

APO 234

Serial 21

~~SECRET~~  
ANNEX B

HEADQUARTERS  
U S. STRATEGIC BOMBING SURVEY  
(PACIFIC)  
C/O POSTMASTER, SAN FRANCISCO

INTERROGATION NO. 30  
(Obtain from G-2)

PLACE TOKYO  
DATE 4 Oct., '45 TIME 1400

Division Of Origin ELECTRIC POWER

SUBJECT: ELECTRIC POWER INDUSTRY, GENERAL.

Personnel interrogated and background of each:  
ARAKI, MATSUO, Chief, Electric Power Bureau, Ministry of Industry and Commerce, since 1943.

Where interviewed (office) MEIJI BLDG.  
Interrogator: LT. (JG) W. A. W. KREBS, JR., USNR  
Interpreter: LT. (JG) SCRIBNER MCCOY, USNR.  
Allied Officers Present:  
Vice Chairman Paul Nitze  
Brig. Gen. G. Gardner

Summary:

The organization of the electric power industry and the extent of control exercised by the minister of Industry and Commerce are set forth in Exhibits 1, 2, 3 and 4, attached.  
Records of the Electric Power Bureau are available at the Bureau's office in Tokyo, as well as those of the Japan Electric Power Generation and Transmission Co. which were not destroyed by fire.  
Electric power was first curtailed by decree in 1939 due to a drought. a coal shortage became the limiting factor as the war progressed until widespread bomb damage in 1945 reduced consumption so that restrictions were lifted on war industries but retained, unnecessarily, on commercial & domestic use.  
~~allocation~~ The small amount of poor quality coal obtained from Hokkaido (other sources being cut off) would have been insufficient for thermal generating facilities during the winter dry season of 1945 even at the low anticipated demand. Labor and repair material shortages affected the industry only indirectly. attrition of load from bomb damage offset damage to thermal plants. Hydro electric plants were untouched.  
A program of plant dispersal, underground installation, and other measures was never carried out. Progress was made on interconnections ~~to~~



make a single network out of all Japan, as a reform measure  
and to reduce coal consumption where hydroelectric power is not  
available.

Repair of damaged facilities was not vigorously prosecuted due to the  
decline in demand.



U. S. STRATEGIC BOMBING SURVEY  
Economic Studies  
Electric Power

5 October 1945.

SUMMARY

Interrogation of ARAKI, Matsuo, Chief, Electric Power Bureau,  
Ministry of Industry and Commerce.

General Statements: Meeting called at 1400, 4 October 1945,  
on the 7th floor, Meiji Building, Headquarters, USSBS. Pre-  
sent in addition to Mr. ARAKI:

Mr. Paul Nitse, Vice Chairman, USSBS.

Brigadier General Grandison Gardner, Military Adviser,  
USSBS.

Lieut.(jg) W. A. W. Krebs, Jr., G-2, USSBS.

Lieut.(jg) Scribner McCoy, G-2, USSBS.

Yeoman 1st Class A. H. Vallieres, USSBS.

Mr. Yoshioka, assistant to Mr. ARAKI

Purpose of the interrogation was to obtain from Mr. ARAKI information about the electric power industry in Japan which would provide a basis for detailed planning of the Survey's investigation of the industry. In response to a previous request Mr. ARAKI brought with him the documents attached as Exhibits 1, 2, 3, and 4, which contain an overall statement of the wartime operation and condition of Japan's electric power industry, prepared by the Bureau of Electric Power, and outlines of the governmental and commercial organizations important in the power industry. Mr. ARAKI was instructed during the interrogation to produce at an early date additional documentary information, listed in exhibit 5 attached to this summary.

Mr. ARAKI speaks no English. A summary of information elicited in the interrogation, in topical form, follows:

IDENTIFICATION  
Identification of ARAKI: Matsuo ARAKI is Chief of the Electric Power Bureau in the Ministry of Commerce and Industry, having served in that post since 1943. Before he came to his present office after a brief retirement, he served in the government from June 1942 to November 1943 as an official of the prefectural office of the Communications Ministry in Hiroshima. In 1941 and 1942 he was Chief of the Secretariat of the Communications Ministry and Chief of the Plans Bureau of the Ministry. From 1939 to 1941 he had served as Chief of the General Affairs Section in the Electric (now Electric Power) Bureau of the Communications Ministry, and before that, from 1936 as Chief of the Air Bureau of the same Ministry.

Organization and control of the electric power industry:  
The general structure of the electric power industry is outlined in Exhibits 1, 2, 3, and 4 attached hereto.



Generation and transmission of electric energy is performed in Japan (with the small exceptions noted in Exhibit 2) exclusively by the Japan Electric Power Generation and Transmission Company (Nippon Hassoden K. K.) which in 1938 acquired, under legislative auspices, the assets of all electric companies operating in these fields. Distribution is accomplished, on a regional basis, by nine supply companies, also monopolies in their fields, which purchase power from JEPGTCO. See Exhibits 2, 3, and 4. Charged by the Japanese government with responsibility for ensuring adequate supplies of electric power for the nation is the Electric Power Bureau in the Ministry of Industry and Commerce, headed by Mr. ARAKI, who holds office at the pleasure of the Ministry. The President and Vice President of JEPGTCO are not elected by its stock-holders but are appointed by the Ministry of Industry and Commerce. The ten key executive officials who serve under the President and Vice President of JEPGTCO in the affairs of that company are also selected by the Minister of Industry and Commerce from a panel of twice the required number, proposed by vote of the Company's shareholders. Any of these may be removed by the Minister at his discretion. All officials of the supply companies are elected by the shareholders, but may be removed by the Minister of Industry and Commerce. No exercise of this summary power of removal is reported, but its existence gives the Minister a large measure of control throughout the structure of the industry. The Chief of the Electric Power Bureau has the initiative in policy questions in the power field, subject to ultimate control by the Minister of Industry and Commerce.

Foreign operations: Nippon Hassoden and the Electric Power Bureau conduct no operations outside the Japanese home islands.

Existence and location of basic records: Records of the Electric Power Bureau are intact and are available at the Bureau's offices in Tokyo. Many records of Nippon Hassoden were destroyed during a bombardment of the company's offices in the Iidabashi district of Tokyo, but most of these are available in summary form from the Bureau. No information is available on the condition of records of the supply companies but the Bureau will endeavor to provide any data requested.

Restrictions on the use of electric power in Japan: The use of electricity was first limited in Japan as a result of the drought of September 1939 which reduced hydroelectric capabilities. A successful voluntary program of curtailment was succeeded by legal restrictions applying to all consumers, industrial as well as commercial. As the war progressed the growing coal shortage became the limiting factor in electric generation, and restrictions were retained to provide conservation of fuel. A general



decline in industrial demand for power in early 1945 caused by widespread bomb damage to principal consumers permitted the government to rescind restrictions applicable to war industries. Limitations on commercial and domestic uses of power were retained, however. This was done not out of a need to conserve Japan's more than ample hydroelectric capacity--which by this time was able to carry the entire load without assistance from thermal plants (except in areas like Kyushu) but primarily as a morale measure consonant with other features of the government's program to maintain psychological pressure for a "Spartan" war effort.

Damage due to bombing attacks: A general statement of damage done by bombing attack is contained in Exhibit 1 attached hereto. Lists of generating and switching stations attacked have already been made available to the Survey by the Electric Power Bureau. In general, extensive damage to electric power facilities did not occur until 1945, and even then aside from distribution networks in the cities, was confined chiefly to steam power plants and substations. Hydroelectric plants in Japan were untouched.

The rate of damage to generating facilities was rising rapidly in the summer of 1945 and might have endangered the system's ability to supplement hydro capacity with thermal generation during the dry season of the winter had attacks been continued. In general, however, attrition of load, due to destruction of consumers' industrial plants, was exceeding the progressive loss of generating capacity. Moreover, increasingly serious coal shortages, due chiefly to transportation difficulties, would probably have reduced production of steam generated electricity during the dry season of 1945-1946 to levels below those dictated by bomb damage of steam plants.

Coal and other shortages: Coal supply has been the principal limiting factor in Japan's electric power program. During the winter dry season as much as 90 per cent of the coal consumed in Japan is burned in the generation of steam for electric power; the annual average percentage is estimated at 30 percent of the national consumption in 1943 and 40 percent in 1944. Increasing difficulties in obtaining these supplies created by Allied sinkings, mines, and air attacks was experienced as the shipping crisis heightened. By 1945 only Hokkaido remained as a source of coal for utility use, since normal traffic with Sakhalin, Korea, and Manchuria had been abandoned. Hokkaido coal is of poor quality and in addition is at some distance from important utility demands--in South Honshu and Shikoku. The railroads were unable to cope with additional burdens thus thrown on them and coastal shipping was also inadequate. For all practical purposes even the inland Sea was closed to coal traffic by mining operations.



An orderly program for allocating coal supplies had been developed at the end of 1943 under the general control of the Total Mobilization Bureau in the Ministry of Munitions. Planning was on a quarterly basis, allocations being made at the end of each quarter, effective at once. The Fuels Bureau of the Ministry accepted statements of requirements from principal industrial consuming groups, represented by the appropriate Bureau Chief, and, under the policy direction of the Total Mobilization Bureau, superintended the administrative detail of allocation. Nippon Coal Company, Ltd., and the Coal Control Association distributed supplies. Extensive regional stockpiling for utilities was carried out under the direction of the Electric Power Bureau, stockpiles being drawn upon by plant managers according to need, apparently without control by the government. This system worked well as long as shipping was reasonably adequate but became progressively defective as transport deteriorated. By April 1945 the allocation process had become monthly instead of quarterly and even then was unable to keep pace with changes in the availability of transport. The Electric Power Bureau estimates that coal supplies would have been insufficient to provide for the operation of thermal generating facilities during the dry season this winter, even at predicted low levels of industrial demand and with allowances made for generating stations destroyed and likely to be knocked out by air attack during the fall.

Other important shortages in repair materials and labor were not serious within the utility industry but had an adverse effect on it because they were contributory, in their effect on transportation, to its inability to acquire sufficient coal. Steel, copper, concrete, and aluminum were generally available to provide for utility needs, allowing for some cannibalization from existing stocks and plant made possible by the overall decline in demand for power.

Measures of defense: Preparations for defending electric power installations from air attack were begun early in the war under leadership of the Electric Power Bureau. Camouflage was undertaken in 1941 with a three year program designed to protect some 1500 installations. This was eventually abandoned as for the development of aerial reconnaissance and radar attack gradually led the government to doubt its efficacy. In 1943 a program was initiated for the construction of reinforced concrete blast walls and shelters for personnel and vital parts. Particular emphasis was put on protecting transformer stations in the 110 kv to 150 kv class. Provisions were also made to drain transformer oil into underground reservoirs or gravel beds as a fire prevention measure. Some dispersal of switching and substation facilities has been effected, and this year the government ordered the underground installation of twenty principal transformer stations--a program never carried out. Plans were drawn to provide anti-torpedo nets and bomb shelters at important



hydro installations, the net project being carried out in conjunction with the Navy. Only one such net has actually been installed. In general, priority was given in all these measures to the steam plants, probably because of their urban location and the fact that, as a whole, capacity is more highly concentrated in that field. Progress on interconnections and frequency changing installations designed to make a single network out of all Japan was made during the war, its importance is a defensive measure having been long appreciated. In general, the aim of the Electric Power Bureau in this field has been to make available the ample hydro-electric capacity of the Honshu system to consumers in Kyushu, now dependent so largely on coal-generated power. The double function of this plan was to reduce coal consumption and provide easy interchange of energy as a counter-measure against bombing attacks.

Repair of damaged facilities: Repair of bomb-damaged facilities has not been vigorously prosecuted in view of the decline in demand for electric power and general confusion over the future of power requirements. One large scale effort to restore facilities in Kyushu by cannibalization of an Osaka plant was begun in August of this year but not completed. It was the plan of the Electric Power Bureau to spend the autumn in repairing only such thermal facilities as would be needed to supplement hydro-power during the winter dry season at the anticipated low level of demand. It is estimated that 90 per cent of repair materials are available in existing, now non-essential, installations, the remaining ten percent in present stocks of spares. No repair equipment can be obtained from Japanese manufacturers.

Manufacturers of electric power equipment: Principal manufacturers of electric power equipment in Japan are the following:

Turbines: Ishikawajima and Dengyo Company.

Boilers: Nihon Seiko and Nagasaki Shipping Company (a Mitsubishi plant)

Electrical equipment: Tokyo Shibaura, Hitachi, and Mitsubishi Electric Manufacturing Company.

A definitive list, with locations, is being prepared by the Bureau. See Exhibit 5.

The attack on Jitsugetsutan: The Electric Power Bureau, not having responsibility for operations outside the Home Islands, has no precise information on the effect of the March, 1945, attack by the Fifth Air Force on the large Formosa hydro electric installation at Lake Jitsugetsutan. A general report, however, indicates almost complete destruction. More complete data will be searched for in the Bureau's files and submitted to the Survey. See Exhibit 5. The Governor General of Formosa is believed to have a detailed damage report.



## ADDENDUM

The following is a list of exhibits attached to the original investigation report:

1. Information on Electric Power - Ministry of Commerce and Industry, - Bureau of Electric Power.
2. Administrative Organization for Electric Supply Utilities
3. Organization of Electric Supply Utilities
4. Electric Supply Companies
5. List of Powerplants to be produced by Chief, Electric Power Bureau, Ministry of Industry and Commerce.

These ~~to~~ exhibits may be consulted in the office of the Electric Power Division.



HEADQUARTERS  
U.S. STRATEGIC BOMBING SURVEY  
(PACIFIC)  
APO 234  
C/O POSTMASTER, SAN FRANCISCO

INTERROGATION NO: 30

PLACE: Tokyo  
DATE: 4 Oct 45  
TIME: 1400

Division of Origin: Electric Power

SUBJECT: Electric Power Industry, General.

Personnel interrogated and background of each:

ARAKI, Matsuo, Chief, Electric Power Bureau,  
Ministry of Industry and Commerce, since 1943.

Where interviewed: Meiji Building.

Interrogator: Lt (jg) W.A.W. Krebs, Jr, USNR.

Interpreter: Lt (jg) Scribner McCoy, USNR.

Allied Officers Present:

- a. Vice Chairman Paul Nitze
- b. Brig Gen. G. Gardner.

SUMMARY:

The organization of the electric power industry and the extent of control exercised by the Minister of Industry and Commerce are set forth in Exhibits 1, 2, 3 and 4 attached.

Records of the Electric Power Bureau are available at the Bureau's office in Tokyo, as well as those of the Japan Electric Power Generation and Transmission Co., which were not destroyed by fire.

Electric power was first curtailed by decree in 1939 due to a drought. A coal shortage became the limiting factor as the war progressed until widespread bomb damage in 1945 reduced consumption so that restrictions were lifted on war industries but retained, unnecessarily, on commercial and domestic use. The small amount of poor quality coal obtained from Hokkaido (other sources being cut off) would have been insufficient for thermal generating facilities during the winter dry season of 1945, even at the low anticipated demand. Labor and repair material shortages affected the industry and indirectly, attrition of load from bomb damage offset damage to thermal plants. Hydro electric plants were untouched.

A program of plant dispersal, underground installation, and other measures was not carried out. Progress was made on interconnections to make a single network out of all Japan, as a defense measure and to reduce coal consumption where hydro electric power is not available.

Repair of damaged facilities was not vigorously prosecuted due to the decline in demand.



## INTERROGATION

Identification of ARAKI: Matsuo ARAKI is Chief of the Electric Power Bureau in the Ministry of Commerce and Industry, having served in that post since 1943. Before he came to his present office after a brief retirement, he served in the government from June 1942 to November 1943 as an official of the prefectural office of the Communications Ministry in Hiroshima. In 1941 and 1942 he was Chief of the Secretariat of the Communications Ministry and Chief of the Plans Bureau of the Ministry. From 1939 to 1941 he had served as Chief of the General Affairs Section in the Electric (now Electric Power) Bureau of the Communications Ministry, and before that, from 1936 as Chief of the Air Bureau of the same Ministry.

### Organization and Control of the Electric Power Industry:

The general structure of the electric power industry is outlined in Exhibits 1, 2, 3, and 4 attached hereto. Generation and transmission of electric energy is performed in Japan (with the small exceptions noted in Exhibit 2) exclusively by the Japan Electric Power Generation and Transmission Company (Nippon Hassoden K. K. ) which in 1938 acquired, under legislative auspices, the assets of all electric companies operating in these fields. Distribution is accomplished, on a regional basis, by nine supply companies, also monopolies in their fields, which purchase power from JEPGTCO. See Exhibits 2, 3, and 4. Charged by the Japanese government with responsibility for ensuring adequate supplies of electric power for the nation is the Electric Power Bureau in the Ministry of Industry and Commerce, headed by Mr. ARAKI, who holds office at the pleasure of the Ministry. The President and Vice President of JEPGTCO are not elected by its stock-holders but are appointed by the Ministry of Industry and Commerce.



power in early 1945 caused by widespread bomb damage to principal consumers permitted the government to rescind restrictions applicable to war industries. Limitations on commercial and domestic uses of power were retained, however; this was not done out of a need to conserve Japan's more than ample hydroelectric capacity--which by this time was able to carry the entire load without assistance from thermal plants (except in areas like Kyushu) but primarily as a morale measure consonant with other features of the government's program to maintain psychological pressure for a "Spartan" war effort.

Damage due to bombing attacks: A general statement of damage done by bombing attack is contained in Exhibit 1 attached hereto. Lists of generating and switching stations attacked have already been made available to the Survey by the Electric Power Bureau. In general, extensive damage to electric power facilities did not occur until 1945, and even then aside from distribution networks in the cities, was confined chiefly to steam power plants and substations, hydroelectric plants in Japan were untouched.

The rate of damage to generating facilities was rising rapidly in the summer of 1945 and might have endangered the system's ability to supplement hydro capacity with thermal generation during the dry season of the winter had attacks been continued. In general, however, attrition of load, due to destruction of consumers' industrial plants, was exceeding the progressive loss of generating capacity.

Moreover, increasingly serious coal shortages, due chiefly to transportation difficulties, would probably have reduced production of steam generated electricity during the dry season of 1945-1946 to levels below those dictated by bomb damage of steam plants.

Coal and other shortages: Coal supply has been the principal limiting factor in Japan's electric power program.



with changes in the availability of transport. The Electric Power Bureau estimates that coal supplies would have been insufficient to provide for the operation of thermal generating facilities during the dry season this winter, even at predicted low levels of industrial demand and with allowances made for generating stations destroyed and likely to be knocked out by air attack during the fall. Other important shortages in repair materials and labor were not serious within the utility industry but had an adverse effect on it because they were contributory in their effect on transportation, to its inability to acquire sufficient coal. Steel, copper, concrete, and aluminum were generally available to provide for utility needs, allowing for some cannibalization from existing stocks and plant made possible for the overall decline in demand for power.

Measures of defense: Preparations for defending electric power installations from air attack begun early in the war under leadership of the Electric Power Bureau. Camouflage was undertaken in 1941 with a three year program designed to protect some 1500 installations. This was eventually abandoned for the development of aerial reconnaissance and radar attack gradually led the government to doubt its efficacy. In 1943 a program was initiated for the construction of reinforced concrete blast walls and shelters for personnel and vital parts. Particular emphasis was put on protecting transformer stations in the 110 kv to 150 kv class. Provisions were also made to drain transformer oil into underground reservoirs or gravel beds as a fire prevention measure. Some dispersal of switching and substation facilities has been effected, and this year the government ordered the underground installation of twenty principal transformer stations--a program never carried out. Plans were drawn to provide anti-torpedo nets and bomb shelters at important hydro installations, the net project being carried



Turbines: Ishikawajima and Dengyo Company.

Boilers : Nihon Seiko and Nagasaki Shipping Company  
(a Mitsubishi plant);

Electrical equipment: Tokyo Shibaura, Hitachi, and  
Mitsubishi Electric Manufacturing company.

A definite list, with locations, is being prepared by the  
Bureau. See Exhibit 5.

The attack on Jitsugetsutan: The Electric Power Bureau,  
not having responsibility for operations outside the Home  
Islands, has no precise information on the effect of the  
March 1945, attack by the Fifth Air Force on the large  
Formosa hydro electric installation at Lake Jitsugetsutan.  
A general report, however, indicates almost complete des-  
truction. More complete data will be searched for in the  
Bureau's files and submitted to the Survey. See Exhibit 5,  
The Governor General of Formosa is believed to have a  
detailed damage report.

#### ADDENDUM

The following is a list of exhibits attached to the original  
interrogation report:

1. Information on Electric Power--Ministry of Com-  
merce and Industry. Bureau of Electric Power.
2. Administrative Organization for Electric Supply  
Utilities.
3. Organization of Electric Supply Utilities.
4. Electric Supply companies.
5. List of Documents to be produced by Chief, Elec-  
tric Power Bureau, Ministry of Industry and Com-  
merce.

These exhibits may be consulted in the office of the Elec-  
tric Power Division.



## INTERROGATION

Identification of ARAKI: Matsuo ARAKI is Chief of the Electric Power Bureau in the Ministry of Commerce and Industry, having served in that post since 1943. Before he came to his present office after a brief retirement, he served in the government from June 1942 to November 1943 as an official of the prefectural office of the Communications Ministry in Hiroshima. In 1941 and 1942 he was Chief of the Secretariat of the Communications Ministry and Chief of the Plans Bureau of the Ministry. From 1939 to 1941 he had served as Chief of the General Affairs Section in the Electric (now Electric Power) Bureau of the Communications Ministry, and before that, from 1936 as Chief of the Air Bureau of the same Ministry.

### Organization and Control of the Electric Power Industry:

The general structure of the electric power industry is outlined in Exhibits 1, 2, 3, and 4 attached hereto. Generation and transmission of electric energy is performed in Japan (with the small exceptions noted in Exhibit 2) exclusively by the Japan Electric Power Generation and Transmission Company (Nippon Hassoden K. K. ) which in 1938 acquired, under legislative auspices, the assets of all electric companies operating in these fields. Distribution is accomplished, on a regional basis, by nine supply companies, also monopolies in their fields, which purchase power from JEPGTCO. See Exhibits 2, 3, and 4. Charged by the Japanese government with responsibility for ensuring adequate supplies of electric power for the nation is the Electric Power Bureau in the Ministry of Industry and Commerce, headed by Mr. ARAKI, who holds office at the pleasure of the Ministry. The President and Vice President of JEPGTCO are not elected by its stock-holders but are appointed by the Ministry of Industry and Commerce.



The ten key executive officials who serve under the President and Vice President of JEPGTCO in the affairs of that company are also selected by the Minister of Industry and Commerce from a panel of twice the required number, proposed by vote of the Company's shareholders. Any of these may be removed by the Minister at his discretion. All officials of the supply companies are elected by the shareholders, but may be removed by the Minister of Industry and Commerce. No exercise of this summary power of removal is reported, but its existence gives the Minister a large measure of control throughout the structure of the industry. The Chief of the Electric Power Bureau has the initiative in policy questions in the power field, subject to ultimate control by the Minister of Industry and Commerce.

Foreign Operations: Nippon Hassoden and the Electric Power Bureau conduct no operations outside the Japanese home islands.

Existence and location of basic records: Records of the Electric Power Bureau are intact and are available at the Bureau's offices in Tokyo. Many records of Nippon Hassoden were destroyed during a bombardment of the company's offices in the Iidabashi district of Tokyo, but most of these are available in summary form from the Bureau. No information is available on the condition of records of the supply companies but the Bureau will endeavor to provide any data requested.

Restrictions on the use of electric power in Japan: The use of electricity was first limited in Japan as a result of the drought of September 1939 which reduced hydroelectric capabilities. A successful voluntary program of curtailment was succeeded by legal restrictions applying to all consumers, industrial as well as commercial. As the war progressed the growing coal shortage became the limiting factor in electric generation, and restrictions were retained to provide conservation of fuel. A general decline in industrial demand for



power in early 1945 caused by widespread bomb damage to principal consumers permitted the government to rescind restrictions applicable to war industries. Limitations on commercial and domestic uses of power were retained, however; this was not done out of a need to conserve Japan's more than amply hydroelectric capacity--which by this time was able to carry the entire load without assistance from thermal plants (except in areas like Kyushu) but primarily as a morale measure consonant with other features of the government's program to maintain psychological pressure for a "Spartan" war effort.

Damage due to bombing attacks: A general statement of damage done by bombing attack is contained in Exhibit 1 attached hereto. Lists of generating and switching stations attacked have already been made available to the Survey by the Electric Power Bureau. In general, extensive damage to electric power facilities did not occur until 1945, and even then aside from distribution networks in the cities, was confined chiefly to steam power plants and substations, hydroelectric plants in Japan were untouched.

The rate of damage to generating facilities was rising rapidly in the summer of 1945 and might have endangered the system's ability to supplement hydro capacity with thermal generation during the dry season of the winter had attacks been continued. In general, however, attrition of load, due to destruction of consumers' industrial plants, was exceeding the progressive loss of generating capacity.

Moreover, increasingly serious coal shortages, due chiefly to transportation difficulties, would probably have reduced production of steam generated electricity during the dry season of 1945-1946 to levels below those dictated by bomb damage of steam plants.

Coal and other shortages: Coal supply has been the principal limiting factor in Japan's electric power program.



During the winter dry season as much as 90 per cent of the coal consumed in Japan is burned in the generation of steam for electric power; the annual average percentage is estimated at 30 percent of the national consumption in 1943 and 40 percent in 1944. Increasing difficulties in obtaining these supplies created by Allied sinkings, mines, and air attacks was experienced as the shipping crisis heightened. By 1945 only Hokkaido remained as a source of coal for utility use, since normal traffic with Sakhalin, Korea, and Manchuria had been abandoned. Hokkaido coal is of poor quality and in addition is at some distance from important utility demands--in South Honshu and Shikoku. The railroads were unable to cope with additional burdens thus throw on them and coastal shipping was also inadequate. For all practical purposes even the inland Sea was closed to coal traffic by mining operations. An orderly program for allocating coal supplies had been developed at the end of 1943 under the general control of the Total Mobilization Bureau in the Ministry of Munitions. Planning was on a quarterly basis, allocations being made at the end of each quarter, effective at once. The Fuels Bureau of the Ministry accepted statements of requirements from principal industrial consuming groups, represented by the appropriate Bureau Chief, and, under the policy direction of the Total Mobilization Bureau, superintended the administrative detail of allocation. Nippon Coal Company, Ltd., and the Coal Control Association distributed supplies. Extensive regional stockpiling for utilities was carried out under the direction of the Electric Power Bureau, stockpiles being drawn upon by plant managers according to need, apparently without control by the government. This system worked well as long as shipping was reasonably adequate but became progressively defective as transport deteriorated. By April 1945 the allocation process had become monthly instead of quarterly and even then was unable to keep pace



with changes in the availability of transport. The Electric Power Bureau estimates that coal supplies would have been insufficient to provide for the operation of thermal generating facilities during the dry season this winter, even at predicted low levels of industrial demand and with allowances made for generating stations destroyed and likely to be knocked out by air attack during the fall. Other important shortages in repair materials and labor were not serious within the utility industry but had an adverse effect on it because they were contributory in their effect on transportation, to its inability to acquire sufficient coal. Steel, copper, concrete, and aluminum were generally available to provide for utility needs, allowing for some cannibalization from existing stocks and plant made possible for the overall decline in demand for power.

Measures of defense: Preparations for defending electric power installations from air attack begun early in the war under leadership of the Electric Power Bureau. Camouflage was undertaken in 1941 with a three year program designed to protect some 1500 installations. This was eventually abandoned for the development of aerial reconnaissance and radar attack gradually led the government to doubt its efficacy. In 1943 a program was initiated for the construction of reinforced concrete blast walls and shelters for personnel and vital parts. Particular emphasis was put on protecting transformer stations in the 110 kv to 150 kv class. Provisions were also made to drain transformer oil into underground reservoirs or gravel beds as a fire prevention measure. Some dispersal of switching and substation facilities has been effected, and this year the government ordered the underground installation of twenty principal transformer stations--a program never carried out. Plans were drawn to provide anti-torpedo nets and bomb shelters at important hydro installations, the net project being carried



in conjunction with the Navy. Only one such net has actually been installed. In general, priority was given in all these measures to the steam plants, probably because of their urban location and the fact that, as a whole, capacity is more highly concentrated in that field. Progress on interconnections and frequency changing installations designed to make a single network out of all Japan was made during the war, its importance is a defensive measure having been long appreciated. In general, the aim of the Electric Power Bureau in this field has been to make available the ample hydro-electric capacity of the Honshu system to consumers in Kyushu, now depended so largely on coal-generated power. The double function of this plan was to reduce coal consumption and provide easy interchange of energy as a counter-measure against bombing attacks.

Repair of damaged facilities: Repair of bomb-damaged facilities has not been vigorously prosecuted in view of the decline in demand for electric power and general confusion over the future of power requirements. One large scale effort to restore facilities in Kyushu by cannibalization of an Osaka plant was begun in August of this year but not completed. It was the plan of the Electric Power Bureau to spend the autumn in repairing only such thermal facilities as would be needed to supplement hydro-power during the winter dry season at the anticipated low level of demand. It is estimated that 90 per cent of repair materials are available in existing, now non-essential, installations; the remaining ten percent in present stocks of spares. No repair equipment can be obtained from Japanese manufacturers.

Manufacturers of electric power equipment: Principal manufacturers of electric power equipment in Japan are the following;



Turbines: Ishikawajima and Dengyo Company.

Boilers : Nihon Seiko and Nagasaki Shipping Company  
(a Mitsubishi plant).

Electrical equipment: Tokyo Shibaura, Hitachi, and  
Mitsubishi Electric Manufacturing company.

A definite list, with locations, is being prepared by the  
Bureau. See Exhibit 5.

The attack on Jitsugetsutan: The Electric Power Bureau,  
not having responsibility for operations outside the Home  
Islands, has no precise information on the effect of the  
March 1945, attack by the Fifth Air Force on the large  
Formosa hydro electric installation at Lake Jitsugetsutan.  
A general report, however, indicates almost complete des-  
truction. More complete data will be searched for in the  
Bureau's files and submitted to the Survey. See Exhibit 5,  
The Governor General of Formosa is believed to have a  
detailed damage report.

#### ADDENDUM

The following is a list of exhibits attached to the original  
interrogation report:

1. Information on Electric Power--Ministry of Com-  
merce and Industry. Bureau of Electric Power.
2. Administrative Organization for Electric Supply  
Utilities.
3. Organization of Electric Supply Utilities.
4. Electric Supply companies.
5. List of Documents to be produced by Chief, Elec-  
tric Power Bureau, Ministry of Industry and Com-  
merce.

These exhibits may be consulted in the office of the Elec-  
tric Power Division.