A Study of

S T R A T E G I C R A W M A T E R I A L S

in a war between

THE UNITED STATES AND THE JAPANESE EMPIRE

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Section I

General Principles

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1. Scope of Modern War. a. Formerly governments at war sought to attain the political objective of their states through the destruction of the organized military (armies and navies) forces of the opposing belligerent. The military operation began and terminated the war, the end sought being attained in the minimum time. As long as the sole military objectives were the opposing armed forces in the field, states maintained and employed trained armies and navies based on immediate operations of short duration. The problem of the continued maintenance, even of these small forces, was but timidly visualized. The current requirements of

the nation and the exigencies of continued warfare of long duration were wholly ignored.

b. Today wars are conducted by the "nation in arms". To this end each nation-empire provides for the maximum mobilization of the resources of the country and of its dependencies. The military activities extend from the combat area to the most distant part of the hinterland -- each person a combatant whether armed and fighting or producing without cessation munitions, material, food. Therefore, the objective in modern warfare becomes a conquest of the enemy's will to fight, i.e., a crushing of weakening of the opposing collective or national morale. While the immediate aim is still that of defeating the hostile military forces, other vital objectives now become profitable to the attacker as well as being additional indirect causes which may lead to the destruction of the enemy's armed forces. Today industrial endurance constitutes the staying power of war. If industry can be weakened by economic pressure, the fighting strength becomes reduced and a physical disorganization of the military forces results.

c. Modern war profoundly effects the economic balance of all belligerents. It weakens domestic production, creates new needs, suppresses superfluous activities. It staggers and tends to paralyze transport and foreign trade. All of these factors influence the rate of production and supply of raw materials, their conversion into war munitions, and hence determine the fighting power of the nation.

2. Raw Materials. a. Raw materials are materials in the form in which they enter a given point for fabrication or conversion into commodities, components, or items of issue.

b. Depending on availability, such raw materials which are essential to national defense are classified as:-

-surplus, where domestic production is unquestionably in excess of demand or consumption.

-critical, where domestic production and demand are approximately equal.

-strategic, where domestic production is less than demand.

c. An economic survey of the world finds that no single political unit or federation contains within its domain sufficient kinds and quantities of raw materials readily available to meet the requirements of a major national war.

3. Strategic Raw Materials. a. Strategic raw materials by further limitation are those required for war purposes but which, either wholly or in part, must be secured from sources outside of the continental limits of the home country.

b. Therefore, strategic raw materials are determined by the actual requirements for the specific war less those amounts obtainable from domestic sources, i.e., items and amounts which must be imported. It is obvious that these materials and their amount vary within each country to be considered, the factors being: the geographic location, the character, balanced distribution, and amount of domestic production, the characteristics of the people and the standards of living to which they may be reduced, and the available national resources including war reserves and allied supply. These raw materials further vary with the type, nature, and magnitude of the military operations, with the theaters of war, and with the duration of hostilities.

c. Hence, the determination of each nation's strategic raw materials depends on existing conditions and must be estimated on the hypothesis of a specific war. Such an estimate fixes the probable enemy or combination of enemies, the national objective of the war -- whether limited or unlimited, and the military operations contemplated -- whether offensive or defensive, at home or overseas, long or short, by land, air, or sea.

4. National War Requirements. a. The national requirements for self-sufficiency in a major war comprise the total needs of the army, the navy, the civilian establishments, and the people.

Statistical data and estimates of the war requirements of the various military supply corps, departments, and bureaus, all in terms of finished articles and commodities, serve as a basis for determining the kind and amount of raw materials necessary in time and place in order to insure adequate provision for the mobilization of the military forces and the industrial organization essential to war-time needs.

b. In general the determination of a nation's strategic raw materials depends on the national requirements as to foodstuffs and war munitions. To live and therefore to maintain war the whole population must eat. The staple articles of diet are fixed. Minimum war rations of staples together with substitutes can be computed. In turn crop production depends on fertilzers, a factor which cannot be ignored. War munitions, exclusive of foodstuffs, depend primarily on iron, ferro-alloys, and fuel. The location, availability, and amount of these are limited and fixed -- all of this being a matter of known scientific data.

5. National Supply. a. The domestic production of a country is known and thus its probable war-time deficiencies can be estimated with reasonable accuracy. Such an economic survey constitutes the basis of war procurement measures which are necessary to make a nation self-sufficient. These measures include:

(1) Accelerated development of existing but unexploited resources without regard to economic cost.

(2) National conservation, recovery, salvage.

(3) Substitution of surplus domestic raw materials for items which otherwise must be imported.

(4) Control or suppression of non-military demands; curtailment; compulsion.

(5) Establishment of war reserves.

(6) Stimulation of procurement by war priorities, subsidies, price raising, embargoes.

(7) Importation as necessary to complete national needs.

b. Nations may be expected to protect themselves by establishing in time of peace a reasonable war reserve of strategic raw

materials. In time of war belligerents will endeavor to maintain these stocks by securing control of the foreign sources of production and of the routes over which they must be transported. The efforts of all governmental agencies of the belligerents will be directed toward these ends. War reserves and access to foreign sources are political, financial, and commercial problems. Procurement is a governmental problem; requirements, a joint defense problem. But, as a purely naval question, there remains the security of those reoutes of transport on the high seas for the movement of strategic raw materials.

c. Through sea areas the carrier of raw materials will be usually the slow, long radius merchantman of small and medium tonnage. However, the freight carrying submarine must not be overlooked when the situation involves transport of limited amounts of non-bulky vital commodities through blockaded areas. The possibilities of aircraft are not yet developed. In general the foregoing carriers will be armed for defense. An additional source of importation is through neutral bottoms especially when stimulated and sustained by price-raising, subsidies, embargoes, and stipulations.

6. Economic Pressure. a. The denial of strategic raw materials to an opposing belligerent will, sooner or later, aid in the attainment of victory. It is necessary, therefore, to ascertain the kinds and amounts of material vital to an enemy. Steps can then be undertaken to prevent such supplies from reaching the hostile country.

b. In general the following methods would be effective and should be initiated as soon as practicable on or before the outbreak of war in order to limit the war-making effort of an enemy:

(1) Counterprocurement -- the immediate purchase in neutral countries of all available war materials including the future out-

same for the purchasing nation. The purchasing should be concentrated on markets nearest and most conveniently situated to the enemy.

(2) Coercion -- by denying to specific neutrals imports essential to them unless they in turn prohibit the export or reexport of important materials to the enemy. This method is possible when the coercing belligerent has a monopoly or dominant control of supplies needed by the neutral.

(3) Control of shipping -- by purchasing or chartering neutral shipping and thus denying its use to the enemy.

(4) Economic alliances -- to be secured by the political agencies of the government.

(5) Naval operations -- against the enemy's shipping, with concentrated effort on important routes, nodal points, and harbors in order to drive off the seas his means of securing and transporting strategic raw materials.

7. Naval Commerce Destruction -- Raids. a. Naval operations for the purpose of interrupting an enemy's seaborne trade and his import of strategic raw materials are undertaken "in force" or by single vessels employed as commerce destroyers. The most effective method of crushing an enemy's commerce is through command of the hostile sea lines of communications. Other methods include the seizing or blockading of the hostile terminii and the occupation of the focal areas where the enemy's trade routes converge.

b. Raiding operations (Mahan) against commerce or against the enemy's communications may proceed from remote colonial possessions or they may be launched directly from the main fleet. Only in the latter case can they be supported in force. Security against raids must be met locally by the converging action of superior force. On the outbreak of war the scattered disposition of naval units may present opportunities for commerce destruction during the concentration of these craft. Protection in this situation requires

all shipping liable to capture to seek shelter in the nearest neutral ports and there to remain until the sea routes are again safe.

c. Today, organized raiding operations are not dependent on the proximity of fortified bases (The Emden). However, the location of secure or hidden fuel and supply stations facilitates commerce destruction and adds to the difficulties of its prevention. For raiding operations which depend on bases the extent of such activities, if unopposed, today threaten a sea area the radius of which is 1000 miles or less, depending on the type of raider employed.

d. Returning to a consideration of the main naval forces, it must not be forgotten that in the case of an inferior "fleet in being" the success of its status depends on sudden furtive raids in force. Against this the superior fleet must remain concentrated and highly mobile.

e. In conclusion, too much must not be expected as a result of naval operations which are directed solely toward the denial of raw materials to an enemy. The effects of such operations, even when successful, are not immediate. The destruction of an enemy's trade and commerce is largely financial, at least during the initial stage of the war. In any event a time lapse occurs before the full effect of an interruption of vital raw materials is appreciably felt by the combat forces.

8. Naval Security. a. The success of military operations depends on relatively secure lines of communications, although such security cannot and need not be inviolate.

b. Protection of the sea routes, according to Corbett, may be undertaken either directly or by means of evasions.

(1) Complete direct naval defense is contingent upon command of the sea duly exercised. Under such circumstances, while the main fleet of the enemy may have been destroyed or is being successfully blocked, there may still be minor forces of the enemy which

are operating on the high seas. Hostile submarines may be expected in all situations and places. Under such circumstances the naval defense of communications and sea routes may comprise any of the following measures:

-organization of the home terminals as defensive areas.

-establishment of strong detachments thereat.

-maintenance of fleets at focal points of importance.

-patrol of the intervening undefended sea areas.

-holding the distant terminii with light forces.

-provision for local defense by means of an escort (the convoy system) or by arming the vessels themselves.

(2) Evasive measures, not involving direct naval support, seek security through one or more of the following:

-shifting the terminii to less exposed ports and sea areas.

-developing all-land routes.

-secrecy in despatch and movement of vessels.

-use of high speed carriers and freight submarines.

-continual shifting of routes and assembly points.

c. The strain of effective naval defense is proportional to:

-the enemy's strength directed to commerce raiding.

-the extent and character of the sea areas to be defended.

-the volume and importance of the maritime trade which is to be defended.

9. Conclusions. a. In modern war attacks against an enemy's economic resources effect the physical well-being of the people and tend to undermine their morale. With a nation's will to fight thus weakened, the power of the people to sustain the operations of their armies and navies is materially lessened. If the field forces be not sustained from the rear, their defeat is certain.

b. The security of a nation's foodstuffs and war munitions is essential to success. Conversely, the denial of essential war supplies contributes to ultimate defeat.

c. Both the attack and defense of maritime trade violate the principle of concentration of effort. When the superior navy attacks only the enemy's sea lines, it violates the principles of the

objective and of economy of force; when this is undertaken by the inferior navy, that of conservation of force. On the other hand, the superior naval power in defending its maritime trade attains national and military security. The weaker navy by commerce raiding may cause the opposing fleet to disperse in order to defend its commerce and sea lines of communications. Should this occur, the weaker force has created a situation whereby it may be able to concentrate superior strength locally and, by battle, attain naval victory.

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Section II

Survey of the United States

10. Economic Situation. a. General. The United States as a whole is unsurpassed in the quantity and variety of its products. Domestic raw materials, with the exception of a few items, are found in sufficient quantity to meet the requirements of any major war. Power and fuel are abundant. The extensive industries of the country, when readjusted to fit war conditions, would be able to produce in quantity most of the articles necessary to meet the full requirements of the military forces. This status would obtain by and after M plus 13 months.

b. Foodstuffs. Continental United States produces foodstuffs in excess (12%) of her consumption. In the production of sugar there is an 80% deficiency and coffee must be wholly imported. The insular possessions in the Pacific are not self-sustaining. Hawaii if rationed could last six months. The Philippines, if denied importations, probably could hold out for one year as regards foodstuffs.

c. Minerals. The general deficiencies in mineral raw materials are approximately as follows:-

Item	National Shortage	Military Requirements	Principal Sources (Peace-time)
Nitrates	50%	37%	Chile
Platinum	75%	52%	Russia, Columbia
Tin	70%	11%	Malayasia, Bolivia
Tungsten	50%	11%	China, Burma
Antimony	50%	18%	China
Mica	80%	27%	Canada, India
Nickel	98%	27%	Canada
Mercury	66%	50%	Spain, Italy
Chromium	60%	36%	Rhodesia
Graphite	15%	16%	Mexico, Africa
Vanadium	82%	14%	Peru, Africa
Manganese	70%	12%	Russia, India, Brazil

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d. Vegetable products. The estimated shortage in vegetable products, exclusive of sugar and coffee, are as follows:

Item	National Shortage	Military Requirements	Principal Sources (Peace-time)
Shellac	100%	25%	India
Camphor	100%	15%	Japan, China
Iodine	87%	25%	Chile, England
Nux Vomica	100%	12%	India, Indo-China
Opium	100%	35%	Turkey, Greece, East Indies
Quinine	98%	7%	" " " "
Cork	100%	25%	Portugal, Spain
Jute	100%	4%	India
Rubber	100%	25%	East Indies
Silk	100%	17%	Japan, China
Coco Shell products	100%	100%	East & West Indies
Hemp	100%	18%	Philippines
Sisal	100%	4%	Mexico, New Zealand

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e. Animal products. The necessary importation of animal products are estimated to be as follows:

Wool	76%	60%)	South America,
Hides	70%	10%)	Canada

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11. Strategic Commodity Planning. a. - Responsibility. By law the Assistant Secretary of War is charged with preparing plans for the industrial mobilization of the United States for war. Such plans include a determination of the probable war requirements and of the raw materials available therefor. Separate contributory Army and Navy Procurement Plans are prepared by the respective departments. The Assistant Secretary of War combines

and coordinates these plans with each other, with industry, and with the estimated divilian and other needs. When general mobilization is ordered by the President, the Commodity Division of the Industrial Strategy Board supervises the execution and operation of these plans.

b. Modifications to 1926. Based on the strategical premises indicated in Section I, the Army War College has continued to investigate the subject of industrial planning. In 1925, due to changes in the General Mobilization project from the "six field army" to a field force of "one million men", on account of the discovery of satisfactory substitutes, and owing to the developments in domestic production, the essential strategic raw materials have been considerably reduced in number and quantity. For details, see Annex A.

12. Adaptation to a Specific War. a. The present General Industrial Mobilization Plan is based on a major war undertaken on the North American continent and its adjacent waters. No allies are assumed but increased ship building is contemplated.

b. The war reserves necessary to bridge the gap from M-day to M plus twelve months inclusive are admittedly inadequate. There is a deficiency in the reserves of certain essential items of military equipment and supply and a possible shortage in certain strategic raw materials. To meet this situation the initial general mobilization planned for any major war, during the first twelve months, is limited to -

-a field army of one million men,

-the present naval units and auxiliaries on a war basis

-industrial organization for quantity production.

c. Inasmuch as the ORANGE WAR PLAN, the subject under specific consideration, differs materially from the foregoing hypothesis, the several procurement plans must be correspondingly changed in order to meet the limited operations and special priorities prescribed by that plan. The initial national requirements of the United States, as given in Annex A, are therefore arbitrarily amended, in the event of war with Japan, as follows:

(1) Military requirements-

(a) Army — 1st year- reduce to 20% except for air corps and overseas departments.

2nd year - reduce to 50% except for air corps, overseas departments, and expeditionary forces.

3rd year - no reduction, maximum effort attained if required.

(b) Navy — 1st year - 100% of plan. Navy has paramount interest during early stages of this war. An extensive ship-building program is necessary, the raw materials therefor being included under "non-military".

(2) Non-military requirements - no change (100%).

c. For the modified list and amounts of strategic raw materials required in the event of a United States-Japanese War, see Annex B.

13. Conclusions. a. In a war with Japan the following strategic raw materials, based on the data developed in Annex B, are no longer to be considered vital to the United States, at least during the first year of the war, after which period domestic production will meet the war requirements or other measures will have been taken to assure imports:

Platinum	Iodine
Vanadium	Nux vomica
Graphite	Flaxseed
Nitrates	Wool
Cork	

b. The following strategic raw materials may be transported direct to United States' ports by secure routes, i.e., entirely by rail from Canada and Mexico, or by water from Mediterranean, Atlantic, and Caribbean ports (includes items listed under a, above).

Chromium - Canada, Cuba, etc.
Manganese - Brazil, etc.
Nickel - Canada
Mercury - Italy, Spain
Tin - Bolivia via Plata
Tungsten - Bolivia "
Graphite - Mexico, Canada
Mica - Canada, South America
Cork - Iberian Peninsula
Camphor - Germany (synthetic)
Iodine - London
Opium - Near East
Quinine - Amsterdam
Coffee - Brazil
Sugar - Cuba
Flaxseed - Canada, Argentina
Coconut Shell - Caribbean Area
Sisal - Mexico
Hides, except goat - Canada, Argentina
Rubber - tropical America (Small quantity only)
Silk - Canada, Italy, France
Wool - Argentina

c. The following strategic raw materials can be shipped to the United States by sea routes which are but shightly exposed, i.e., along the west coast of South America and thence through the Panama Canal to United States Gulf and Atlantic ports:

Platinum - Bolivia
Tin - Bolivia
Vanadium - Peru
Nitrates - Chile
Iodine - Chilean by-product.
Quinine - Peru, small amount

d. The following strategic raw materials must be shipped by more exposed sea routes in the Indian Ocean to United States Atlantic ports:

Mica - India
Manganese - India
Tungsten - Burma, Malaysia, Australia
Quinine - Java
Shellac - India
Jute - India
Hides, goat - India
Opium - India
Rubber - Ceylon, India, Burma, Malaysia

e. The remaining strategic raw materials are produced in areas which are in close or dangerous proximity to probable hostile operations. The supply of these items must be obtained in neutral markets or by means of special security through military operations:

Antimony - Changsha
Manila fiber - Philippines
Rubber - Borneo, Dutch East Indies
Silk - by purchase in Europe, South China.

-SECTION III-

-Survey of the Japanese Empire-

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14. Geographical Situation. a. From an economic viewpoint the Japanese Empire now extends to and includes the adjacent littoral of the Asiatic mainland from Kamchatka southward as far as Foochow. It controls Manchuria and dominates the North China hinterland by means of numerous Japanese-owned concessions -- mines, industrial plants, and railways. In time of war it will overshadow

Eastern Siberia and threaten the South China coast, the Philippines, and all trade routes in the Western Pacific. Therefore, as long as Japan maintains her predominant position in the Far East so long will the resources of this extensive area be available to Japan in the event of war with the United States.

15. National Factors. a. Being an island empire, Japan must import many of her essential supplies of raw materials. This factor makes the security of her sea routes to external sources of supply vital to her national existence. Therefore, Japan maintains a relatively strong fleet and has organized extensive naval and land bases in order to insure absolute command of the Sea of Japan and of the Yellow Sea both of which include her vital sea lines of communication to Korea and to the mainland. From this defensive sea area, extended to Formosa (Taiwan), the Japanese navy is in position to assert naval control over the Western Pacific Ocean. In addition the large conscript army is available to protect such economic areas on the Asiatic mainland as Japan may desire to exploit.

b. The Japanese nation is homogeneous, frugal, industrious, and loyal. The people, therefore, may be expected willingly to submit to the hardships of war including all necessary material sacrifices especially in the form of reduced personal requirements.

c. The Japanese government is strong and well able to enforce and effect such national war measures as will lead to economy in the requirements of raw materials and to insure the maximum procurement of available war supplies. The national policy of Japan provides for an effective industrial mobilization of the nation's resources. In peace large military factories# are maintained together with adequate reserve raw materials (amount not indicated by author).

16. War Objectives -- Operations. a. The national objective of the Japanese Empire in peace and war is to maintain her:-

position as a world power
exclusive predominance in the Far East
industrial development by controlling the sources of essential raw materials and by insuring markets for her products.
outlets for an expanding population.

(#Masuda - Military Industry of Japan, pp. 259, et seq.)

b. In a war against the United States, Japan will probably use such of her land forces on the Asiatic Mainland as may be necessary to secure for her an area of economic exploitation while at the same time she may employ her principal military (Army and Navy) forces in one of the following courses of action:##

(1) To prevent the United States from advancing its Fleet, with or without an accompanying expedition, westward across the Pacific. This plan is deemed impracticable because Japan lacks the naval superiority necessary to insure victory.

(2) To capture Luzon in order to deny to the United States naval bases thereat and in the Western Pacific, and then to attack the United States Fleet should it endeavor to enter Far Eastern waters. This course is practicable. Furthermore, it insures the security of Japan and of her trade routes to Asia and Europe.

(3) To defend the Japanese homeland and the lines of communications to northern Asia only, acting generally on the defensive. This course would not serve the national or political aims, altho ultimate military victory would rest safely with Japan.

c. In studying Japanese war requirements the plan b (3), "to defend the homeland" would make minimum demands on Japanese resources. Such a plan would not suit the purposes of this study. Therefore, the more probable course of action "to deny to the United States 'a foothold' in the Western Pacific" is taken as a basis for determining the war requirements and possible sources of procurement of Japanese strategic raw materials.

d. Based on the above plan of military operations, the Japanese Empire may be expected to mobilize her industry, utilize minimum army forces in Asia, transport a relatively small expedition to the Philippines, and employ her full naval strength initially on the defensive.

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See Estimate of the Situation, War Plans Course, A.W.C., 1925-1926.

17. Economic Situation.# a. Japan imports vital raw materials: for the feeding of her population - rice, beans, barley, wheat, sugar; for the development of her industries - cotton, metals exclusive of copper, coal in part, oil, rubber, numerous chemicals; and for the maintenance of her agricultural activities - fertilizers. For references for further study, see Annex C. The foodstuffs generally go to improve the "state of living" which formerly was very low. The metals are for re-export and to continue the industrial development of the homeland. The coal is brought in from China for use in smelting, the local product being unsuitable. Cotton is imported for fabrication and resale to Asia. For peace time sea routes, see Annex D. (Note: Masuda gives details of some important military raw materials, the sources, sea routes, and carriers, home factories, etc. - Military Industry of Japan, pp. 230-240.)

b. The domestic supply of the following vital items is believed to be adequate for the requirements of any major war and need not be further considered:

-Antimony	-Graphite	-Strychinine
-Camphor	-Iodine	-Sulphur
-Coal	-Lumber	-Tungsten
-Copper	-Molybdenum	-Zinc

c. Based on the continued security of Japanese sea routes to Korea, Manchuria, and Shantung, the following items, principally foodstuffs, can be removed from further consideration as strategic raw materials:

-Bean cake	-Hemp	-Peas
- Bean oil	-Hides	-Rice
-Beans, soy	-Jute	-Salt
-Cotton	-Opium	-Wheat

d. There remain for detailed study the following vital items which in time of peace are imported in quantity:

-Aluminum	-Mica	-Shellac
-Chromium	-Nickel	-Sugar
-Iron	-Nitrates	-Sulphate ammonia
-Lead	-Petroleum	-Tin
-Manganese	-Platinum	-Vanadium
-Manila fiber	-Quinine	-Wool
-Mercury	-Rubber	

For details of the above, see Annex "E".

#Authorities consulted: Commerce Yearbook (USA), 1925; The Japan Year Book, 1926; Material Resources of Japan for War - Yarnell; U.S. Tariff Commission, 1922.

18. Hypothesis of Requirements. a. The war requirements of Japan, in the absence of primary evidence, can only be estimated. This estimate, to be as nearly correct as possible, must be based on the following specific data and hypotheses:

(1) Non-military requirements-

(a) Predictable graphs of population growth.
(b) Agricultural production - past, present, future. Vital domestic resources - developed, undeveloped (underground), reserves, and rates of production.

(c) Imported raw materials - peace rate; these amounts to be diminished by the quantities re-exported.

(d) Industrial war readjustments - due principally to the loss of American markets.

(e) The above can be further amended by assumptions as to expected reductions in the national "state of living" by individuals and by the effect of governmental restrictive war measures.

(2) Military requirements-

(a) Naval. The assumption of a 5 to 3 ratio in a comparison between the computed requirements of the United States Navy and that of Japan will provide a factor of safety considering the Japanese defensive operations close to their home bases.

(b) Land forces. The Japanese Army will probably mobilize its full coast defense, air forces, and naval bases in order to defend the homeland and to support the fleet. It may send 5 to 10 divisions to occupy Korea and Manchuria and 4 to 8 divisions to capture Luzon. It can still hold in reserve in the homeland 10 or more divisions. Her air forces undoubtedly will be developed to the maximum and ample reserves of munitions will be established. This total war strength is about that of Japan's existing peace force. The special transition to a war footing is similar in character and about equal in strength to that of the American army during the first year. Therefore, the modified requirements of that force as given in Annex "B", see also paragraph 12 c (1) (a), may be reasonably taken to apply to estimated requirements for the Japanese army during the corresponding period.

b. For tabulation of probable requirements, see Annex "E".

19. Probable Procurement. a. In Japan proper the scarcity of raw materials, with the exception of foodstuffs, is an insuperable handicap to economic independence. Japan is still largely agricultural, although it is steadily passing toward full industrial development. To the latter end Japan is rapidly gaining control of the sources of raw materials which lie within neighboring countries.

b. Japan with her colonies can be made self-sustaining in time of war. But to do this in the event of a war against the United States she must have free overseas channels to her colonies and to North China and access to ports south to Kwantung. Iron ore and petroleum are Japan's outstanding necessities. If steel production be limited to Japan proper, she probably can do no more than operate her fleet in a limited way and maintain in the field an army not much in excess of 100,000 men, or 275,000 men if Korean ores be included. With access to Manchuria and to China she could maintain her fleet actively on the high seas and at the same time place in the field land forces of from one to two millions. Without free access to European plants Japan will be unable to secure or to manufacture aircraft adequate to meet the situation.

c. Under this hypothesis, the more important strategic raw materials, those against which attack should be concentrated, appear to be as follows:-

- Iron ore
- Lead
- Manganese
- Nickel
- Nitrates
- Petroleum
- Rubber
- Shellac
- Wool

-SECTION IV-

OPERATIONS (U.S.) - - DEFENSIVE, OFFENSIVE.

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21. Non-Military Measures. During the period of strained relations between the United States and Japan and subsequently throughout the war, the several governmental agencies of the United States will set in operation their non-military supporting measures. These would seek to secure military, political, and commercial allies; build up sentiment for neutrality favorable to the United States and hostile to Japan; launch a campaign of counterprocurement with unlimited funds; etc. With these efforts this study is not concerned except to the extent of procurement as indicated in paragraph 13 c.

22. United States Sea Security. a. At the outbreak of war with Japan, vessels flying the United States flag would not be seriously menaced while on their normal trade routes except those ships then in the Pacific Ocean, and particularly those in the western portion thereof. For security all American craft must be withdrawn from this area as soon as war becomes imminent. Commerce to the Far East must be transferred to neutral bottoms or diverted via the Suez Canal. At the outbreak of war isolated Japanese raiders may be expected on all oceans. Popular clamor will demand naval protection. This must be denied. Such sporadic raiding will not materially reduce the total imports of the United States nor affect the issues of the war. Merchantmen must be armed and the convoy system established between Chili and the Panama Canal a in the Indian Ocean from Singapore to the Red Sea.

b. Initially, Japan will sweep the American flag from Easter Asiatic waters. Later, she may extend these operations to include Australasian waters and the Indian Ocean unless the approach of t main United States naval forces becomes too serious a threat.

When the latter shall have established naval supremacy in the Far East, Japan may be expected to undertake commerce destruction by means of fast surface craft and long radius submarines operating in all waters but particularly against the United States convoy routes between Hawaii and the Fleet and off important ports on the west coast of the United States and the Pacific exit of the Panama Canal.

c. In this war the strategic raw materials required by the United States which come from Japan and Northern China will be most difficult to obtain. These are: camphor, silk, tungsten, antimony. To secure these items the United States must resort to neutral sources. Other strategic raw materials are drawn from countries relatively far from the seat of war. In the event of the known presence of Japanese raiders on specific trade routes, exceptionally vital cargoes must be protected by naval escort.

23, Conclusions. a. United States. The United States is economically secure in a war against Japan. Existing shortages in strategic raw materials can be obtained through neutrals. No specific naval detachments or operations are necessary initially in order to provide economic self-sufficiency. Japanese raiding operations cannot become decisive.

b. Japan. If Japan retains command of the Sea of Japan and is able to exercise control of the sea routes in the Yellow Sea and to Formosa, while at the same time obtaining in limited tonnage special imports from Europe via the Siberian Railway - as appears reasonable - Japan would in general be economically secure in the successful prosecution of a limited objective (defensive) war against the United States. From an analysis of all factors, it would appear that, if Japan is to be attacked economically, her fleet must be restricted to the Sea of Japan, that imports from Europe by way of the Siberian Railway be interrupted, and that all water access to South China and in the Western Pacific be prevented. In no other way can Japan be assuredly deprived of her economic life.

c. Strategic raw materials. From the foregoing it is concluded that the United States cannot be effectively attacked if its strategic raw materials be the objective. The same conclusion applies equally to Japan - initially. If surrounded, the Japan islands would succumb; but this involves the success of extensive major military operations which are not immediately related to this study. Therefore, in summation - strategic raw materials, initially, do not constitute a vital or decisive factor in the preparation of a joint plan for war against Japan.

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8-27 B-3

Bibliography

Political and Commercial Geology, Spurr, 1920

Strategy of Minerals, G.C. Smith, 1919

Mineral Resources as a Factor in World Affairs, Institute of Politics - Leith et al, 1925

Means of Solving the Problems of the Pacific Ocean, Andogsky, 1925

International and Inter-Allied Supply Relations and Dependencies, AWC - ASW Course #11, 1925

Strategic Raw Materials, AWC - ASW Course, 1926

National Economic Independence, McClure - NWC, 1926

Control of Extraterritorial Supplies of Raw Materials, Durand - NWC, 1926

Principles of Maritime Strategy, Corbett, 1911

Material Resources of Japan for War, Yarnell - NWC, 1927

China - Commercial Handbook, US Dept. of Com., 1926

Military Industry of Japan, Masuda, 1920

Year Book of Japan, 1926

Commerce Yearbook (US) 1925

US Tariff Commission - Japan, 1922

World Atlas of Commercial Geology, Part I, US Geol. Surv., 1921

Nautical Atlas, Brown

Mercantile Marine Atlas, Philip

Atlas America Latina, Gen. Drafting Co.

Economic Atlas, Putman

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1922
8-27 B-3

ANNEXES

A -- Summary of Strategic Raw Materials, (US maximum effort) ASW

B -- Ditto (US vs Japan) Modification of Annex A
x

C -- Economic Survey - Japan, list of references for critical commodities.

D -- (Chart - Japanese Imports - (peace time)
xx

E -- (Summary of Strategic Raw Materials - Japan.

To be prepared:

(x) Chart of US routes and naval (1) security (2) insecurity

(xx) Ditto of Japanese

1922
8-27 B-3

Annex "A"

Note:

This annex will be found in the Archives as

"ULM/1926 - 94"

It consists of the following:

1. Commodities - 31 - listed by ASW as strategic.
2. Their use.
3. Estimated requirements for major war, 1st year
4. Normal domestic production.
5. Sources of imports.
6. Remarks include suggested substitutes, conservation measures, stimulation of domestic production, etc.

The above paper is based on AWC study, ASW Course of 1926.

1922
8-27 B-5

NOTES to ANNEX "B"

Antimony

1. Import 3000 tons via safe routes from Bolivia (2.7%), Mexico (2.1%), Balkans (1%).

2. Secure remainder -- 8000 tons or more -- from China which produces 60 to 78% of the world's supply. Route principally from Changsha, Hankow and other treaty ports via inland canal to Hong Kong. (U.S. Dept. Com.--China Handbook p. 211 and 412)

Chromium

1. Secure sources -- Canada, Cuba, Brazil -- exist for 30,000 to 40,000 tons, if required.

2. No imports are vital during the first year.

Manganese

1. Secure contiguous sources -- Brazil, about 400,000 tons of ore; Costa Rica, 18,000; Cuba, 50,000; Mexico, 1500; Panama, 5000. These amounts include only those sources which are under American development.

2. Secure distant sources -- Europe, principally Russia; and India. Foregoing is under British and Russian control with but 10% of American capital.

3. Brazil -- route Nazareth and Minas Geras via ports of San Salvador and Rio Janeiro; and Matta Grosso by rail to Paraguay River and thence 1300 miles to the sea via the La Plata.

Nickel

1. Principal source -- Canada -- produces 35,000 tons of metallic nickel. The largest holdings are operated under American financial control.

2. Route of import is from Sudbury by rail to the United States.

Platinum

1. Canada produces 700 lbs. annually, Bolivia 4000 lbs.

2. Both of the above sources are favorable to American control. The routes therefrom are secure.

Mercury

1. Principal sources -- Italy, 1825 tons; Spain, 1260 tons. Mexico produces 50 tons.

2. Mercury is shipped from Mexico by rail direct to New York thru El Paso.

European mercury is English owned and is shipped via London.

Tin

1. Sources -- Bolivia, 39,000 tons; Cornwall, 1900; South Africa, 1200; Nigeria, 6700; India, 2200; Siam, 9000; Australia 2800.

2. The above scattered sources will provide for war requirements. American capital is not in control of any of these mines altho some is invested in the Bolivian fields which are owned by Chilean individuals. The Bolivian fields ship normally to the United States for smelting.

Vanadium

1. Peru produces 700 tons metallic.

2. The above is under American financial control. The Peruvian Government exercises a mild export control.

Graphite

1. The principal quick sources for import are Mexico which can produce 6000 tons amorphous per year and Canada, 1200 tons of flake graphite.

2. The above producing fields are American owned. Shipment is by rail.

Mica

1. Canada produces 2200 tons of the type which must be imported. Brazil and Argentina produce about 75 tons each; India, 2600 tons.

2. American capital controls the mines in Canada and Brazil. English capital controls practically all other sources.

3. The route from Sydenham (Canada) is all rail. The Brazilian ports are via the Plata and Rio Janeiro.

Nitrates

1. The domestic production depends on the full development of the by-product and of the fixation processes -- cyanamide, arc, Haber, etc.

2. The import required for the second year is estimated at 213,000 tons of nitrates. Thereafter, decreasing amounts will be needed on account of domestic fixation plants coming into quantity production.

3. Foreign sources are practically limited to Chile -- Tarapaca and Antofagasto. Here the ownership is generally Chilean with some British holdings. Little American capital, as yet, is invested in this activity.

Tungsten

1. Contiguous sources:

Mexico	300	tons (60% concentrate)
Bolivia	3703	tons -could meet all US requirements.
Peru	251	
Argentine	600	
Portugal	1500	& Saxony 300 via Atlantic

2. Distant sources:

Burma	4000	tons (60%)
China	10000	" doubtful supply during revolution
Malay	1400	
Indo-China	1450	
Siam	175	
Australia	1350	

3. Routes. Chinese ore is reshipped thru European market. Bolivia now ships from Pacific ports via Canal to Atlantic coast, but could reroute by rail to ports on the east coast of South America and thence to the United States. The Sierra Cordoba mine ships from Buenos Aires.

Cork

1. The stated army and non-military requirements are largely influenced by conditions which existed during the World War.

2. It is estimated that one year's supply can be secured within the United States particularly if stringent conservation measures be enforced with respect to the non-military needs.

Camphor

1. Synthetic camphor can be produced, at a cost, within 12 months.

2. The normal sources of supply are: China, 600 tons; Japan, 2500; Germany, 280 synthetic; others, 200 tons.

3. The route from Germany is Hamburg -- Atlantic Ocean; from Aisa, across the Pacific. However, about 400 tons can be secured from South China ports and thence shipped via the Indian Ocean and the Suez.

Iodine

1. The US can produce 20 to 30 tons as a war measure.

2. London stores about three year's supply for the world.

3. As by-product Chile could produce 1500 tons and Japan 375, annually.

Opium

1. Sources -- Turkey, Greece, and Persia 500 tons; India ?; China ? ; via the Mediterranean

2. The above routes lie/across the Atlantic. From India, this route is extended via the Suez and the Red Sea.

Quinine

1. The import requirement calls for bulk shipments in the form of bark and salts of about 3600 short tons gross.

2. Amsterdam is the world entrepot for the quinine trade.

3. The sources are South America 10% scattering; the remainder comes from Java.

4. From Java the route is hazardous. The full requirement, however, may be purchased from safe neutral sources, principally at Amsterdam.

Coffee

1. The principal exporting countries are:

Brazil	470,400 tons	
Columbia	123,300	
Venezuela	32,600	
Guatemala	22,000	
Mexico	13,800	equals 662,100 tons

2. The routes are by water direct from the producing countries to the US.

3. Financial control is generally such that the US would be able to obtain the necessary quantities. Local control and ownership, however, will attempt to control the price.

Sugar

1. Contiguous sources:

Cuba	5,175,000 tons	
San Domingo	320,000	
Porto Rico	522,000	
Hawaii	754,000	
South America	1,200,000	(more than)

2. Route: direct from sources.

3. Ownership in West Indies is practically all American. The sugar crop of Cuba is directly associated with markets in the US.

Flaxseed

1. Foreign sources: Canada, produces 9,700,000 bu. and export 3,000,000 to the US; Argentine produces 52,000,000 bu. and exports 14,000,000 to the US.

2. Routes from Canada are all rail; from Argentina by ocean direct to US Atlantic ports.

3. By conservation etc., it is believed that domestic production can meet war requirements.

Shellac

1. Principal source: India, 90%. Ten percent from Indo-China, Siam, Hong Kong, Straits Settlements, Europe, and Canada.

2. No shipments from source is made between June and October.

Coconut shell

1. Used for gas masks.

2. West Indies and Carribbean countries can produce 131,500 tons annually.

3. Routes direct from source to US Atlantic ports.

4. Research can provide a suitable substitute for this item if war chemicals are to be anticipated by time large land forces may be employed. Naval requirement insignificant by comparison.

Jute

1. Only source: India, 1,700,000 tons annual crop. Under British monopolistic control.

2. Principal army use: sandbags which will not be immediately needed. Substitutes: cotton.

Manila fibre

1. Source: Philippines, which export 200,000 tons annually.
2. Ocean route direct to the US Pacific ports. If these be denied, purchases from neutral sources up to one half of requirement are possible..
3. Substitutes: leather, wire, cotton; within limits.

Sisal

1. Mexican henequen - 108,000 ton - will supply the US.
2. Route from Yucatan and Campeche to Gulf ports.

Hides

1. Additional hides, other than cattle, to be imported are:

calf	8,000,000
sheep	29,000,000
goat	41,000,000
pig	none

2. Contiguous sources:
   a. Cattle and calf: Argentina, Canada, Uraguay, Brazil.
   b. Sheep: England, Argentina, New Zealand.
   c. Goat; India, China, Brazil, Spain.
3. Ocean routes are direct to the US ports, except sheep skins of which 75% are reexported from ports in the British Isles.
4. Only cattle hides are of military importance.

Rubber

1. Sources:

Tropical America	28,000 tons	(wild)
Ceylon	37,500 "	)
British Malaya	180,000	) British
India & Burma	7,200	) monopoly
Borneo	8,200	
Dutch East Indies	175,000	

2. Routes: 83% by direct routes from Far East; 10% by trans shipment via London; 4% direct from Brazil; 3% by reshipment from ports on European mainland.

Silk

1. Non-military demands can be met by use of rayon, 19000 tons manufactured in US.
2. World stock now in neutral countries is estimated at 34,000 tons of raw material or equivalent.
3. Japan (22,000 tons) is the principal source for raw silk. Other sources are:

China	2350 tons	Canada	150 tons
Italy	550	France	85
Hong Kong	350	Others	55

Wool

1. Contiguous wool exporting countries are:

Argentina	140,000 tons
South Africa	97,000
Uraguay	56,000
United Kingdom	52,000

1922
8-27 B-3

Annex "C"

Economic Survey of Critical or Strategic Raw Materials

JAPAN

(List of References and Authorities)

Beans--- Yarnell - Material Resources of Japan for War, p 5
US Dept. Com. - China Yearbook 1926, pp 239-240, 641, 743; 736.
Andogsky - Problems of the Pacific, p 14.

Rice---- Yarnell - op cit, pp 3-5, 31.
US Dept Com - op cit, pp 239, 554, 435, 621, 707, 773.

Sugar--- Yarnell - pp 8-9.
US Dept Com - pp 474, 622-624.
Andogsky - pp 14-15.

Wheat--- Yarnell - pp 6-7.
US Dept Com - pp 247, 524.
Andogsky - p 14.

Coal---- Yarnell - pp 11-15.
U S Dept Com - pp 211, 470-472, 524, 670, 737.
Andogsky - pp 19-22.

Iron---- Yarnell - pp 16-23.
US Dept Com - pp 213, 471-474, 525-527, 692-694, 737.
Andogsky - pp 17-19.

Lead---- Yarnell - p 23.
US Dept Com - pp 215, 472.

Manganese-Yarnell - p 34
US Dept Com - pp 217, 473, 584.

Mercury- Yarnell - p 36,
US Dept Com - pp 215, 585.

Nitrates- US Dept Com - p 216.

Petroleum-Yarnell - pp 23-26.
US Dept Com - pp 216, 623.
Andogsky - pp 22-23.

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