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Date 30 January 1945
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C O N F I D E N T I A L

JOINT TARGET GROUP, WASHINGTON, D. C.

31 January 1945

General Information

and

Request for Additional Intelligence

Concerning

The Electric Power Industry of Japan

This document, prepared by the Joint Target Group in collaboration with the Economic Section, Military Intelligence Division, WDGS, states the requirements of these agencies for intelligence concerning the Japanese Electric Power Industry as of the date of issue. It is suggested that after the recipient of this publication has received a copy of the Air Target System Folder that is to be issued by the Joint Target Group with respect to the Japanese Electric Power Industry, he destroy Part I of the present publication and insert Part II (the questionnaire) in the new folder. As conditions change and as new intelligence material is received in Washington, new questions will arise, and, therefore, revisions of, or supplements to, this intelligence requisition may be expected. If the Joint Target Group is informed of the name and organization of the utimate user of this document, efforts will be made to have copies of all revisions and supplements forwarded to the same person. It is hoped that this statement of intelligence requirements will be used as a guide by POW interrogators, personnel examining captured documents, investigators and others who may be able to increase the effectiveness of the above mentioned agencies by supplying needed intelligence.

Note: The Joint Target Group (staffed with personnel contributed by the U.S. Army and Navy, the Royal Air Force, the Office of Strategic Services, the Foreign Economic Administration, and the Office of Scientific Research and Development) has been established in the office of the Assistant Chief of Air Staff, Intelligence, AAF, with the functions of integrating and coordinating pre- and post- attack analyses of air targets in the air war against Japan. Its specific responsibilities are to assemble and analyze all available data on Japanese targets; to prepare and distribute target material for the use of planning agencies, commands, and combat units; to recommend target priorities; to prepare special studies for planning agencies; and to maintain field liaison with agencies using its target material.

I Characteristics of the Japanese Electric Power Industry

A. Military Importance:

Japan is dependent almost wholly on electric power for the operation of her industrial plants. Not more than 5% of power could be furnished by Diesel engines operated with oil or steam engines operated with coal. Substitution of manual labor for work done by electric energy would be slow, impracticable, and in most cases impossible.

The importance of an adequate supply of electric power is equally great in all the four areas where the great bulk of Japan's industrial activity is centered - Japan Proper, Manchuria, Korea, and Formosa. These areas have more than nine-tenths of the generating capacity and the production in all the areas controlled by Japan.

B. Pattern of Production:

1. Growth of Electric Power System in Japan Proper and Its Present Character

The growth of the electric power system in Japan Proper has been remarkable. During the past 15 years Japan has installed twice as much equipment in her power plants as she had installed in the previous 40 years.

The Japanese electric power supply has developed in accordance with available means of generating energy from steam and water fall. Where coal was readily available, or could readily be shipped, steam electric plants were erected, in which the steam turbine drives the generator. Thus large steam electric plants were built in Kyushu and along the Pacific Ocean coast of Honshu at Kobe, Amagasaki, Osaka, Nagoya, Yokohama, Tokyo, and other points.

Japan has many short swift rivers in central Honshu, suitable for hydro-electric exploitation. Diversion dams have been built to create the waterfall which, through penstocks, reaches the hydro turbines which drive the generator. For the past 15 years hydro capacity has consistently outstripped steam capacity. Pre-eminence of hydro capacity has caused Japan to depend, in the main, on hydro-electric generation for power supply. This, in turn, has meant dependence on rainfall. The dry and wet seasons in Japan are, therefore, an important reality from the point of view of electric power. The dry season generally extends from December through January, the balance of the year, except August, being wet season, although precipitation is not the same from month to month. The great proportion of hydro plants in Japan Proper are "run-of-river", that is, without water storage facilities. The Japanese endeavor to operate their hydro plants as far as water conditions permit, that is, on the average 4,000 to 6,500 hours a year, or about 46 to 74% of the time. Steam electric plants, on the other hand, function as long as coal stocks permit, during the dry season and longer, if the demands for power are large. Depending on the localities, steam plants operate from 1500 to 4700 hours a year, or 17 to 54% of the time.

2. Supply Areas:

There are seven electric supply areas in Japan Proper, of which Honshu has four - Osaka-Nagoya, Chugoku, Tokyo, and Tohoku. The islands of Kyushu, Shikoku and Hokkaido form separate supply areas.

The Osaka-Nagoya supply area includes the western parts of Toyama, Nagano, Yamanashi, Shizuoka; the prefectures of Ishikawa, Gifu, Aichi, Fukui, Shiga, Mie, Nara, Wakayama, Osaka, Kyoto and Hyogo.

The Chugoku supply area includes Okayama, Tottori, Shimane, Hiroshima and Yamaguchi.

The Tokyo supply area includes the southern parts of Niigata and Fukushima, the prefectures of Gumma, Tochigi, Ibaraki, Saitama, Tokyo, Kanagawa, Chiba and the eastern parts of Toyama, Nagano, Yamanashi and Shizuoka.

The Tohoku supply area includes the prefectures of Aomori, Akita, Twate, Yamagata, Miyagi and the northern parts of Niigata and Fukushima.

3. Transmission of Power

Transmission of power in Japan is fluid within each supply area but more rigid between supply areas, because of the inadequacy of the transmission network between supply areas. The difficulty is accentuated by the fact that the electric energy in Japan is generated at both 50 and 60 cycles. In general, the eastern portion of Honshu generates at 50 cycles, and the western portion generates at 60 cycles. The eastern and southern parts of Kyushu generate at 50 while the balance produces 60-cycle energy. Thus the Japanese are unable to shift large blocks of energy from one supply area to another, owing to the inadequacy of inter-area transmission lines, and the difference in cycles. Rotary converter equipment, which is used for converting energy from 50 to 60 cycles and vice versa, probably amounts to only 5% of total generating equipment. However, some equipment now used by the Japanese in the boundary prefectures between the Tokyo supply area and the Osaka-Nagoya supply area operates at both 50 and 60 cycles.

4. Manchuria

During the past 5 years (since 1939) Manchuria has more than doubled its total generating capacity. In 1939 production of energy depended entirely on coal. Since then there has been a remarkable increase in hydro-electric capacity, the principal developments being the Tafengman plant on the Second Sungari River, and the Suiho plant on the Yalu River. Another important development, on the Hun River, is being planned.

At present Manchuria still has twice as much steam as hydro capacity. The steam plants are supplied with coal from nearby coal mines. Since the hydro plants have water storage facilities, the annual operation of such plants may be as high as 6000 hours a year.

5. Korea

Korea, like Manchuria, has more than doubled its total generating capacity during the past five years. It also has had a notable increase in hydro capacity amounting to about 160% during this five year period, while steam capacity advanced only 30%. In addition to the Suiho plant (which furnished 2/5ths of its capacity to Korea and 3/5th to Manchuria) Korea has completed important hydro projects at Kyosen, Choshin and other points during the past ten years.

6. Formosa

Formosa was slow in electric power developments until the completion of Jitsugetsutan #1 hydro plant in 1934, and the Jitsugetsutan #2 hydro plant in 1937. The two plants are the main pillars of the island's power system, representing 46% of all the generating capacity of the island and 57% of its hydro capacity. High tension transmission lines carry power from these plants to the industrially important western, northern and southern parts of the island.

The island's largest steam plants - small relative to the hydro plants - are located at Keelung, Taihoku province, and Takao, Takao province.

7. Other areas under Japanese control

Production and utilization figures for these areas are not as reliable as they are for Japan Proper. For this reason, division of total energy into hydro and steam (and Diesel) for Malaya, Netherlands East Indies, Philippine Islands, and Burma is only approximate.

In the Occupied China area, extending from Peiping to Canton along the eastern coast, there is practically no transmission network. Each city is served by from one to six generating plants and the only reserve capacity is the normal percent set aside for contingencies.

In the Netherlands East Indies two networks furnish about 50% of capacity, mainly hydro-electric. The balance of the installed capacity is divided among a large number of isolated plants.

In the Philippine Islands, where there is a capacity of 150,000 kilowatts, roughly 50,000 are hydro; 30,000 are steam; and 70,000 are being driven by Diesel engines.

In Burma, according to present information, most of the normally available capacity is not functioning.

8. Power Shortages

Power shortages have frequently been reported from Japan Proper, but there have been no such reports, on the whole, from Manchuria, Korea and Formosa. The latter three areas appear to have sufficient capacity for the production of all requisite power and in the case of Korea (and possibly Manchuria) there may be an occasional abundance of power. Shortages of power in Japan Proper have been due chiefly either to unseasonal dryness,

impairing the operation of the hydro plants, or lack of suitable coal, impairing the operation of the steam plants.

Some of the capacity, especially steam, has undoubtedly been decommissioned in recent years and replaced with new capacity. Since Pearl Harbor, it is believed that Japan has not been able to fill more than 50% of its needs for new generating equipment. However, it is believed that Japan Proper has at present enough usable capacity to generate all required electric power, provided favorable conditions prevail, i.e. sufficient rainfall and sufficient supplies of suitable coal.

C. Process for Generating Electric Power

Electric energy is generated from motive power caused by waterfall, steam, or oil.

In the case of waterfall (hydro-electric plants), the impact of the rush of water coming down the penstocks and reaching to the turbine blades causes the turbine to revolve at a high speed. The generator, mounted on the same shaft, by the mutual effect of the generator armature and its magnetic field, converts the mechanical energy of the turbine into electrical energy. Penstocks are long pipes, one or several in number, which come down the slope from the surge tank (which regulates water flow) to the plant situated at the base. Other features of a hydro plant are the dam itself and the tailrace - flow leaving the plant.

In the case of steam (steam-electric plants), high-pressure steam produced in the boilers drives the steam turbine which in turn drives the generator. Steam plants are almost invariably located by a body of water and have large coal yards with piles of coal and slip hoists for conveying coal.

Energy produced by Diesel-driven generators in Japan-held areas is relatively unimportant. In this case mechanical energy is provided by the diesel-driven engines.

D. List of Plants

Hydro and Steam Plants (50,000 kilowatts and over)
Japan Proper, Manchuria, Korea, Formosa

Location	Plant	Capacity	
		Steam	Hydro
JAPAN PROPER			
Prefecture	Honshu		
Hyogo	Amagasaki #2	375,000	-
Hyogo	Amagasaki #1	318,000	-
Aichi	Meiko	212,000	-
Kanagawa	Tsurumi	178,500	-
Niigata	Shinanogawa	-	177,000
Niigata	Senju	-	150,000
Hyogo	Amagasaki	140,000	-
Aichi	Nagoya Karyoku	144,000	-

Location	Plant	Capacity: Steam	Capacity: Hydro
JAPAN PROPER (Cont'd)			
Prefecture	Honshu (cont'd)		
Kanagawa	Tokyo	112,000	-
Kanagawa	Tokyo Karyoku	105,000	-
Shizuoka	Konagai	-	92,000
Toyama	Kurobe #3	-	90,000
Tokyo	Senju	-	84,000
Hyogo	Shikama #3	77,000	-
Okayama	Samban	75,000	-
Toyama	Komaki	-	72,000
Yamaguchi	Ube #2	75,000	-
Toyama	Kurobe #2	-	65,000
Osaka	Kasugade #1	63,000	-
Osaka	Kasugade #2	65,000	-
Osaka	Kuzugawa	63,000	-
Shizuoka	Oikawa	-	62,000
Gumma	Saku	-	61,500
Kanagawa	Kawasaki	60,000	-
Niigata	Toyomi	-	45,000
Nagano	Yasuoka	-	52,500
Hiroshima	Saka	51,000	-
Fukushima	Shingo	-	51,500
Toyama	Yanagawara	-	50,700
Shizuoka	Kambara	-	50,000
	Kyushu		
Fuokuka	Minato	209,000	-
Fukuoka	Tobata	162,000	-
Fukuoka	Yawata (Imperial Steel Works #4)	124,600	-
Fukuoka	Shin Karyoku	104,000	-
Fukuoka	Kokura #2	78,000	-
Fukuoka	Najima	60,000	-
Fukuoka	Kokura	50,000	-
Miyazaki	Tsukabaru	-	50,000
	Hokkaido		
Hokkaido	Shimisuzawa	74,500	-
Hokkaido	Uryu	-	51,000
Hokkaido	Ebetsu	50,000	-
MANCHURIA			
Province	Manchuria		
Fengtien	Fushun (3 plants)	342,000	
Kirin	Sungari (Tafengman)	-	360,000
Antung	Suiho (see Korea)	-	270,000
Chinchow	Fuhsin	160,000	-
Kwantung	Dairen (3 plants)	135,000 1/	-
Fengtien	Hunho (Mukden reserve)	159,000 1/	-
Fengtien	Penhsihu (3 plants)	120,000	-

Location	Plant	Capacity: Steam	Capacity: Hydro
MANCHURIA (Cont'd)			
Province	Manchuria (Cont'd)		
Fengtien	Anshan (2 plants)	129,000	-
Tunghua	Tungpientao	71,000	-
Kirin	Shulan	72,000 1/	-
KOREA			
Province	Korea		
S. Kankyo	Choshin-ko (4 plants)	-	342,000
S. Kankyo	Kyosen-ko (4 plants)	-	355,000 2/
S. Kankyo	Fusen-ko (4 plants)	-	200,000
N. Heian	Kokai (2 plants)	-	189,000
N. Heian	Suiho (see Manchuria)	-	180,000
Kogen	Kan-ko (2 plants)	-	170,000
Kogen	Neietsu	100,000	-
Kogen	Sanchoku	50,000	-
FORMOSA			
Taichu	Jitsugetsutan (2 plants)	-	143,500
Taichu	Tenrei	-	98,000
Taichu	Toyohara	-	70,700

II Questionnaire on Japanese Electric Power Plants

A. Concerning Steam-electric Plants (listed below):

1. What kind of coal is used (BTU per pound)? Where does it come from, and has there been a shortage of coal?

2. What is the plant factor - average capacity used as percentage of total installed?

3. What is the load curve for any period available?

4. Has the plant been expanded recently?

5. Do you know the size of individual generating units and total capacity?

6. Into what network is the power fed and what are the major consumers?

7. What is the thermal efficiency of the plant?

8. Does the plant shut down entirely at any time (outside of reasons of breakdown)?

9. Has anything been done to camouflage the plant?

1/ No definite information as to operation of this plant.

2/ Some 140,000 kw of this capacity is presumed to be in operation, but may not be.

List of Plants

Amagasaki No. 1, Honshu
Amagasaki No. 2, Honshu
Amagasaki (no number), Honshu
Nagoya Power Plant, Honshu
Tobata Plant, Kyushu
Tsurumi Plant, Honshu
Tokyo Plant, Honshu

B. Concerning Hydro-electric Plants (listed below):

1. Size and number of units installed.
2. Load demand by month and hour of the day.
3. Have new transmission lines been constructed recently in Manchuria, and if so, with what points in the Manchurian network do they connect?
4. What factories in what areas of Manchuria are the major consumers of the energy generated at this plant?
5. Does the plant function the year round?
6. Has anything been done to camouflage the plant?

List of Plants

Kirin Hydro-electric plant at Fengman (or Tafengmen)
Suiho Hydro plant on Yalu River
Shinano Hydro Plant, Honshu
Senju Hydro Plant, Honshu
Yanagaware Hydro Plant, Honshu
Jitsugetsutan No. 1 Hydro Plant, Formosa
Jitsugetsutan No. 2 Hydro Plant, Formosa
Tenrei Hydro Plant, Formosa
Toyohara Hydro Plant, Formosa

C. Concerning Substations (listed below):

1. How many and what size transformers has the substation?
2. Voltage of the transmission lines over which they receive and transmit energy?
3. From what plants is the energy received?
4. To what primary or secondary substations is the power forwarded?
5. Do you know of any measures taken to protect transformers against air attacks?

List of Plants

Amagasaki substation
Osaka substation
Anshan substation (Manchuria)
Inuyama substation
Iwakura substation
Kawasaki substation
Asahi substation
Inawashiro substation
Sasazu substation

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JOINT TARGET GROUP, WASHINGTON, D. C.

31 January 1945

General Information

and

Request for Additional Intelligence

Concerning

The Aircraft Industry of Japan

This document, prepared by the Joint Target Group in collaboration with the Air Industry Section, Military Intelligence Division, WDGS, states the requirements of these agencies for intelligence concerning the Japanese Aircraft Industry as of the date of issue. It is suggested that after the recipient of this publication has received a copy of the Air Target System Folder issued by the Joint Target Group with respect to the Japanese Aircraft Industry, he destroy Part I of the present publication and insert Parts II and III (the questionnaires)in the new folder. As conditions change and as new intelligence material is received in Washington, new questions will arise, and, therefore, revisions of, or supplements to, this intelligence requisition may be expected. If the Joint Target Group is informed of the name and organization of the ultimate user of this document, efforts will be made to have opies of all revisions and supplements forwarded to the same person. It is hoped that this statement of intelligence requirements will be used as a guide by POW interrogators, personnel examining captured documents, investigators and others who may be able to increase the effectiveness of the above mentioned agencies by supplying needed intelligence.

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I. CHARACTERISTICS OF THE JAPANESE AIRCRAFT INDUSTRY

A. Military Importance. The role of the Japanese aircraft industry in the Japanese war economy is so obvious that comment is unnecessary. One point might be stressed: there is believed to be a minimum time lag between the production of most operational models and their shipment to and use in first line units.

B. Structure of the Industry.

1. Four major companies dominate Japanese aircraft and aero-engine production. The two largest of these account for over half of combat plane output and four-fifths of the engines produced for these combat aircraft. Production of aircraft components is likewise dominated by a few large concerns.

2. Aircraft and aero-engine production is also believed concentrated in a few large plants, although the information on which this conclusion is based is not entirely satisfactory. Almost 90 percent of combat aircraft are currently believed to be manufactured in some half-dozen plants although the extent to which these plants are dependent upon subsidiary factories and subcontractors is not definitely known. About 90 percent of aero-engines are estimated to be finished in four large plants.

3. Available intelligence and available photographic cover support the belief that the dozen or so principal plants are extremely large and modeled more on American large-scale plant layout than on the German and British dispersal pattern. For example, photographs of the Nakajima plants at Musashino reveal that the Army and Navy plants are adjacent to each other and that both occupy highly built-up site areas. Similarly, available cover and ground intelligence strongly suggest a similar concentration of both plant area and fabrication processes in the airframe industry.

C. Principal Plants - Engine

Company	AAF Target No.	Plant	Location
Nakajima Hikoki	90.17-357	Musashino (Army) Tama (Navy)	Tokyo-Fu Kitatama-Gun Musashino-Cho
Mitsubishi Jukogyo	90.20-193	Nagoya Hatsudoki	Aichi-Ken Nagoya-Shi Higashi-Ku
Kawasaki Kokuki	90.25-1547	Akashi	Hyogo-Ken Akashi-Gun Hayashizaki-Mura
Aichi Kokuki	90.20-2010	Nagoya	Aichi-Ken Nagoya-Shi Minato-Ku
Airframe			
Mitsubishi Jukogyo	90.20-194	Nagoya Kokuki	Aichi-Ken Nagoya-Shi Minami-Ku
Nakajima Hikoki	90.13-1545	Koizumi	Gumma-Ken Ora-Gun Koizumi-Machi

Nakajima Hikoki	90.13-1544	Ota	Gumma-Ken Nitta-Gun Ota-Machi
Kawasaki Kokuki	90.20-240	Kagamigahara	Gifu-Ken Kagamigahara
Aichi Kokuki	90.20-1729	Nagoya	Aichi-Ken Nagoya-Shi Minato-Ku

D. Production Processes and Important Facilities

1. Airframes. Briefly stated, there are four principal stages in airframe fabrication. These are: Metal Fabrication, Bench or Detail Work, Subassembly, and Final Assembly.

a. Metal Fabrication. After reception of raw sheets, forgings and extrusions, metal is cut, then machined or pressed or hammered or stretched into its required shape. Besides machining and press shop facilities, heat treating equipment is utilized.

b. Bench or Detail Work. In this stage the parts made in stage #1 are finished, holes are drilled in metal, small parts are put together; these processes include welding and polishing.

c. Subassembly. In this stage the parts from stages a. and b. are assembled into those larger parts which in turn are assembled into the major parts (components) of the airframe. In this stage the relatively vulnerable jigs (frames in which parts are held in their proper relative position during machining and assembly) are used to make certain every part will be interchangeable with similar parts made before and after it. Unlike the two preceding stages, this stage of fabrication is divided among the major airframe components, and there is a wing section or shop, a fuselage shop, etc. As was mentioned above, the final fabrication process in this stage is the assembly of the finished parts into the completed component.

d. Final Assembly. In this stage the completed components are assembled together; motors, tires, armament are added and the finished airplane is ready for flight testing.

2. Engines. There are three main processes in engine fabrication.

a. The first is mainly one of machining the many parts that make up the engine. In a modern plant two main machining processes may be distinguished:

(1) Parts Fabrication. This process involves a linear movement of the part being machined so that the raw forging or castings (which are usually not made at the engine plant) entering at one end, emerge at the other end as finished engine parts (components). This necessitates that (i) several types of operations be done in sequence and (ii) that, to insure maximum production, only one part be made on any production "line". Thus a production line for crankshafts or connecting rods, etc. will each have its own turning, milling and grinding operations. The finished parts are assembled on the main assembly line. In the most modern plants highly complicated machines capable of performing many operations may be used in these lines.

In any case, even the more simple (and hence more flexible) machine tools will have special jigs and fixtures to permit the most rapid alignment of the work.

(2) General Machining. Almost all engine plants have a few general machining departments where miscellaneous grinding, drilling, etc. are done. These departments thus have a concentration of similar type tools - there will be a grinding department, a lathe shop, etc.

The steel parts - crankshaft, connecting rods, gears, etc. - are generally isolated from the aluminum/magnesium alloy departments where cylinder heads, pistons, etc. are machined.

An important part of the machine shop is the tool room where the cutting tools are resharpened, jigs and fixtures made, gauges adjusted, etc.

b. Assembly. Some parts, such as radial engine cylinders and cylinder heads are usually made into subassemblies before reaching this production stage. Most sub and final assembly occurs at one point however. For an aero-engine this is relatively simple and can be done in a matter of a few hours.

c. Testing. Engines are tested for performance characteristics in special houses. These tests usually last four to eight hours and afterwards most plants tear down their engines, inspect them, reassemble them and test them once more. This tear down and inspection stage may be done near the assembly process or it may be some distance away. The test beds are generally of two basic kinds - the "hangar type" in which the engine turns a heavy wooden propeller and the "dynamometer type" where the engine is geared to an electric generator. The former type can usually be recognized from the air by the one or two stacks (air inlet or exhausts) for each individual test cell.

3. Vulnerable Processes. For both airframes and engines, the equipment used in the fabrication and subassembly stages are the more difficult to replace. The jigs used in subassembly are more vital than the simple and small machine shop of the airframe plant, and the machine tools of the engine plant (which generally utilize 40 percent or more of the entire plant) are the vital equipment used in engine fabrication.

E. Subcontracting. Many plants - both engine and airframe - are not "integrated" and do not make the entire product. Subcontracting generally starts with the smaller items - control surfaces, wing tips, etc. for aircraft plants, with small steel parts (rockers, bolts, etc.) playing a comparable role in engine plants. As the amount of subcontracting increases larger parts are "farmed out" until one finds whole wings or crankshafts being made away from the parent plant.

There are some items which even "integrated" plants do not make - an airframe plant thus does not make instruments, tires, armament, radio equipment, etc. An engine plant does not make such accessories as magnetos, generators, carburetors, spark plugs, etc.

Propellers are generally made in separate plants devoted to their fabrication. These are sent directly to the airframe assembly plant.

II. QUESTIONNAIRE ON JAPANESE AIRCRAFT INDUSTRY

A. General.

1. Company Name - Kanji (Japanese name in characters), Romaji (Japanese name in Roman letters), and English.

2. Plant Name - Kanji, Romaji and English.

3. Location. Fix location on map; give geographical coordinates; and, in Kanji, Romaji, and English state:

   a. Administrative area (Ken)

   b. County (Gun)

   c. City or town (Shi or Machi)

   d. Part of city (Ku and Cho)

4. Landmarks. Note the location of any landmarks, such as tall buildings, mountains, lakes, roads, rail lines, rivers, bridges, etc., which will facilitate recognition from the air.

5. Other Plants of Company. Give names and location in Kanji, Romaji, and English.

B. Physical Plant Features.

1. Area. Describe general shape of plant site and give estimates of:

   a. Total plant area.

   b. Total ground area covered by buildings.

   c. Floorspace.

   d. Area devoted to machine shops, component erection, final assembly, and post assembly, respectively.

2. Buildings and Installations.

   a. Number of buildings.

   b. Identification. Using a rough sketch, identify each building, stating the use made of it, i.e. storage of engines, cafeteria, offices, etc., and describing the exact production operations taking place therein.

   c. Erection date of each building or relative ages.

   d. Proximity. Describe the geographic location of the buildings with respect to one another using a rough sketch for this purpose. If all the buildings are not in immediate proximity, locate each of the buildings situated away from the plant site.

   e. Structural details of each building.

      (1) How big is building (dimension each way)?

      (2) How high is building from ground to eaves? To ridge?

      (3) How many floors does building have? What is height from floor to floor?

(4) Of what material is each of the floors constructed? How thick are floors?

(5) If building has more than one floor, are the floors supported by columns inside the building?

(6) Is the roof supported by columns inside the building?

(7) At what distance are the columns spaced, in each direction?

(8) How thick are the columns? Of what material are they made?

(9) Do the columns flare out at the top?

(10) Of what materials are partitions inside the building made?

(11) How thick are these partitions? Are openings protected by automatic fire doors?

(12) Of what material are the outside walls constructed?

(13) How thick are the outside walls? Are openings protected by automatic fire doors?

(14) Are there many windows in the outside walls? How big are these windows? Are they wire glass or protected by fire shelters?

(15) Are the outside walls made of smooth or of corrugated material?

(16) Are columns visible in the outside walls either from inside or outside the building?

(17) Of what material is the roof made? How thick is the roof?

(18) Are the trusses and framing supporting the roof visible from inside the building?

(19) Of what material are these trusses and framing made?

(20) What is the shape of the roof? Sketch shape of roof, showing way in which it slopes.

(21) Are windows or sky lights set into the roof? There? How big?

(22) Does building have overhead cranes?

(23) How big are these cranes, span? Lifting capacity?

(24) Are there any underground working areas? Describe and locate them if possible.

(25) To what extent is timber used in construction of this building? Has timber been used to replace steel in any way?

(26) Are special hazards cut-off or protected, i.e., are paint spraying, dipping, dope rooms, etc., separated by fire walls or substantial partitions from other operations?

f. Fire protection facilities.

(1) Does plant have own fire department? State any known details concerning organization, efficiency, motorized equipment, number of pumping engines, total capacity, quantity of hose, and size of hose.

(2) Describe static water supplies, stationary pumps, and total water capacity.

(3) Describe yard hydrant system including size of mains, spacing and size of hydrants. Is system connected to public water system? If so, what is size of connection and pressure?

(4) What is the distance to nearest public fire department? Are public hydrants availabe? How many within 500 feet of the plant? Size of public mains adjacent to plant and water pressure of same?

(5) Does building have automatic sprinklers for fire protection? What is spacing of hand fire extinguishers or fire pails? Inside hose equipment?

3. Equipment and Utilities.

a. Number, description, rated capacity, and location, of each of the principal types of machine tools: main fuselage jigs, wing jigs, etc. Machine tools include but are not limited to: drop hammers, hydraulic presses, lathes, turret lathes, automatic screw machines, millers, planers, drillers, honers, broachers, shapers, grinders (break down by type), profilers, duplicators, gear cutters, power brakes and punches, shearers, stretchers.

b. Description of plant transportation system including all gantry cranes, conveyors, etc.

c. Description and location of heat and power equipment. Are alternative sources of heat and power available?

4. Testing.

a. Airplane plants:

(1) Location of test flying field.

(2) If field is not located adjacent to the plant describe how planes are taken to the field.

(3) Location and size of wind tunnels if any.

(4) Location of armament sheds, flight sheds, storage sheds, etc.

b. Engine plants:

(1) Location and number of engine test cells.

(2) Number of stacks showing.

5. Camouflage.

6. Miscellaneous.

a. Combustibility of contents.

(1) What percent of floor space is occupied by combustible contents? (Include both equipment and stock).

(2) Are combustible contents concentrated or widely dispersed?

(3) What is nature of combustible contents?

b. Cleanliness of plant.

(1) What are the housekeeping conditions of the plant (with particular reference to the collection and disposal of combustible waste materials)?

(2) Are floors oily or greasy?

C. Employment.

1. Number of Employees.

a. On all shifts. (This will seldom be known by a PW who had not worked in the administrative offices of the plant).

b. On same shift as PW.

c. In PW's department.

d. Doing same job as PW.

2. Number or percentage of female employees.

3. Shifts.

a. Number of shifts per day.

b. Hours for each shift.

c. Number of employees on each shift.

D. Production.

1. Principal products or activity.

a. Pre-war products.

b. Present products.

(1) Aircraft. With respect to each type of aircraft produced.

(a) Code designation, i.e., ki number in case of Army planes and code group (A6M5) and experimental designation in case of Navy planes, also any other name by which aircraft is known.

(b) Sketch of aircraft.

(c) Dimensions and description.

(d) Any available performance figures.

(e) When did aircraft go into production?

(f) Is it about to be replaced? If so, by what?

(g) Number and type of engines. At what plant are they manufactured?

(2) Engines. With respect to each type of engine produced.

(a) Code designation, i.e., ha number for Army and code group (MK6A) for Navy engines.

(b) Is it air-cooled or liquid cooled?

(c) How many cylinders?

(d) When did engine go into production?

(e) To what plants are completed engines delivered?

(f) In what planes are engines installed?

(g) Is production of this engine about to cease? If so, what engine will take its place?

2. Rate of output.

a. Maximum capacity for production of each type of aircraft or engine.

b. Actual output of each type during any stated period (give basis of production estimate).

c. Number and types of parts produced by FW during a week; number produced by FW's department.

d. Production of what parts is abundant? Scarce? Holding up the finished product?

e. Has shortage of raw materials hold up production? If so what?

3. Extent to which other plants are supplying parts and components to this plant.

a. Name and locate all subcontractors, including other plants of the company supplying parts to the plant.

b. Identify each part supplied with the supplier.

c. The number of each item being supplied. What proportion is this of total requirements. If less than 100 percent where is the remainder obtained.

d. Are the subcontracted parts plentiful or do they constitute a production bottleneck? What is the average time interval between receipt of parts and their installation.

e. Identify the maker of the following parts. Where the producer is an outside plant, give name and location.

Airframe

Center Section
Fin
Stabilizer
Rudder
Elevator
Flaps
Ailerons
Leading edges
Floats
Propellers
Engines
Cooling Equipment
Arrester Gear
Hydraulic Equipment
Tanks
Gas

Engines

Rough Forgings and Castings
Cylinder heads and barrels
Magnetos
Carburetors
Ignition harnesses
Bearings
Superchargers
Crankshaft

Trailing edges
Wing tips
Cowling (Fairing)
Nacelles
Pilot enclosure

Firewall
Engine mounts
Oleo struts
Wheels

Oil
Hydraulic
Coolant
Bearings
Fire Extinguisher Equipment
Turrets
Fire Control Equip.
Pilot Seat
Radio

Generator
Filters
Valves
Piston Rings

Pistons and Pins
Starters
Fuel Pumps
Crankcases
Connecting Rods
Rocker Arms
Gears
Manifolds
Spark Plugs

4. Extent to which plant is supplying parts and components to other plants.

a. Name and production of such parts.

b. To whom are they being supplied.

5. If plant is engaged in modification and/or repair work.

a. What planes or engines are involved.

b. Describe the operations performed.

c. What is the plant capacity.

6. Where do raw materials come from?

E. Production Methods.

1. Type of production.

a. Are the major parts manufactured along an assembly line either moving continuously or at stated intervals, or are several production steps performed on a part in the same location either by the same or by a different group of employees?

b. Is each major part manufactured in a separate section of the plant or are several parts manufactured together?

2. Multiplicity of models: Where more than one model is being made, is production of each model kept separate or are certain parts for more than one model made in the same shop? If the latter, to what extent? (For example: Are the wings of two different planes or cylinder barrels of two different engines both produced in the same department or is their production carried on in two departments. Usually, metal cutting and forming, anodizing (finishing to prevent corrosion) and heat treatment are "common" processes whereas sub and final assembly are usually performed independently, although there are some instances where different model planes are assembled on the same line.)

3. In plant transportation:

a. Describe how raw stock, small parts and similar items are brought to the worker and how the airplane sections are moved from one area to another.

b. Are there overhead conveyor belts or cranes?

c. Must the workers go to the stockrooms for securing small parts or are these packaged and brought to the worker?

4. Storage and stock rooms. (Number and location of general stock rooms should be shown).

a. What proportion of a month's requirements of the following type items are kept within the plant: raw stock (forgings, castings, aluminum sheets, extrusions) small parts (nuts, bolts, screws, rivets) subcontracted items (often but not always wing tips, ailerons, landing gear, flaps) purchased parts and Government Furnished Equipment (carburetors, magnetos, propellers, engines)?

b. Howare the parts awaiting fabrication stored?

c. What percentage of a day's or week's work is piled up awaiting fabrication and what percentage remain after fabrication, i.e., how quickly are they moved to the next process?

5. Machine Tools.

a. Are machine tools general purpose or specialized for a specific job?

b. Is there any shortage of machine tools; if so what types?

c. What difficulties if any have been met in repairing machine tools?

d. What reserve of machine tools exists?

e. Are machine tools arranged by purpose or process, i.e., are all drillers together, all millers together, etc., or are the various machine tools dispersed according to where they are required?

f. Howare the machine tools powered? Are they belt driven or driven by motors in the machine.

6. Final Assembly.

a. Sketch the final assembly line showing the number of planes or engines on the line at any one time and the stages at which the various aircraft parts are joined to the fuselage.

b. How do planes and engines move along the final assembly line?

c. Where are parts awaiting assembly stored?

d. How many planes do the parts stored at any one time represent?

7. Inspection.

a. Describe the inspection which takes place during the construction of a plane.

b. What are the various inspection marks used by plant inspectors, government inspectors?

c. Where do these marks appear?

d. Are inspectors limited to inspecting one or a few parts, or are they likely to inspect any and all parts of a plane?

e. Where more than one model is being produced do inspectors ever inspect parts of several models?

f. Does an inspector move from one plant of a company to another; if so, does he maintain the same inspection stamp.

8. Nameplates.

a. What parts of a plane receive nameplates?

b. At what stage in their manufacture are these nameplates added?

c. Does the nameplate of the manufacturer of subcontracted items and purchased parts appear on such items or does the plant put its own nameplate on them?

d. Where a company has several plants, will the same nameplate be used at all plants or is an attempt made to individualize the nameplates of each plant?

9. What processes presented the most difficult production problems? Describe fully including the steps taken to alleviate such problems.

10. Number of engine test runs and time required for each run. Time required for installing and demounting engines from test cells.

F. Analysis of PW job.

1. Description of job: This should be a detailed study of PW's job describing the exact work performed. Include:

a. Number of other persons doing the same or similar work.

b. Tools, jigs, and fixtures used.

c. Part of the plant in which work was performed.

d. Method and place from which parts worked on came and where they were sent after finishing.

G. While there is a considerable body of intelligence on Japanese aircraft production, the location of plants and the output of the more important ones, there are many unanswered questions concerning conversion of old plants and construction of new plants, development of new types of aircraft experimental laboratories, etc. The subject which might be developed includes:

1. New plants engaged in manufacture of aircraft, engines or components.

2. Old plants converted to manufacture of aircraft, engine or components.

3. Development of new types of aircraft. Type, where developed, progress, characteristics, when expected to be operational, etc. (Any plant with a wind tunnel can be expected to carry out experiments.)

III. QUESTIONNAIRE ON REPAIR AND MODIFICATION CENTERS

A. General information on airfields doing repair, modification and inspection or installing equipment on combat aircraft.

NOTE: These questions are designed to bring out needed information on repair, modification, inspection, etc. of Japanese aircraft. This detail is needed by J.T.G. on only those airfields which perform such functions.

1. Name: Kanji, Romaji, and English.

2. Location.

   a. Fix location on map.

   b. Address: Ken, Gun, Shi or Machi, Ku or Cho.

   c. Landmarks for identification from the air.

3. Physical Features: Sketch airfield and buildings.

   a. Area.

      (1) Airfield site.

      (2) Each building.

      (3) Length of runways.

   b. Identification of buildings.

      (1) Processes taking place in each.

      (2) Equipment in each building.

      (3) Structural details.

      (4) Camouflage.

      (5) Fire protection faciltics - sprinklers, inside hose equipment, static water supplies, external hydrant system, water pumping capacity.

4. Employment.

   a. Total number employed at the airfield.

   b. Number of skilled mechanics.

B. Production Activity.

   1. Scope of Activity.

      a. Type of repair and/or modification work normally performed at the airfield. Include not only the main types involved, such as airframe, engines, etc., but also a breakdown, such as all airframe, or wings and empennage: or all engine, or crankcases, or cylinders, etc.

      b. Name of planes, engines, propellers, etc., serviced at the airfield:

         (1) Regularly.

         (2) In emergency.

      c. Is the airfield a regularly established repair and/or modification center or does it perform such work only in emergencies?

      d. Number of planes undergoing repair/modification normally at the airfield at any one time. Distinguish between such planes and planes stationed at the airfield for combat or other reasons.

e. Number of planes, engines, propellers, etc., normally repaired/modified per month.

f. What determined whether damaged aircraft were repaired at the airfield, cannibalized at the field, or sent elsewhere for repair? To what other places were damaged aircraft sent?

2. Supplies.

a. Type and number of spare parts normally available at the airfield for repair/modification. What proportion of a month's requirements? How supplied: from where? delivery?

b. Are completed spare engines and/or propellers stored at airfield? In what proportion to operational aircraft based or normally cared for at the field? How are the engines or propellers brought in? From where?

c. Type and number of machine tools and other equipment at the airfield. Location by building. Extent to which such equipment is utilized; excess reserves.

d. Number of engines and/or propeller test cells. Number of engines or propellers tested per month/per cell. Number and duration of test runs given. Are all engines given test runs or only those undergoing repair.

e. Extent to which aircraft were cannibalized? What determined whether cannibalization took place. Were parts available from cannibalization interchangeable completely or only after further machining and handwork?

C. Operational Information.

1. Serviceability.

a. Number of flight hours before regular overhaul of airframes, engines, etc.

b. Non-combat loss of aircraft compared with operational losses.

c. Usual length of time required to make "regular", "special" repairs/modification. Break down specifically by types of work. Length of time planes undergoing repairs/modification remain at airfield.

d. What was the approximate time required to repair superficial combat damage to airframes? Engines? Serious damage to airframes? Engines?

e. Proportion of damaged aircraft successfully repaired.

31 January 1945

Specific Aircraft Plant Questionnaire No. 1

NAKAJIMA AERO-ENGINE, OGIKUBO (TOKYO) PLANT
Tokyo-Fu, Suginama Ku, Yado Mashi
AAF Target No. 90.17-356

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Target Illustration No. 90.17-356, P3.

a. Structural analysis of each of the numbered buildings.

b. Identification of production in each of the numbered buildings including the type of engines concerned.

c. What is the explanation for the raised roof on building 7?

d. Are there any engine test cells at the plant?

3. Production.

a. What are the principal products of the Ogikubo plant? (It is known that this plant formerly manufactured Nakajima's Navy engines. Recent reports, however, suggest that all Navy engines are now manufactured at Nakajima's Tama plant and the Ogikubo plant is manufacturing only aero-engine parts.)

b. What was the output during any stated period (e.g. June 1944) of each of the main products manufactured here? Who are the principal consumers?

c. Is any distinction made in the markings of those parts manufactured for both Army and Navy aero-engines? Is their production kept separate?

d. What type of experimental work and research is being done at the plant?

e. Since there are no apparent engine test cells at the plant, where are engines tested? If away from the plant are they brought back for dismantling after testing?

4. Relationship to other Plants.

a. What is the relationship between the Ogikubo plant and the Nakajima Musashino-Tama (Musashi) aero-engine works, the Nakajima Tanashi Foundry, and a reported Nakajima aero-engine plant in Hamamatsu?

b. From where do castings and forgings come?

c. Is there any connection between the Ogikubo plant and the Ishikawajima aero-engine works in Yokohama which also appears to be manufacturing a Nakajima engine?

d. When the Musashino, and later, the Tama plants were completed were machine tools and other equipment moved from the Ogikubo plant to these plants?

NOTE: It is important to tie the answers to these questions to specific dates.

31 January 1945

Specific Aircraft Plant Questionnaire No. 2

NAKAJIMA AIRCRAFT, KOIZUMI PLANT
Gumma-Ken, Ora-Gun, Koizumi-Machi
AAF Target No. 90.13-1545

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Target Illustration No. 90.13-1545, P3.

a. Structural analysis of each of the numbered buildings.

b. Identification of process and plane type concerned for each of the numbered buildings.

3. Production.

a. Type, output during any stated period (e.g. June 1944) and date at which manufacture started, of each of the planes produced at the plant.

b. Types previously manufactured at plant; their maximum monthly output; date on which maximum rate of output was attained; and dates at which manufacture started and ceased.

c. From the plant layout it appears that the plant is primarily devoted to major components sub-assembly and final assembly and that much of the small parts fabrication and minor plant sections are obtained elsewhere? Is this interpretation correct? If so, what parts are secured elsewhere?

d. Is the 4-engine bomber Liz (or a successor) still being made at the plant?

e. Rufe production is reported to have been transferred to the Handa plant of Nakajima. Is this correct? Have any other plane types been transferred to Handa? There is some possibility that Jill may have been sent there.

4. Relationsip to other Plants.

a. See Specific Aircraft Plant Questionnaire, Nakajima Aircraft, Ota Plant: 90.13,1544, Item 4.

b. Location, size, and other relevant details of plants supplying aero-engines and propellers. Are all Nakajima-engines now supplied by the company's Tama (Musashi) Plant or does the older Tokyo (Ogikubo) plant still supply some engines? If so, which ones?

c. What is the relationship of Nakajima's Handa plant with this plant?

d. What is known about a reported Nakajima plant in Utsunomiya manufacturing parts for Naval aircraft. Location, size type and number of parts produced?

e. What production work is performed at the airfield to the north of the plant?

f. Wing tips of Nakajima Zeke aircraft bear the name Kumagaya Koku Kogyo. Where is this plant; what is its size; what other aircraft products are being produced and what other aircraft plants are being supplied by it? Is the this the same plant as the reported Nakajima plant in Kumagaya?

g. Ailerons and flaps of Nakajima Zeke aircraft bear the name Nippon Kentetsu Kogyo. Where is this company? What is the size of its plant? What other aircraft products does it manufacture and what other aircraft plants does it supply?

NOTE: It is important that the answers to these questions be tied to specific dates.

31 January 1945

Specific Aircraft Plant Questionnaire No. 3

NAKAJIMA AERO-ENGINE, MUSASHINO-TAMA (MUSASHI) PLANT
Tokyo-Fu, Kitatama-Gun, Musashino-Cho
AAF Target No. 90.17-357

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Target Illustration No. 90.17-357, P3.

a. Structural analysis of each of the numbered buildings. (Construction details of two-storied Tama plant buildings are particularly desired).

b. Identify the functions and the type of engines involved in each of the numbered buildings. (Information concerning the use of the second story of each of the buildings of the Tama plant is particularly desired).

c. After the construction of the Tama plant, did the Musashino plant remain as a self-contained unit devoted largely to Army engines or were the production processes of the two plants integrated and harmonized so that all production of one type of parts such as cylinders takes place in one plant while all production of some other parts takes place in the other plant? Is assembly of Army and Navy engines kept separate?

d. How much and what types of production are being performed underground as has been reported? Under which buildings are these operations done?

e. Where are the raw materials and stocks awaiting processing at at the Tama plant stored? (There appears to be inadequate storage space for the Tama plant and only one railroad siding apparently used for raw material delivery).

f. The building immediately south of building 6 and west of building 11 exhibits a peculiar roof pattern. It would be helpful to have this building identified and the reasons given for its roof pattern. The second building to the south of this building also has a peculiar roof pattern. What is the reason for this roof pattern? Is this building a power plant?

g. Have all the engine test cells been correctly identified? How many test cells are there in each of the buildings? Are any of the buildings at the Musashino plant test cells? Do any engines go to the Tanashi Foundry for testing? If so, are these engines then brought back for inspection?

h. Are the machine tools in the Tama Plant mainly of Japanese or American make?

i. What type of buildings and production are planned for the expansion area east of the Musashino plant?

3. Production.

a. Type, output during any stated period (e.g. June 1944), and date when manufacture was first started of aero-engines being produced at the Musashino unit and at the Tama unit.

b. Type of aero-engines previously manufactured at these plants. During what period were they manufactured? Maximum monthly output rate? When was the maximum attained?

c. Were only Army engines manufactured at the Musashino plant and Navy engines at the Tama plant? If not, describe the inter-relationships between the plants.

d. Are Nakajima's 18-cylinder engines (the Homare and the Ha 45) manufactured in both plants or only one?

e. Are engines from both plants tested in the test cells located near the plamt?

f. For each of the engines described in (a) amd (b) above, what parts were manufactured at the Musashi plant and what parts obtained elsewhere. Where were these parts obtained?

g. Is experimental work done at Musashi? Where? What?

4. Relationship to other Plants.

a. Nakajima's Tokyo (Ogikubo) plant formerly manufactured aero-engines for the Navy. Does it still manufacture any or are the final stages of manufacture of all Nakajima's Navy engines at Tama? What parts are manufactured at the Ogikubo plant? Are these for both Army and Navy engines?

b. What is produced at the Tanashi foundry of Nakajima? What engines are tested there? Does it have any dynamometer (as opposed to hangar-type) test cells?

c. Are castings received from a Nakajima plant in Okayama, reported to be manufacturing castings?

d. What parts are supplied by the Sumitomo Works?

e. A Nakajima engine plant has been reported in the Hamamatsu area. What is known about this plant? Does it produce engines or engine parts for Musashino-Tama Plant?

f. What parts are secured from the Ishikawajima plants in the Tokyo - Yokohama areas?

g. Approximately 2½ miles SE of this is another engine plant which has been variously identified as the Mitaka Engine Plant, Shoda Aircraft, and the Nakajima Engine Plant. There are 12 engine test cells in the S part of this plant. Are Nakajima engine, or parts for Nakajima engines being manufactured here? Are engines completed at the Musashi plant sent here for testing? Are used Nakajima engines overhauled here?

NOTE: It is important to tie the answers to all questions to specific dates.

31 January 1945

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Specific Aircraft Plant Questionnaire No. 4

NAKAJIMA AIRCRAFT WORKS, OTA PLANT
Gumma-Ken, Nitta-Gun, Ota-Machi
AAF Target No. 90.13-1544

NOTE: The following questions are those which are considered most important for completing our knowledge of the target. Reference should be made to the General Aircraft Questionnaire for additional questions which may require answers.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.13-1544,P3.

a. The two buildings in the southwest corner of the plant (in line with and west of building 10) have frequently been referred to by PW's as final assembly buildings. Since this appears to be unlikely from the aerial photographs additional identification is desirable.

b. Describe the structural features of each of the numbered buildings.

c. Describe the flow of production including the principal activities taking place in each of the numbered buildings and the type of aircraft being worked on in each of the buildings.

d. The building immediately west of building 29 and south of building 30 has been tentatively classified as a 2-story structure used for machining and small parts fabrication. It is possible that this building may be high-roofed and actually performing assembly operations.

3. Production.

a. What plane types are being manufactured at the plant? When did their production begin? Estimate output of each type during any stated period (e.g. June 1944). What parts of these planes are being manufactured at the plant and which ones are being supplied from elsewhere?

b. What plane types were formerly manufactured at the plant? Give the date when their production first started and when it ceased. What was their maximum monthly rate of output? When was this rate attained?

c. Where did finished planes go for flight testing and/or flyaway? Did any of the planes leave the plant minus wings and/or other major parts?

d. What were the principal factors interfering with production?

4. Relationship to Other Plants.

a. Plants supplying airframe parts to the Ota plant have been reported at Tatebayashi, Isezaki, Ojima, Kumagaya, Utsunomiya, Maebashi. What are the names, location, sizes, and products of these plants?

b. Hydraulic cylinders and retraction gears of Nakajima Army planes bear the name of a Nakajima plant in Maebashi. What is the exact location of this plant? Size? Does it manufacture any other aircraft parts or supply any plants other than the Ota plant?

c. What is known about a newly reported Nakajima plant in Saitama believed to be manufacturing Army aircraft? What is known about reported Nakajima plants in Tachikawa, Shibaura, Hamamatsu? A reported propeller plant in Tokyo?

d. What is being manufactured at the older Nakajima aircraft plant in Ota (NW of the new plant)?

e. Does the Ota plant manufacture parts for other aircraft plants? What parts and for whom?

f. Name, location, and other relevant information about the plants supplying aero-engines and propellers to the Ota plant?

g. The Ikeuchi Airplane Co. in Ueda, Nagano Prefecture is reported to be manufacturing fuselages and assemblying aircraft designed by Nakajima. What is this plant's relationship to Nakajima? Are parts made here for the Ota plant?

NOTE: <u>It is important to tie the answers to these questions to specific dates</u>.

Specific Aircraft Plant Questionnaire No. 5

SHIZUOKA AIRCRAFT ENGINE PLANT
(Shizuoka Hatsudoki Seisakusho)
Shizuoka-Ken, Shizuoka-Shi
AAF Target No. 90.18-2011

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location.

a. Aerial photographs show a large engine plant 1.3 miles E of Shizuoka Station, approximately midway between the city and the mountain range which separates Shizuoka from Simizu Bay. The plant is about 1.5 miles inland from Suruga Bay and about 2 3/4 miles NE of the mouth of the Abe River. It is not known whether the subdivision of Shizuoka City in which the plant is located is called Magarigane or Uto.

2. Plant Layout - Refer to Illustration No. 90.18-2011, P3.

a. Floor plans of principal buildings.

b. If more than one model is manufactured or if engines for both Army and Navy are produced is their production kept separate or are similar processes performed together.

c. Is there "line" production (i.e., do the various manufacturing processes follow one another) or "group" production (i.e., is all grinding done in one section of the plant, all drilling in another, etc.)

d. Type and number of machine tools? Are the machine tools new or had they been used previously? Were they transferred from the Mitsubishi Engine Plant in Nagoya (Target 90.20-193)? Is there a shortage of machine tools?

e. What plant expansion is proposed for the designated expansion area to the W of the built-up plant?

f. Number of shifts? If multiple shifts when plant went on this basis? Hours of each shift?

3. Production.

a. Type and rate of output of engines made here. (Give date.)

b. Are engines manufactured for both the Army and the Navy?

c. What engine parts are secured from other plants? What plants?

d. Are engine parts manufactured here for other engine plants? (It is reported that the engine plant in Shizuoka manufactures cylinder barrels for the Mitsubishi Nagoya Engine Plant (Target 90.20-193).

e. What is the scheduled maximum rate of production for this plant by engine type?

f. Where are completed engines sent?

4. Relationship to other Plants.

a. It is reported that Mitsubishi has built an engine plant in Shizuoka in the general area where this plant is located. For this reason,

it is tentatively assumed that the Shizuoka Engine Plant is a branch of Mitsubishi. Is this correct? If so, what is the relationship of this plant to the company's main engine plant in Nagoya? Does this new plant represent the dispersal of the Mitsubishi engine production? What other dispersals are planned?

b. It is reported that Mitsubishi has bought land along the E side of the Abe River, just W of Shizuoka. Although the aerial photographs show no extensive plant construction in this area, is such construction planned?

c. A new plant, part of which is still under construction, is located just W of this plant. This may be the new Sumitomo Kinzoku Kogyo plant reported to have been built in the area. What is known about its production? What is its relation to the engine plant?

d. Are any of the former spinning mills in the Shizuoka area assisting the engine plant or otherwise engaged in aircraft production?

NOTE: <u>It is important to tie the answers to all questions to specific dates.</u>

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CONFIDENTIAL

Specific Aircraft Plant Questionnaire No. 6

TACHIKAWA AIRCRAFT COMPANY
(Tachikawa Hikoki KK)
Tokyo-Fu, Kitatama-Gun, Tachikawa-Shi
AAF Target No. 90.17-792

NOTE: The following equestions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.17-792, P3.

a. It is believed that the southern half of the plant is engaged in trainer production while the northern section produces combat aircraft (Oscar - Ki 43) as well as 2E trainers. Is this interpretation correct?

b. In the northern section of the plant are there 3 separate production lines:

(1) Buildings 23, 30 and 31;

(2) 28 and 32;

(3) Buildings 37, 36, 35 and 34?

If so, how do buildings 29, 24, 22, and the building just N of 22 fit into the picture?

c. When was the northern section of the plant built?

d. What is the function of the group of buildings just E of the northern section of the plant?

3. Production.

a. Type of aircraft and their rate of production. (State period concerned.)

b. What aircraft production is performed for other plants?

c. Number of shifts? If multiple shifts when second shift was introduced?

4. Relationship to other Plants.

a. This plant was at one time owned by the Ishikawajima Aircraft Company. What is the relationship between Tachikawa and Ishikawajima?

b. Several years ago part of the Tachikawa plant is reported to have been moved to Manchuria. What information is known about this transfer? Is the Manchurian plant connected with the Manchurian Aircraft Company (Plant #1 93.3-177, Plant #2 93.3-45)? What is known about the manufacture at the Manchurian plant?

c. Is there any relationship between the Tachikawa Aircraft Company and the Tachikawa Army Air Arsenal (Target 90.17-2008)? Does Tachikawa make aircraft parts for the Arsenal?

d. Tachikawa has taken over the production of a Nakajima plane (Oscar - Ki 43); what is its relationship to Nakajima?

e. Hitachi Aircraft is reported to manufacture engines for Tachikawa's trainer planes at its plant just N of Tachikawa. Is this correct? Is there any other relationship between Tachikawa and Hitachi.

NOTE: It is important to tie the answers to all questions to specific dates.

b. Two Nakajima aircraft parts plants are reported to be in the Hamamatsu area. Where is the second plant? What does it manufacture? What is its relationship to this plant?

c. Nippon Gakki has important aircraft component manufacturing plants in the Hamamatsu area (e.g. 90.21 - 1219, propeller manufacture). Is there any relationship between these plants and the engine plant?

d. Does this plant indicate that Nakajima is dispersing its aircraft production? What other new Nakajima plants are known?

Note: It is important to tie the answers to all questions to specific dates.

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Specific Aircraft Plant Questionnaire No. 7

NAKAJIMA AIRCRAFT, HAMAMATSU PLANT
(Nakajima Hikoki, Hamamatsu Seisakusho)
Shizuoka-Ken, Hamamatsu-Shi
AAF Target No. 90.21 - 2012

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location.

a. Aerial photographs show an engine plant approximately 2½ miles NW of the center of Hamamatsu City. (AAF Air Objective Folder 90.21, Map M-6, just less than 1 mile S of the indicated cellophane plant, adjacent to the road.) This plant has been tentatively identified as a Nakajima engine plant on the basis of repeated Prisoner of War references to Nakajima aircraft parts plants in this area.

2. Plant Layout - Reference Illustration No. 90.21 - 2012, P3.

a. Are buildings correctly identified? What specific operations are being performed in each of the major buildings?

b. If more than one engine type is manufactured here are there duplicative manufacturing facilities for each component of each engine, or are all similar components, regardless of the engine in which they are used, manufactured together.

c. If both Army and Navy types are manufactured here is their production kept separate; entirely? in part?

d. What plant building is scheduled for the expansion area?

e. Is further engine test cell construction contemplated?

f. Are all engines manufactured here tested at the plant? Are engines manufactured elsewhere tested here?

3. Production.

a. Type and production rate of engines manufactured here. (State period.) Ultimate production goal.

b. Is the entire engine manufactured here or are parts received from other plants?

c. What engine parts are manufactured for other engine plants?

d. When did the plant first get into production?

e. How many shifts are worked? If two shifts, when did the second shift start? Hours of each shift?

4. Relationship to Other Plants.

a. Since this is believed to be a Nakajima plant, all information on the relationship of this plant to other Nakajima plants is important. For example, were machine tools moved from other Nakajima engine plants to this plant? skilled personnel? Are engine parts manufactured here for other Nakajima plant? Parts manufactured at other Nakajima plants for this plant?

Specific Aircraft Plant Questionnaire No. 8

SHOWA AIRCRAFT COMPANY
(Showa Hikoki Kogyo, KK)
Tokyo-Fu, Kitatama-Gun, Showa-Mura
AAF Target No. 90.17-791

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.17-791, P3.

a. Identification of hangar-type buildings along the eastern edge of the plant area. (Believed to be engaged in post-assembly operations.)

3. Production.

a. Monthly rate of Tabby (DC-3) production. (At what date?)

b. What planes other than Tabby, if any, are manufactured here?

c. Does Showa manufacture aircraft parts for other plants. Type of parts, rate of output, and purchaser?

d. Does Showa also engage in aircraft repair and modification? For what types of planes?

e. Engine production previously engaged in at Showa is reported to have been discontinued? Is this correct? Has engine production been transferred elsewhere? Are engine parts still being manufactured? Types, rate of output, purchaser?

f. Number of shifts. If multiple shifts, when second shift was started? Hours of each shift?

4. Relationship to other Plants.

a. Two Showa plants in addition to that identified as 90.17-791 have been reported. One is a small plant just E of Tachikawa-shi, while the other is a large plant NW of 90.17-791 and adjoined an airfield. What is known about these plants?

b. What is the relationship between the Showa plant and Tachikawa Air Arsenal (Target 90.17-2008) and Tachikawa Aircraft (Target 90.17-792) located nearby to the E?

NOTE: It is important to tie the answers to all questions to specific dates.

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Specific Aircraft Plant Questionnaire No. 9

JAPAN MUSICAL INSTRUMENT PROPELLER PLANT
(Nippon Gakki Seizo KK)
Shizuoka-Ken, Hamamatsu-Shi, Nakazawa-Cho 250
AAF Target No. 90.21-1219

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.21-1219, P3.

a. Are buildings correctly identified? Sketch the floor plans of the principal buildings.

b. Type and number of machine tools in the plant? What operations were performed largely by hand? Was there a shortage of machine tools? (It is reported that Japanese propeller manufacture is performed largely by handicraft methods. It is particularly important to secure confirmation or rejection of this report.)

c. Are there any propeller test cells at the plant? If so, where and how many?

d. If more than one type of propeller is manufactured here or if both Army and Navy models are made here, are there separate production lines for each type or are similar operations on all types performed together?

3. Production.

a. Type and rate of output of the propellers manufactured here. (State date.)

b. Are blade forgings and the castings and forgings of the hub and spider manufactured at the plant or purchased elsewhere and simply machined at the plant? If produced at the plant, in what buildings and what is the explanation for the apparent lack of a foundry and forge shop?

c. What propeller parts are purchased elsewhere and what parts are manufactured at this plant for other plants?

d. At one time this plant manufactured musical instruments. Has this production been discontinued and is the entire plant devoted to propeller manufacture?

e. Are multiple shifts worked here? When did such multiple shifts begin? Hours of each?

4. Relationship to other Plants.

a. Several other Nippon Gakki plants are reported, the most important being another plant in Hamamatsu (AAF Air Objective Folder No. 90.21, Map M-6, somewhat more than 1 mile E of Target 90.21-1227, on the S side of the railroad). This plant is believed to be engaged in veneer work although definite information as to its production is lacking. What is the relationship of this and other Nippon Gakki plants to the plant under consideration?

b. Sumitomo Kinzoku Kogyo is reported to have taken over Nippon Gakki. What is the relationship between these two companies?

c. What plants manufacture forgings and castings for this plant? Have these been a bottleneck?

NOTE: It is important to tie the answers to all questions to specific dates.

Specific Aircraft Plant Questionnaire No. 10.

KAWASAKI AIRCRAFT WORKS, KAGAMIGAHARA PLANT
(Kawasaki Kokuki Kogyo KK, Gifu Kojo)
Gifu-Ken, Kagamigahara
AAF Target No. 90.20-240

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.20-240, P3.

a. Is the plant area outline correctly drawn?

b. Are buildings 59 and 60 correctly identified? What is their floor plan?

c. What is the function of the buildings immediately to the W of building 59?

d. Is the Ogaki Iron Works (Target 90.20-1811) immediately to the W of buildings 35 and 21 now part of the aircraft plant?

e. Number of shifts? If multiple shifts when this was introduced? Hours of each shift. (It is reported that as late as November 1943 this plant was working only one shift.)

f. Does the area N of the railroad (buildings 59 and 60) form one manufacturing group and the area S another, or are they both engaged in the production of different parts of the same planes?

g. Where do the plant's employees live? How many live near the plant? How many live in Gifu?

h. Where is experimental production performed?

3. Production.

a. Types produced and rate of output. (Give date.) As of the end of 1943 this plant is reported to have manufactured the following plane types: Nick (Ki 45), Tony (Ki 61) and Lily (Ki 48). A new plane Rob (Ki 64) is reported to be manufactured now by Kawasaki at one of its plants and twin-engine aircraft are being built at the Kawasaki plant in Akashi (Target 90.25-1547) suggesting the possibility that one or more of the types formerly manufactured at the Kagamigahara plant may now be manufactured at the Akashi plant.

b. What aircraft parts are supplied by other plants? It is reported that many plants in the Gifu area are manufacturing aircraft parts for Kawasaki and that aircraft parts are also being supplied from Akashi and the Nagoya area.

c. Are aircraft parts being made here for other plants?

d. What experimental production is done?

4. Relationship to other Plants.

a. What is the relationship of this plant to the Kagamigahara Army Air Arsenal? Does it produce parts for the Arsenal? (It is reported that engines used in the 2E bomber Lily are installed at the Arsenal.)

b. What is the relationship between this plant and the Akashi plant of Kawasaki? (Were personnel and equipment moved from the plant to the Akashi plant?)

c. Are any of the older Kawasaki plants in Kobe still manufacturing aircraft or aircraft parts? What, if any, is their relationship to this plant?

NOTE: It is important to tie the answers to all questions to specific dates.

31 January 1945

Specific Aircraft Plant Questionnaire No. 11

HITACHI AIRCRAFT, TACHIKAWA PLANT
(Hitachi Kokuki, Tachikawa Kojo)
Tokyo-Fu, Kitatama-Gun, Yamato-Mura, Imokubo
AAF Target No. 90.17-2009

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location.

a. Is Target 90.17-2009 correctly identified as the Hitachi Aircraft, Tachikawa Plant?

2. Plant Layout - Reference Illustration 90.17-2009, P3.

a. Structural analysis of each of the numbered buildings.

b. Principal operations performed in each of the major buildings and engine types involved.

c. Is the building immediately to the E of the designated plant site and the group of buildings somewhat further E of the plant part of the plant? What are these buildings?

d. Number of shifts? If multiple shifts when plant went on this basis? Hours of each shift?

3. Production.

a. Name and monthly output rates of the engines manufactured at this plant. Date when manufacture of these engines first began. (It is believed that Hitachi may be one of the most important producers of engines for trainer planes in Japan. In addition, it is thought that Hitachi manufactures the Type 99, 900 h.p. engine, used in Sonia, and Kinsei 43 which has been found in Jake, Kate, Tess, and Mavis.)

b. What engines were formerly manufactured at the plant but have since been discontinued? When did their manufacture start and end? What was their maximum monthly output rate?

c. What production other than complete engine manufacture, if any, is being done at the plant? It is reported that this plant also manufactures 2E bomber trainers.

d. Are all engine parts manufactured at the plant or are some secured elsewhere? Which ones and where do they come from? (Several Hitachi plants in Tokyo City are reported to be manufacturing engines and engine parts.)

e. Is the plant shifting from the smaller trainer engines to engines for combat aircraft?

f. The floorspace at Hitachi appears excessive in terms of the number of engine test cells. Are engines sent elsewhere for testing? Are additional test cells planned? Is the plant only partially utilized? Does it make anything other than engines?

4. Relationship to other Plants.

a. What is the relationship between Hitachi and Mitsubishi? (The two combat engines thought to be manufactured by Hitachi are both Mitsubishi engines.)

b. What is the connection between Hitachi and Tachikawa Aircraft (Target 90.17-792) to the S? (A road leads directly from the Hitachi plant to the Tachikawa Works. Since Tachikawa is believed to be manufacturing training planes, it is possible that Hitachi supplies engines to it for such planes.)

c. Is there any inter-relationship between Hitachi and the Rikugun Koku Kosho (Army Air Arsenal at Tachikawa, Target 90.17-2008)? One of the two combat engines believed to be manufactured at Hitachi is used in a plane (Sonia) associated with the Arsenal.

d. Several other Hitachi plants concerned with aircraft production have been reported. Some of the more important appears to be:

(1) The former Tokyo Gasu Denki Works in Tokyo, Omori-ku, Iriarai-cho (Target 90.17-331).

(2) A plant in Tokyo, Kamata-ku, Haneda-Edomi-cho. (Probably manufactures trainer aircraft.)

(3) A plant identified as the Solex Seisakusho located 7 miles SW of Yokohama Harbor, along the Tokyo-Yokosuka RR (Target 90.17-1390).

(4) The Kameri plant, Tokyo-Fu, Tokyo-Shi, Adachi-Ku, Oyata-Machi (Target 90.17-1686).

What is the relationship between the Tachikawa plant of Hitachi and these other plants?

NOTE: <u>It is important to tie the answers to all questions to specific dates</u>.

Specific Aircraft Plant Questionnaire No. 12

MITSUBISHI AIRCRAFT ENGINE WORKS
(Mitsubishi Jukogyo KK; Nagoya Hatsudoki Seisakusho)
Aichi-Ken, Nagoya-Shi, Higashi-Ku, Daiko-Machi
AAF Target No. 90.20-193

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.20-193, Pl4.

a. It is believed that Plant 1 manufactures the older, lower horsepower engines of Mitsubishi, while Plant 2 is engaged in the newer and higher horse-powered engines. Is this correct?

b. Is engine production for the Army and Navy kept separate or is their production combined? Are some processes combined (such as cylinder barrel machining) and some separated (such as assembly)?

c. Is there complete engine production in both buildings 29 and 62 (that is, does each building contain such processes as cylinder head and barrel machining, gear cutting, connecting rods machining, crankshaft machining, and assembly) or does the production on one of these buildings feed to the other (that is, machining of some parts in one building and their assembly in the other)?

d. What engines are manufactured in Plant 1? In building 29? In building 62? Describe the production layout in these buildings.

e. Is building 74 correctly identified as a machine shop.

f. Is Plant 2 a self-contained unit, or are parts manufactured for it in Plant 1?

g. What engines are manufactured in Plant 2?

h. Describe the production layout of the principal buildings in Plant 2. Have the buildings in this plant been correctly identified?

3. Production.

a. Type of engines currently in production; rate of output.

b. Engines formerly manufactured, now discontinued; maximum rate of output; date of discontinuance.

c. New engines planned for manufacture; expected production rate.

d. Does the Mitsubishi plant manufacture all engine parts or are some obtained from outside the plant?

e. The plant is reported to be manufacturing some airframe parts. What airframe parts are manufactured, what is their rate of production, what planes are they for, and in what buildings are they manufactured?

f. Does the plant manufacture engine parts for other engine manufacturers?

j. Number of shifts? If multiple shifts when second shift was introduced? Hours of each shift?

4. Relationship to other Plants.

a. Many plants in the Nagoya area are reported to be manufacturing engine parts for the Mitsubishi plant. What is known about the following plants?

(1) Fuji Boseki, Nishi-Biwajima area, reported to be manufacturing castings and hardening cylinder heads.

(2) Toyo Textile Mill, 1 mile NNW of Mitsubishi Denki (Target 90.20-254), reported to be manufacturing small engine parts.

(3) Nippon Kiorimono (Woolen Mill), Iwatsuka-Cho, reported to be manufacturing simple engine parts.

(4) A new Mitsubishi engine plant, N of Nippon Kiorimono, reported to be engaged in complete engine assembly.

(5) Tokyo Muslin, near Fuji Boseki, reported to be manufacturing small engine parts.

(6) Okuma Iron Works, several plants scattered through Nagoya, reported to be manufacturing gears.

(7) Mitsubishi Denki (Target 90.20-254) E of the main Mitsubishi engine plant, reported to be manufacturing electrical equipment.

b. Parts of Aichi aircraft engines have been found with Mitsubishi inspection stamps. What is the relationship between these two companies?

c. A new Mitsubishi engine plant is reported to have been built in Shizuoka and photographs confirm the existence of a large engine plant in this city (Target 90.18-2011). Is this the Mitsubishi plant? What engines does it manufacture; Army? Navy? Does it supply parts to (receive parts from) the Mitsubishi plant in Nagoya? When did this plant come into production? What is its planned output rate? Were personnel shifted from the Nagoya plant to it; how many? (See Questionnaire on Shizuoka Engine Plant.)

d. Hitachi Aircraft (Target 90.17-2009) and the Tachikawa Army Air Arsenal (Target 90.17-2008) are believed to manufacture low-powered engines formerly manufactured by Mitsubishi? What is the relationship between these companies and Mitsubishi?

e. Are engines or engine parts being manufactured (as has been reported) by the Mitsubishi Shibaura plant (Target 90.20-327) and the Mitsubishi Oimachi plant (Target 90.20-799) located in Tokyo? What, if any, is the relationship of these plants to the Nagoya plant?

5. Bomb Damage - Reference Illustration No. 90.20-193, Pl4.

a. This plant has been attacked three times by B 29's of the XXI Bomber Command - 13 December, 22 December, and 23 January. The raid of 13 December appears to have done severe damage to buildings 62, 74 and 80. What was the exact nature of the damage inflicted? Type and number of machine tools destroyed? Number and degree of skill (i.e. skilled, semi-skilled and unskilled) of employees killed? Number and type of engines in process destroyed? Number and type of completed engines destroyed? Particular manufacturing processes damaged? Did fire gut the plant? Number of days in which Plant 1 was completely out of production; partially out of production? Number of weeks before pre-attack production levels were reached?

b. Did the damage to Plant 2 result in any production loss?

c. What steps have been taken to disperse the engine production of this plant? What other plants have been or are to be brought into production by Mitsubishi. What machine tools have been sent from the Nagoya plant to these plants? How much of the dispersal took place prior to the attacks and how much after the attacks?

d. Has the plant been able to secure machine tools to replace those destroyed? Where did these tools come from?

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Specific Aircraft Plant Questionnaire No. 13

MITSUBISHI AIRCRAFT WORKS, NAGOYA AIRFRAME PLANT
(Mitsubishi Jukogyo K.K., Nagoya Kokuki Seisakusho)
Aichi-Ken, Nagoya-Shi, Minami-Ku, Oe-Machi 7
AAF Target No. 90.20 - 194

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout - Reference Illustration No. 90.20-194, P4.

a. Is the overall identification of the various sections of the plant correct? (For example, it is not definitely known that Section C is manufacturing Army aircraft; similarly, Section E has been reported to be a steel manufacturing plant).

b. Are each of the sections of the plant self-contained or are parts manufactured in one section assembled in another section. (For example, it is reported that wings are manufactured in Section D for assembly on Army aircraft in Section B.)

c. How are raw materials brought into Section C and what provision is made for the shipment of finished aircraft?

d. Between 23 November 1944 and 18 December and prior to any bombing attacks, two machine shops, buildings 96 and 151, were removed. What was the reason for their removal and where were their functions transferred?

e. The following plant layout has been reported for Section A, believed to be manufacturing Navy aircraft. To what extent is it correct?
Building 4 - final assembly of Jack in N Section; wing assembly of Betty in S section.
Building 5 - final and post assembly of Zeke and Betty.
Building 19 - fuselage assembly of Betty; wing assembly of Zeke; fuselage assembly of Jack; wing assembly of Jack; tail assembly of Jack; fuselage assembly of Zeke.
Building 24 - cowling and tanks for Zeke and Jack; bomb bay doors for Betty; wheel cover of Jack, Zeke and Betty.
Building 25 - small parts fabrication.
Building 27 - press shop; metal shaping and cutting. A wind tunnel is reported to be located just S of this building.
Building 35 - machine shop; various machine tools including wing spar cap milling machines in the SW section.
Building 11 - motor mounts for Zeke, Jack, and Betty; preparation of landing gear struts.

f. Can a building breakdwon, similar to that covering Section A, be secured for the other sections of this plant?

g. Number of shifts? If multiple shifts, when plant went on this basis? Hours of each shift? (It is reported that in April 1944 the Navy Section of the plant worked only one shift).

h. How many weeks supply of engines are kept at the plant? Where are they stored? Are engines shipped directly from the engine factory or from a Government Warehouse?

3. Production.

a. Types and rate of ourput of aircraft manufactured here. (Give date). Section A, as of April 1944, is reported to have been manufacturing three Navy aircraft types, Zeke, Betty and Jack. It is believed that at least two additional Navy types are being made by Mitsubishi, Luke and Sam. In what part of the plant are these being manufactured?

b. Mitsubishi is believed to be producing 6 aircraft for the Army: Sally (Ki 21), Peggy (Ki 67), Sonia (Ki 51), Dinah (Ki 46), Topsy (Ki 57) and Ki 83 (no code name). In what buildings are each of these planes being constructed?

c. Was Section C intended to manufacture new aircraft? Was it in production at the end of 1944? (From the photographs of 23 November 1944 it appears that Section C is of recent construction and may not have been in full production or even in partial production at that time.)

d. What plane types are manufactured in Section D?

e. What experimental work is done at the plant? Where is it carried on?

f. What new plane types other than those mentioned are being manufactured at this plant? (For example, production of Ki 65 at this plant has been mentioned).

g. What parts are manufactured here for other plants? What parts are purchased? Does the plant manufacture most of the parts assembled by it, or is it primarily engaged in major and final assembly?

4. Relationship to Other Plants.

a. A large new Mitsubishi airframe plant, the Mishima plant, has been constructed near Okayama-Shi (Target 90.27-1681). It is believed to be producing Bettys although its maximum output potential is far greater than its current estimated output of 25 or 50 a month. Has all Betty production been shifted to this plant? What other aircraft are being manufactured? What aircraft are planned? Production rate? Are parts manufactured here supplied to Mitsubishi's Nagoya plant and does it receive aircraft parts from the Nagoya plant?

b. A large number of factories, many of them previous spinning mills, are reported to have been taken over by Mitsubishi for aircraft production. Some of these are: (i) Asahi Kojo and Koa Kojo, both in Nagoya City, Higashi-Ku, reported to be manufacturing small fuselage parts. (ii) Plants of the Katakura Paper Mill in Oita City, Oita-Ken, and in Toshu City, Saga-Ken. (iii) Plants of the Kurashiki Spinning Mill in Kurashiki City, Okayama-Ken. (iv) The Mizuho Spinning Mill in Nagoya City. (v) Three plants of the Nishin Spinning Mill, one of which is located in the S part of Nagoya while two are located in Okazaki City, Aichi-Ken. (vi) Three Nagoya plants of the Toyo Spinning Mill. (vii) The Marifu Kojo in Marifu City, Yamaguchi-Ken. (viii) The Ogaki Kojo in Ogaki City, Mie-Ken. (ix) The Tsuyama Kojo in Tsuyama City, Okayama-Ken. What is known about these plants?

c. Mitsubishi is reported to perform final assembly operations on some of the planes manufactured at this plant at its plant in Kagamigahara. What is the exact location of this plant? (It is believed to be just E of the Kawasaki Aircraft Works, Kagamigahara Plant - Target 90.20-240). What work is performed by it? Does it manufacture aircraft parts as well as assemble planes? What type of machine tools and other equipment does it have?

d. Mitsubishi is reported to assemble planes also at its airfield in Suzuka. What is known about the function of this installation?

e. What production facilities, if any, does Mitsubishi have at the Toyohashi and Hamamatsu airfields to which it is reported to ship aircraft built at the Nagoya plant?

f. Does Mitsubishi operate any aircraft facilities in Kyushu or Korea? (A new aircraft plant in Oita, Kyushu, is believed to be under construction; Mitsubishi is known to have operated an aircraft plant in Heijo, Korea).

g. The Watanabe Aircraft Co. at one time manufactured Betty wings for Mitsubishi. In general, what is the relationship between these two companies? Are other aircraft parts being made by Watanabe for Mitsubishi?

5. Bomb Damage.

a. This plant was attacked by the 21st Air Force on 18 December and 14 January with some damage, particularly to Section C. What specific damage was accomplished? How many weeks' production of each plant type was lost? Number of machine tools and other equipment damaged?

b. What repair was undertaken? What plans made for dispersal? What production has been taken over by other plants?

NOTE: It is important to tie the answers to all questions to specific dates.

Specific Aircraft Plant Questionnaire No. 14

TACHIKAWA ARMY AIR ARSENAL
(Rikugun Kokku Kosho)
Tokyo-Fu, Kitatama-Gun, Tachikawa-Shi
AAF Target No. 90.17-2008

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location.

a. Is the plant identified as Tachikawa Army Arsenal correctly identified? If not, where is this plant and what is the plant given the Target No. 90.17-2008?

2. Plant Layout - Reference Illustration 90.17-2008, P4.

a. Structural analysis of the principal buildings.

b. Identification of production in each of the buildings in the four sections of the plant, A, B, C and D. Plane and aero-engine types concerned.

c. If aero-engines are being manufactured at the plant carefully trace the production flow through the appropriate buildings.

d. Are any of the buildings in the complex propeller test stands?

3. Production.

a. Describe as fully as possible the nature of the production taking place at this plant. (Rikugun is believed to be a major research and experimental station engaged in producing and/or testing the prototypes of new models and aircraft parts and equipment). It is known to be an armament installation post. In addition, it probably manufactures aircraft and aero-engines. Both Sonia and Oscar production has been associated with this plant although recent information suggests that Oscar production has been shifted to the nearby Tachikawa Aircraft Plant (Target 90.17-792). Production of the Type 1, 1050 h.p. engine has also been identified with the Rikugun plant. What are the production rates? Section C appears to be a modification center. What types are normally found here? How many?

b. If engines are not manufactured at Rikugun what are the engine test cells (building 24) used for?

c. Are new models designed for the most part at other plants and brought here for testing or does the design and engineering occur primarily at Rikugun?

d. Is testing of all aircraft and aero-engine parts done here or just particular parts?

e. What types of planes and aero-engines are normally brought to Rikugun for testing and post assembly work? How long do they remain there?

4. Relationship to other Plants.

a. Since the Rikugun plant is believed to have made aircraft generally associated with Mitsubishi and Nakajima and an aero-engine generally associated with Mitsubishi, what is the exact relationship between it and these companies?

b. Does Rikugun make all of the parts used in the aircraft and aero-engines manufactured by it, or are parts supplied by other concerns, particularly those concerns which are primarily associated with production of the types made at Rikugun?

c. What is the relationship of Rikugun and the nearby Tachikawa Aircraft Works? (It has been reported that Tachikawa made parts for Rikugun planes, and recently, it is believed, Tachikawa has taken over production of Oscar from Rikugun.)

d. What is the relationship between Rikugun and the Army Air Base in Kagamigahara?

e. Several other Army Technical Research Plants have been reported to be in this area. What is known about these plants? What is their relationship to the Arsenal?

NOTE: <u>It is important to tie the answers to all questions to specific dates.</u>

Specific Aircraft Plant Questionnaire No. 15

JAPAN INTERNATIONAL AIRCRAFT, OKUBO PLANT
(Nippon Kokusai Koku Kogyo KK., Okubo Kojo)
Kyoto-Ken, Kuse-Gun, Okubo-Mura
AAF Target No. 90.23-1167

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout.

a. This plant consists of nine principal shop-type buildings and several smaller buildings on a 4500' x 1900' plot S of the former Lake Ogura, now drained. It is connected to an airfield to the W. What are the functions of the main buildings?

b. This is a relatively new plant. (It is reported that construction was begun in late 1941.) Is the plant adequately supplied with machine tools and other equipment? What types of machine tools are here? Are they primarily of Japanese manufacture? Are the manufacturing methods modern; for example, are there moving assembly lines, conveyor belts, etc.

c. How many shifts are operated? If multiple shifts, when did plant adopt this? Hours of each shift?

3. Production.

a. Type of aircraft manufactured? Rate of output as of a specific date (e.g., December 1944). (It is reported that this plant manufactures trainers and liaison planes, possibly of wooden, or partly wooden construction.)

b. Are complete aircraft manufactured here or are parts secured from other plants? What plants?

c. Are aircraft parts manufactured for other plants?

d. From the size of the plant it appears that production is not very great. Is expansion planned? Of what types? Rate of output?

e. Although it appears unlikely from the photographs, aero-engine production has been reported for this plant. Is it planned to manufacture engines here? Type? Planned production rate?

4. Relationship to other Plants.

a. It is reported that this plant is a merger of Nippon Koku Kogyo and Kokusai Kogyo with the participation of the Kanegafuchi Spinning Mill. What is the relationship of these companies to one another?

b. Five plants of the Japan International Aircraft Co., in addition to the Okubo Factory, have been reported to be producing aircraft and aircraft parts. These plants are:

(1) The Kamike Factory, Kyoto-Ken, Kyoto-Shi, Kamike-Cho (formerly the Kamike Textile Factory).

(2) The Osaka Factory, Hiego-Ken, Sonoda-Shi, Tonouchi-Cho (formerly the Kanegafuchi Spinning Mill).

(3) The Fukui Factory, Fukai-Ken, Yashiro-Shi, Koyamatani-Cho (formerly the Koa Textile Mill).

(4) The Nankin Factory, Nankin, China..

(5) The Hiratsuka Factory, Kanagawa-Ken, Hiratsuka-Shi, Baneu-Cho, Target 90.17-2015. (The Hiratsuka Factory is probably the former Nippon Koku Kogyo.) Photography shows this plant to be a medium-sized factory, probably manufacturing fuselages and possibly also producing propellers.

What is the principal production of these plants? Do they supply aircraft parts to the Okubo plant and/or other aircraft plants? What parts are supplied to them by other aircraft factories? Fuselage-like objects can be seen in the photographs of the Hiratsuka Factory; their length suggests that they are intended for more important plane types than trainers. Large supplies of wood in the plant area indicate that the fuselages may be of wooden construction.

NOTE: <u>It is important to tie the answers to all questions to specific dates</u>.

31 January 1945

Specific Aircraft Plant Questionnaire No. 16

WATANABE AIRCRAFT, ZASSHONOGUMA PLANT*

Watanabe Tetsukosho (Tekkosho), Zasshonoguma Hikoki Kojo
Fukuoka-Ken, Chikushi-Gun, Naka-Mura, Zasshonoguma
AAF Target No. 90.35-662

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout.

a. Since there is no airfield adjoining the plant, it seems unlikely that final assembly of aircraft is done here. Is this the case? Where is final assembly done? (Both Wajiro and Tachiari (Target 90.35-1236) have been suggested.)

b. If final assembly is performed here, where are planes taken to for flyaway? How are they transported?

c. What are the functions of the principal buildings? If engine production as well as aircraft production is performed here, is its production kept separate or are some processes, such as machining, carried on in the same building, or part of a building? Where are engines tested?

d. Number and types of machine tools? Are they old or new? Manufactured in America or elsewhere?

e. Number of shifts? If multiple shifts, when was this adopted by the plant? Hours of each shift?

3. Production.

a. Type and rate of output of aircraft manufactured here? New types planned and their planned production rates? (Jake is the only plane whose manufacture is definitely associated with Watanabe. However, the size of the Zasshonoguma plant is much greater than would be required for Jake production.)

b. Are aircraft parts for other plants manufactured here? (At one time, Watanabe is known to have manufactured wings for the 2E bomber Betty, manufactured by Mitsubishi in its Nagoya airframe plant - Target 90.20-194.)

c. What aircraft parts are manufactured at other plants for assembly here? (Fuel tanks are believed to be manufactured in plants at Nitto and Nishihara; rudders at a plant in Toyami; and elevators at a factory in Kumamoto.)

d. Are aircraft engines or parts for such engines produced at this plant? (It is reported that Watanabe manufactures trainer engines used in aircraft made at the Fuji aircraft plant in Tokyo.)

4. Relationship to other Plants.

a. What is the relationship of this plant to the plants mentioned above at Nitto, Nishihara, Toyami, and, particularly, Kumamoto where there is a large aircraft production or overhaul and modification works?

* The name of the aircraft section of the large Watanabe Iron Works Company has recently been changed to Kyushu Aircraft (Kyushu Hikoki).

b. What is the relationship of Watanabe to the airfields at Tachiari and Wajiro? Is either or both of these airfields used for flyaway and testing? Are the installations at either or both of them used for final assembly and/or other production?

c. Is Watanabe connected in any way to the aircraft production and repair plant at Omura (Target 90.36-1627) or to the aircraft production or repair installations at Oita?

d. Does Watanabe have an aircraft plant or are there aircraft production facilities of any kind at Hakata?

e. What is the relationship of the plant to the Miyata Motor Works, (Target 90.35-1241) reported to be manufacturing fuselage parts for Watanabe?

NOTE: It is important to tie the answers to all questions to specific dates.

Specific Aircraft Plant Questionnaire No. 17

AICHI AIRCRAFT WORKS, EITOKU PLANT
(Aichi Kokuki, Eitoku Seisakusho)
Aichi-Ken, Nagoya-Shi, Minato-Ku, Inaeniido
AAF Target No. 90.20-1729

NOTE: The following questions relating only to the designated plant are not complete. Refer also to the General Aircraft Questionnaire for questions applicable to all aircraft plants.

1. Location - No questions.

2. Plant Layout.

a. What is the flow of production from receipt of raw material to completion of finished aircraft?

b. Is each of the several planes completed at this plant manufactured in a separate building or group of buildings, or are similar processes on different planes performed together?

c. Is more than one type of aircraft assembled on the same final assembly line? Is this an automatic moving line? How many days from start to finish of final assembly? How many planes are on the final assembly line at one time?

d. Where are engines and other major purchased parts stored? How many days' supply of engines are kept at the plant?

e. Number of shifts? If multiple shifts, when was this adopted by the plant? Hours of each shift?

f. When did the Eitoku plant first come into production? When did it become fully built-up?

g. Where were machine tools supplied from?

h. Where are aircraft taken for flyaway?

i. Have engine shortages ever held up production? When? For how long? What planes?

3. Production.

a. Plane types and output rate as of a specific date, e.g. December 1944. (Aichi is believed to manufacture the following aircraft types although it is not known whether all are made at the Eitoku plant: Grace, Judy, Val, Paul, and "Denko".) When did each of these first come into production, and have any of them been discontinued? What new plane types are planned?

b. What parts are supplied from other plants? What other Aichi plants manufacture parts for this plant? (It is reported that aircraft parts are made by the Aichi Tokei Denki Atsuta plant, Target 90.20-198, the Aichi Mizuho plant, Target 90.20-199, and the Aichi Tsukiji plant, Target 90.20-1828. The Mizuho plant is reported to manufacture tail sections for Judy.)

c. Are parts manufactured here for other plants?

d. Are aircraft completed here or are they sent to the Aichi Bonimura plant (Target 90.20-1730) and other plants for completion?

e. What production, if any, is done at the adjoining Nagoya Airfield to the S?

4. Relationship to other Plants.

a. What is the relationship of this plant to the other Aichi plants mentioned above and to the Aichi Engine Plant (Target 90.20-2010)?

b. It is reported that the Omura Aircraft Factory (Target 90.36-162[redacted]) has either gone into production or is intending to produce the new Aichi plane Grace. What is the relationship of these two companies?

NOTE: It is important to tie the answers to all questions to specific dates.

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Plant Name	Target No.	Referred to in Specific Aircraft Questionnaire No.
Nakajima Aircraft, Ogikubo Plant	90.17- 356	1, 2, 3
Ishkawajima Engine Plant, Tomioka	90.17-1391	1, 3, 6
Nakajima Aircraft, Koizumi Plant	90.13-1545	2
Nakajima Aircraft, Musashino-Tama Plant	90.17- 357	2, 3
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Kumagaya Aircraft Parts Plant	---	2
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Nakajima Aircraft, Okayama Casting Wks.	---	3
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Japan International Aircraft, Osaka Factory	---	15
Japan International Aircraft, Fukui Factory	---	15
Wajiro Airfield		16
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Toyami Aircraft Parts Plant	---	16
Kumamoto Aircraft Plant	---	16
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Omura Aircraft Factory (21st Naval Air Depot)	90.36-1627	16, 17
Miyata Motor Works	90.35-1241	16
Aichi Aircraft Works, Eitoku Plant	90.20-1729	17
Aichi Aircraft Works, Mizuko Plant	90.20-.199	17
Aichi Aircraft Works, Tsukiji Plant	90.20-1828	17
Aichi Electric Clock, Atsuta Plant	90.20- 198	17
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C O N F I D E N T I A L

JOINT TARGET GROUP, WASHINGTON, D. C.

7 February 1945

General Information

and

Request for Additional Intelligence

Concerning

The Armament Industry of Japan

This document states the requirements of The Joint Target Group for intelligence concerning the Japanese Armament industry as of the date of issue. It is suggested that after the recipient of this publication has received a copy of the Air Target System Folder that is to be issued by the Joint Target Group with respect to the Japanese Armament industry, he destroy Part I of the present publication and insert Part II (the questionnaire) in the new folder. As conditions change and as new intelligence material is received in Washington, new questions will arise, and, therefore, revisions of, or supplements to, this intelligence requisition may be expected. If the Joint Target Group is informed of the name and organization of the ultimate user of this document, efforts will be made to have copies of all revisions and supplements forwarded to the same person or organization. It is hoped that this statement of intelligence requirements will be used as a guide by POW interrogators, personnel examining captured documents, investigators and others who may be able to increase the effectiveness of the Joint Target Group by supplying needed intelligence.

Note: The Joint Target Group (staffed with personnel contributed by the U.S. Army and Navy, the Royal Air Force, the Office of Strategic Services, the Foreign Economic Administration, and the Office of Scientific Research and Development) has been established in the office of the Assistant Chief of Air Staff, Intelligence, AAF, with the functions of integrating and coordinating pre- and post-attack analyses of air targets in the air war against Japan. Its specific responsibilities are to assemble and analyze all available data on Japanese targets; to prepare and distribute target material for the use of planning agencies, commands, and combat units; to recommend target priorities; to prepare special studies for planning agencies; and to maintain field liaison with agencies using its target material.

C O N F I D E N T I A L

I. CHARACTERISTICS OF JAPANESE ARMAMENT INDUSTRY

A. The Industry.

1. This document deals with guns, tanks, tractors, trucks, and torpedoes which are made both at Government Arsenals (Army and Naval) and by private concerns. These weapons are manufactured at eight major Army arsenals, having a total of about twenty-seven (27) plant locations, 5 major and about 5 secondary Naval establishments and at a relatively small number of important private plants. A considerable number of other private plants also contribute to the manufacture of these products.

2. Not all of these plants are strategically important and only relatively few of them are likely to become bombing targets.

3. The Joint Target Group is particularly interested at present in plants producing the following critical armament* items:

a. Antiaircraft guns, particularly 75 mm and larger, also directors for these guns.
b. Heavy field artillery and coast defense guns, especially 105 mm and larger.
c. Naval munitions, particularly heavy guns, torpedoes and mines.
d. Combat vehicles such as tanks, tractors and military trucks

Presently known important producers of the above equipment are listed in the following sections of this document. There may be many other important producers of this equipment.

B. Antiaircraft Guns

1. Military Importance.

The Japanese must depend increasingly on AA for air defense, especially as their aircraft strength is weakened by combat attrition and the bombing of their aircraft plants. Heavy AA (75 mm or above) which can fire on B-29 aircraft is most important but lighter AA will also become important when carrier-based American naval aircraft begin to operate over Japan.

2. Pattern.

A.A. guns are apparently manufactured mainly in a few selected Army and Navy arsenals. However, AA is now a high priority item in the Japanese war production program and the number of plants engaged in this work will undoubtedly increase.

3. Principal plants.

The most important establishments which to date have been positively identified as heavy AA gun producers are:

90.30-657A Kure Naval Arsenal (Kure Kaigun Kosho)
Hiroshima-ken, Kure-shi.

Osaka Army Arsenal (Osaka Rikugun Zoheisho)
90.25-382 Osaka Army Arsenal (Factories 1 thru 5)
Sugiyama-cho, Higashi-ku, Osaka
90.25-1723 Hirakata Branch, Osaka Army Arsenal,
Hirakata-machi, Kita Kawachi-gun, Osaka
90.25-2019 Harima Factory, Osaka Army Arsenal,
Arai-mura, Kako-gun, Hyogo-ken.
(Manufactured at one or some of these plant locations)

Japan Steel Company (Nippon Seikosho)
90.3-378 Muroran plant (4 Chazu-cho, Muroran)
-- -- Yokohama plant (1836 Deiki-cho, Isogo-ku, Yokohama)(Possibly).

Producers of antiaircraft guns under 75 mm may become important. Additional information is therefore desired as to such manufacture. Producers of such guns, thus far identified are:

90.30-657A Kure Naval Arsenal (Kure Kaigun Kosho)
90.22-1041 Maizuru Naval Base (Maizuru Kaigun Kosho) Maizuru-shi, Kyoto-fu
90.17- 282 Yokosuka Naval Arsenal (Yokosuka Kaigun Kosho) Kanagawa-ken, Yokosuka-shi
90.21-1653 Toyokawa Naval Arsenal (Toyokawa Kaigun Kosho) Toyokawa-shi, Aichi-ken
90.34- 168 Kokura Arsenal (Kokura Rikugun Zoheisho) Fukuoka-ken, Kokura-shi, Ta-machi
-- -- Hitachi Manufacturing Company (Hitachi Seisakusho K.K.) (There are a number of plants. Which of these plants manufacture A.A. guns has not been determined).

4. Production processes and facilities.

Gun plants may or may not contain foundries for casting mounts, etc., but will always include forge shops containing furnaces and hydraulic hammers for shaping steel into barrels and other parts. Very large lathes and rifling machines are also present in a heavy machine shop which may also contain gear cutters, milling machines and other general purpose machine tools. Buildings devoted to the manufacture of heavy guns will normally be equipped with overhead cranes. Heat treating furnaces will also be found in most ordnance plants.

5. Other items.

Directors and other fire control devices for AA guns are potentially important and additional information on the manufacturers of this equipment is urgently needed. The known manufacturers at present include Kure Arsenal and Aichi Tokei Denki K.K., manufactured at one or two plants in Nagoya-shi. and Japan Optical Industries (Nippon Kogaku Kogyo K.K.), manufactured in one or more of five plants in the Tokyo-Yokohama area.

C. Field Artillery and Coast Defense Guns

1. Military importance.

These items will become increasingly critical as the scale of ground fighting in the Far East grows. The importance of these weapons for the defense of Japan is obvious. Many of the coast defense guns found thus far are converted naval-guns. Such guns are here classified as coast defense guns.

2. Pattern.

As with AA guns, manufacture is mainly concentrated in selected arsenals but certain private plants are also important either as assemblers of complete equipment or sources of vital components. Manufacture of these guns is believed to be less concentrated than manufacture of the more specialized types such as A.A.

3. Principal plants.

Either positively identified or believed to be engaged in heavy (75 mm or over) gun fabrication are:

Osaka Army Arsenal (Osaka Rikugun Zoheisho)
90.25- 382 Osaka Army Arsenal (Factories 1 thru 5)
90.25-1723 Hirakata Branch, Osaka Army Arsenal
90.25-2019 Harima Branch, Osaka Army Arsenal
(Mfgd. at one or some of these plants)

90.30-657A Kure Naval Arsenal (Kure Kaigun Kosho)

90.22-1041 Maizuru Naval Base (Maizuru Kaigun Kosho)

90.17- 282 Yokosuka Naval Arsenal (Yokosuka Kaigun Kosho)

90.36- 758 Naval Arsenal and Engineering Department (Sasebo Naval Base) Sasebo-shi, Nagasaki-ken.

93.3 - 46 Mukden Arsenal (South Manchurian Army Arsenal)(Nanman Rikugun Zoheisho) (Also see later), Mukden, Manchuria

93.3 - 29 Showa Steel Works (Showa Jukogyo K.K.) Anshan, Manchuria

-- -- Kobe Steel Company (Kobe Seikosho K.K.) (several plants - undetermined which mfg. field artillery and coast defense guns)

-- -- Japan Steel Company (Nippon Seikosho K.K.) (4 plants - undetermined which mfg. heavy guns)

90.20-2020 Suzuka Naval Arsenal (possible) Suzuka Kaigun Kosho) Suzuka-gun, Mie-ken.

Nagoya Army Arsenal (Nagoya Rikugun Zoheisho)
90.20- 196 Chigusa plant of Nagoya Army Arsenal, Aichi-ken, Nagoya-shi, Chigusa-ku, Chigusa-cho
90.20- 197 Atsuda plant of Nagoya Army Arsenal, Aichi-ken, Nagoya-shi, Atsuta-ku, Rokuno-cho

90.20-1691 Takaki plant of Nagoya Army Arsenal, Takaki, Aichi-ken
90.20- 200 Toriimatsu plant of Nagoya Army Arsenal, Toriimatsu-mura, Higashi Kasugai-gun; Aichi-ken.
(Some one or all of these identified with mfgr. of 75 mm guns)

--- -- Mukden Arsenal (Hoten Zoheisho K.K.-a private plant) Mukden, Manchuria (so far identified with 75 mm guns) (There may be two plants, one private; one government. This should be determined.)

90.17 -- Japan Special Steel Works (Nippon Tokushuko K.K.) 6475 chome 1, Omori-ku, Tokyo-shi (so far identified with 75 mm guns).

4. Production processes and facilities.

Similar to those described for A.A. guns.

D. Combat Vehicles.

1. Military importance.

The importance of tanks, trucks and tractors, in which the Japanese ground forces are quite weak, will increase greatly and may become critical if mechanized warfare developes in China, Manchuria, or Japan.

2. Tanks.

Only one army arsenal and a small number of private plants have been positively identified as contributing to tank production as follows:

90.17-1692 Sagami Arsenal (Sagami Rikugun Zoheisho) Ono-mura, Koza-gun, Kangawa-ken.

90.17- 799 Mitsubishi Heavy Industries (Mitsubishi Jukogyo K.K. - Tokyo Kiki Seisakusho plant)

--- ---- Kobe Steel Company (Kobe Seikosho K.K. - which plant undetermined)

--- ---- Niigata Iron Works (Niigata Tekkosho K.K. - which plant undetermined)

--- ---- Hitachi Manufacturing Company (Hitachi Seisakusho K.K. - which plant undetermined).

90.30-1891 Japan Steel Company (Nippon Seikosho) Hiroshima Plant, Niho-cho, Hiroshima, Hiroshima-ken.

3. Tractors.

On the basis of present information the following private companies and single army arsenal are chiefly responsible for making large military tractors:

90.17-1692 Sagami Arsenal (Sagami Rikugun Zoheisho)

90.17- -- Diesel Automobile Company (Diesel Jidosha Kogyo K.K.-Several plants in Tokyo-Yokohama area)

---- --- Ikegai Iron Works (Ikegai Tekkosho K.K. - which plant undetermined)

---- --- Komatsu Manufacturing Company (Komatsu Seisakusho K.K. - which plant undetermined)

4. Trucks.

On the basis of present information there are two leading producers of trucks in Japan and at least three other important producers as follows:

90.17- 522 Nissan Automobile Company (Nisson Jidosha K.K.) 3442, Moriya-machi, Namamugi, Yokohama

90.20-1139 Toyoda Automobile Company (Toyoda Jidosha K.K.) 8, Shimoichibamae, Koromo-machi, Mishikamo-gun, Aichi-ken.

90.17- --- Diesel Automobile Company (Diesel Jidosha Kogyo K.K.-several plants in Tokyo-Yokohama area)

90.20- --- Kawasaki Vehicle Company (Kawasaki Sharyo K.K.) Wadayama-dori, 1 chome, Hayashida-ku, Kobe

90.17- --- Ikegai Automobile Company (Ikegai Jidosha K.K.- 2 plants in Kawasaki area)

5. Processes and facilities.

Tank assembly plants contain little special equipment except jigs but usually are equipped with overhead cranes. Buildings devoted to the manufacture of engines for tanks, tractors, or trucks contain well equipped machine shops.

E. Naval Munitions.

1. Military importance.

With her fleet already weakened, Japan must depend more and more upon torpedoes, launched from ships, submarines and torpedo planes, naval mines and other expendable naval equipment.

2. Pattern.

Production of naval munitions such as torpedoes and mines is apparently quite highly concentrated in the Naval arsenals, with some assistance from private plants.

3. Principal plants.

90.30-657A Kure Naval Arsenal (Kure Kaigun Kosho)- torpedoes.

90.17- 282 Yokosuka Naval Arsenal (Yokosuka Kaigun Kosho) - torpedoes.

90.36- 758 Naval Arsenal and Engineering Department (Sasebo Naval Arsenal) - torpedoes and naval mines.

---- -- Maizuru Naval Arsenal (Maizuru Kaigun Kosho) torpedoes and naval mines.

---- -- Aichi Clock and Electric Company (Aichi Tokei Denki K.K.)-torpedoes at one or both plants in Nagoya-shi.

4. Production processes and facilities.

Shops for the manufacture of torpedoes are usually well equipped with general purpose light machine tools and dynamometer test units. High pressource air lines for testing the compressed air propulsion mechanism of torpedoes are likely to be found through the plant.

II QUESTIONNAIRE ON JAPANESE AIRCRAFT INDUSTRIES

A. GENERAL

1. Company name - Kanji (Japanese name in characters), Romaji (Japanese name in Roman letters), and English.

2. Plant name - Kanji, Romaji, and English.

3. Location - Fix location on map; give geographical coordinates; and in Kanji, Romaji and English, state

   (a) Administrative area (ken)
   (b) County (gun)
   (c) City or town (shi or machi)
   (d) Part of City (Ku and cho)

4. Landmarks - Note the location of any landmarks; such as tall buildings, mountains, lakes, roads, rail lines, rivers, bridges, etc., which will facilitate recognition from the air.

5. Other plants of Company - Give names and location in Kanji, Romaji and English.

B. CAPACITY AND PRODUCTION

1. Principal products or activity

   (a) Present products. Identify as precisely and as completely as possible, e.g. "type 88 75mm AA guns". Relate to buildings or building areas as accurately as possible.

   (b) Has there been any particular emphasis on any class or type of product?

   (c) Pre-war products. Describe.

   (d) To what other production could plant be readily converted.

2. Capacity and Rate of output

   (a) Maximum capacity for production of each product.

   (b) Actual output of each product during any stated period (e.g. June 1944). Give basis of production estimates.

   (c) Give dates on which production of various models was started and ended.

   (d) Number of shifts per day, length of each shift, and number of employees on each shift.

   (e) Production of what parts is abundant? Scarce? Are scarcities of parts holding up production of the finished product? If so, which parts?

   (f) Is shortage of raw materials holding up production? If so what?

   (g) Does plant produce products for both Army and Navy?

   (h) Are products sent to modification centers after leaving this plant. If so, what modification centers?

3. Production Process

   (a) Show how raw material enters plant, passes from step to step and leaves the plant. Give flow diagram if possible.

(b) Describe the equipment used at each step of all processes.

(c) Indicate any particularly vulnerable equipment, step or process.

4. Extent to which other plants are supplying parts and components to this plant.

(a) Name and locate (using Kanji, Romaji, and English) all subcontractors, including other plants of the company supplying parts to the plant.

(b) Identify each part supplied with the supplier.

(c) The number of each item being supplied. What proportion is this of total requirements. If less than 100 percent where is the remainder obtained.

(d) Are the subcontracted parts plentiful or do they constitute a production bottleneck? What is the average time interval between receipt of parts and their installation.

C. STOCKS

Give the best available estimate of the total stock of each of the following items on hand at the plant at any stated time (preferably as recently as possible) and indicate whether such stock is abnormally high or low:

1. Each important raw material
2. Each component
3. Each finished product
4. Each type of tool or other equipment of which spares are usually held in reserve.

D. SHORTAGES

1. What types of military equipment and materiel are available at the front in insufficient quantity? What are the evidences of the shortages? At what front were these shortages observed?

2. What types of military equipment and material are available in more than adequate quantity? Where?

E. RESEARCH

1. What research facilities exist at this plant?
2. Has research been expanded or specialized recently?

F. PHYSICAL PLANT FEATURES

1. Area - Describe general shape of plant site and give estimates of

(a) Total plant area.
(b) Area of ground covered by buildings.
(c) Floorspace.
(d) Area devoted to each major activity carried on within the plant.

2. Buildings

(a) Number of buildings.

(b) Identification. Using a rough sketch, identify each building, stating the use made of it and describing the exact production operations taking place therein, e.g., storage of tank engines, cafeteria, office, etc.

(c) Erection date of each building or relative ages.

(d) Proximity. Describe the geographic location of the buildings with respect to one another using a rough sketch for this purpose. If all the buildings are not in immediate proximity, locate each of the buildings situated away from the plant site.

(e) <u>Structural details of each building</u>.

1. How big is building (dimensions each way)?

2. How high is building from ground to eaves? To ridge?

-Or-

3. How many floors does building have? What is height from floor to floor?

4. Of what material is each of the floors constructed? How thick are floors?

5. Are the floors supported by columns inside the building?

6. Is the roof supported by columns inside the building?

7. At what distance are the columns spaced, in each direction?

8. How thick are the columns? Of what material are they made?

9. Do the columns flare out at the top?

10. Of what materials are partitions inside the building made?

11. How thick are the interior walls? Are openings protected by automatic fire doors?

12. Of what material are the outside walls constructed?

13. How thick are the outside walls? Are openings protected by automatic fire doors?

14. Are there many windows in the outside walls? How big are these windows? Are they wire glass or protected by fire shutters?

15. Are the outside walls made of smooth or of corrugated material?

16. Are columns visible in the outside walls, either from inside or outside the buildings?

17. Of what material is the roof made?

18. How thick is the roof? Are the trusses and framing supporting the roof visible from inside the building?

19. Of what material are these trusses and framing made?

20. What is the shape of the roof? Sketch shape of roof, showing way in which it slopes.

21. Are windows or sky lights set into the roof? Where? How big?

22. Does building have overhead cranes?

23. How big are these cranes, span? Lifting capacity?

24. Are there any underground working areas? Describe and locate them if possible.

25. To what extent is timber used in construction of this building? Has timber been used to replace steel in any way?

26. Are special hazards cut-off or protected - i.e., are paint spraying, dipping, dope rooms, etc., separated by fire walls or substantial partitions from other operations?

(f) Fire Protection Facilities

1. Does plant have own fire department? State any known details concerning organization, efficiency, motorized equipment, number of pumping engines, total capacity, quantity of hose, and size of hose.

2. Describe static water supplies, stationary pumps, and total water capacity.

3. Describe yard hydrant system, including size of mains, spacing and size of hydrants. Is system connected to public water system? If so, what is size of connection and pressure?

4. What is the distance to nearest public fire department? Are public hydrants available? How many within 500 feet of the plant? Size of public mains adjacent to plant and water pressure of same?

5. Does building have automatic sprinklers for fire protection? What is spacing of hand fire extinguishers or fire pails? Inside hose equipment?

3. Equipment and Utilities

(a) Number, description, rated capacity, and location of each of the principal types of machine tools, such as hydraulic presses, lathes, drillers, millers, planers, gear cutters, etc. (Distinguish between general and special purpose tools and machines).

(b) Number, description, and location of other types of production equipment, e.g. heat treating equipment, casting facilities, etc.

(c) Description of plant transportation system, including all gantry cranes, conveyors, etc.

(d) Description and location of heat and power equipment. Are alternative sources of heat and power available?

4. Miscellaneous

(a) Combustibility of Contents

1. What percent of floor space is occupied by combustible contents? (include both equipment and stock).

2. Are combustible contents concentrated or widely dispersed? How stowed?

3. What is nature of combustible contents?

(b) Cleanliness of Plant

1. What are the housekeeping conditions of the plant with particular reference to the collection and disposal of combustible waste materials?

2. Are floors oily or greasy?

JOINT TARGET GROUP, WASHINGTON, D.C.

31 January 1945

General Information

and

Request for Additional Intelligence

Concerning

The Oil Industry of Japan

This document, prepared by the Joint Target Group in collaboration with the Economic Section, Military Intelligence Division, WDGS, states the requirements of these agencies for intelligence concerning the Japanese Oil industry as of the date of issue. It is suggested that after the recipient of this publication has received a copy of the Air Target System Folder that is to be issued by the Joint Target Group with respect to the Japanese Oil industry, he destroy Part I of the present publication and insert Part II (the questionnaire) in the new folder. As conditions change and as new intelligence material is received in Washington, new questions will arise, and, therefore, revisions of, or supplements to, this intelligence requisition may be expected. If the Joint Target Group is informed of the name and organization of the ultimate user of this document, efforts will be made to have copies of all revisions and supplements forwarded to the same person. It is hoped that this statement of intelligence requirements will be used as a guide by POW interrogators, personnel examining captured documents, investigators and others who may be able to increase the effectiveness of the above mentioned agencies by supplying needed intelligence.

Note: The Joint Target Group (staffed with personnel contributed by the U.S. Army and Navy, the Royal Air Force, the Office of Strategic Services, the Foreign Economic Administration, and the Office of Scientific Research and Development) has been established in the office of the Assistant Chief of Air Staff, Intelligence, AAF, with the functions of integrating and coordinating pre- and post- analyses of air targets in the air war against Japan. Its specific responsibilities are to assemble and analyze all available data on Japanese targets; to prepare and distribute target material for the use of planning agencies, commands, and combat units; to recommend target priorities; to prepare special studies for planning agencies; and to maintain field liaison with agencies using its target material.

I. CHARACTERISTICS OF THE JAPANESE OIL INDUSTRY

A. The Japanese Oil Position

1. It is believed that at long as Japan can hold the East Indies, which produce a little over 3/4 of the aviation gas and fuel oil now consumed within the Japanese Empire, and has sufficient shipping capacity, her oil supply will be ample for all estimated needs.

2. It is further believed that Japan is building up her stock position at present and has been doing so for some time, extending well back into the pre-war years. As a result of this stockpiling, Japan is thought to have a supply of aviation gasoline and fuel oil, possibly stored in the Japanese Islands, sufficient for one year's consumption. Motor gasoline is believed to be even easier, but the lubricant position may be much tighter. These conclusions are tentative and may be altered radically by future evidence.

3. As the oil output of the East Indies is lost to the Japanese by capture or by successful attacks on the tanker routes, Japan will be forced to rely upon Inner Zone production of oil from all sources (believed to be about 15,000,000 bbls. or possibly 1/3 of the 1944 consumption rate) plus whatever oil she may have in storage. It is to be expected that Japan will continue to expend considerable effort on building up a synthetic oil industry and exploiting Inner Zone shale and crude oil resources to the full.

4. Japan's oil supplies are derived from three major sources: crude oil, obtained from producing oil fields; synthetic oil, produced by combining hydrogen with coal derivitives or some low grade oil; and shale oil, distilled from oil shale. All of these oils must be refined to various products such as gasoline, diesel oil, fuel oil, lubes, etc.

B. Crude Oil

1. Oil Geology. Natural or crude oil and gas accumulate underground in porous beds of rock (sandstone, limestone, dolomite,etc.) over extremely long periods of time.

Since oil is lighter than water, and gas is lighter than oil, a separation by gravity occurs, with gas and oil accumulating in the upper levels of the rock reservoir or porous medium. In general there are three types of conditions which cause oil pools to form (anticlines, sand lenses, changes in porosity). In many oil pools, a combination of the three will exist.

(a) An anticline is formed during a period of folding of the rocks of the earth's crust and is defined as a fold in which the rocks dip away in all directions from a common center. An anticline is usually elongated in one general direction but may be more or less round in shape in which case it is called a dome. Gas and oil rise through the producing horizon to the highest parts of the anticline where they are trapped by some impervious bed of rock such as shale.

(b) A sand lense is a body of sand or any other porous medium which was deposited roughly in the shape of a lense and which is often overlain by an impervious bed of rock. Rising gas and oil, being unable to pass through this bed of rock, will accumulate in the sand lense below. A variation of this type occurs when a porous bed of rock has been tilted, cut off (or truncated) by erosion and then covered by an impervious bed (such as shale).

(c) Changes in porosity. Oil may also accumulate in beds of rock of which the higher structural portions are less porous than those below. Gas or oil seeking the highes level in the bed may run into a "tight zone"(one of such low porosity as to bar further movement) and accumulate into an oil pool in that region. Variations in porosity may be due to differences in size of grains of sand or rock. Changes in porosity may result from the closing of pore spaces through natural cemetation by such materials as calcium carbonate or silica. Changes in porosity are important also because they affect the rate at which oil or gas can flow into the oil well from the reservoir bed.

In the past, some of the largest and richest oil fields discovered (such as East Texas) are of the sand lense type. They have been extremely difficult to discover by scientific means, but are very prolific when found. It is possible (though improbable) that Japan has discovered fields of the sand lense type. There is no evidence that this has occurred although Japan has been scientifically combing her oil producing areas for many years.

Crude oil is obtained by drilling wells into a porous bed of rock which contains "pools" of gas, oil, and water usually separated in that order by gravity. Oil pools vary greatly in size and productivity. Oil either flows or is pumped into tanks in the oil fields and from there is pumped through a pipe line to a refinery or to loading facilities at tide water.

2. Refining of Crude Oil

a. Oil refineries receive and store crude oil in large tanks ordinarily having capacities of 35,000-85,000 bbls. This crude is run through various types of stills and towers in which it is heated. Various fractions are distilled off and then condensed into liquids of different specific gravities, which are separated and stored by product in tanks for final distribution to the consumer.

b. In more detail, crude oil is heated and pumped into one of several different types of primary distillation units. The oldest type is a shell still arranged in the form of batteries, in which hot oil is progressively heated as it flows from one unit to the next. In this process the most volatile fractions of the oil boil off in order of their volatility as the oil moves through progressively hotter units. Separation of the products of distillation is accomplished by means of running the condensed liquids

B. 2. Refining of Crude Oil (Cont'd)

into various "run down" tanks, each tank receiving only those oils which condensed between certain temperature limits. Batteries of shell stills are rectangular in shape, possibly 30 ft. wide, varying in length with the number of stills. The more modern ones have low towers in association.

c. More modern primary distillation units have different names, depending on slight variations in the process employed, but all attempt a more accurate and efficient selection of products through better methods of fractionation. In general, this is accomplished by means of running the oil through "fractionating" or "bubble" towers in which successive fractions of the oil are drawn off by pipes at the side of the tower in the form of vapor as the oil is heated during its movement through the tower. Each distillation unit of any type has a furnace nearby in which the crude oil is heated before it is run to the still or tower.

d. For a more perfect and accurate separation of products, certain cuts or fractions are pumped through "re-run" towers, in which the distillation process just described is done again more carefully, so that the final product varies in gravity only within very small limits.

e. Usually the gasoline made by primary or straight run distillation is saved and marketed as motor gasoline or used as a base stock for aviation gasoline.

f. In more modern refineries a process called "cracking" is then applied to some of the lower fractions obtained from straight run distillation. Cracking re-arranges the Hydrogen and Carbon atoms in oil which make up these chemically complex hydrocarbons. In its most simple form (Thermal cracking), heat and pressure are applied to low gravity oil or fractions of oil and a higher gravity product is formed, resulting in larger yields of gasoline. When cracking is carried out in the presence of a catalyst, more efficient results are obtained. The most modern cracking process is the "Cat (Catalytic) Cracker" used in the making of aviation gasoline. It is not known whether the Japanese are using this process, but they are actively using the others.

g. Cracking stills or towers are larger and more massive than the older distillation units. The Cat Crackers are very large, often as much as 200' tall supported by a frame work of steel girders, and with associated furnaces and pump houses make an impressive showing in a refinery area.

h. Due to demands for high octane aviation fuel, modern refining practice has developed many processes for producing aviation gasoline and for raising the octane number (a rating for the anti-knock efficiency of gasoline) of gasoline components. Such processes include Hydrogenation and De-Hydrogenation of various refinery by-products and products.

i. Other parts of a modern refinery, varying with the type of crude oil used, are the paraffin and lube oil plant, asphalt plant, Edelenan plant (solvent extraction), and many minor by-products works.

B. Crude Oil (Cont'd)

3. Sources of Crude Oil

a. Japan's main source of crude oil at present is in the East Indies (37,000,000 bbls). It is believed that most of this crude is refined locally and that the remaining crude oil plus the excess in production over consumption of refined products is being stored in Japan.

b. It is believed that the small amount of oil produced and refined in Burma does not exceed the amount necessary for ground operations in that area.

c. Aviation gasoline is shipped from Sumatra. About 3,000,000 bbls. of crude oil is produced annually from wells in the Inner Zone, mostly located in the Japanese Islands.

C. Synthetic Oil

1. Oil can be produced synthetically by combining Hydrogen and Carbon in one or more of the known Hydrogenation or Hydrocarbon synthesis processes. The Germans have developed the making of synthetic oil to a greater degree than any other nation and it is believed probable that Japan is attempting to use the German processes. It is not known definitely as yet what success she has had in her ambitious synthetic program, but it is probable that expansion will not exceed the German rate (about 20-25% per year). Photographs of Japanese synthetic oil installations examined to date indicate a low rate of progress. German synthetic processes are roughly grouped into the Hydrogenation (Bergius) and the Fischer Tropsch (Hydrocarbon synthesis) processes, although there are many variations in the use of temperature pressure and catalyst.

2. Hydrogenation (Bergius)

a. In this process (by which most of the German synthetic aviation gasoline is produced) the reactions take place under very high pressure and temperature and usually in the presence of a catalyst. Hydrogen gas is produced and purified in one of several ways and is combined under high pressure with carbon in the form of either a coal or lignite paste or a low grade oil. The combination takes place in a hydrogenation stall, about 60'-80' tall, which must be made of very thick high grade steel, similar to gun barrel, in order to withstand high pressures, which run from 3,000 to 9,000 lbs per sq. inch.

b. The output of the Hydrogenation stalls can generally be divided into three products: methane gas, high grade oil, and low grade oil. The methane is used in the formation of Hydrogen or as fuel; most of the high grade oil is refined to gasoline; and the low grade oil is re-run through the stalls.

c. The Hydrogenation plants can be adjusted in many ways with varying degrees of efficiency to produce many products including high octane blending agents for aviation gasoline, edible fats, lubricants, etc.

d. In general, a typical German Hydrogenation plant includes a boiler and power house, gas generating and purifying equipment, gas holders, compressors, hydrogenation stalls in groups of three, a refinery, and tanks.

C. Synthetic Oil (Cont'd)

3. Fischer Tropsch

a. In a Fischer Tropsch or Hydrocarbon synthesis plant, a gas composed equally of CO & H is made into an oil in a reaction chamber in the presence of a catalyst. Oil produced by this process is somewhat similar to crude oil and, therefore, it must be refined. It is used mostly for the production of motor gasoline, gas and diesel oils, and fuel oil. German output of Fischer Tropsch oil has been only about one quarter of its Hydrogenation output. Producer gas is made by blowing steam over incandescent coke in gas generators. H_2S, organic sulphur, and CO_2 is removed from this gas in purifying columns and scrubbers. Close control must be maintained over formation of the gas in order that the proportions of CO and H will remain at nearly 1:1. The pure gas is pumped into reaction chambers (usually found in long tall buildings) and in the presence of a catalyst and varying amounts of heat and pressure, an oil is formed.

b. In general, a typical German Fischer Tropsch plant includes a boiler and power house, gas generating and purifying equipment, gas holders, reaction chambers, refinery and tanks.

4. Low Temperature Carbonization (L.T.C.)

a. Low grade oil, gas, Benzol and poor coke are obtained by heating coal slowly at about 600°C in a process called low temperature carbonization (L.T.C.). This is done in a long tall building containing L.T.C. ovens. There is also a gas holder and some small amount of tankage found in association with the oven building and its coal and coke piles.

b. The tar oils formed in this process and the following one can be cracked for additional gasoline, diesel, and fuel oil yields while Benzol is added to gasoline in order to raise its octane rating. It is believed that a substantial amount of Japanese synthetic production is derived from this source.

5. High Temperature Carbonization

a. This process operates at a high temperature and produces good coke, some tar oils and benzol, with a much higher yield of gas than L.T.C. Consequently, it is used for making coke and in producing gas for municipal gas works.

6. In the late 1930's Japan instituted a program for the development of a large synthetic oil production. It is believed that this program has not developed according to plan, although Japan probably had a synthetic production (including L.T.C. and H.T.C. oil) and shale oil production of from 7-10 million bbls. in 1944.

7. German practice has been referred to extensively because it has been thoroughly studied and because it is believed that Japan has attempted to pattern its synthetic program after that of Germany. It is not known how successful she has been in adapting German processes to her particular problems and it is not known whether she has modified German methods or originated methods of her own. Photography already examined has shown one Fisher Tropsch plant (Miike 90.35-1262), no Bergius plants, one L.T.C. plant (Wakamatsu 90.34-1123), and two of questionable characteristics (a new one at Yokkaichi, 90.20-1684, and one at Fushun, 93.3-41).

C. Synthetic Oil (Cont'd)

8. In general, synthetic production will be located in the Inner Zone, to increase its self-sufficiency, and near the coal fields (in Kyushu, Hokkaido and Manchuria), to minimize the transportation problem involved in moving coal, the principal raw material used.

D. Shale Oil

1. Japan has at least one plant with a 2,000,000 bbls. capacity in which an oil similar to crude oil is distilled from oil shale. Since large deposits of oil shale are found in Manchuria and since the mining of this shale is made economic because it is removed as over-burden in the process of mining coal, it is possible that Japan has other shale oil plants or may build them in the future.

2. After stripping oil shale from the coal bed, it is transported to the SMR Shale Oil plant at Fushun, Manchuria (93.3-40) where it is crushed, then fed into retorts where it is heated to 350°-550°C. Heating is accomplished by means of hot waste gases plus producer gas injected into the upper half of the retort. By means of this heat, oil is distilled from the shale and is then condensed and run into storage tanks. Refining is accomplished as in a crude oil refinery.

3. Retorts used in this plant have a constriction in the middle, and after distillation has been accomplished in the upper half, the hot spent shale is dropped into the lower half where it is blown with steam to make producer gas.

4. Other methods for obtaining oil from oil shale are used in Sweden, Scotland and Estonia but it is not believed that they are used by Japan.

E. Butanol

1. Butanol (or Butyl alcohol) and a by-product, iso-propanal are made by fermentation of sugar or some other carbohydrate. They can be altered to form high octane blending agents such as iso-octane or can be used as solvents in the manufacture of explosives, film or lacquers.

2. Because of food and transportation problems it is believed that extensive butanol production will not be found in the Inner Zone, but that some may exist in, and south of, Formosa. Since Japan's aviation gasoline production appears adequate at present and since her big source of aviation gasoline is in the East Indies, the loss of which will also mean the loss of the great source of raw material for butanol production, it may be that butanol production is not connected with Japan's aviation gas program.

F. Tetra Ethyl Lead

1. Tetra Ethyl Lead (T.E.L.) is a fluid which, when added to gasoline in small quantities, raises its anti-knock characteristics. It is produced in small plants by special and complicated processes. Since the patents for T.E.L. are controlled in the U.S., imports into Japan during the pre-war years are known, although it is not known whether Japan made it under cover during this time or whether a somewhat similar or a different product may have been invented. It is known that experiments have been conducted on Butylene Chloride and Analine mixtures with gasoline.

G. Oil Storage

1. Japan has always been an oil importer and in pre-war years is believed to have stored rather large stocks of crude oil and oil products. Since acquisition of the East Indies, she has had access to large supplies of oil and probably has increased these stocks.

2. Construction of oil storage, both above and below ground, is believed to have been extensive in recent years. Our knowledge of the capacity and location of Japanese storage areas as well as the present amount and type of product stored is rather limited due to obvious difficulties.

3. As aerial photography is obtained, the present capacity of above ground storage facilities is rather easily estimated, but the amount and type of product stored will still remain unknown.

4. Underground storage is constructed by burying large tanks or by building tankage areas in hillsides. Knowledge of methods used in constructing, burying and protecting (dirt, concrete, and fire protection by nitrogen or CO_2) such tanks will be of value.

H. Consumption

1. Reliable estimates of the rates of consumption of oil products, broken down by type and by user, are essential to any evaluation of the Japanese oil situation; but little information on this subject is now available. At present estimates of amounts consumed by the Japanese military and civilian economy must be made by analogy and comparison. All bits of intelligence on this subject will be of value.

I. OIL FACILITIES AVAILABLE TO JAPAN - DEC 1944

(Note: All estimates of refining, storage, and synthetic capacity are meant to indicate only order of magnitute suggested by available evidence and are not to be regarded as firm estimates.)

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
90.17- 147	Aikoku Oil Company	Kawasaki	660,000		
	Amagasaki Jinzo	Amagasaki		550,000	
92.2 - 70	Alexendra Tank Farm	Singapore			2,900,000
	Aoki Oil Company	Ehime	?		
	Amboina Island	Amboina Island			35,000
90.1 - 963	Anbetsu Oil Field	Anbetsu			?
91.7 - 150	Ansan Naval Base				150,000
-	Asiatic Petroleum Co.	Tsingtao			90,000
-	Asiatic Petroleum Co.	Swatow			32,000
83.12- 4	Asiatic Petroleum Co.	Taku			160,000
-	Asiatic Petroleum Co.	Wuhu			12,000
-	Asiatic Petroleum Co	Pulo Sambee Is.			850,000
-	Asiatic Petroleum Co.	Bagan Luar			100,000
-	Asiatic Petroleum Co.	Woodlands (Singapore)			22,225
-	Asiatic Petroleum Co.	Tanjong Pagar			168,000
-	Asiatic Petroleum Co.	Pasir Panjong			19,000
	Asiatic Petroleum Co.	Johore			7,000
	Asiatic Petroleum Co.	Malacca			Small
	Asiatic Petroleum Co.	Port Dixon			26,000
	Asiatic Petroleum Co.	Port Swettenhan			80,000
	Asiatic Petroleum Co.	Telok Anson (Perak)			68,000
	Asiatic Petroleum Co.	Haiphong			80,000
	Asiatic Petroleum Co.	Saigon			150,000
98.2 - 32	Asiatic Petroleum Co.	Bangkok			250,000
	Asiatic Petroleum Co.	Upper Wharf, Shanghai			250,000
	Asiatic Petroleum Co.	Lower Wharf, Shanghai			130,000
	Asiatic Petroleum Co.	Canton			125,000
	Asiatic Petroleum Co.	Amoy			100,000
	Asiatic Petroleum Co.	Chinkiang			60,000

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
	Asiatic Petroleum Co.	Hankow			225,000
	Asiatic Petroleum Co.	Hongkong (North Point)			100,000
	Asiatic Petroleum Co.	Hongkong (Taikoktsui)			?
	Asiatic Petroleum Co.	Kinking			100,000
	Asiatic Petroleum Co.	Lien Yun			40,000
	Asiatic Petroleum Co.	Tientsin			90,000
83.12- 10	Asiatic Petroleum Co.	Tokyo	165,000		
90.17- 130	Asahi Petroleum Co.	Akita	?		
	Asahi Petroleum Co.	Shimonoseki	?		
	Asahi Petroleum Co.	Hikoshima	165,000		150,000
90.34- 40	Asahi Petroleum Co.	Balikpapan (N.E.I.)	4,250,000		2,570,000
94.4 - 250	Balikpapan Refinery	Belawan-Deli			75,000
94.1 - 31	Harbor Storage	Belawan-Deli			100,000
94.1 - 291	Palm Oil	Soerabaya			168,000
94.3 - 278	B.P.M.	Soerabaya			60,000
94.3 - 279	B.P.M.	Boela			150,000
94.3 - 232	Boela Storage	Tandjoeng Priok			25,000
94.3 - 272	B.P.M.	Singapore			750,000
92.2 - 72	Bukom Island Tank Farm	Singapore			100,000
92.2 - 74	Butterworth Oil Storage	Rangoon	5,600,000 - (Reported not in operation)		
82.2 - 18	Burma Oil Co.	Rangoon (Dunneedaw Plant) Reported Destroyed			
82.2 - 19	Burma Oil Co.	Bangkok			20,000
98.2 - 53	Bangkok Dock Co.	Agochi		750,000	Some
84.1 - 125	Chosen Chisso Hiryo	Eian		100,000	Some
84.1 - 126	Chosen Sekitan	Genzan	1,650,000		500,000
84.4 - 88	Chosen Sekiyu	Chilachap			50,000
94.3 - 149	Harbor Storage	Tokyo	?		
90.17- 360	Edogawa Petroleum Refinery	Singapore			1,675,000
92.2 - 17	Fourth Senoko Oil Depot	Gifu			20,000
	Fuji Gas Co.	Ehime	?		
	Fukutaro Takeda	Thailand			100,000
	Goh Khan Yai Is.	Bangkok	Operation Uncertain		350,000
98.2 - 31	Government Oil Refinery	Kawasaki	660,000		Some
90.17- 127	Hyama Oil Co.	Yokosuka			A number of surface plus underground tanks.
90.17- 297	Hako Point Oil Tanks				

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
	Hokkaido Jinzo Sekyu	Rumoe		New Plant?	
90.2 -1561	Hokkaido Jinzo Sekyu	Rumoe		366,500	
90.2 -1049	Hokkaido Jinzo Sekyu	Kushiro		366,500	
90.3 -1562	Hokkaido Tanko Kisen	Yubari		Unknown	
90.3 -1050	Hokkaido Jinzo Sekyu	Takigawa		366,500	
	Imperial Navy	Yokosuka			2,000,000
90.32- 673	Imperial Navy	Tokuyama	2,600,000	150,000	3,300,000
	Imperial Navy	Kushiga-hama			Extensive?
	Imperial Navy	Nakiri			Extensive?
	Imperial Navy	Sukuma Jima			?
90.32- 674	Imperial Navy	Tokuyama		?	
90.32-1884	Imperial Navy	Oshima			4,300,000
90.32- 669	Imperial Navy	Hanano-Waki			580,000
	Imperial Navy	Senshima			Extensive?
84.7 - 101	Imperial Navy	Chinkai			600,000
90.30- 659	Imperial Navy	Hitonese (Yetashima)			2,000,000
90.30-1907	Imperial Navy	Kinokawa (Nishi-Nomi Jima)			52 Tanks
	Imperial Navy	Iwakuni			Some
90.22-1041	Imperial Navy	Maizuru			2,500,000
	Imperial Navy	Hebi Island			1,000,000
					underground?
90.36- 755	Imperial Navy	Sasebo			2,500,000
90.36-1835	Imperial Navy	Sasebo			2,500,000
	Imperial Navy	Takeshiki (Nagasaki)			Some
93.5 - 6	Imperial Navy	Port Arthur			400,000
83.12- 9	Idemitsu Co.	Tanku			Extensive?
	Idemitsu Co.	Hankow			40,000
90.17- 88	Nichibei Koyn	Yokohama	Small		
83.12- 5	Japanese Oil Storage	Taku			?
93.5 - 197	Jijoko Oil Storage	Dairen			590,000
	Kwang Wha Co.	Hankow			100,000
	Kitamura Oil Co.	Chosi (Chiba)	?		
	Kaijima Kagaku Kogyo	Osaka		6,500	
93.2 - 58	Kirin Jinzo Sekyu	Kirin		2,250,000	200,000

AOF	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
	Kyushi Zan	Keelung (Taihoku)			Extensive?
	Kapoean Refinery	Kapoean	150,000		Some
92.2 - 71	Kranji Tank Farm	Singapore			2,900,000
98.2 - 64	K Si Chang Is.	Thailand			350,000
90.17- 92	Lighthouse Bureau	Yokohama			?
81.1 - 8	Lutong Refinery	Lutong	6,600,000		1,720,000
93.5 - 1	Manchuria Petroleum Co.	Dairen	1,650,000		1,000,000
93.3 - 175	Manshu Gosei Nenryo	Chinchow		350,000	
93.3 - 43	Manshu Yuka Kogyo	Ssupingkai		375,000	
	Manchooku-Japan Petroleum Co.	Kanchingtsu		?	
94.5 - 216	Makassar Storage	Makassar			4-5 tanks
83.1 - 125	Maruzan Oil Installation	Shanghai			150,000
	Municipal Oil Storage	Irai			8,400
90.3 -1563	Mitsubishi Coal Mine	Bibai-Tanzan		Unknown	
91.6 - 4	Mitsubishi Oil Co.	Takao			6 Tanks
90.25- 258					100,000
a&b	Mitsubishi Oil Storage	Osaka			
90.20-1685	Mitaki River Refinery	Yokkaichi	Unknown		
90.17- 117	Mitsubishi Oil Co.	Yokohama	?		Small
90.17- 116	Mitsubishi Oil Co.	Kawasaki	3,465,000		Important
	Unknown	Mishima			11,000
90.35-1262	Mitsui Kozan	Miike (Omuta)		600,000	
	Mita Kiri Tank Farm	Bofu			Unknown
90.17- 94	Matsukata Oil Storage	Yokohama			8 Tanks ?
90.17-1457	Montonaga Inlet Oil Tanks	Yokosuka			7 Tanks ?
90.25-1764	Maruzen Oil Tanks	Shimotsu	1,000,000		15 large tanks ?
	Maruzen Sekiyu	Niitsu	40,000 ?		
90.25- 257	Maruzen Oil Company	Osaka	330,000		
	Niitsu (Showa ?) Sekiyu	Nakadori-Osaka	231,000		
90.6 - 10	Niitsu Sekiyu (Marushan)	Akita	66,000 ?		
	Niitsu Sekiyu (Marushan)	Niigata	165,000		Some
90.6 -1067	Nihon Kogyo	Akita (Funakawa)	165,000		
90.34-1123	Nissan Ekitai Nenryo	Wakamatsu		75,000	

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
90.17- 128	Nippon Oil Company	Tsurumi	1,980,000		Very Large
90.17- 129	Nippon Yuka Kogyo	Kawasaki		400,000 ?	
90.17-1366	Nippon Oil Company	Tokyo			Unknown
90.32- 672	Nippon Oil Company	Kudamatsu	2,500,000		At least 1,000,000
90.32-1880	Nippon Hatsudoki Seikyu	Ube	Small		Small
90.9 -1649	Nippon Oil Company	Kashiwazaki	1,320,000		100,000 ?
90.9 -1000	Nippon Oil Company	Niigata	990,000		Some
90.9 -1012	Nippon Oil Company	Niigata			560,000
90.9 -1013	Nippon Oil Company	Niigata			420,000
	Nippon Oil Company ?	Sado Island			Unknown
90.6 -1066	Nippon Oil Company	Akita	1,320,000		600,000
90.3 -1027	Nippon Oil Company	Karugawa	132,000		Some
90.3 -1564	Nihon Nenryo Kogyo	Iwamizawa		225,000	
90.3 - 988	Nihon Seitetsu	Wanishi		81,000	
	Nissan Kogyo	Shotsu		16,000	
	Nichiman Sekitam Ekitai Tokoshu	Mukden		9,600	
85.1 - 41	North American Syndicate Oil Storage				Unknown
	Naval Fuel Depot	Haiphong			40,000
90.32- 670	Nihon Seiro	Hongkong			
91.4 - 86	Nippon Oil Company	Tokuyama	400,000		
91.4 - 85	Nippon Oil Company	Byoritsu	82,500		Some
90.17- 911	Ogura Oil Company	Kinsui	353,000		Some
90.17- 87	Ogura Oil Company	Tokyo	1,155,000		Important
83.1 - 124	Petroleum Center	Yokohama	3,300,000		88 Tanks ?
94.2 - 61	Pladjoe Refinery	Shanghai			1,700,000
94.1 - 33	Pangkalan-Branden Refinery	Palembang	20,460,000		4,410,000
94.1 - 16	Harbor Storage	Pangkalan-Branden	3,500,000		260,000
		Pangkalan-Soese			250,000
94.1 - 35		Padang Emmahaven			71,000
90.17- 910	Rising Sun Petroleum Co.	Poeloe Samboe			1,800,000
90.25- 260	Rising Sun Petroleum Co.	Tokyo			Small
90.25- 17	Rising Sun Petroleum Co.	Osaka			100,000 ?
84.4 - 90	Rising Sun Petroleum Co.	Kobe			500,000 ?
		Bumpyo			165,000

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
90.1 - 962	Saghalien Minami Karafuto Tanko Tatsudo	Naihoro		187,500	
	Saghalien Karafuto Jinzo Sekiyu	Naibuchi		225,000	
	Sekiyu Rengo Kumiai	Canton			20,000
	Sandakan Storage	Sandakan			300,000
94.2 13	Sabang Storage	Sabang			100,000 ?
94.3 - 289	Semampir Storage	Soerabaya			350,000 ?
94.2 - 231	Soengi-Gerong Refinery	Palembang	4,000,000		2,000,000 ?
94.3 - 273	Southeast Oil Co.	Tandjoeng Priok			350,000 ?
	Showa Steel	Anshan		350,000	
93.3 - 41	S. Manchuria Railway Co.	Fushun		600,000	
93.3 - 40	S. Manchuria Railway Co.	Fushun	990,000 - shale oil plant		
98.2 - 57	Satahib Naval Base	Thailand			125,000
	Suzuki Refinery	Niigata-Ken ?	unknown		
90.25- 261	S.V.O.C. and Nippon Oil	Osaka			Large ?
90.1 - 964	Standard Oil Co.	Otamori			Unknown ?
82.2 - 20	Seigyi Refinery	Rangoon	demolished ?		
	Shinsuke Fuse	Shizuoka	?		
91.4 - 119	Shukkoko Plant	Shukkoko (Formosa)	unknown		
92.2 - 73	Shell Oil Company	Singapore			55,000
92.2 - 15	Shell Oil Co.	Singapore			140,000
92.2 - 25	Shell Oil Co.	Penang			Limited
92.2 - 33	Shell Oil Co.	Port Swettenham			80,000 ?
85.1 - 42	Shell Oil Co.	Haiphong			87,000 ?
85.2 - 93	Shell Oil Co.	Saigon			168,000
94.3 - 277	Standard Oil Co.	Soerabaya			200,000 ?
94.3 - 274	Standard Oil Co.	Batavia			68,000
	Standard Vacuum Oil Co.	Tsingtao			185,000
	Standard Vacuum Oil Co.	Swatow			20,000
83.12- 9	Standard Vacuum Oil Co.	Tangku			Extensive?
	Standard Vacuum Oil Co.	Wuhu			85,000

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
	Standard Vacuum Oil Co.	Bagan Luar			?
92.2 - 36	Standard Vacuum Oil Co.	Port Swettenham			30,000
	Standard Vacuum Oil Co.	Pulo Sebarok (Singapore)			300,000
85.1 - 39	Standard Vacuum Oil Co.	Haiphong			180,000
85.2 - 121	Standard Vacuum Oil Co.	Saigon			100,000
83.1 - 126	Standard Vacuum Oil Co.	Shanghai			550,000
83.4 - 58	Standard Vacuum Oil Co.	Canton			157,000
	Standard Vacuum Oil Co.	Amoy			400,000 ?
	Standard Vacuum Oil Co.	Chinkiang			120,000
	Standard Vacuum Oil Co.	Hankow			400,000
	Standard Vacuum Oil Co.	Hongkong			250,000
83.12 - 13	Standard Vacuum Oil Co.	Tientsin			300,000
94.3 - 229	Tjepoe Refinery	Tjepoe	4,500,000		960,000
82.2 - 21	Thilawan Refinery	Rangoon area	operating?		
	Takanashi Oils-Fat Co.	Moji	?		
90.17 - 89	Toho Sekiyu	Yokohama	165,000		300,000
	Tokyo Gas Kagaku Kogyo	Tsurumi		150,000	
	Toyo Shako	Yokohama	66,000		
90.20 - 456	Toho Kagaku Kogyo	Nagoya		150,000	Some
90.25 - 257	Toyo Sekiyu	Osaka	231,000		Some
	Teikoku Nenryo	Seishin		350,000 ?	
91.6 - 178	Toshien Fuel Depot	Takao			880,000
94.4 - 224	Tarakan Storage	Tarakan-Linkas			1,000,000 ?
94.1 - 269	Tandjoeng-Oeban Storage	Tandjoeng-Oeban			100,000 ?
83.4 - 95	Texas Oil Co.	Canton			125,000
	Texas Oil Co.	Hankow			90,000
	Texas Oil Co.	Hongkong			160,000
83.12 - 21	Texas Oil Co.	Tientsin			25,000
	Texas Oil Co.	Tsingtao			50,000
	Texas Oil Co.	Tanjong Pagar (Singapore)			Warehouse
85.1 - 40	Texas Oil Co.	Haiphong			75,000
85.2 - 122	Texas Oil Co.	Saigon			Extensive ?
83.12 - 9	Ta Wha	Tangku			Unknown
90.17 - 359	Uibar Oil Co.	Tokyo			

AOF & TN	NAME	LOCATION	REFINING (bbls/year)	SYNTHETIC (bbls/year)	STORAGE (Tankage)
90.20 - 1684	Utsube River Oil Refinery	Yokkaichi	5-10,000,000		2,285,000
90.32 - 1841	Ube Yuka	Ube		850,000	Unknown
	Wada Refinery	Niigata-Ken	?		
94.3 - 230	Wonokromo Refinery	Soerabaya	1,000,000		300,000
	Yamaguchi Refinery	Niigata-Ken	?		
90.17 - 295	Yokosuka RR Station	Yokosuka			at least 4 tanks

Evidence is especially fragmentary on each of the following:

LOCATION	AOF & TN	
Bako (Formosa)	91.7 -- 165	How much storage?
Canton (China)		Two Chinese firms have oil storage facilities?
Chinnampo (Korea)		Storage reported.
Foochow (China)		Any storage? 42,000 reported.
Fusan		125,000 storage visible.
Hakodate (Hokkaido)	90.4 - 980	Large tank farm - capacities needed.
Hikoshima		May be large oil storage in area.
Hakata		May be 900,000 bbls storage facilities.
Heijo		How much storage?
Hulutao		Storage reported.
Hiroshima		New refinery reported in area.
Itosaki	90.29 - 934	175,000 storage?
Jinsen		Storage reported.
Kisarazu	90.14 - 1477	Very large storage. Total capacity? Surface or underground?
Kobe		How much storage in area and where spotted?
Kagoshima		Very large storage possible.
Kozaki Point	90.36 - 545	653,000 visible.
Keijo (Korea)		Storage reported.
Megami Point	90.36 - 832	55,000 visible.
Numazu		20,000 storage.
Noda (Karafuto or Chiba)		400,000 storage reported.
Nanoi	90.5 - 995	Large storage possible.
Ominato	90.5 - 996	Large storage possible.
Otaru		
Ogakura (Nagasaki area)		100,000 storage ?
Reisui (Korea)		Storage reported.
Shimizu		Is there a new refinery here?
Sendai		Possibly 1,000,000 storage
Saitozaki		177,000 capacity for storage?
Toyohashi		35,000 storage reported.
Taketoyo		70,000 storage reported.
Ube		50 large storage tanks reported.
Wakayama		Is there a new refinery here?
Wenchow		31,000 storage reported.
Yawata Area		Is there more than 475,000 storage in area?
Yinkow		200,000 storage reported.

II. QUESTIONNAIRE ON JAPANESE OIL INDUSTRY

A. General.

1. Total stocks of oil and oil products in Japan, Korea, and in Manchuria.

2. Size and location of each known stock of each oil product (particularly lube oils and aviation fuel).

3. Total production of each refined product (broken down by refinery if possible).

4. Total production of synthetic oil (broken down by plants and by process, if possible).

5. Total production of tetra ethyl lead (broken down by plants, if possible).

6. Amount of tetra ethyl lead in storage.

7. Any master plan covering expansion of the synthetic oil industry, including main processes to be used, planned yearly increases, German aid, type of plant layout used, etc.

8. What plans have been made on butanol production? Is the plan to use it in industry or for iso-octane or both (give percentages)? What is total production of butanol?

9. Crude oil production of Japan by fields and locations. Percentage yields of each crude (especially lube oil yield).

10. Names and locations of oil fields in which P/W worked or has knowledge of, in : (1) Japan, (2) Formosa, (3) East Indies, (4) Sakhalin (and dates.)

11. Crude Oil Specifications:

    (a) Specific gravity (or API gravity); physical appearance; color; odor; classification (paraffinic, asphaltic, naphtehnic, mixed base).

    (b) What percentage yield (stipulate by weight or volume) from the crude of the following: aviation gas, motor fuel, fuel oil, diesel oil, lubes, kerosene?

12. Field Characteristics:

    Depth to oil horizon, number of oil horizons; areal extent of each oil horizon, number of wells producing from each horizon; number of wells flowing naturally; number of wells on gas lift; number of wells pumping; number and percentage of dry holes; average production per day per well, initially and when settled; total production for the field (per day or per year); what method of drilling was used (cable tools or rotary); what was the average well spacing (how far apart were the wells drilled); were any particular difficulties encountered in drilling or in producing, such as caving formations or sanding-up of a producing zone; what sort of water problems were encountered during the producing life of each zone, (was water intrusion rapid or slow);were there any repressuring operations or plans to use gas repressuring or water flooding;was there a natural gasoline plant located at the field?

13. General Geology:

What type of geological structure was the oil field (anticlinal, faulted, sand-lense); is the structure exposed on the surface or was the field discovered by subsurface methods; was there any geo-physical prospecting connected with the field or any other areas P/W may have knowledge of; have all the possible oil horizons been tested in the field; what is the depth of the deepest test and was it productive?

14. How long can aviation fuel be kept in storage without gum precipitation or loss in octane rating?

15. How is buried oil storage protected? What type of tank (concrete or steel) is used? What protection is given against fire (use of CO_2 or Foamite)? Where is it located?

16. Japanese consumption of oil broken down by products and by user - Military (Air, Ground, & Navy) Industrial (Essential to war effort and otherwise) and Civilians.

17. What is Japanese trend of thought regarding their oil position - present and future.

18. Rates of consumption of petroleum products by consuming units.
    (a) Consumption per period of time by a ship, tank, motor vehicle or aircraft (if rate of consumption is per hour or per day, then an indication of number of hours or days of operation per month is desirable).
    (b) Consumption by a tactical unit (such as squadron or regiment) for a period of time.

19. Evidence of shortages of petroleum products, such as: use of substitutes, conservation measures, use of inferior grades, overuse of lubricating oils, conversion from oil products to other fuels. Effectiveness of above measures and the effect of shortages upon war production, training or tactical use of vehicles, ships, aircraft and weapons. (Pay particular attention to lube oils and evidence of use of vegetable lubricating oils and the performance of same.)

B. Specific Questions to Apply to All Plants

1. Refineries

(a) Name (Kanji, Japanese name in characters; Romaji, Japanese name in Roman letters; and English).

(b) Annual capacity and annual output (total and by product).

(c) Storage capacity (crude oil, refined products, total).

(d) What is the source of the crude or crudes which were the feed stocks of the refinery?

(e) How many distillation stills does the refinery have?

(f) How many reforming stills does the refinery have?

(g) How many thermal cracking stills does the refinery have?

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(h) What was the capacity of each unit?

(i) Did the plant have lube oil facilities for making motor oils (dewaxing unit, solvent extraction unit, (Edeleanu, Furfural, Phenol, Duo-Sol Process?)); for making aviation lube oils (solvent extraction (Edeleanu, Furfural, Phenol, Duo-Sol Process?)), polymerization unit).

(j) What was the average viscosity index of the lubricating oils produced (regular motor lubes, aviation lubes).

(k) In what proportion were vegetable oils blended with mineral oils?

(l) From where did the plant receive its tetra-ethyl lead?

(m) What percentage of tetra-ethyl lead was added to aviation base stock, to motor fuel base stock, in order to bring octane number up to specifications (how many cc's of tetra-ethyl lead per gal.)?

(n) In the case of any refinery which has been under USAAF bombing attack; what general damage was inflicted? How serious? What specific units were hit? How much fire damage occurred?

(o) Capacity of cracking plant (if any).

(p) Is Catalytic Cracking (Cat Cracker) used?

(q) Are any of the high octane blending agents for aviation gasoline (such as iso-octane and alylate) made?

(r) Is butanol (butyl alcohol) or iso-propanol used in any process under (q)?

(s) Is any somerization, polymerization, hydrogenation or de-hydrogenation process used? If so, what is made?

(t) Give plan of plant with accent on location of boiler and power houses, distillation units (name and type), cracking units, lube oil plant, tankage and other installations.

(u) Structural details of all buildings.

2. Synthetic Plants.

(a) Name (Kanji, Japanese name in characters; Romaji, Japanese name in Roman letters; and English)

(b) Annual capacity and output (total and by product).

(c) Type of synthetic process used. Describe.

(d) If German process is used, give name and discuss any difficulties in operation.

(e) If new process or variation of old one is used, give all details possible.

(f) Where and how was the hydrogen made?

(g) How was the feed stock prepared?

(h) What was the catalyst? How was it handled? How often was it replaced or regenerated?

(i) What was the hydrogen input capacity?

(j) Type and source of feed stock.

(k) Storage capacity.

(l) Draw sketch of plant and identify all important installations.

(m) Structural details of all buildings.

3. Oil Storage Areas.

(a) Name (Kanji, Romaji, and English)

(b) Capacity of the storage.

(c) Amount and type of crude oil or oil products in storage on any particular dates.

(d) Is storage always full or empty? Give trend by months or by years.

(e) Amount stored underground. How is it buried? State type and construction of underground tanks used.

(f) How is the storage protected? State amount and type of overburden. Is gas such as Nitrogen or CO_2 used for fire protection (if so, how used); or is foamite employed? Is diking used?

(g) Source of products or crude oil.

(h) How is oil or oil products transported (e.g. by tanker or rail) to and from the storage area?

4. Shale Oil.

(a) Southern Manchuria Railway Shale Oil Plant at Fushun, Manchuria.

(1) What is the shale input capacity of the plant?

(2) What is the percentage yield of primary product from the distillation of the shale?

(3) How is the primary product processed (distilled or cracked)?

(4) What final products are produced, and what is the output of each?

(5) Where is the plant located (east of Fushun or west of Fushun)?

(6) How many retorts are present?

(7) Was a new plant constructed next to the old plant? and if so, when? When was it started? When was it completed? To what extent did the shortages of material or labor interfere with the construction program?

(8) Where are the products shipped?

(b) Are there any other shale oil deposits in Manchuria? Has construction of shale oil plants been started or planned at any of these other locations?

5. Transportation.

(a) Tankers:(See questionnaire concerning shipping.)

(1) How were the compartments of the tankers divided?

(2) Did the tankers usually carry the same products or product?

(3) In changing products were the compartments steamed or how were they cleaned out?

(4) What were the loading and unloading facilities at the tanker terminals (Size of pipe lines, pumps)? How many tankers can be accommodated at one time?

(b) Pipe Lines:

(1) Where did the pipe line start, and where did it end?

(2) What was the size of the pipe; what was the capacity of the line?

(3) How many pump stations were present:

(4) What products were shipped through the line?

(5) When was the line constructed?

(c) Tank Cars:

(1) What is the usual capacity of a tank car?

(2) How many tank cars are in use in any named area?

(d) Any available information concerning other means of shipping oil, e.g, barges, drums, etc.

6. Performance of Products

(a) What is the performance efficiency (do they perform satisfactorily or unsatisfactorily) of the following products: (1) aivation gas, (2) motor fuel, (3) fuel oil, (4) diesel oil, (5) lube oil, (6) kerosene?

(b) What appear to be the greatest difficulties in performance of each of these products?

(c) Does the aviation gas have lower octane rating than required by specifications?

(d) Is trouble encountered with the use of water-methanol in aviation gas?

(e) Is power output of truck and car engines affected by using unleaded ordinary gasoline?

(f) Does the diesel oil come up to specifications as regards cetane number? Do the diesel engines smoke excessively? Do diesel engines have excessive trouble due to sticking rings?

(g) How well do regular lubricating oils stand up? Do they have a high sludge rate causing bearing corrosion and excessive wear or failure? Are they of such low viscosity index that they "burn up" fast?

7. Shortages.

(a) Are there shortages in the following products: (1) aviation gas, (2) motor fuel, (3) fuel oil, (4) diesel oil, (5) lube oil, (6) kerosene?

(b) Have there been shortages? (Where and when)?

(c) How much did the shortage amount to?

C. Specific Questions for Specific Plants
(See also B. Specific Questions to Apply to All Plants)

1. At Yokkaichi near Nagoya on Honshu, a large new refinery (90.20-1684) has been built with an attached probable synthetic oil plant of unidentified process.

(a) What kind of synthetic process is used?

(b) What is the feed stock?

(c) What is the use of the big saw toothed roof buildings in western part of the refinery area, each near several gas holders? Are they connected with hydrogenation of oil fractions?

2. The SMR Coal liquefaction plant at Fushun, Manchuria (93.3-41) is probably a synthetic oil plant, but its type has not been identified. Any information as to the function of each building of this plant is desired as well as identification of the type of synthetic process in use.

3. Is there a synthetic oil plant owned by Nippon Yuka Kogyo in Kawasaki? If so, where is it located and what is its capacity? What process is used?

4. Is there any oil storage at any of the following places on Shikoku Island: Takamatsu, Imabari, Yawatahama, Tokushima, Marugame, Takaohama, Niihama, Uwazima or at any other point on Shikoku? If so, give capacities of tankage and amounts stored.

5. Is there an oil refinery in or near Shimizu?

6. How many oil storage tanks are at Taketoyo? What are their sizes or capacities?

7. How many refineries are at Wakayama? What is the size or capacity of each? (In each case give the number and capacities of the storage tanks present).

8. How many oil tanks are at Hikoshima in Yamaguchi-ken? How large are they?

9. Has the briquette plant of the Naval Fuel Station at Tokuyama been converted to synthetic oil production? If so, what process is used?

10. How much oil storage, if any, is on Sen Island near Tokuyama? Describe both surface and underground tanks.

11. How much oil storage, if any, is at Nakiri, near Tokuyama? Describe both surface and underground storage.

12. How much oil storage, if any, is at Kushigi-hama, near Tokuyama? Describe both underground and surface storage.

13. How much oil storage, if any, is on Sukuma Jima near Tokuyama? Describe both underground and surface storage.

14. Does Nihon Seire at Tokuyama produce oil from shale, or does it import crude and refine it?

15. How many tanks for oil storage are at the Mitajiri Tank Farm at Bofu?

16. What is produced by Nippon Hatsudoki Seikyu at Ube? What quantities?

17. Is there a new refinery near Hiroshima? What does it produce, and in what amounts?

18. How many oil storage tanks are at Kagoshima? Give capacities.

19. How much oil storage is at Takeshiki (Nagasaki)? Give capacities.

20. Does the Asahi Petroleum Co. have an oil refinery at Akita City or anywhere in Akita-ken?

21. Does Niitsu Seikyu have an oil refinery at Akita City or anywhere in Akita-ken?

22. Give specific locations of the following refineries in Niigata-ken: Suzuki; Wada; Yamaguchi.

23. Does the Hyama Oil Co. have a refinery in Niigata?

24. Are there storage tanks on Sado Island (off Niigata)? If so give number and sizes.

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25. How many and what size oil storage tanks are at Sendai? at Ominato? at Nanoi?

26. How many synthetic plants are in operation in Rumoe (Hokkaido)? What processes are used?

27. Is there a synthetic plant (coal liquefaction) in operation in Yubari (Hokkaido)? Describe the size and type of operation.

28. Is there a synthetic plant (coal liquefaction), called Mitsubishi Babai Coal Mine, in operation at Bibai-Tanzan (Hokkaido)? Describe the size and type of the operation.

29. How many oil storage tanks are at Otaru and at Hakodate (Hokkaido)? Give locations and capacities.

30. How many and what size oil storage tanks are at Anbetsu, Karafuto?

31. How many and what size oil storage tanks are in the following Korean towns: Chinnampo, Bumpyo, Chinkai, Genzan, Heijo, Keijo, Jinsen, Reisin, Ryojun, Yinkow, Hulutao?

32. Describe the oil facilities to be found at the following Formosa locations: Takao, Taihoku, Bako (Pescadores), Shukkoko.

33. What oil products and in what quantities are moving, via tanker or otherwise (specify), as follows:

    (a) Korea and/or Manchuria to points in Japan Proper,

    (b) Points in Japan Proper to Korea and Manchuria,

    (c) Points in Korea and/or Manchuria to points in China,

    (d) Points in Japan Proper to points in China?

34. Describe the oil facilities owned by the following firms at the indicated locations:

    (a) Aoki Oil Co. - Nishi Uwa Gun Ehime

    (b) Fukutaro Takeda - Nishi Uwa Gun Ehime

    (c) Asahi Oil Refinery Co. - Shimonoseki

    (d) Kitamura Oil Co. - Choshi, Chiba

    (e) Manchuoko-Japan Petroleum Co. - Kanchingtsu, Manchuria

    (f) Shinsuke Fuse - Haruhara-Gori, Shizuoka

    (g) Takanashi Oils and Fats Co. - Moji, Fukuoka

JOINT TARGET GROUP, WASHINGTON, D. C.

25 January 1945

Request for Additional Intelligence Concerning Japanese Land Transportation

This document, prepared by the Joint Target Group in collaboration with the ~~Land Transportation~~ Economic Section, Military Intelligence Division, WDGS, states the requirements of these agencies for intelligence concerning Japanese land transportation as of the date of issue. It is suggested that after the recipient of this publication has received a copy of the Air Target System Folder issued by the Joint Target Group with respect to Japanese land transportation, he insert the present publication in the new folder. As conditions change and as new intelligence material is received in Washington, new questions will arise, and, therefore, revisions of, or supplements to, this intelligence requisition may be expected. If the Joint Target Group is informed of the name and organization of the ultimate user of this document, efforts will be made to have copies of all revisions and supplements forwarded to the same person. It is hoped that this statement of intelligence requirements will be used as a guide by POW interrogators, personnel examining captured documents, investigators and others who may be able to increase the effectiveness of the above-mentioned agencies by supplying needed intelligence.

Note: The Joint Target Group (staffed with personnel contributed by the U.S. Army and Navy, the Royal Air Force, the Office of Strategic Services, the Foreign Economic Administration, and the Office of Scientific Research and Development) has been established in the office of the Assistant Chief of Air Staff, Intelligence, AAF, with the functions of integrating and coordinating pre- and post- attack analyses of air targets in the air war against Japan. Its specific responsibilities are to assemble and analyze all available data on Japanese targets; to prepare and distribute target material for the use of planning agencies, commands, and combat units; to recommend target priorities; to prepare special studies for planning agencies; and to maintain field liaison with agencies using its target material.

C5-6230,AF

Intelligence on the enemy's rail and highway transportation system serves two purposes. First, the movement of commodities and personnel overland between various regions can be measured, the most serious bottlenecks ascertained, and measures designed for increasing the stringency at the most damaging points. Finally, such information is of utmost value in determining the extent of military or industrial activity known to be dependent on land transport.

In reporting specific information on the commodities moved and facilities employed in land transportation, distinction should be carefully maintained between the movement of military traffic and the movement of industrial products. It should also be kept in mind that while the most recent information available is the most valuable, changes in any given factor or circumstance over a period of time (with dates of changes) is important. That information will be most useful which is not procurable by aerial reconnaissance such as what goes on under roof or camouflage, what amount of material is in storage, activities carried on only at night, and the like.

Specifically, the information desired is indicated by the following outline:

I. Railroads

A. The characteristics of all stretches of railroad line between major terminals including number of tracks, gauge of track, length and frequency of sidings (on single track lines), controlling grades and curves, number and adequacy of fueling and watering facilities (for steam roads), signaling and train control equipment, electrification, the weight of the rails per unit of length, general condition of rails and right-of-way maintenance, maintenance of way practices including special measures to deal with bomb damage to tracks, bridges and yards (such as location of spare bridge girders and rails along the right-of-way, preparation of special repair trains with rail, ballast and so forth at key centers).

B. The volume of traffic depends on the number and size of trains, time required for making up and breaking up trains, time required for unloading practices. Evidence on train speeds, total load per train (weight of freight and rolling stock), load per car (net weight of freight carried) should reveal both the average and maximum in each case.

C. The type of fuel used and its origin.

D. The type, weight, pulling power (tractive effort) and supply of locomotives. Also the type, capacity and supply of rolling stock available.

E. Yard and terminal facilities may form bottlenecks on a busy line. Information should be obtained on number and length of tracks and special facilities such as "hump" classification (a method of making up trains by pushing them over a small incline at the choke points of the yard from which they coast down to the appropriate track) in freight yards, function of the yard (storage, classification, holding, etc.), industrial sidings, roundhouses, warehousing and stockpiles, and special loading and unloading facilities. Information should show the capacity and actual usage of these facilities and should also give the construction details essential to determining their physical vulnerability to bombing (dimensions, construction design and material of roof, walls and floors).

F. The supply and relative skill of labor available for train crews, switching, cargo handling, equipment servicing, equipment repairing and other railroad activities.

G. In regard to locomotive and car construction and repair establishments, the type and quantities of equipment produced or handled and in the case of repair shops, the character of repair undertaken (whether minor servicing or major overhaul). Detailed description of buildings and installations including dimensions, type and materials of construction of roofs, walls and floors should be ascertained for the assessment of physical vulnerability.

H. The character of the traffic handled on particular lines including whether military or industrial, whether passenger or freight, origin, destination and volume of major commodities, indication of the priorities assigned to different traffic items.

I. Rail lines for which the foregoing information is particularly desired:

1. Honshu

Information is particularly desired on the trans-insular rail lines, the lines along the west coast and those to the North from Tokyo. Of particular interest is confirmatory evidence on the reported construction of a line between Kyoto and Tsuruga to the west of Biwa Ko (lake). Information on the volume and character of traffic including number of freight and passenger trains per day in each direction and the speed and length of trains and gross trailing and net loads is of major importance for all lines including the double-track line between Tokyo and Shimonoseki. Any development should be carefully noted of a rotary traffic system on two separate single track lines between two particular points whereby trains are run in only one direction, going out on one line and returning on the other.

2. Shimonoseki Tunnel

Information is desired indicating the exact course, degree of completion and extent of use of the tunnel or tunnels under Shimonoseki Straits. Of great importance is information on the exact location of approaches, entrances, and underground portions of the tunnel or tunnels (including the one now known to be in service). Data on the controlling grades and curvature, on the depth below the floor of the Straits, on the number of trains a day in each direction at various times, and gross and trailing load are also of particular interest. It is known that at least one track has been in for some time. A second track may have been put in and a highway tunnel may have been put through. The extent to which the railroad car ferries across the Strait continue to operate is also significant.

3. Kyushu

The rail lines of northern and western Kyushu are primarily an extension of the main line on Honshu especially with the opening of the tunnel under the Straits. Kyushu coal was formerly shipped in large quantity out of the port of Miike to the major population centers on Honshu. Recently shipping activity at Miike has been materially reduced. The extent to which Kyushu coal is moving to Honshu by rail in cars or trains of a stated number of cars per unit of time is an important question.

4. Korea

(a) The principal rail line in Korea has been between Antung and Fusan. It is known that this line is double-tracked all the way between Heijo and Fusan. Double-tracking is not known to be continuous between Antung and Heijo. Evidence is desired on the exact location with reference to places, the length, and the provision of side tracks on each stretch of any stretches of single track on this line.

(b) Information is desired on the use made of the single track line between Keijo and Fusan by way of Anto and Keishu.

(c) The coastal line between Genzan and Fusan is reported under construction between Koryo and Hoko. Information is desired on the locality and length of stretches of this line which are completed, under construction, or not yet started.

(d) Evidence is desired on the use of trans-peninsular lines between Heijo and Genzan via Junsen and Kogen and between Keijo and Genzan via Rensen.

(e) Evidence is desired on the reported construction of a coastal line between Seishin and Rashin.

(f) Data should be reported on the use of the coastal line between Genzan and Seishin or Rashin/Yuki if the link referred to in (e) has been completed. Evidence on the movement of iron ore, iron ore concentrates, pig iron and coal on the lines to Seishin or Rashin and whether such movement is for transhipment to Japan or local use is of major importance. A large iron ore concentrator is known to be operable and a second one may be. Any evidence on the volume of movement (tonnage or number of cars or trains) and destination of concentrates out of this plant is of great significance.

5. Manchuria

(a) Evidence on the volume of coal that may be moving from Mishan (north of Lake Khanka) to Seishin/Rashin for export to Japan or use at Seishin should be reported.

(b) Data are desired on the capacities and use of the central Manchuria--north Korea coast lines between Hsinking and Seishin via Kirin and Tunwha and between Harbin and Seishin via Mutankiang.

(c) It is reported that a direct line from the ore and coal fields near Tunghua has been constructed via Penshihu to Liaoyang. Evidence on the completion of this line and the volume and destination of any coal or ore traffic over it is of considerable importance.

(d) Evidence on the completion and use of the new coastal line reported between Antung and Dairen is desired.

(e) Evidence on what parts of the Peking-Mukden railway are double-tracked is desired very much.

6. China

(a) Evidence is desired on the status of the following lines reported to be under construction:

(1) Chenghsien-Hankow (Pinghan line south of Yellow River).

(2) Schuichiahu-Pengpu (Anwhei province). Presumably this line is projected as an outlet from the Huainan mines to Tientsin-Pukou railroad permitting the removal of all portions of the line between Schuichiahu and Yukichen (Yuchi) opposite Wuhu on the Yangtze. Evidence on the removal and disposition of this line by the Japanese is also desired.

(3) Hankow-Canton (Pinghan line south of the Yangtze). Of major importance is evidence on the extent to which the Japanese intend or are able to reconstruct and use portions or all of this line either for support of military operations or for any possible through movements from the South.