hulutao	Hulutao Lead & Zinc Smelter
93.3-367	RRT	Mukden	Hun River RR Bridge
93.5-1	P	Kanseishi	Manchuria Petroleum Co.
93.5-8	EP	Kanseishi	Kanseishi Steam Power Plant
93.5-10	S	Dairen	Manchuria Dockyard
93.5-16	RRT	Dairen	South Manchurian Railway Workshops
93.5-19	CI	Kanseishi	Manchurian Chemical Industry
93.5-197	P	Dairen	Jijoke Oil Storage Area
93.5-3506	S	Dairen	Port

Holders of Joint Target Group folders should insert this sheet in Air Target Index—Japanese War in place of sheet ATI/2/93

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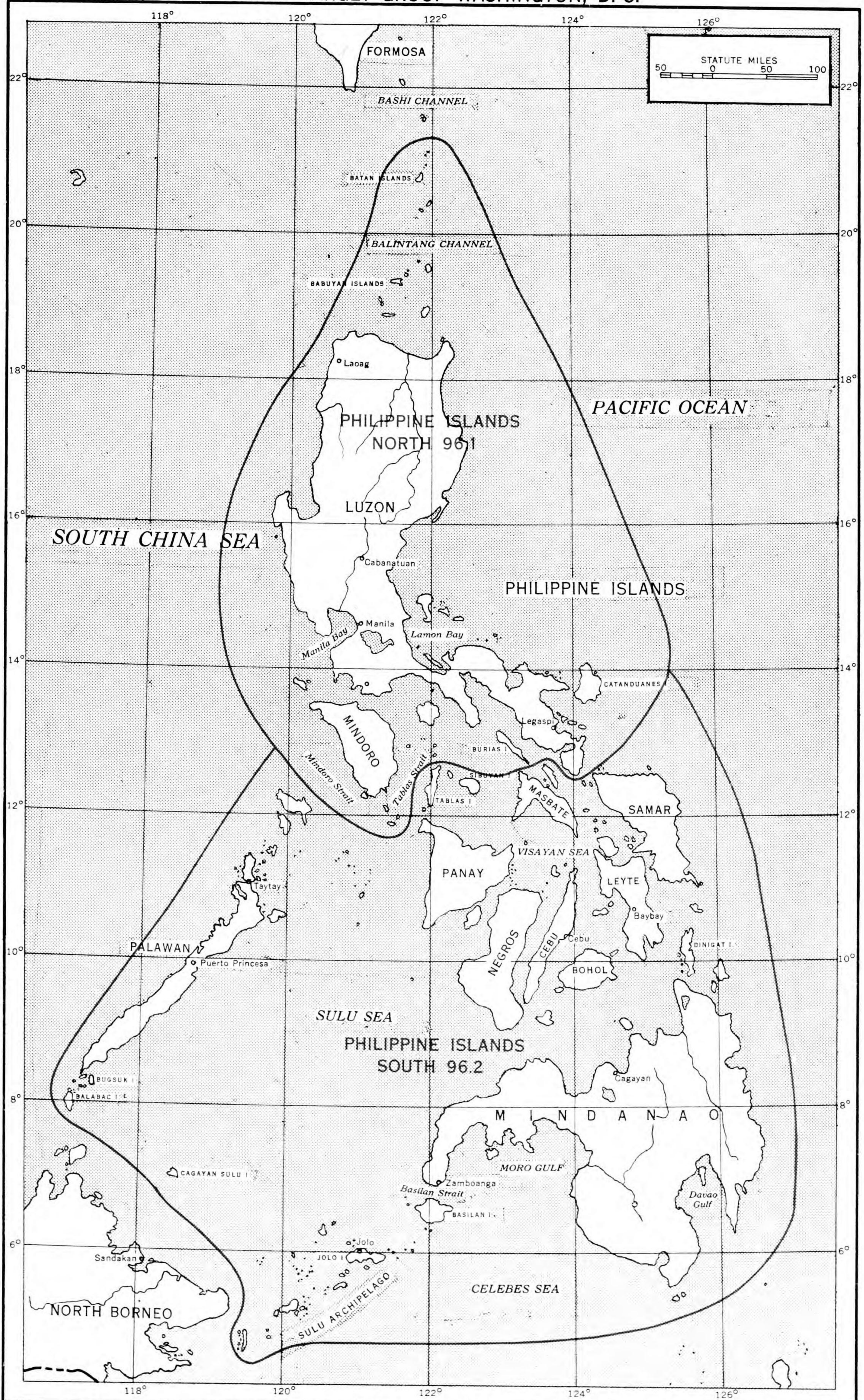
Joint Target Group — Washington, D. C.

**AIR TARGET INDEX — JAPANESE WAR
PART 2 — AREA INDEX**

AREA 94 — SUMATRA, JAVA, ETC.

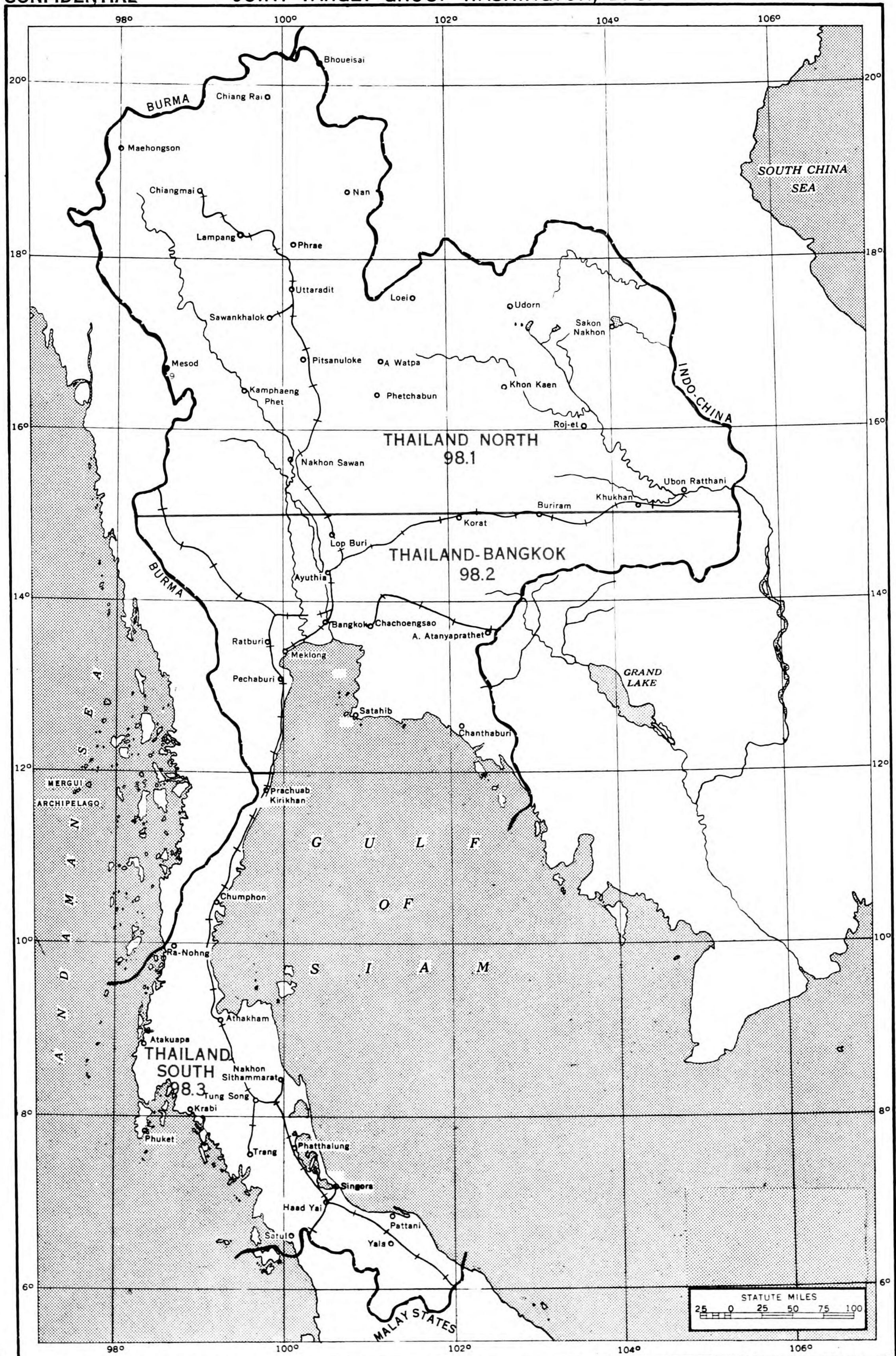
Target Number	Place Name	Target Name
94.1-33	Pangkalan Brandan	Pangkalan Brandan Refinery
94.1-35	Poeloe Samboe	Poeloe Samboe Tank Farm
94.1-269	Tandjoeng Oeban	Tandjoeng Oeban Oil Storage
94.2-53	Palembang	Port
94.2-61	Palembang	Pladjoe Refinery
94.2-231	Palembang	Soengei-Gerong Refinery
94.3-229	Tjepoe	Tjepoe Refinery
94.3-230	Soerabaja	Wonokromo Refinery
94.3-3560	Soerabaja	Port
94.4-224	Tarakan Is.	Tarakan Storage Tanks
94.4-225	Balikpapan	Balikpapan Refinery
94.4-3501	Balikpapan	Port
94.4-3563	Tandjoeng Priok	Port
94.4-3572	Tarakan	Port
94.5-3525	Kolaka	Port

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**AIR TARGET INDEX — JAPANESE WAR
PART 2 — AREA INDEX**

AREA 98 — THAILAND

Target Number	Place Name	Target Name
98.2-3502	Bangkok	Port
98.2-3561	Si Chang Is.	Port

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JOINT TARGET GROUP - WASHINGTON, D.C.

Sheet No. JTG/M/1

Date 22 December 1944

MEMORANDUM NO. 1

Page No. 1 (3 pages)

NOTE IN CONNECTION WITH TARGET MATERIAL BEING PRODUCED.

PREVIOUS TARGET MATERIAL PRODUCED ON FAR EAST

Prior to the formation of the Joint Target Group, material on targets in the Far East was produced by the Far East Target Information Section under AC/AS Intelligence, and the main items produced comprised:

AAF Objective Folders
Interim Reports (i.e., Special Studies on various industries or areas, etc.)
City Plans
Target Charts (for selected targets, on demand)
Area Bases (acetate sheets indicating location of targets in various areas)
etc., etc.

The Joint Target Group has taken over the responsibilities of the previous Target Information Section and will supply further copies of the above documents when required, but it does not intend to continue to produce all these particular documents in future.

The fundamental principle underlying the work of the J.T.G. is that it shall be limited to the production of that material which it appears can be produced better in Washington (due to the wider intelligence sources available to it) than in the field, and that it will not attempt to duplicate work by producing material which can be produced better in the field.

Hence it follows that J.T.G. productions will be basic in form for use in connection with other intelligence material which may become available, in planning, briefing, photo interpretation, prisoner interrogation or other general intelligence requirements.

Such material will include basic data regarding the evaluation and analysis of the significance and vulnerability of targets and target systems and detailed particulars, plans or annotated photographs of specific targets, etc., etc.

The Group will not except on specific request, attempt to produce the material which will be carried in the aircraft on missions, such as Target Charts, Mosaics, Obliques, etc., etc., as facilities exist in the field in the form of PI and Engineer Topographical units to carry out this work and the latest photography required in the preparation will be available in the field in original form and at the earlier date than in Washington. Furthermore, any attempt to ship from Washington the large quantities of material which would be required on a "per aircraft" basis for all Far Eastern Theatres and Commands would involve such a heavy transportation problem that delays would inevitably occur which would render the material of questionable value by the time it reached the lower echelons.

JOINT TARGET GROUP FUNCTIONS

There are two documents which will constitute the main channels for distribution of J.T.G. target material, and they are:

(1) AIR TARGET INDEX - JAPANESE WAR

This is a single volume and it comprises lists of Principal Strategic Targets in the Main Japanese Target Systems. The index is divided into two main parts, the first part listing the targets by systems and the second part listing the same targets by areas. The third part of the volume is used as a receptacle for general memoranda issued by J.T.G. from time to time.

As initially issued the lists will cover twelve target systems with a total of about 450-500 targets.

STANDARD JOINT TARGET PUBLICATIONS

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MEMORANDUM NO. 1 (Cont'd)

Additions to, or deletions from the lists will be made periodically according to latest intelligence, and these will be issued through the medium of addenda. These lists constitute the working program of J.T.G. at present and it is intended to issue material (information sheets and illustrations) on all targets included in the lists. (The basic list for all known and recorded targets in the Far East is the document known as "Key Place Names and Objective Index" issued in July 1944 by AC/AS, Intelligence).

(II) AIR TARGET SYSTEM FOLDERS

There will be several of these volumes, one for each target system and, at the present time, twelve are being prepared. Each volume is divided into three main parts. The first comprises Text Pages describing the system and evaluating the targets therein. The second is a small scale Location Map or maps on which the various targets are pin pointed. The third and last section is a receptacle for individual Target Material comprising Information Sheets and Illustrations and any Economic Damage Assessment Reports that may be issued for each target in the system.

The various targets included in each folder will be the same as those listed under that system in the Air Target Index. Alterations to the text, and corresponding modification to the location map will be made by the periodic issuance of addenda. With these addenda will also be distributed any individual target information sheets and illustrations or damage reports which have been completed. The volumes, if kept up to date by inserting the addenda as issued should constitute in one book a complete and detailed basic reference document in respect of each target system.

The books are being made in loose leaf form to enable the contents to be readily changed. They will comprise Legal Size binders with four 2" rings and all material issued will be punched and folded suitable for insertion in the binders. Addendum material will be issued in envelopes which will be numbered on the outside to correspond to original folder numbers. Material designated for several folders will be issued within one envelope. It is important therefore that each recipient hold similarly numbered JTG volumes. Additional copies of material (Information Sheets and Illustrations) for individual targets will continue to be issued and distributed as heretofore.

As at present planned and being produced this material comprises approximately seven items, a text sheet giving all available evaluated data on the target together with six standard and possibly certain extra supporting illustrations.

a. The TARGET INFORMATION SHEET (TI Sheet) includes data under the headings - Significance; Location; Description and Layout; Construction and Vulnerability; Vital Parts (or Primary Objectives); Weapon Recommendations; Level of Damage; Camouflage, Decoys and Smoke Screens; and additional Information.

b. Six STANDARD TARGET ILLUSTRATIONS with standard suffix numbers as follows:

P1 - 1:32,000 scale 14" x 10" unannotated mosaic of target and surroundings.

P2 - 1:32,000 scale 14" x 10" mosaic of target and surroundings as P1 but annotated to show the target outline.

P3 - 1:6,000 or 1:12,000 photo of target. Either a plain and annotated (main parts only) photo (each approximately 10" x 6½") side by side on a single sheet, or a plain photo and black and white block plan (each 10" x 6½") side by side on a single sheet.

If however the target is so extensive that it cannot be contained on the half sheet (10" x 6½") then the whole sheet (14" x 10") is used and comprises the unannotated view only, the corresponding annotated view or plan being separately produced.

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TARGET DATA
ON INDIVIDUAL
TARGETS

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MEMORANDUM NO 1 (Cont'd)

- P4 - The 1:6,000 or 1:12,000 scale annotated photo or plan of the target for those cases where the target is so large that it cannot be accommodated on the half-sheet (10" x 6½") of the P3 illustration.
- P5 - 1:6,000 or 1:12,000 scale Fire Susceptibility Plan of the target printed in various colours to show varying degrees of such susceptibility. All buildings on the plan will also be identified by number.
- P6 - A functional schedule enumerating the functions of all buildings corresponding to the identity numbers on P5.

c. NON-STANDARD ILLUSTRATIONS.

As and when any special illustrations are available for a target which appear to give information which would be of use in planning the mission these will be included as additional illustrations. Such might be dimensioned cross-section of a dam, ground photos either of finished buildings or during construction, internal views to indicate typical plant within buildings, etc., etc. These illustrations will be given the suffixes PX1, PX2, PX3, etc., but they will not follow any regular sequence, i.e., any illustration PX1 will not necessarily always be a cross-section, etc.

The material will be produced broadly in two forms.

In the case of more important targets -- which represent about 20% of the total for which briefing material is being prepared -- full data will be produced based upon a detailed analysis of Physical Vulnerability. In these cases the Target Information Sheets will be long documents of up to 6 or 7 pages and will include considerable data on Weapon Recommendations etc. Furthermore in these cases the P5 illustrations dealing with Fire Susceptibility and the P6 Functional Schedule will be produced.

In the case of less important targets - which represent the remaining 80% of the total for which material is being prepared -- briefer data will be produced, and a detailed analysis of physical vulnerability will not be made. In these cases the Target Information Sheets will be short documents of one or two pages and will include a brief paragraph on Weapon Recommendation etc. No P5 illustration or P6 schedule will be produced for these targets.

As and when good post-raid aerial cover is received in Washington relative to a target which has been well hit by a heavy weight of attack, an Economic Damage Assessment Report will be prepared and issued. This will estimate the probable loss in production resulting from the attack and the resulting revised target value. The text will be printed on a blue paper to distinguish it from the normal white TI Sheets.

The above briefly sets out the program as at present envisaged by and being operated upon by J.T.G. It is hoped that the description will assist recipients of material issued by J.T.G.

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ESE WAR

ECONOMIC
DAMAGE ASSES-
MENT REPORTS

CONCLUSION

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MEMORANDUM NO. 2

NOTE IN CONNECTION WITH GRID REFERENCES ON TARGET ILLUSTRATIONS.

ILLUSTRATIONS	As and when suitable aerial cover is received in Washington Target Illustrations on individual targets are being printed and issued.
ANNOTATIONS	As far as possible all component parts of a target are being given separate identity numbers on the illustrations as shown on the annotated part of P3, P4 (when issued) and P5.
USE OF IDENTITY NOS.	By this means it is possible to discuss details of targets by cable or in correspondence by quoting the full illustration number and the identity number on that illustration of the building or part of the target to which it is desired to refer, as for example: "Illustration 90.17-357P3, building no. 32" or "Illustration 90.17-2009P3, item no. 16."
FURTHER IDENTIFICATION NECESSARY	However occasions may often arise when it is necessary (i) to be more specific about identifying a pinpoint within a general area covered by an annotated building or part of a target, or (ii) to be more general in referring to a section of the total target area containing the part or whole of several buildings, or (iii) to refer to some particular building which is not annotated.
PROVISION OF GRID	To enable this to be done all target illustrations are provided with a simple standard grid border. In earlier illustrations this border was shown only on the bottom and left-hand sides of the illustrations, but on later issues the grid is being shown on all four sides to enable a rule or straight edge to be laid across the illustration at the given reading.
DIMENSIONS OF GRID	The grid border is <u>always</u> the same irrespective of the type or scale of the illustration and it is a plain 1" (one inch) grid divided into 1/10" (one tenths of an inch).
NOMENCLATURE OF GRID	The grid along the bottom and top edges of the illustration is known as the H grid (for Horizontal) and the grid alongside the left and right edges of the illustration is known as the V grid (for Vertical) and these letters H and V are always printed in the grid border together with an arrow to show the direction in which the reading is made.
METHOD OF USE OF GRID	The method of expressing the grid reference for any pinpoint falling within the total area of the illustration is quite simple, the rules being as follows: (i) The horizontal (H) reading is always given first and the vertical (V) reading, second. (ii) To avoid any confusion the letters H and V are put in front of the two three-digit numerals forming the two parts of the whole reference. (iii) The grids themselves are always given as three-digit numerals starting from 000 in the bottom left-hand corner in both directions. Thus a point on the H grid only 1/10th of an inch from the LH side would be 001, a point one inch from the LH side would be 010 and a point 10 inches from the LH side would be 100.

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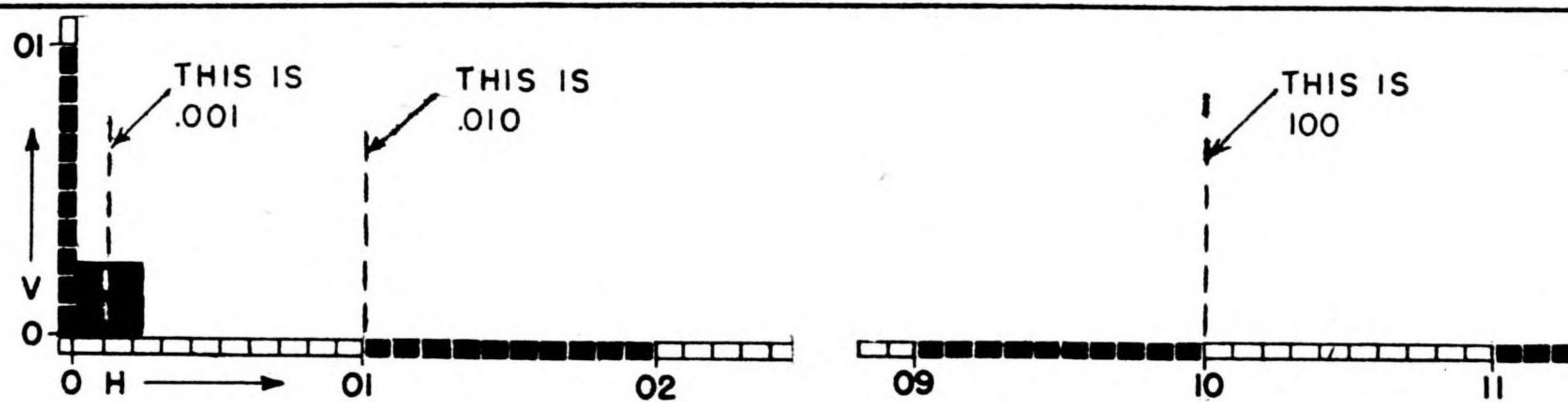
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In other words the figure is merely the number of one-tenths of an inch along the grid from the bottom left-hand corner, and the 0's are put in front where necessary to always make a total of three numerals. This avoids any possibility of confusion as to whether 1/10", 1" or 10" etc., is being referred to.

(iv) The complete grid reference is given in the form:

H 012, V 134 or H 123, V 056 or H 054, V 032, etc., etc.

It is now possible to take some examples which will make the matter clear.

Referring to illustration no. 90.17-2009 P3 the building 16 is a very large one being approximately 1150 feet x 400 feet. Now supposing that it becomes known that a particularly important part of the plant is situated within this building a given distance to the east of the N/S axis and another given distance to the south of the E/W axis and that it was desired to select that as the Aiming Point, in a field or operational order. By ordinary methods this might take quite a bit of explaining but, with grid system it is both simple and foolproof and would be for example, just say: H 035, V 062.

Not only can a single pinpoint be identified in this way but an area can be given. Thus with three points a triangular area, four points a four-sided area, and so on, can be given. Thus for example, referring to illustration 90.17-356 P3 supposing that it is found from later intelligence that the group of buildings just outside the north-east corner of the annotated target outline is really part of the main target, then this information can be given with exactitude by merely quoting the grid references corresponding to the four corners, for example:

H 042, V 058; H 046, V 059; H 047, V 054; H 044, V 053

With this information the target outline can be corrected quite simply on the illustration.

There are many ways in which this pinpointing by grids can be most useful. For example (i) in cable instructions from HQ AAF to theatre commands, regarding vital parts of targets, etc., (ii) in cable reports back from commands regarding results of a mission, concentration of bombs, parts demolished, etc., etc., (iii) in interchange of intelligence between HQ AAF and theatres or P/W interrogation centres, etc., etc.

The exact grid reference method outlined above has been used for several years in the European Theatre by American and British Air Forces and has been found to be immensely useful in intelligence planning between Air Force, Commands, and lower echelons and between coordinate units, and is especially important where units are widely separated and communications poor.

EXAMPLES OF
USE OF GRID

USEFULNESS
OF GRID

PREVIOUS USE
OF GRID

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**APPLICATION TO
NON-GRIDDED
ILLUSTRATIONS**

One other point might perhaps be mentioned and that is that the principle can be applied to illustrations even if the grid border is not printed on, although the latter is most desirable wherever possible. Thus for example the forerunner of the present type of target material was the Air Objectives Folder which has received wide distribution and which includes many photographs, plans and illustrations. Providing that a 1" ruler is available the grids can be given on any of these illustrations by following the procedure outlined in "Method of Use of Grid" above. To quote a single example refer to the AICHI AIRCRAFT WORKS, ATSUTA PLANT at NAGOYA (Target No. 90.20-198), and assume that it is desired to run a mission on this target before the latest form of target material is issued. In Objective Folder 90.20 on page 24 there is a plan of this target. Theatres might cable back to HQ and ask what were considered to be the most important parts of the target to select as an aiming point. Supposing that J.T.G. analysis showed that the Wing Jig Section (say) was the most important and that they knew the location, then they could send a two-line cable giving all the information required, say as follows:

"Wing Jig Section considered most vital part, location at H 048, V 024 on plan 198 on page 24 of objective folder 90.20."

(This case is hypothetical and not factual but serves to illustrate the principle involved and reference should be made to illustration mentioned so as to check the method.)

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MEMORANDUM

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**No. 3—EXPLANATION OF WEAPON
RECOMMENDATIONS**

ALL PREVIOUS SHEETS CANCELLED

A. INTRODUCTION

The methods used by the Joint Target Group in determining the most effective combination of weapons to use against a target have been considerably simplified as a result of an analysis of attacks made to date by American Air Forces in the European and Far Eastern Theaters.

An attempt will be made to explain these methods so that they can be applied by technically qualified officers in field commands. With this end in view, the following papers are in preparation:

1. An "Annex" to the General Analysis in each Target System Folder entitled "Weapon Recommendations". Each Annex will provide guidance in the selection of primary objectives, the best size, type and fuzing of HE, and the best IB; and in determining the ground densities of HE and/or IB necessary to destroy targets in the system.

2. A full technical explanation of the methods used in selecting weapons and in calculating ground densities and force requirements will be issued as Joint Target Group Memorandum No. 8 (JTG/M/8).

In using the technical papers referred to above for selecting weapons against a particular target, an analysis must be made of the functions of the buildings in the target (for choosing primary objectives) and of their construction. Functional and building construction analyses are made by the Photographic Division, AC/AS Intelligence, on important targets, and are summarized in Target Information Sheets (-P5, -P6 and paragraph on "Construction and Vulnerability"). In the absence of Target Information Sheets, functional and building construction analyses can be made by qualified photo-interpreters in field commands.

In addition to providing this type of general guidance to field commands in weapon selection, the Joint Target Group will continue to make recommendations for the attack of selected targets. These recommendations will be issued as Weapon Recommendation Sheets (WR1 and WR2) in connection with the Target Information Sheets. WR Sheets are designed to give a quick answer where a quick answer is necessary and acceptable. WR1 makes recommendations for high and medium altitude attack (primarily for heavy and very heavy bombers); WR2 for low altitude attack (primarily for carrier-based or tactical aircraft).

The purpose of this memorandum is to explain the use of the recommendations in WR Sheets, and to provide a non-mathematical description of the vulnerability analysis on which the recommendations are based. Sample WR1 and WR2 Sheets, with examples of their use, are attached as Appendices.

B. VULNERABILITY ANALYSIS

In the preparation of WR Sheets, the analysis of a target for vulnerability to HE and IB weapons has two primary purposes:

1. It establishes the order of effectiveness of the principal weapons (including fuzing) against the important elements of the target:

2. It provides data to be used in recommending best combinations of HE and IB, and in estimating force requirements for desired levels of damage.

Because of marked differences in layout, construction and occupancy between industrial targets, even within the same industry, an individual analysis of each target must be made to determine the most effective weapons and the required densities. The basic data used in these analyses are of two general types:

1. Intelligence on the target (this includes reconnaissance photos and available ground information, both of which are used in the structural and functional analysis of the target);

2. Experience data on the effectiveness of the weapons against targets of similar construction. These come partly from measured effects of comparable enemy weapons on Allied installations; partly from effects observed on post-attack cover or in ground surveys of American or Allied weapons on enemy targets; and partly from supporting experimental evidence.

1. Structural Analysis.

Photo interpreters analyze each building of the target for all factors which will affect the vulnerability of the building to HE and IB or both. These factors are listed on "Building Construction Analysis" sheets, which, together with the Functional Analysis sheets, are a guide for the analysts who determine the effectiveness of HE and IB weapons against the target.

The important structural factors include type, size, and height of buildings, length of spans, and material used in walls, roofs and floors. Data is provided which permits the determination of the number, size and configuration of "fire divisions" in the target—a fire division being a building unit

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within which a fire is likely to be confined by air gaps or walls.

The probable contents of buildings are determined, in the absence of specific information, from the analysis of building functions and a knowledge of typical practices in the industry. The analysis of building structures and contents is continuously checked with the judgment of architects and engineers, and against target intelligence derived from many sources. Intelligence sources include P/W interrogations, captured documents, pre-war publications, and fire insurance company records.

2. Vulnerability to HE weapons.

By analysis of the weapon effectiveness data described above, it has been possible to classify major structural types according to their probable vulnerability to HE weapons, and to predict the average areas of damage to be achieved on each structural type by the available bombs and fuzings. The predicted areas of damage are calculated to reflect damage from "near-misses" as well as from direct hits. The vulnerability classifications are based solely on vulnerability to HE bombs, and the structures within a single class may include a number of architectural types. The classifications are, of course, checked continuously against new data from the bombing of Japanese targets, and revisions will be made as often as necessary.

The following are the classifications in order of increasing vulnerability to HE:

- V-1: Multi-story, earthquake proof structures.
- V-2: Buildings housing traveling cranes.
- V-3: Ordinary steel or reinforced concrete framed, multi-story buildings.
- V-3A: Multi-story buildings with load-bearing walls.
- V-4: Includes most of the ordinary single story industrial building types.
- V-4A: Single story, wide span, heavily braced industrial structures, generally of assembly type.
- V-5: Structures susceptible to large area spreading collapse if a vital structural member is destroyed. Example: Large, long-span, arched hangars.

A full description of the architectural types included in each classification, and of the average areas of damage to each by different HE bombs, will be given in JTG/M-8.

Special structural units such as coke ovens and engine test cells are not included in these major groupings and are treated as special cases, requiring more detailed application of data.

The Target Information Sheets for each target carry a listing of the primary and secondary build-

ings with their appropriate vulnerability classifications, together with a summary classification for the whole target.

3. Vulnerability to IB.

Assessment of the vulnerability to IB of the buildings of a target begins with a classification of each building according to its combustibility. The combustibility classifications are: C (combustible buildings); N (non-combustible structures) which may be damaged structurally by fire in the contents; and R (fire resistive structures).

An assessment is also made of the relative vulnerability to damage by fire of the contents of the buildings in the target. The -P5 sheets of the TIS show the susceptibility to fire damage of each building and its contents.

C. WR1 SHEETS HIGH AND MEDIUM ALTITUDE ATTACK

The WR1 sheet has three functions: (1) the recommendation of most effective weapons; (2) the recommendation of best combinations of HE and IB; and (3) the estimation of force requirements for desired levels of damage to the target.

1. Weapon Selection.

On the basis of their relative effectiveness against the principal elements of the target, bombs are listed in WR1 Sheets as "preferred", "alternative", or "not recommended". "Preferred" weapons are those which are expected to do the most damage to the target, compared with equal weights of other available weapons. "Alternative" choices are those which are somewhat less effective than those recommended, but which may be employed if availability or stowage dictates, with reasonable expectation of damage. Classification as "not recommended" indicates that the weapons so designated are not suitable for use against this target. An IB which is "not recommended" is believed to be less effective than an equal weight of HE.

2. The Loading Table.

Recommended combinations of HE and IB, and estimated force requirements for desired levels of damage, are presented in WR1 Sheets in the form of a Loading Table.

a. What the Loading Table Shows. The best combination of HE and IB to dispatch against a target depends upon three factors:

- (1) The relative effectiveness of the HE and IB weapons against the target.
- (2) The total tonnage to be dispatched.
- (3) The expected accuracy of the bombing.

The effectiveness of the HE and IB against the target (factor a) is calculated in the Joint Target Group by the methods explained in sections C.3

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and C.4 below. The tonnage to be dispatched, of course, is determined by the operational command; and the expected accuracy of the bombing to be expected in any operation can also best be estimated by the air force making the attack.

It is therefore necessary in the WR1 Sheets, to present separate recommendations covering a range of different tonnages dispatched, and several different assumptions as to bombing accuracy. The command using the table, knowing the force to be dispatched, can estimate the probable accuracy of the bombing, and read the most effective combination of HE and IB.

In the Loading Table, the same box which shows the most effective combination of HE and IB also shows the approximate level of serious damage to the target which can be expected if the recommended load is dispatched and if the accuracy of bombing is as anticipated. Serious damage is defined as *structural* damage to buildings or severe fire damage to their contents. It does not include superficial or roof damage.

The aiming point indicated in WR1 is recommended as giving the best expectancy for maximum damage to the important buildings of the target, and has been used in all calculations. The aiming point used in an attack should be as near the one recommended as is operationally feasible.

b. Use of the Loading Table for Initial Attack. A sample Loading Table, with examples of use, is attached as Appendix I.

Each line on the table represents a different total load dispatched. These loads are shown in the left-hand column. They are measured in tons of actual (not nominal) weight of bombs.

Each column of the table represents a different expected efficiency and accuracy of bombing, as measured by the percentage of bombs *dispatched* expected to fall within 1,000 feet of the aiming point. This figure is calculated by multiplying the percentage of planes dispatched expected to bomb the target (i. e., after subtracting abortives and planes bombing with gross errors) by the percentage of bombs aimed at the target which fall within 1,000 feet of the aiming point. Since statistics of bombing accuracy are carefully kept in all air forces, the average percent of bombs aimed at a target which fall within 1,000 feet of an aiming point in successful attacks will be known; this value happens, as a matter of fact, to lie between 10% and 40% for most heavy bomber forces. On a particular occasion, knowing all the circumstances of weather, opposition and local factors, the command may wish to estimate some figure higher or lower than the average. In making this estimate, the possibility of an unsuccessful attack should be ignored. The percentage figures for which load recommendations are made at present are 10%, 15%, 20%, and 30%, and there

is no necessity for accuracy to be estimated with greater precision.

The Loading Table may be used in two ways:

1. Given the total tonnage to be dispatched, to determine the best division of this load between the best HE and IB weapons, and the expected level of damage to the target:

a. Estimate the percent of bombs dispatched expected to fall within 1,000 feet of the aiming point by multiplying:

- (1) The percent of planes dispatched expected to bomb the target, by
- (2) The percent of bombs aimed at the target expected to fall within 1,000 feet of the aiming point.

Round off the product to the nearest percentage figure at the top of the table.

b. Read in the appropriate column showing bombing accuracy and opposite the total tonnage to be dispatched, the recommended HE-IB loading and (under F) the expected percent of serious damage to the target.

2. Given the level of damage to be achieved on the target, to determine the force required and the best combination of HE and IB:

- a. Estimate bombing accuracy as in 1. a. above.
- b. In the appropriate accuracy column find the desired percent level of serious damage (under F).
- c. Read, along side the percent level of damage, the approximate tonnages of HE and IB respectively to be dispatched to cause this level of damage.

Sample calculations for both these methods of using the Loading Table are included with the Loading Table attached to this paper as Appendix I.

Stowage factors will usually make it impossible to divide the load between HE and IB in exactly the proportions indicated. Deviations up to 20% will not materially reduce the expected damage.

c. Use of the Loading Table for Reattack. The Loading Table has been prepared from an analysis of the target before attack. If the important buildings of the target have suffered only slight damage in an early attack, the Table will still be suitable for determining the best loading. However, after substantial damage to the important buildings has been caused, a new analysis of the target should be made and a new Loading Table prepared.

If the target has suffered considerable damage in earlier attacks and no new Loading Table is available, the following general rules can be applied:

1. If previous attacks have destroyed most of the combustible buildings (or buildings with highly combustible contents) on the site as shown in the Fire Susceptibility Plan (ref.-P5), loads carried on

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subsequent attacks should consist wholly of the recommended HE weapon.

2. If the proportion of combustible buildings remains about the same as in the virgin target (when, for instance, the bomb pattern has covered only a part of the site), the original Loading Table may still be used to determine the best mixture of HE and IB for a subsequent attack.

3. If it has not been possible to assess damage in the earlier attack, the Loading Table should be used to calculate the cumulative load. For example (refer to sample WR1 Sheet, Appendix I), if 200 tons have previously been dispatched, and 200 tons additional are to be dispatched in the second attack, with an estimated accuracy of 15%, the sample Loading Table shows that the cumulative load (400 tons) should be divided 270-IB and 130-HE. If 175-IB and 25-HE were dispatched in the first attack, 95-IB and 105-HE remain to be dispatched in the second attack.

3. HE Effectiveness Calculations in WR1.

In the preparation of recommendations for high level attacks, it is necessary to consider the target as a whole. To determine the most effective bomb against a particular target, the HE analyst calculates the percentage of the primary objectives in the target falling in each vulnerability classification (as shown by the structural analysis). An average area of effectiveness is then computed for each bomb against primary objectives as a whole, on the basis of its predicted effectiveness against each of the vulnerability groups comprising the primary objectives. A comparison of the probable areas of effectiveness of each bomb against all primary objectives, in terms of thousands of square feet per actual ton of bombs, determines the bomb to be recommended.

Using the predicted average area of effectiveness of the "preferred" bomb against the whole target, similarly estimated, it is then possible to compute the probable fraction of the target seriously damaged for each of a series of bomb densities dropped on the target.

4. IB Effectiveness Calculations in WR1.

The buildings of the target are grouped into classes of approximately equal fire susceptibility as indicated by their structural analysis. If it develops that a sufficient fraction (usually 25%) of the target as a whole can be damaged by fire, the use of incendiaries is recommended. If incendiaries are to be used, a further analysis of the target is made to determine the best type of incendiary bomb. Particular attention is paid to the average size of fire divisions, and to the character of the roofs. Where the fire divisions are average or small, small clustered incendiaries (M50 or M69) are preferred. The M47 is equally good against medium size divisions. The M76

is suitable for use against very large fire divisions only. The M17 is not recommended against very light roofs since it then penetrates too far into the ground; and the M69 is not recommended against heavy concrete roofs since it will not penetrate them.

To determine the expected fraction of damage due to fire, the expected area of damage to each class of building (C, N, or R) is then calculated for various ground densities of the selected IB. A summation of these areas over the whole target gives the expected fraction of damage.

5. Best HE-IB Combinations.

While for both HE and IB, the percentage of damage to the target increases with the density of bombs, the way in which it increases is markedly different in the two cases. In the case of HE, damage increases almost proportionately with the number of bombs on the target until it reaches a fairly high level—to cause 40% damage requires only a little more than twice as many bombs as to cause 20% damage. But at high levels of damage—beyond 50% or 60%—damage increases less and less rapidly because bombs begin to fall upon buildings already destroyed by other bombs.

In the case of IB, on the other hand, a relatively low density of an effective bomb is capable of destroying almost the whole of that part of the target which will burn, and additional bombs will add little or nothing to this damage.

The efficiency of either HE or IB is measured by the additional damage which an additional tonnage of bombs delivered on the target will cause. Where the target is at all vulnerable to IB, the IB is much more efficient in this sense for low densities—i. e., a given tonnage will cause much more damage. This will be true until the point is reached at which most of the combustible part of the target has been destroyed. Beyond that point HE is more efficient in causing additional damage than IB. There is thus a maximum efficient (or optimum) density for the IB weapon, but there is no such optimum for HE short of 100% destruction of the target. In a small attack the advantage therefore lies with IB, while in heavier attacks the advantage shifts to HE (assuming that the target is not more than 30-60% combustible, as is usually the case with industrial targets). Of course, if practically the whole target can be burned, only IB need be used, because combustible buildings and contents can always be destroyed with lesser tonnages of IB than HE. On the other hand, if the target is less than about 25% combustible, no significant advantage attaches to the use of any IB at all.

One addition to these conclusions is necessary. It is believed that it is almost always desirable to use a small amount of HE with IB as an auxiliary

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weapon to hamper and discourage firefighting. This HE is recommended not because it is more efficient in causing damage, but because it permits the IB to operate with maximum effectiveness.

D. WR2 SHEETS—LOW LEVEL ATTACKS

Low altitude attacks, as carried out by dive, glide or fighter bombers, whether land based or from carriers, are made with much greater accuracy than are those from higher levels. Consequently, instead of attempting to drop a certain density of bombs over the whole target area, it is possible to select and attack individual buildings of primary importance.

In preparing the weapon recommendations, therefore, each building is considered as a separate target.

1. Number of Hits Tables.

Force requirements are presented in terms of the number of hits required on each building. No attempt is made to compute the tonnage to be dispatched, since this can readily be calculated by operational planners from a knowledge of current bombing accuracy.

The choice of weapons then depends on the relative numbers of hits required with the various bombs and upon the stowage capabilities of the available aircraft. That weapon should be chosen which will cause the damage with the minimum number of sorties, and this is best decided by the operating command.

a. Table I (HE). In this table the primary and secondary buildings are listed in the order of their importance to production. For each building there is given the number of hits with each appropriate weapon required to achieve 50% serious damage. In addition correct fuzings are listed. Unsuitable bombs are also indicated. To obtain the number of hits required for 30% and 70% serious damage the number of hits should be multiplied by 0.5 and 1.7, respectively.

b. Table II (IB). In this table those primary and secondary buildings suitable for IB attack are listed, but not necessarily in the order of their

importance to production. For each building there is given the number of hits with various clusters of incendiaries of M50 and M69 bombs, with single incendiary bombs (M47 and M76), and with the 58 gallon and 150 gallon sizes of fire bombs (belly tanks filled with napalm gel) required for 50% serious damage. "50% damage" here means a 50% probability of destroying any one fire division. When the building is a single fire division, this means a 50% probability of destroying the building. When the building includes a number of fire divisions, this means that it is to be expected that 50% of the building will be destroyed. When the building sizes and groupings are such that one incendiary cluster will cover more than one building, the appropriate buildings are grouped together in the "number of hits" column for clustered bombs. The recommendations of the table give a load which is alternative to the number of hits listed in the HE table. Either HE or IB will do the job, and the choice of which to use depends as above upon the relative numbers of hits required and the available stowage. To obtain the requirements for 30% and 70% serious damage the conversion factors listed for the HE table should be used.

2. Special Cases.

In special circumstances (such as attacks on arsenals) there are no buildings of outstanding importance, virtually all buildings being primaries or secondaries. In these cases a low altitude attack should be directed against the whole target and the "number of hits" table is not applicable. In these special cases a suitable modification of the WR2 Sheet will be prepared with a full discussion of the factors involved.

3. Use of WR2 for Reattack.

Where a low level attack is made on a previously damaged target, on which no new analysis is available, Tables I and II will still be a guide to the order of importance and vulnerability of those buildings which are either undamaged or only slightly damaged.

Refer to Appendix II for a sample WR2.

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

Sheet No. 90.17-791-WR1
Date 26 March 1945
Page No. 6
AAAF Target No. 90.17-791
Obj. Folder 90.17
Obj. Area 90.17
Air Target System: Aircraft
Lat.: 35°43' N
Long.: 139°22' E
Alt.: 360 feet

SHOWA AIRCRAFT
TACHIKAWA JAPAN

High and Medium Altitude Attack

(See also Target Information Sheet 90.17-791 TI/2 and associated target illustrations)

AIMING POINT

For maximum damage to primary objectives the aiming point should be building 26. (Illustration No. 90.17-791 P3, P5.)

WEAPON AND FUZING

	HE	Fuze	IB
Preferred.....	1000-lb GP.....	.01 N/ND T..	AN-M50 4-lb (in aimable clusters).
Alternative...	500-lb GP.....	.01 N/ND T..	AN-M69 6-lb (in aimable clusters).
	2000-lb GP.....	.01 N/ND T..	AN-M47 70-lb. AN-M76 500-lb.

Note recommended: Smaller GP bombs; SAP or AP bombs; Depth bombs.

NOTES

- (a) Use 0.1 N fuzes, if 0.01 N fuzes are not available.
- (b) The 500-lb and 2000-lb GP bombs are respectively 95 and 90 percent as effective as the 1000-lb GP bomb.

LOADING TABLE FOR INITIAL ATTACK

Loading table for preferred combination of bombs¹

[This table is prepared for an initial attack on this target. For its application to later attacks see JTG Memorandum No. 3/1]

Tons (actual) Dis-patched	Percent of bombs dispatched falling within 1000 feet of aiming point											
	10%			15%			20%			30%		
	TONS		F ² %	TONS		F ² %	TONS		F ² %	TONS		F ² %
	HE	IB		HE	IB		HE	IB		HE	IB	
50.....				25	25	15	20	30	20	10	40	30
100.....	35	65	20	25	75	30	20	80	35	10	90	40
200.....	35	165	35	25	175	45	20	180	45	50	150	50
400.....	35	365	45	130	270	50	180	220	55	250	150	65
800.....	380	420	55	530	270	65						
1000.....	580	420	60									

¹ If the alternative bombs are used, the distribution of the load between HE and IB should be the same. The expected percent of damage will, of course, be lower.

² Expected percent of serious damage to the whole target.

EXAMPLES ILLUSTRATING USE OF LOADING TABLE IN WR1

1. To find best HE-IB combination and probable percent of serious damage for a given force.

Given:

- a. Mission of 133 planes with total load of 400 tons.

b. Percent of planes expected to bomb target—70% (i. e., 30% expected abortives or bombing with gross errors).

c. Percent of bombs aimed at target expected to fall within 1,000 feet of aiming point—30%.

d. Individual A/C load=3 tons.

Solution:

a. $70\% \times 30\% = 21\%$, which is rounded off to the nearest percentage figure at top of Loading Table, =20%. This is the percent of bombs dispatched expected to fall within 1,000 feet of aiming point.

b. Opposite 400 tons in 20% column find loading:

HE—180 tons.

IB—220 tons.

c. In the same box of Loading Table, under F, read probable level of damage to target=55%.

d. If each plane is to carry a single type bomb:

HE—180 tons=(approximately) 60 planes.

IB—220 tons=(approximately) 73 planes.

e. If eleven formations of 12 planes are to be used, each formation carrying a single type bomb, five should carry HE and six IB.

2. To find force required to achieve a recommended level of serious damage.

Given:

- a. Recommended level of damage=40%.
- b. Expected bombing accuracy as in Example 1.
- c. Individual A/C load=3 tons.

Solution:

a. In 20% column find under F the percentage figures nearest to recommended level of damage =35% and 45%.

b. In same box of table interpolate required loading:

HE—20 tons.

IB—130 tons.

c. Total force required is 50 planes.

d. If 12 plane formations are used, each formation carrying a single type of bomb, four should be dispatched, one with HE and 3 with IB.

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

Sheet No. **90.17-791 WR2**
Date **26 March 1945**
Page No. **7**

AAF Target No. **90.17-791**
Obj. Folder **90.17**
Obj. Area **90.17**
Air Target System **Aircraft**

SHOWA AIRCRAFT

TACHIKAWA JAPAN

Lat.: **35°43' N**
Long.: **139°22' E**
Alt.: **360 feet**

Low Altitude Attack

(See also Target Information Sheet 90.17-791-TI/2 and associated target illustrations)

TYPE OF ATTACK

This sheet applies primarily to an attack by carrier based aircraft, fighter bombers, or other similar aircraft which carry out dive, glide, low level, or minimum altitude attacks.

BUILDINGS CONSIDERED

Data are given below for attack on primary and secondary buildings only (see Ill. No. 90.17-791 P3, P5.) Other buildings are of insufficient importance to merit specific attack.

WEAPONS AND FUZING

A pure HE attack (no incendiaries) may be launched against the buildings specified in Table I; a pure IB attack (no HE) may be launched against the buildings specified in Table II. The choice of a particular HE or IB weapon for attack on a given building can be made by considering both the number of hits on that building required for the various bombs (see the tables below) and the stowage capabilities of the aircraft to be used. The proper fuzings for the HE weapons to be used against the individual buildings are given in Table I below, with the exception that for minimum altitude attacks a 4-5 sec. delay is required for safety to the aircraft. The use of SAP, AP, Smaller GP, or Depth bombs is not recommended for this target.

NUMBER OF HITS

Number of hits required to achieve 50% damage to individual important buildings¹

TABLE I (HE)

Buildings in order of importance to production (Ill. No. 90.17-791 P3, P5)	Number of Hits			Fuzing ²
	500-lb GP	1000-lb GP	2000-lb GP	
26.....	44	22	12	.01 N/ND T
17.....	22	11	6	.01 N/ND T
27.....	17	8	5	.01 N/ND T
21.....	13	7	4	.01 N/ND T
18.....	16	8	4	.01 N/ND T
38.....	6	3	2	.01 N/ND T
40.....	8	4	2	.01 N/ND T
39.....	8	4	2	.01 N/ND T

TABLE II (IB)

Buildings (Ill. No. 90.17-791 P5)	Number of Hits							
	Clusters				Individual Bombs		Fire Bombs	
	M-50		M 69					
	M-6	M-7	M-12	M-13	M-47	M-76	58 gal.	150 gal.
38.....	7	2	5	1	5	2	1	1

¹ To obtain the number of hits required to achieve 30% damage to individual important buildings, multiply the appropriate entry in the preceding tables by 0.5; for 70% damage, multiply by 1.7.

² Use 0.1 N fuzes if 0.01 N fuzes are not available.

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET SYSTEM FOLDER—JAPANESE MACHINE TOOL INDUSTRY

**JOINT TARGET GROUP, WASHINGTON, D. C.
M E M O R A N D U M**

CONFIDENTIAL

Sheet No. JTG/M5

Date 23 Feb 1945

NO. 5—NUMBERING OF AIR TARGETS

1. Joint Target Group will number new air targets in the Japanese War on its own initiative where such targets are relatively important; i. e., are generally equal in importance to those now listed in Air Target Index—Japanese War.

2. Numbering of any targets other than those described above will be undertaken by Joint Target Group at the request of appropriate field commands. Such requests should be accompanied by photography of the target or reference to print and sortie number if photography is held in Washington.

3. Dissemination of new target numbers will be accomplished through issuance of sheets included in the semi-monthly J. T. G. addendum envelopes. These sheets are designated for inclusion in the Air Target Index—Japanese War. Such target numbers will not constitute amendments to target lists in Air Target Index—Japanese War unless so indicated.

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8. Penetration.

Striking velocity, M69: 225 ft/sec (approx.), cluster released at 25,000 ft., opening at 5000 ft. will penetrate light to medium roof construction: 1 inch wood sheathing covered with 2 layers asphalt felt; terra cotta tile, slate, 2 to 5 inch cinder concrete, 3 inch light concrete (not reinforced).

9. Performance, Probability, M-18 cluster containing AN-M69 bombs.

Malfunctions	Percentage	
Clusters not opening-----	5	
Air Bursts-----	3	*Probability of
Tails torn off-----	2	bomb functioning
Flatlanders-----	3	as expected: .84
Fuze Failures-----	2	(.95) (.97) (.98)
Nonejection, nonignition, mechanical failures.	2	(.97) (.98) (.98) = .84.

*This factor, a characteristic of the bomb; does not consider the type of target.

10. Remarks and Recommendations as to Uses of the M-18 Cluster.

a. In production but not yet in service are two modifications of the M69: (1) The M69X, similar to the M69, but containing slightly less fuel, and an explosive charge of tetryl. (2) The M69WP, similar to the X bomb, but containing a charge of white phosphorous in place of the tetryl. Both of these modifications, designed to hinder and drive away fire fighting personnel, will be included in varying quantities with M69's in the aimable cluster.

b. Because of its low striking velocity the M69 has heretofore been regarded as suitable only for

attacks on residential areas. Intelligence gained from adequate aerial cover indicates that most industrial roofs in Japan are of light construction, and recent incendiary attacks have demonstrated the ability of the M69 to penetrate and set fire to typical Japanese plants. This characteristic of the M69 makes it a good choice for use in mixed IB-HE raids where the primary target is industrial and the secondary target, for bombing through clouds, is an urban area. The M69 bomb is by far the best weapon now available for urban areas.

c. In level bombing the recommended minimum altitude of operation with the M-18 is 3000 ft. (opening at 1000 ft.). Inability to set the T39 or T55 fuze at less than 5 secs. limits the utility of the cluster at lower altitudes and for dive bombing, as the action of the cluster striking as a unit is not efficient.

d. To be effective a small incendiary must land in a favorable location. The tail ejection feature of the M69 greatly enhances the probability that the fuel will finally come to rest adjacent to easily ignitable material.

e. The M-18 is being replaced by the recently CWS developed E46, 500-lb. aimable cluster containing 38 M69's. Significant differences between the M-18 and E46 are (1) increase in weight to 425 lbs. for the E46, (2) incorporation in the E46 of two tail fuzes and a mechanical opening feature in place of a single nose fuze and primacord burster, and (3) a better streamlining of the E46. Improvement in the overall functioning of the M69 is indicated from proof testing of this cluster. A supplementary Data Sheet No. 2 will be issued when the cluster is available for use in the field.

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Sheet No. **JTG/M6**

Date **March 23 1945**

Page No. **1 (2 Pages)**

NO. 6—BOMB DATA SHEET NO. 2

Cluster, Aimable, Incendiary Bomb, 500 lb., M-18 (E6R2)

INTRODUCTION

The following additional incendiary data supplements Memorandum No. 4. (M-17).

1. Cluster, Aimable, 500-lb., M-18 (E6R2).

Total Weight: 350 lbs.
Overall Length: 59 $\frac{1}{16}$ inches.
Diameter: 14 $\frac{1}{16}$ inches.
Weight of cluster adapter, tail and fuze: 114 lbs.
Bombing Table: 500-K-2.
No. of Bombs: 38 AN-M69.
Weight of Bombs: 236 lbs.
Weight of Fuel: 99 lbs.
Total Heat Liberated: 1,672,000 Btu.

2. Fuze, Nose, Mechanical Time, T39-E1 and T55.

Fuze: T39-E1 or T55, Nose, Mechanical, clock actuated time delay (5 to 93 secs. after release from plane). Clock and arming vane freed simultaneously by the withdrawal of the arming wire. The fuze is armed in the usual manner by the revolving of the vanes in from 2 to 3 seconds (200 mph). The firing pin is then held solely by the trip mechanism of the clockwork. At the end of time period set on the fuze the firing pin is released and the fuze functions.

Booster: Tetryl; Primacord: Extends length of cluster; on detonation, bursts cluster holding straps, releasing individual bombs.

3. Ballistic Data.

Striking velocity of unopened cluster from 25,000 ft.: 900 ft/sec (approx.).

Recommended altitude for cluster opening: 5,000 ft.

Striking velocity of the individual bombs, AN-M69, when cluster is dropped from 25,000 ft, opening at 5,000 ft.: 200-225 ft/sec.

The ballistics of the M18 make it unsuitable for dropping with HE bombs from the same plane. The M18 will trail the AN-M30, 100-lb. G. P. bomb, by 35 mils when dropped from 25,000 ft., cluster opening at 5,000 ft., plane air speed 250 mph.

4. Plane Loadings.

	B-17 (max)	B-24 (max)	B-29 (max)	B-29 (Saipan to Tokyo)
No. of Clusters/plane	12	12	40	17
Total load, lbs/plane	4200	4200	14000	5950
Weight of bombs/plane	2832	2832	9440	4012
Incendiary fuel, lbs/ plane	1190	1190	3960	1683
Bombs/plane	456	456	1520	646
Bombs/group (9 planes)	4104	4104	13680	5814
Bombs/group (12 planes)	5472	5472	18240	6752

5. Bomb Patterns.

Individual cluster pattern (cluster opening at 5000 ft.): 120 x 150 yds.

Bomb Pattern/group (release altitude: 20,000 ft., minimum intervalometer, cluster opening at 5000 ft.).

12 B-17's	9-12 B-29's
1700 x 1700 ft.	2500 x 2400 ft.
2,890,000 sq. ft.	6,000,000 sq. ft.
321,000 sq. yds.	667,000 sq. yds.
66 acres	137 acres
.10 sq. miles	.22 sq. miles

6. Ground Densities.

	(Based on preceding pattern data) (Saipan to Tokyo)	
	Groups of 12 B-17's	12 B-29's
Sq. yds./bomb	58.7	99
Actual tons of bombs/acre	.26	.18
Actual tons of bombs/sq. mile	163	110

7. Bomb, Incendiary, 6-lb., AN-M69.

Actual Weight: 6.2 pounds.
Length: 19.5 inches.
Diameter (across flats): 2 $\frac{7}{8}$ inches.
Weight of Fuel (gelled gasoline): 2.6 lbs.
Heat Liberated: 44,000 Btu.
Burning Time: 4-7 minutes.
Length of cloth tail: 40 inches.
Delay between impact and ignition: 3 seconds.
Normal terminal velocity: 250 ft/sec.
Burning Temperature: 1800° F.

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET INDEX-JAPANESE WAR

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No. 7—BOMB DATA SHEET No. 3

BOMB, INCENDIARY, 100-LB., AN-M47A2

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET INDEX—JAPANESE WAR—AFTER JTG/M6

1. Bomb, Incendiary, 100-lb, AN-M47A2:

Actual weight: 70 pounds.
 Length: 48.9 inches.
 Diameter: 8 inches.
 Thickness of case: $\frac{1}{16}$ inch.
 Total heat liberated: 670,000 B. t. u. (approx.).
 Burning time: 10 minutes (approx.).
 Bombing table: 100-G-2.
 Total volume of body: 7 gals.
 Void left in filling: 10 percent.
 Weight of filling: 40 pounds (approx.).
 Composition of Napalm filling: 88.5 percent gasoline and kerosene; 11.5 percent aluminum soaps.

2. Fuze, Bomb Nose, Mechanical Impact, AN-M126A1.

Actual weight: 1.06 pounds.
 Overall length: $3\frac{1}{16}$ inches.
 Functioning: Instantaneous.
 Arming time: 340 vane revolutions, 725 feet air travel; minimum altitude to arm: 100 feet (2.5 seconds), plane air speed 200 m. p. h.

3. Burster, AN-M12 or AN-M13:

AN-M12—actual weight: 2.4 pounds.
 Length: $37\frac{7}{8}$ inches.
 Diameter: $1\frac{1}{8}$ inches.
 Contains 450 grams of a 50/50 mixture of black powder and magnesium.
 AN-M13—actual weight: 5 pounds (approx.).
 Length: $38\frac{1}{4}$ inches.
 Diameter: $1\frac{3}{16}$ inches.
 Contains 57.5 grams of TNT and 0.82 grams of tetryl; is used with igniter AN-M9 (WP) containing 2.2 pounds WP, or with igniter AN-M9 (Na) containing 0.7 pounds sodium for water targets.

Neither of these bursters has proved wholly superior to the other for bomb functioning.

4. Ballistic data:

Striking velocity from 25,000 feet: 760 ft./sec. (approx.).
 In the case of mixed HE-IB loads in the same plane, the AN-M47A2 will trail the AN-M30, 100-pound G. P. bomb by approx. 42 mils when released together at 25,000 feet.

5. Plane loadings:

	B-17 (max.)	B-24 (max.)	B-29 (max.)	B-29 (Saipan to Tokyo)
Number of bombs/plane.....	42	52	184	72
Weight of bombs/plane.....	2,940	3,640	12,880	5,040
Incendiary fuel/plane.....	1,680	2,080	7,360	2,880
Bombs/group (9 planes).....	378	468	1,656	648
Bombs/group (12 planes).....	504	624	2,208	864

6. Bomb patterns:

Bomb pattern/group (release altitude: 25,000 feet, minimum intervalometer setting:

12 B-17's.	9-12 B-29's.
1700 x 1700 feet.	2500 x 2400 feet.
2,890,000 square feet.	6,000,000 square feet.
321,000 square yards.	667,000 square yards.
66 acres.	137 acres.
0.10 square miles.	0.22 square miles.

7. Ground densities—(Based on preceding pattern data (Saipan to Tokyo):

	Groups of—	
	12 B-17's	12 B-29'
Square yards/bomb.....	637	772
Actual tons of bombs/acre.....	.27	.22
Actual tons of bombs/square mile.....	176	137

8. Penetration:

Striking velocity from 25,000 feet: 760 ft./sec. (approx.). Will penetrate 5 inches of reinforced concrete.

9. Performance, probability, AN-M47A2:

Malfunctions:	Percent
Flatlanders.....	10
Fuze failures.....	2
Probability of bomb functioning as expected: (0.90 (0.98) = 0.88. ¹	

10. Remarks and recommendations as to uses of the AN-M47A2:

- a. On functioning on hard ground or concrete, burning fuel is scattered over a radius of 50 feet. On soft ground the fuel is confined to the crater.
- b. Average burning time is 10 minutes; a few large globs of gel may burn for 20 minutes or longer.
- c. Cooling of the bomb to 35° F. does not affect its functioning.

¹ This factor a characteristic of the bomb; does not consider the type of target.

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d. Used extensively by the Eighth Air Force over Germany, the M47A2 has proved effective against combustible industrial targets. Its initial area of influence is considerably larger than that for small (4-10 pounds) IB's. However, where industrial targets are composed of a large number of small fire divisions (as is usually the case), the M47A2 is not considered a good choice for an IB attack because the group pattern is sparse and not enough direct hits can be expected. Near misses are completely ineffective.

e. Against urban areas, the M47A2 is far too large a weapon and is much less effective than the clustered small bombs.

f. For use by the Navy, the M47A2 is not recommended because of low plane loading efficiency. For minimum altitude or dive bombing attacks where the target is small and the bombing accuracy good, the M76 or the fire bomb (jettisonable gasoline tank) are preferred. For medium level attacks and dive bombing on large dispersed targets, clustered small bombs are recommended.

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Sheet No. JTG/M9
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NO. 9—BOMB DATA SHEET, NO. 4
(Bomb, Incendiary, 500-lb., AN-M76)

INTRODUCTION

This is the fourth in a series of data sheets issued on the characteristics of incendiary bombs. See also JTG/M4 (M-17, M-17A1) JTG/M6 (M-18 (E6R2)), JTG/M7 (M47A2).

1. Bomb, Incendiary, 500-lb., AN-M76.

Actual weight: 473 pounds.
Length: 59.2 inches.
Diameter: 14.2 inches.
Thickness of case: 0.3 inch.
Bombing table: 500-F-2.
Weight of incendiary filling: 175 pounds.
Composition of filling: Finely divided magnesium, gasoline, and IM polymer to form a paste.
Total heat liberated: 2,210,000 B. t. u.
Burning time: 20 minutes (approximate).

2. Fuze, Nose Impact, AN-M103 and Tail Inertia, AN-M101A2.

Fuze, Nose Impact, AN-M103A1:

Actual weight: 3.7 pounds.
Over-all length: 7 inches.
Maximum diameter: 2.7 inches.
Functioning: Instantaneous.
Arming time: 330 vane revolutions, 1,000 feet air travel; minimum altitude to arm: 185 feet at plane speed 200 m. p. h.

Fuze, Tail Inertia, AN-M101A2:

Actual weight: 2.9 pounds.
Over-all length: 12.6 inches.
Maximum diameter: 1.5 inches.
Functioning: Nondelay.
Arming time: 555 feet air travel; minimum altitude to arm: 60 feet at plane speed 200 m. p. h.

3. Burster, AN-M14.

Actual weight: 2 pounds (approximate).
Length: 35.8 inches.
Diameter: 1.43 inches.
Contains 1.25 pounds of tetrytol.

4. Igniter, AN-M5.

Weight: 20 pounds.
Length: 35 $\frac{5}{16}$ inches.
Diameter: 3.2 inches.
Contains 9 pounds of white phosphorus.

5. Ballistic Data.

Striking velocity from 25,000 feet: 1,000 ft/sec (approximate). Trajectory is almost identical to that of the AN-M64, 500-lb. G. P. bomb, trail difference at 250 m. p. h. and 25,000 feet being only 12 mils.

6. Penetration.

Will penetrate 12 inches of reinforced concrete from 25,000 feet.

7. Plane Loadings.

Can be carried on all 500-lb. bomb stations of Army and Navy planes.

8. Remarks and Recommendations as to Uses of the AN-M76.

- a. On functioning on hard ground or concrete, burning fuel is scattered over a radius of 150 feet. On soft ground the fuel is largely confined to the crater.
- b. The M76 is far too large a weapon for most incendiary attacks. Only in low level or dive bombing against single targets, or against targets that require high penetration (greater than 5 inches of reinforced concrete) is this bomb preferred. Clustered small bombs have proved more effective for medium and high altitude bombing against industrial and urban areas.

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET INDEX—JAPANESE WAR FOLLOWING JTG/M8

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No. 10 — BOMB DATA SHEET No. 5
CLUSTER, AIMABLE, INCENDIARY BOMB, 500-LB., E48

Holders of Joint Target Group Folders should insert this sheet in Air Target Index—Japanese War, after JTG/M9.

1. Cluster, Aimable, 500-lb., E48.

Total weight: 525 lbs.
Overall length: 59.5 inches
Diameter: 14.75 inches
Cluster adapter: E23
Bombing table: 500-T-1
No. of bombs: 38 M74
Weight of bombs: 320 lbs.
Weight of fuel: 107 lbs.
Total heat liberated: 1,440,000 Btu.

2. Fuze, Tail, Mechanical Time, M-152 (T53E1).

Fuze Functioning: Aerial burst, 5 to 92 seconds after release from plane. Clock and arming vane freed simultaneously by the withdrawal of the arming wire. The fuze is armed by the revolving of the vanes in from 2 to 3 seconds (200 mph.). The firing pin, then held solely by the trip mechanism of the clock work, is released at the end of the set time period, and the fuze functions.

Fuzing of the E48: With the E23 cluster adapter, two (2) M-152 tail fuzes are used. One acts with a 31-inch length of primacord which is channeled to the cluster tail retaining cup. On fuze functioning, the retaining cup is blown off, the tail drags in the wind stream and on separating from the cluster withdraws the cluster buckle release wires, thereby mechanically releasing the individual M74 bombs. The second fuze, insurance against failure of the first, is set to function 2 seconds after the first. This acts with a 60-inch length of primacord extending the entire length of the cluster, detonation of which explodes the holding straps and opens the cluster. A lower percentage of malfunctioning bombs due to air bursts is believed to result from the mechanical opening of the cluster.

3. Ballistic Data.

Striking velocity of unopened cluster from 25,000 ft.: 910 ft/sec (approx.).

Recommended altitude for cluster opening: 5000 ft. (dropped from above 10,000 ft.).

Striking velocity of the individual M74 bombs when cluster is dropped from 25,000 ft., opening at 5000 ft.: 250 ft/sec (approx.).

The ballistics of the E48 make it unsuitable for dropping with HE bombs from the same plane. The E48 will trail the AN-M30, 100-lb. G.P. bomb, by 38 mils when dropped from 25,000 ft., cluster opening at 5000 ft., plane air speed 250 mph.

4. Plane Loadings.

	B-17 or B-24 (max.)	B-29 or B-32 (max.)
No. of clusters/plane	12	40
Total load, lbs/plane	6300	21000
Weight of bombs lbs/plane	3840	12800
Incendiary fuel, lbs/plane	1284	4280
Bombs/plane	456	1520
Bombs/group (9 planes)	4104	13680
Bombs/group (12 planes)	5472	18240

5. Bomb Patterns.

Individual cluster pattern (cluster opening at 5000 ft.): 95% in circle 200 yds. in diameter. Bomb pattern/group (release altitude: 25,000 ft., minimum intervalometer, cluster opening at 5000 ft.)

12 B-17's or B-24's	12 B-29's
1700 x 1700 ft.	2500 x 2400 ft.
2,890,000 sq. ft.	6,000,000 sq. ft.
321,000 sq. yds.	667,000 sq. yds.
66 acres	127 acres
.10 sq. miles	.22 sq. miles

6. Ground Densities.

	Groups of:	
	12 B-17's	12 B-29's
Sq. yds./bomb	58.7	36.5
Actual tons of bombs/acre26	.56
Actual tons of bombs/sq. mile	163	349

7. Bomb, Incendiary, 10-lb., M74.

Actual weight: 8.4 lbs.
Length: 19.5 inches
Diameter (across flats): 27/8 inches
Weight of fuel: { 2.8 lbs. PT mixture
 { 0.4 lbs. WP
Total heat liberated: 38,000 Btu.
Normal terminal velocity: 250 ft/sec.
Fuzing: M-142 (all-ways fuze), functioning instantaneous
Overall length (with telescopic tail extended): 24.4 inches
Burning time: 4-7 minutes

8. Penetration.

Striking velocity M74: 250 ft/sec (approx.), cluster released at 25,000 ft., opening at 5000 ft. Will penetrate heavy roof construction—3 inches concrete.

9. Performance, Probability, E48 Cluster containing M74 bombs.

Malfunctions	Percentage
Clusters not opening	4
Air bursts	3.5
Fuze failures, mechanical failures	2
Probability of bomb functioning as expected: (.96) (.965) (.98) = .91.*	

10. Remarks and Recommendations as to Uses of the E48 Cluster.

a. The M74 contains a charge of white phosphorous which obscures the initial fire center and acts as an effective deterrent to fire fighters.

* This factor, a characteristic of the bomb; does not consider the type of target.

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- b. Proof testing has displayed varying degrees of yaw for individual M74's released from E48 clusters. However, striking velocity/weight characteristics of the bombs are such that flat or near-flat landers offer no problem in penetrating normal Japanese roofs. Functioning for all angles of impact is provided in the M-142 all-ways fuze.
- c. In level bombing the recommended minimum altitude of operation with the E48 is 3000 ft. (opening at 1000 ft.). Inability to set the M-152 fuze at less than 5 seconds limits the utility of the cluster at lower altitudes and for dive bombing, as the action of the cluster striking as a unit is not efficient.
- d. The tail ejection feature of the M74 enhances the probability of the fuel coming to rest in or adjacent to easily ignitable material. Also, immediate ejection of the fuel after impact of the bomb on a roof is believed to better the chances of a fire being initiated in the attic out of reach of fire fighters.
- e. The E48 has proved effective in setting appliance type fires in typical Japanese dwellings. It is believed that the use of a WP charge and the all-ways fuze make this munition slightly superior to the E46 cluster containing M69 bombs for incendiary attack of Japanese urban areas. However, sufficient data are not available at present to indicate a decided superiority.
- f. Owing to its greater weight, the E48 cluster has a substantially smaller trail than the E46 (M69) cluster, but a greater trail than that of the M17 (M50 bomb) cluster. It requires off-set aiming to correct for excess cross trail when released in a cross-wind.
- g. The E48 cluster is suitable for the attack of industrial targets with light roofs, but its efficiency when so used is expected to be less than that of the E46 or M17 clusters.

Holders of Joint Target Group Folders should insert this sheet in Air Target Index — Japanese War, after JTG/M10, page 1.

HOLDERS OF JTG FOLDERS SHOULD INSERT
THIS SHEET IN AIR TARGET INDEX—JAPANESE
WAR

SECRETBy Authority of
The Commanding General
Army Air Forces15 Jan '45 W.F.R.B.
Date Initials**SECRET**JOINT TARGET GROUP - WASHINGTON, D.C.
DECEMBER 1944 PROGRESS REPORTSheet No. JTG/MPRI
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I. GENERAL

The Joint Target Group during the month of December has functioned in accordance with the directive of 6 December. The amount of Target Material and number of special studies prepared has increased and the categories of Target Material to be produced for the field have been established as: (a) "Air Target Index - Japanese War and (b) "Air Target System Folders".

The activities of the several Sections and Sub-sections follow:

II. EVALUATION SECTION

(a) Reports

The semi-monthly priority target lists were completed on schedule. There have been no changes made in the list of targets recommended. The December 30th list included a brief list of targets suitable for bombing through overcast technique and a few of these were recommended for attack. The analysis of targets for radar suitability was started late in the month and only a limited area was covered, therefore a more complete list will be presented January 15th.

(b) Special Studies

A comprehensive Air Target Estimate of significant areas in the war against Japan was completed during the month and will be distributed early in January. The target situation is kept continuously under review and five special target studies are contemplated for completion within a month. High classification prohibits detailed discussion of these projects.

III. ECONOMIC VULNERABILITY SECTION

(a) Target Information Sheets

(1) Target Information Sheets and accompanying illustrations were completed during December on the following plants grouped for target system categories:

Aircraft:

Tachikawa Aircraft--Revised (90.17-792)
Mitsubishi Aircraft Engine Co. (90.20-193)
Nakajima Aircraft Plant, Ota--Revised (90.13-1544)
Hitachi Aircraft, Tachikawa (90.17-2009)
Showa Aircraft Plant (90.17-791)
Nakajima Aircraft, Ogikubo--Revised (90.17-356)

Armament:

Mitsubishi Steel and Arms Works (90.36-546)
Nissan Automobile Co., Yokohama (90.17-522)
Kure Naval Arsenal (90.30-657A)

Electric Power:

Taikanton Steam Power Plants (93.3-35)
Kokura Steam Power Plant #2 (90.34-188)
Kokira Steam Power Plant #1 (90.34-1127)
Tobata Steam Power Plant (90.34-1594)

Machine Tool Industry:

Manchuria Iron Works (93.3-166)

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	<p><i>Electrical Equipment Industry:</i></p> <p>Mitsubishi Elec. Mfg. Co., Nagasaki (90.36-829)</p> <p>(2) Photography is now available and photo interpretation reports are completed or in preparation, on an additional 40 targets.</p>
(b) <i>Damage Assessment Reports</i>	<p>(1) Damage Assessment Reports on the following reports were completed:</p> <p>Okayama Aircraft Company (91.3-166) Nakajima Engine Plant, Musashino-Tama-Preliminary (90.17-357)</p>
(c) <i>Miscellaneous Studies Completed</i>	<p>(1) Preliminary Target Analysis Sheets for the following plants:</p> <p>Mitsubishi A/C Co., Nagoya Mitsubishi Aero-Engine Co., Nagoya Nakajima A/C Co., Tanashi</p> <p>(2) Report: "Evaluation of Alternative Methods of Attacking Urban Areas".</p> <p>(3) Report on Additional Target Data Revealed by Photo Cover of Hamamatsu, Nagoya and Tacharai Army Air Arsenal.</p> <p>(4) Procurement of data on Photo evidence of jet-propelled a/c production and operations in Germany.</p> <p>(5) Industry summaries prepared on Aircraft, Electronics, Shipping, Naval Repair Facilities, AA Guns, Iron-Steel-Coke, Aluminum, Electric Power, and Oil.</p> <p>(6) Industry Study - Electric Power Plants of Kyushu as a Target System.</p> <p>(7) Estimate of Japanese Combat a/c strength and production by types as of 1 December 1944.</p> <p>(8) Preliminary study of Japanese Torpedo Industry.</p> <p>(9) Preliminary draft - "Effects of Bombing Japanese Engine Plants and Air Frame Plants of Japanese A/C Production".</p> <p>(10) Target Index: - Listing of important targets in air war against Japan.</p> <p>(11) Selection and Evaluation of Individual Industrial Clusters as Alternative Radar Bombing Objectives.</p> <p>(12) Revision of Air Objective Folder, Kumano Area (90.24)</p> <p>(13) Memo - Significance of South Korean Ports.</p>
(d) <i>Intelligence Procurement</i>	<p>(1) P/W questions and briefing material completed for several industries.</p> <p>(2) Memo to G-2 and ONI on shipping and transportation intelligence requirements.</p> <p>(3) General statement of JTG requirements distributed by Collection Division; over 1100 copies.</p>

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(e) *Projects
in Course of
Completion*

(1) *Aircraft Sub-Section*

(a) Final draft of examination of relative merits of aero-engine plants and airplane plants as alternative target systems.

(b) Aircraft Industry Study, for Target System Folder.

(2) *Area Studies Sub-Section*

(a) Tokyo Area Target Summary - codification half completed of all available data on industrial targets in this area, accompanied by annotated mosaic.

(b) Nagasaki Urban Area Assessment - pre-attack economic assessment of incendiary attack; sample study in conjunction with Physical Vulnerability Section.

(c) Study of workers/floorspace relationship and distribution of industrial workers in principal cities - for use in assessing economic results of attacks on Japanese urban areas.

(d) Second Phase Photo Interpretations - Nagoya and Toba - annotation of mosaic to show all known industrial installations. Two-thirds finished.

(3) *Shipping and Transportation*

(a) Preliminary Evaluation of Proposed Method for Decreasing Japan's Shipping Efficiency.

(4) *Armament and Munitions*

(a) Industry Study - Army and Naval Ordnance, for Target System Folder - preliminary edition covering mainly description of targets, nearing completion.

(b) Industry Study, for Target System Folder - Machine Tools - Research nearly completed.

(c) Industry Study, for Target System Folder - Electronics, Research completed.

(d) Industry Study, for Target System Folder - Electrical - Equipment - Portion of research done.

(5) *Non-ferrous Metals and Misc. Industries*

(a) Industry Study, for Target System Folder - Aluminum - Substantial progress.

(6) *Iron and Steel*

(a) Study of Japanese Steel Requirements - Progress on requirements for railroads, public utilities, and plant expansion.

(b) Coke Oven Vulnerability - Preliminary assessment of damage at Showa completed.

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(c) Preliminary edition of Industry Study for Target System Folder - Iron and Steel.

(7) *Oil-Rubber-Chemicals Sub-Section*

(a) Re-examination of estimates of oil production, consumption, and stocks. New estimates of a/c and Naval consumption nearly completed.

(b) Preliminary edition of Oil Industry Study, for Target System Folder.

IV. *PHYSICAL VULNERABILITY SECTION*

(a) *Target Material Prepared*

(1) In addition to the completion of Target Information Sheets (short form) for all the plants in the Electric Power, Machine Tools, and Electric Equipment Industries listed under (a) Target Information Sheets on pages 1 and 2, above, the following Target Information Sheets (short form) were completed:

Mitsubishi Steel and Arms (90.36-546)
Nippon Aluminum (90.34-1108)
S.M.R. Shale Oil (93.3-40)
Mitsubishi A/C Eng. Works, Nagoya (90.20-193)
Manchuria Light Metals (93.3-32)
Hitachi A/C Tachikawa Plant (90.17-2009) (Revision)
Nissan Automobile Company (90.17-522)
Aichi A/C Works, Atsuta Plant (90.20-2010)
Nakajima A/C Ogikubo (90.17-356) (Revision)
Showa A/C (90.17-791) (Revision)

(2) Target Information Sheets (long form) for the following plants were completed:

Manchuria A/C No. 1 (93.3-177)
Omura A/C (90.36-1627)
Manchuria A/C No. 2 (93.3-45)
Kokura Arsenal (90.34-168)

(3) Analysis is in progress on sixteen (16) additional targets.

(b) *Special Projects Completed*

(1) The following numbered special projects have been completed:

- #1. Report showing disadvantages of Sporadic Incendiary Attacks - Japan.
- #2. Recommended Revisions of Weapon and Fuze Selections Against Light and Heavy Industrial Targets.
- #3. Tactical Targets - Memorandum on Policy.
- #5. Memorandum - Data Required by Physical Vulnerability Section.
- #8. Grounded Aircraft - Efficiency of Attack by Bombing.
- #16. Force Requirements for Attack on Japanese Oil Industry.
- #17. Force Requirements for Aero-Engine and A/C Assembly Plant.
- #18. Vulnerability of Coke Ovens.

(2) The following unnumbered special projects have been completed:

Force Requirements for Navy Planes Against Japanese Electronic Plants.

Effectiveness of M-76IB.

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(c) *Special Projects in Process of Completion*

(1) The following numbered projects are in process of completion:

- #3. Weapon Effectiveness, Analysis of Okayama and Omura A/C Plants; German A/C Plants.
- #10. Japanese Arms and Munitions, Structural Characteristics.
- #11. Mathematical Methods Employed in Calculating Loading Tables.
- #12. Bomb Selection, Mathematical Principles of.
- #14. Fire Damage to Machine Tools.

(2) The following numbered projects are being completed in cooperation with Division 2, NDRC, Princeton, N.J.:

- #7. Airfields, Air Attack of. Data on the cratering of runways and landing areas being prepared by Division 2, NDRC, Princeton, N. J.
- #9. Japanese Electric Power Plants, Air Attack of.

V. *PRODUCTION SECTION*

(a) *Target Material Sub-Section*

(1) *Target Text Sheets and Target Illustrations*

- (a) During December, 14 target text sheets and 27 target illustrations were completed and forwarded to the field, and particulars are given on schedule attached.

(2) *City Plans*

- (a) Six large scale city plans were published during the past month, making a total of 57 published to date and leaving 129 in process.

(3) *Target Area Acetate Bases*

- (a) Reproduction of Target Area Bases has been increased to include distribution to:

- (a) CinCPOA
- (b) SEA Command (Fwd. Ech.)
- (c) SEA Command (Rear Ech.)
- (d) Fifth Air Force
- (e) Seventh Air Force
- (f) Thirteenth Air Force
- (g) India-Burma Theatre
- (h) RAF Bomber Command
- (i) Air Ministry A13c(1) (s/Ldr. V. Mearles)

All are to receive total coverage of target area bases except CinCPOA, who is to receive coverage on Japan only and the Fifth, Seventh and Thirteenth Air Forces to receive coverage on Japan south of 37° parallel.

- (b) Nineteen (19) Target Area Bases have been completed on Japan, Korea and Manchuria during December. Two hundred ninety (290) bases have been completed out of the four hundred forty-nine (449) bases necessary to make possible a twelve (12) mile radius coverage from any targets. In addition one hundred twenty-six (126) bases are in work for complete coverage of Japan.

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(4) *Target Charts*

- (a) During January 1944 a program was initiated for revising selected target charts covering the Far East which included 88 charts, 41 of which were designated Special Edition Charts for limited distribution. With development of new intelligence these 41 special edition target charts were revised and reprinted. This program was completed during the month of December.

(5) *Air Objective Folders*

- (a) Six additional Air Objective Folders on the Far East were reprinted in quantity of two thousand copies each, thus completing all but one of these folders requested by the Navy. One old-type folder on Kumano Area (90.24) had to be revised and will not be published until the early part of January.

(6) *Guide and Reports*

- (a) The following guide and reports have been published or reproduced:

"Guide to Intelligence Requirements in the War Against Japan, December 30, 1500 copies

"Economic Damage Assessment Report No. "1". 10 copies reproduced

"Enemy Electronics Intelligence Report". 71 copies reproduced

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TARGET TEXT SHEETS AND TARGET ILLUSTRATIONS ISSUED
DURING DECEMBER 1944

TARGET NUMBER	NAME AND LOCATION OF TARGET	Item Reference and date in Dec.: distributed from Washington								
		TI	PI	P2	P3	P4	P5	P6	PX	
90.13- 1544	Nakajima Aircraft Plant OTA	15	15	15	15					
- 1545	Nakajima Aircraft Plant KOIZUMI	15	15	15	15					
90.17- 356	Nakajima Aircraft Engine Plant OGIKUBO	15			15					
- 357	Nakajima Aircraft Engine Plant MUSASHINO	15	23	23	15					
- 522	Nissan Auto Company YOKOHAMA				29					
- 792	Tachikawa Aircraft TACHIKAWA	15	19	19	19					
- 2008	Tachikawa Air Arsenal TACHIKAWA	15	23	23	15	15				
- 2009	Hitachi Aircraft TACHIKAWA		23	23	15					
90.20- 193	Mitsubishi Aircraft Engine Works NAGOYA		26	26	26	26				
90.34- 188	Kokura Steam Power Plant KOKURA	15			15					
- 1127	Kokura Steam Power Plant #1 KOKURA	15			15					
- 1594	Tobata Steam Power Plant TOBATA	15								
90.36- 546	Mitsubishi Steel & Arms Works NAGASAKI	18								
- 829	Mitsubishi Electric Co., Mfg. NAGASAKI	18								
93.3 - 35	Taikanton Steam Power Plant FUSHUN	15								
- 166	Manchuria Iron Works MUKDEN	18								
- 177	Manchuria Airplane Mfg Co Pl #1 MUKDEN	28								

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PROGRESS REPORT
FOR THE
MONTH OF JANUARY
1945

1. GENERAL

- a. During the month of January the first of fourteen Air Target System Folders - that on Japanese Aircraft - - was completed and distributed.
- b. Two field liaison teams, each composed of one Air Force and one Navy officer, departed in opposite directions to contract using agencies in the Pacific and C.B.I. theatres. Valuable reports as well as specific recommendations and requests from some of the commands visited have already been received from them.
- c. Activities of the several Sections and Sub-sections of the Joint Target Group as represented by work and material completed or in progress follows according to types of material.

2. STANDARD MATERIAL

a. Air Target System Folders and Air Target Index - Japanese War

- (1) In addition to the ATSF - Japanese Aircraft referred to above the schedule for issuance of other ATSF's and the Air Target Index - Japanese War is tentatively as follows:

Electrical Equipment Industry	6 Feb.
Air Target Index	10 Feb.
Machine Tool Industry	19 Feb.
Coke, Iron & Steel	23 Feb.
Non-Ferrous Metals	27 Feb.
Armament	1 March
Electric Power	3 March
Petroleum	8 March
Urban Areas	12 March
Shipping	16 March
Chemical Industry	24 March
Road & Rail Transportation	31 March
Typical Military Targets	indefinite
Typical Naval Targets	indefinite

b. Other Material

- (1) Other Standard Material produced and distributed included:

19 Target Information Sheets
39 Target Illustrations
26 City Plans
55 Target Area Acetate Bases
5 General Information Folders
(concerning specific Japanese industries for use of intelligence collection agencies)

c. Other Material in Process

- (1) At the request of ComAirPac a production program covering large wall-size briefing reproductions of standard target illustrations has been initiated. Distribution will include all operating air units in the Far Eastern Theater.
- (2) At request of JICPOA, ComAirPac and Interpron Two a program has been initiated to prepare and distribute film negatives of the Joint Target Group target illustrations. These will be distributed to any requesters.

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JANUARY PROGRESS REPORT (Cont'd)

<p>3. PERIODIC REPORTS (limited distribution)</p>	<p>a. Semi-Monthly Priority Reports - These reflect recommended priorities in the above air target systems and of individual targets within those systems.</p> <p>(1) A report dealing with proposed mining operations was appended to the 15 January list and one dealing with the Hodogoya Tetraethyl Lead Plant at Koriyama (90.10 - 2025) was appended to the 31 January list.</p> <p>b. Monthly Review of Target Intelligence</p>
<p>4. SPECIAL STUDIES</p>	<p>These are produced on various subjects in answer to special requests by service agencies or are initiated within the Joint Target Group for external distribution.</p> <p>a. The following Special Studies were completed at the request of AC/AS Plans:</p> <p>ES-S8 Reduction of Bomb Wastage through Reducing the Size of Attacking Formations</p> <p>EC-S24 Report on Key Targets Within Range of Potential Bases</p> <p>b. The following Special Studies were completed at the request of the 20th Air Force:</p> <p>EC-S20 Preliminary Report on Repairs to Mitsubishi A/C Engine Works (TARGET 90.20-193)</p> <p>EC-S23 Report on Priority Photo Reconnaissance Requirements</p> <p>EC-S25 Spot Damage Assessment Report on Mitsubishi A/C Engine Works (TARGET 90.20-193)</p> <p>PV-S32 Incendiary Attack on Kobe, Recommendations for</p> <p>c. The following additional Special Studies were completed:</p> <p>EC-S17 Spot Damage Assessment Report on Manchuria A/C Mfg. Co. (TARGET 93.3-177)</p> <p>EC-S18 Spot Damage Assessment Report on Nakajima A/C, Ogikubo Plant (TARGET 90.17-356)</p> <p>EC-S19 Damage Assessment Report No. 2 on Mitsubishi A/C Engine Works (TARGET 90.20-193)</p> <p>EC-S21 Damage Assessment Report No. 3 on Omura A/C Plant (TARGET 90.36-1627)</p> <p>EC-S22 Priority Assignment for Railroad Targets North of Peiping</p> <p>PV-S7 Japanese Airdromes, Air Attack of</p> <p>d. The following Special Studies are in the process of completion:</p> <p>EC-S26 Accomplishment of XX Air Force to 20 January 1945 (requested by AC/AS, Intelligence)</p> <p>EC-S27 Study of Methods of Attacking Chinese Rail Transport (requested by Eighth and Fourteenth Air Forces)</p> <p>EC-S28 Evaluation of Proposals for Mining Far Eastern Waters</p> <p>EC-S35 Establishment of Priorities for Mining Far Eastern Waters (requested by XXI B.C.)</p>

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JANUARY PROGRESS REPORT (Cont'd)

	<p>PV-S12 Bomb Selection, Mathematical Principles of</p> <p>PV-S8 Japanese Airframe and Aircraft Engine Plants, Attack of</p> <p>PV-S11 Mathematical Methods Employed in Loading Tables</p> <p>PV-S19 Japanese Electric Power Plants, Attack by Felix</p> <p>PV-S20 Effect of Fuzing, Bomb Detonation against Japanese Industrial Targets</p> <p>PV-S25 Preparation of a report of data on bombing accuracy and damage assessment to be submitted to Headquarters Twentieth Air Force following combat missions against specific targets.</p> <p>PV-S27 Force Requirements on Okayama A/C Plant</p>
5. ESTIMATES (limited distribution)	<p>Air Estimate No. 2 reflecting the opinion of the Joint Target Group as to air employment in the war against Japan is in the process of completion.</p>
6. SPECIAL PROJECTS	<p>These are in memorandum form, for the use of Joint Target Group, do not necessarily represent the official opinion of J.T.G. and are not intended for external distribution. During the month the following significant projects were completed.</p> <p>EC-P15 Study of Importance of Japanese Mainland Steel Targets</p> <p>PV-P13 Weapon Effectiveness, Analysis of in Attacks on German Aircraft Plants</p> <p>PV-P14 Fire Damage to Machine Tools</p> <p>PV-P21 Industrial Clusters, Vulnerability Analysis of</p> <p>PV-P26 Attack on Skilled Workers in the Japanese A/C Industry</p> <p>PV-P30 Attack on Stocks of Japanese A/C Engines</p> <p>PV-P31 Study of a New Method for Preparing Bomb Plots</p> <p>b. The following Special Projects are in the process of completion:</p> <p>EC-P31 Study of Importance of Japanese Mainland Steel Targets</p> <p>EC-P32 Estimate of Location of Completed Japanese Aero-engines</p> <p>EC-P33 Study of Japanese Tetrethyl Lead Position</p> <p>EC-P34 Location of Japanese Administrative Centers</p> <p>PV-P23 Relative Effectiveness of L.C. Bombs Against Selected Targets</p> <p>PV-P28 Method of Zoning Japanese Urban Areas</p> <p>PV-P29 High Level Attack on Japanese Fleet</p>
7. MISCELLANEOUS	<p>a. During January personnel have returned to Washington which have been collecting data on weapon effectiveness in the ETO in connection with a National Defense Research Committee project entitled "Combined HE-IB Attacks on Precision Targets". The Physical Vulnerability Section will collaborate with this group in the preparation of its report.</p>

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JANUARY PROGRESS REPORT (Cont'd)

- b. A program for tactical targets has been drawn up and approved. Material on construction and suitable weapons will be prepared for two new Target Systems Folders - - Typical Military Targets and Typical Naval Targets. The material will be based on experience in the ETO, experimental evidence, and structural analysis of Japanese tactical targets.
- c. Interviews with representatives of outside agencies were primarily concerned with questions of interrogation of prisoners of war.

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JANUARY PROGRESS REPORT (Cont'd)

TARGET TEXT SHEETS AND TARGET ILLUSTRATIONS ISSUED
DURING JANUARY 1945

REPRINTS OF ALL MATERIAL LISTED ARE AVAILABLE ON REQUEST TO
COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D.C.,
ATTENTION: AC/AS, INTELLIGENCE, JOINT TARGET GROUP

AREA NO TARGET NO	NAME & LOCATION	Date in January Distributed from Washington											
		T1	P1	P2	P3	P3/1	P4	P4/1	P5	P6	PX	DP	
90.17-133	Shibaura Engineering Works, Ltd., YOKOHAMA TOKYO AREA	15			15								
-356	Nakajima Aircraft Engine Plant, OGIKUBO TOKYO AREA *	9 /2	6	6									
-357	Nakajima Aircraft Engine Plant, MUSASHINO TOKYO AREA *	23 /2							24	23			
-522	Nissan Auto Company YOKOHAMA TOKYO AREA	2											
-791	Showa Aircraft, TACHIKAWA TOKYO AREA *	9 /1	6	6	6								
-792	Tachikawa Aircraft TOKYO AREA *	9 /1											
-2009	Hitachi Aircraft TACHIKAWA TOKYO AREA	2							30				
90.18-2011	Shizuoka Aircraft Engine Plant, SHIZUOKA AREA	23	24	24	24								
90.20-193	Mitsubishi Aircraft Engine Works, NAGOYA AREA												29 DPI
-194	Mitsubishi Aircraft Works NAGOYA AREA *	29 /1	29	29	29		29						
-196	Chigusa Factory of Nagoya Arsenal, NAGOYA AREA	20	20	20	20								
-197	Atsuta Factory of Nagoya Arsenal, NAGOYA AREA	20	20	20	20								
-240	Kawasaki Aircraft Works, Kagamigahara Plant, GIFU, NAGOYA AREA	23 rev	24	24	24								
-254	Mitsubishi Electric Mfg Co. NAGOYA AREA		22	22	22								
-2010	Aichi Aircraft Engine Works, NAGOYA CITY, NAGOYA AREA	9	4	4	4								

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JANUARY PROGRESS REPORT (Cont'd)

TARGET TEXT SHEETS AND TARGET ILLUSTRATIONS ISSUED
DURING JANUARY 1945REPRINTS OF ALL MATERIAL LISTED ARE AVAILABLE ON REQUEST TO
COMMANDING GENERAL, ARMY AIR FORCES, WASHINGTON 25, D.C.,
ATTENTION: AC/AS, INTELLIGENCE, JOINT TARGET GROUP

AREA NO TARGET NO	NAME & LOCATION	Date in January Distributed from Washington											
		T1	P1	P2	P3	P3/1	P4	P4/1	P5	P6	PX	DP	
-1806	Okuma Iron Works, Kachikawa Plant, KACHIKAWA, NAGOYA AREA		30	30	30								
90.21-1219	Japan Musical Instrument Propeller Plant HAMAMATSU AREA				30								
-2012	Nakajima Aircraft Hamamatsu Plant, HAMAMATSU AREA				30								
90.13-1544	Nakajima Aircraft Plant OTA, TAKASAKI AREA								30				
90.30- 657A	Kure Naval Arsenal KURE AREA											29 PX1 PX2	
90.34- 168	Kokura Arsenal, KOKURA SHIMONOSEKI	17				13					17		
90.36- 542	Akunoura Engine Works, NAG- ASAKI, SASEBO AREA								24				
-1627/849	Omura Aircraft Factory, OMURA, SASEBO AREA								13				
93.3 - 30	Penhsihu Iron Works (Old Plant) MUKDEN, MANCHURIA								25				
- 40	SMR Shale Oil Plant FUSHUN, MANCHURIA	29							29	31	29		
- 45	Manchuria Airplane Mfg Co Plant No 2, MUKDEN	15								25	23		
- 46	Mukden Arsenal, MUKDEN, MANCHURIA	29							29	29	29		
-177	Manchuria Airplane Mfg Co Plant No 1, MUKDEN									2	9		

* Diagonal (/) indicates this is a new publication and supersedes previous text
on same target

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PROGRESS REPORT

FOR THE

MONTH OF FEBRUARY

1945

1. GENERAL

1. The field liaison team which visited the Pacific Area returned to Washington on 26 February, after having effected liaison with eighteen commands. The field liaison team visiting the China and Burma-India Theaters is expected to return about 15 March.

2. The Physical Vulnerability Section has made considerable progress in the presentation of weapon recommendations for carrier-based aircraft, in the improvement of methods for determining the best incendiary loads for industrial targets, and in the preparation of bomb fall plots from strike photographs.

11. PRODUCTION

1. Standard Material.

a. Air Target System Folders and Air Target Index - Japanese War

(1) During the month four Air Target System Folders and Air Target Index - Japanese War were distributed as follows:

Japanese Electrical Equipment Industry	6 Feb.
Air Target Index - Japanese War	19 Feb.
Japanese Machine Tool Industry	20 Feb.
Japanese Coke, Iron & Steel	23 Feb.
Japanese Non-Ferrous Metals	27 Feb.

(2) Issuance of future Air Target System Folders is now scheduled as follows:

Japanese Armament	1 Mar.
Japanese Electric Power	3 Mar.
Japanese Petroleum	8 Mar.
Japanese Urban Areas	15 Mar.
Typical Japanese Military Targets	17 Mar.
Japanese Chemical Industry	24 Mar.
Japanese Shipping	26 Mar.
Japanese Road and Rail Transportation	31 Mar.
Typical Japanese Naval Targets	5 May

(3) Addenda numbered one and two were issued to holders of ATSF's and Air Target Index - Japanese War on the seventh and twenty-first of the month. This schedule will be maintained monthly.

b. Damage Assessment and Repair Reports

(1) Economic Damage Assessment Reports:

No. 4, Manchuria A/C Plant #1 (93.3-177)
No. 5, Mitsubishi A/C Works (90.20-194)

(2) Spot Damage Reports:

No. 9, Kawasaki A/C Co., Akashi Plant (90.25-1547)
Nos. 10 and 12, Nakajima Aircraft Co., New Ota Plant (90.17-356)
No. 11, Mitsubishi Aircraft Engine Works (90.20-193)

Holders of JTG folders should insert this sheet in Air Target Index - Japanese War.

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PROGRESS REPORT FOR THE MONTH OF FEBRUARY (Cont'd)

(3) Preliminary Reports on Repairs:

No. 2, Nakajima Aircraft Engine Plant, Musashino-Tama (Musashi) Plant, (90.17-357)

No. 3, Mitsubishi Aero-Engine Plant, Magoya, (Target 90.20-193)

No. 4, Kawasaki Aircraft, Akashi Plant, (Target 90.25-1547)

No. 5, Nakajima Aircraft, Ogikubo Plant, (Target 90.17-356)

No. 6, Kawasaki Aircraft, Akashi Plant, (Target 90.25-1547)

c. Other Material

(1) Distributed:

11 City Plans

6 Target Area Bases

4 General Information Folders (covering specific Japanese industries for use of intelligence collection agencies)

9 Target Information Sheets*

18 Target Illustration Sheets*

44 Negatives of Target Illustrations

*loose sheets, also distributed when pertinent in addenda envelopes.

(2) In process:

(a) Large briefing mosaics

(b) Gridded mosaic maps of important Japanese ports for use in shipping location.

2. Periodic Reports (limited distribution)

a. *Monthly Priority Reports* - These reflect recommended priorities in the above air target systems and of individual targets within those systems.

(1) A Semi-Monthly Priority List was distributed on 15 February.

(2) Subsequently, it was decided to limit the preparation of these lists, for the time being, to one on the 15th of each month.

b. *Monthly Reviews of Target Intelligence* - These review the latest intelligence, including strike damage received as to the various economic systems. They are distributed on the 1st of the month to appropriate service headquarters and contributing agencies. Pertinent excerpts are also distributed as addenda to Air Target System Folders.

3. *Air Estimates* (limited distribution) - These reflect the opinion of the Joint Target Group as to air employment in the war against Japan.

a. Air Estimate No. 2 is in the process of completion.

4. *Special Studies* - These are produced on various subjects in answer to special requests by service agencies or are initiated within the Joint Target Group for external distribution.

a. Completed

(1) For Twentieth Air Force:

ES-S8 Strategic Importance of the Japanese Aircraft Industry Following Successful Attack Upon Aircraft Engine Manufacture.

PV-S35 Incendiary Attack on Tokyo, Recommendations for

PV-S39 Incendiary Attack, Recommendations for

Holders of JTG folders should insert this sheet in Air Target Index - Japanese War.

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PROGRESS REPORT FOR THE MONTH OF FEBRUARY (Cont'd)

Holders of JTG folders should insert this
sheet in Air Target Index - Japanese War.

(2) For XXI Bomber Command:

EC-S35 Establishment of Priorities for Mining Far Eastern Waters.

(3) For Joint War Plans Committee:

EC-S42 Significant Installations within Range of Potential China Bases.

EC-S43 Significant Installations within Range of Northern Bases.

(4) For AC/AS, Intelligence:

ES-S9 Estimate of Effect on Japanese War of Twentieth Air Force Operations Through 15 January 1945.

(5) Other:

EC-S28 Evaluation of Proposals for Mining Far Eastern Waters.

EC-S29 Questions for Use of P/W Interrogators.

b. *In Process*

(1) For Twentieth Air Force:

PV-S25 Bombing Accuracy and Damage (continuing study following combat missions against specific targets)

PV-S27 Force Requirements on Okayama A/C Plant

(2) For Fifth and Fourteenth Air Forces:

EC-S27 Study of Methods of Attaching Chinese Rail Transport.

(3) For AC/AS, Plans:

EC-S45 Installations within Range of Japanese and Chinese Bases.

(4) For Air Intelligence Group, O.N.I.:

EC-S44 Study of Installation within Range of Japanese Operational Airfields.

(5) Other:

PV-S11 Mathematical Methods Employed in Loading Tables

PV-S12 Bomb Selection, Mathematical Principles of

PV-S19 Japanese Electric Power Plants, Attack by Felix

PV-S34 Data Required for Target Vulnerability Analysis in the Field

PV-S36 Hankow and Nagoya Incendiary Attacks, Weapon Effectiveness

5. *Special Projects* - These are in memorandum form for the use of Joint Target Group Sections, do not necessarily represent the official opinion of J.T.G., and are not intended for external distribution.

a. *Completed*

EC-P31 Study of Importance of Japanese Mainland Steel Targets

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PROGRESS REPORT FOR THE MONTH OF FEBRUARY (Cont'd)

EC-P32 Estimate of Location of Completed Japanese Aero-Engines

EC-P33 Study of Japanese Tetra-Ethyl Lead Position

PV-P29 High Level Attack on Japanese Fleet

PV-P30 Attack on Stocks of Japanese A/C Engines

PV-P31 Study of a New Method for Preparing Bomb Plots

b. *In Process*

EC-P34 Location of Japanese Administrative Centers

PV-P20 Effect of Fuzing on Bomb Detonation, Jap Industrial Targets

PV-P23 Relative Effectiveness of LC Bombs Against Selected Targets

PV-P28 Method of Zoning Japanese Urban Areas

PV-P40 Use of Azon and Rason

PV-P41 Evaluation of Attack on Naval Vessels in Kobe Harbor

PV-P42 Estimation of MAE of the 4 lb. Magnesium IB from a Study of British Attacks on German Targets

PV-P43 Building Size in Yawata and Nagasaki, Statistical Analysis of

PV-P44 Kobe Incendiary Attack, Weapon Effectiveness

Holders of JTG folders should insert this
sheet in Air Target Index - Japanese War.

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PROGRESS REPORT

FOR THE

MONTH OF MARCH

1945

I. PRODUCTION

1. Standard Material

a. Air Target System Folders and Air Target Index - Japanese War

- (1) During the month seven Air Target System Folders were distributed as follows:

Japanese Armament	1 Mar.
Japanese Electric Power	3 Mar.
Japanese Petroleum	8 Mar.
Japanese Urban Areas	16 Mar.
Typical Japanese Military Targets	19 Mar.
Japanese Chemical Industry	24 Mar.
Japanese Road and Rail Transportation	31 Mar.

- (2) Issuance of future Air Target System Folders is now scheduled as follows:

Japanese Shipping	21 Apr.
Typical Japanese Naval Targets	5 May

- (3) Addenda numbered three and four were issued to holders of ATSF's and Air Target Index - Japanese War on the seventh and twenty-first of the month. This schedule for addenda will be maintained monthly.

b. Damage Assessments and Repair Reports

- (1) Economic Damage Assessment Reports:

No. 6, Kawasaki Aircraft Co., Akashi Plant (Target No. 90.25-1547)
 No. 7, Hitachi Aircraft (Target No. 90.17-2009)
 No. 8, Tachikawa Aircraft (Target No. 90.17-292)

- (2) Preliminary Damage Reports:

No. 13, Kobe Urban Area
 No. 14, Hitachi Aircraft (90.17-2009)
 No. 15, Nakajima Aircraft, Koizumi Plant (Target No. 90.13-1545)
 No. 16, Tachikawa Aircraft (90.17-792)
 No. 17, Tokyo Urban Area
 No. 18, Aichi Aircraft, Eitoku Plant (90.25-1547)

- (3) Preliminary Repair Reports

No. 7, Kawasaki Aircraft, Akashi Plant (90.25-1547)

c. Other Material

- (1) Distributed:

9 cities covered by City Plans

HOLDERS OF JTG FOLDERS SHOULD INSERT THIS SHEET IN AIR TARGET INDEX - JAPANESE WAR - AFTER SHEET JTG/MPR/3

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