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VULNERABILITY OF THE SOVIET BLOC TO EXISTING AND TIGHTENED WESTERN ECONOMIC CONTROLS

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Division of Research for the USSR and Eastern Europe
OFFICE OF INTELLIGENCE RESEARCH

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SUMMARY CONCLUSIONS

1. The rulers of the Soviet sphere have always had the deliberate policy of reducing to a minimum their vulnerability to outside economic pressures.

a. In the case of the USSR itself, each of the Five-Year Plans has had as a principal objective building up Soviet productive capacity in deficient areas, even at the cost of great wastage of resources and energies. Appreciable success has attended these efforts, the USSR being today capable of meeting the bulk of its operating requirements in every major area of production. Where shortages of particular commodities continue to exist, a systematic attempt has been made to provide a cushion against an interruption of outside supplies through extensive stockpiling.

b. Soviet emphasis on self-sufficiency has been extended to the European orbit countries. Within certain areas of production, the satellites are attempting to build up their own facilities. In others, they are adapting themselves to a scheme of intra-orbit division of labor. In both instances, Moscow appears to exercise decisive direction and control. Satellite dependence on the Western world has been greatly reduced as compared with pre-war, but it remains substantially greater than that of the USSR itself.

c. The Chinese Communists have given every indication that they too will follow a policy of enforced economic isolation from the Western world. Despite, however, a strong Soviet desire and

an apparent Chinese willingness to integrate the Chinese economy with that of the remainder of the orbit, factors of geography and economic structure seriously restrict the degree to which such integration can be effected in practice. On the other hand, the predominantly primitive and rural nature of the Chinese economy automatically limits China's dependence on the outside world.

2. Despite strenuous efforts to develop self-sufficiency, the USSR and its orbit are still dependent to an important degree on the West for economic assistance:

a. The Soviet Union itself, and even more most of the European satellites and China, are in relatively early stages of industrialization. Each has as a central goal the rapid expansion of its facilities. For this, each has inadequate supplies of capital, capital goods, managerial and engineering talents, highly skilled labor, and know-how in general. All of them vitally need from abroad industrial equipment, especially high quality machines and instruments, some vital raw materials and semi-finished goods, "pilot plants" of all descriptions, and technological information. As western assistance played a key role in Soviet economic progress to date, the ability of the USSR and its satellites to develop in the future will be substantially affected by the continued availability of such assistance.

b. The Soviet Union and its satellites are immediately short of a number of commodities that are necessary for the operation of their economies at the current level. While substantial

stockpiles of these commodities have been built up (probably equaling in most cases at least a year's requirements), the relief that these would offer in case of an interruption of imports would obviously be only temporary.

c. The entire orbit constantly needs replacement parts for the vast amount of assorted foreign equipment acquired in former years. A large percentage of the inventory of industrial equipment in the Soviet sphere is of foreign manufacture. For example, it is estimated that approximately 35 percent of the machine tools in operation in the USSR are western built. The bulk of this equipment is now over five years old and is already beginning to present serious maintenance problems because of the non-availability of spare parts and the difficulty encountered in manufacturing them in the USSR or the satellites. The problem is further complicated because most of this equipment is of an especially complex type, purposely obtained from abroad because of Soviet inability to produce it domestically. Thus, an estimated 75 percent of Soviet specialized machine tools are of foreign make. The constantly growing spare parts problem is, therefore, concentrated in the weakest and most important sector of the Soviet-orbit industrial establishment.

3. The importance that the USSR and its satellites attach to the continuation of supplies from abroad is directly evidenced in a number of ways.

a. It is estimated that in 1950 the USSR and its satellites, including China, imported roughly $1.7 billion worth of goods from the outside world. It is true that this amount is less than one-fifth of what the US imported in 1950 (about $9 billion) and that in comparison with the aggregate national output of the Soviet bloc it is little more than 1 percent. But included in the total were virtually no consumers' goods. It consisted with few exceptions of essential items, essential for military preparedness and for expansion of the industrial base of the eastern countries. It included, in particular, prototypes which embody Western technical improvements.

b. The USSR and its satellites have shown great official sensitivity over western export control policies. Moreover, they have made strenuous efforts to obtain items currently restricted on the sly. Irregular and covert eastward shipments have assumed large proportions and range from complicated third country deals, utilizing frequently the facilities of free ports, to smuggling in knapsacks. Such imports are necessarily expensive because of circuitous hauls, price gouging, and middleman commissions and therefore are strongly indicative of pressing Soviet and satellite needs.

c. During lend-lease negotiations the Soviet Government revealed an extensive need for western commodities, particularly all types of equipment, for both current operations and future development. Although the USSR was interested at that time to exaggerate its needs, careful screening of the basic data presented at that time shows significant shortages and bottlenecks.

4. The greatest impact on the Soviet-orbit economy, from the standpoint of (a) current production and (b) development prospects, could be achieved through interruption of foreign supplies of the following specific commodities.

a. Maintenance of the existing level of production would be impaired by an embargo of:

Swedish iron ore -- an embargo would seriously lower satellite steel output unless and until reconversion to Soviet ores were effected;

Alloy steel, particularly tool and bearing steel, and alloying metals, including nickel, but excluding manganese and chrome; present supplies from the West relieve a tight situation in the bloc;

Tin -- imports from China alone do not appear sufficient to make up the bloc's deficit;

Copper -- domestic production cannot meet even minimum requirements;

Industrial diamonds and gems -- effective control would slow down precision tools output and might hamper the atomic development program;

Piezo-electric quartz -- an embargo would lower the quality of Soviet bloc radio sets and related equipment;

Sulphur, pyrites, and sulphuric acid -- although domestic production is large, rapidly growing requirements necessitate imports at present;

Graphite, mica, asbestos and their manufactures, but special types only; local deposits are in some cases, qualitatively inadequate, and processing facilities are limited;

Natural rubber -- large recent imports have allowed Soviet stockpiles sufficient for one or two years, but otherwise the bloc is completely dependent on outside sources;

Textiles fibres, especially long-stable cotton, apparel wool -- embargo would cause 10-15 percent decline in Soviet textile output and very substantial decline in satellite output;

Ball and roller bearings, including high-grade bearing steels and parts -- present controls have little effect or are evaded; chief sources are Sweden, Switzerland, Italy, Austria; embargo would have serious effect, especially on satellite output, although stockpiles exist;

Electronic equipment, as well as materials and component parts -- present receipts from the West make a direct and substantial contribution to the bloc's war potential which could not be matched from internal resources for some years;

Abrasives, especially critical grain sizes -- embargo would impair present levels of output of bearings, precision instruments, military items, etc; chief sources: Norway and other European countries;

Spare parts -- all types of replacement parts for equipment previously acquired by the Soviet bloc in the West are essential for continued operation of the equipment. In the cases where they can be reproduced within the bloc, a significant drain on the bloc's skilled labor and productive capacity would result.

b. An embargo on the export of these commodities to the Soviet bloc would substantially impair ability to raise production above existing levels:

Equipment for petroleum exploration, drilling, and refining, especially certain crucial components, such as drills -- strong efforts to obtain these through clandestine channels attest to their tight supply throughout the bloc;

Power generating equipment and, in this connection, copper already listed in group (a) above -- embargo on present shipments from the West would limit expansion of power facilities;

Anti-friction bearing producing equipment -- coupled with an embargo on bearings, this would have repercussions on many vital industries;

Machine tools (principally complex, specialized, automatic types) -- with no receipts from the West, the bloc would have to reallocate engineering resources, overwork existing equipment, and for a time, work with inferior tools;

Precision instruments and testing equipment -- embargo would substantially retard expansion in a number of important industries, would also hamper research;

Complete plants of all types, but especially chemical plants, steel and aluminum mills, and building materials plants -- these are required not only to expand current production but more important for use as pilot models for copying. Blast furnace equipment and electric furnaces;

Laboratory equipment -- one of the most essential needs.

Shipping, viz. -- an embargo on acquisition of new vessels and chartering operations.

5. The USSR and its satellites would be able to counter in part an attempted western program of dehial of the above commodities in several ways:

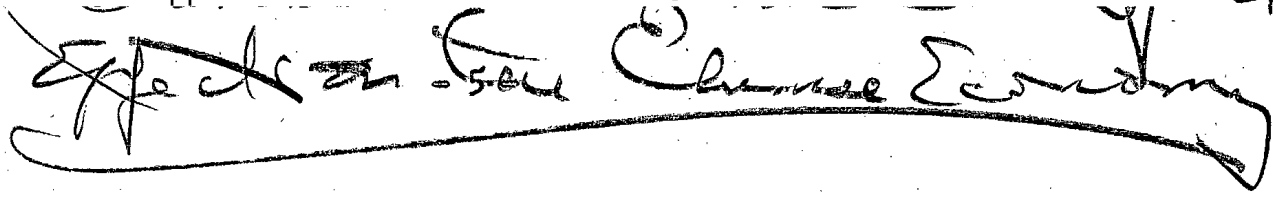
a. A widespread net of more or less covert trade channels has been developed in recent years through which the Soviet bloc continues to obtain products on Western control lists. The volume of this trade is a measure of the partial ineffectiveness of the existing program and an indication of the difficulty that would be encountered in enforcing any future programs. The volume, however, could be reduced to a significant extent if full cooperation of the major non-Soviet producers were secured for a selective control program. Even with such cooperation, some restricted items would, of course, still get through, especially those of small bulk or those with numerous and highly competitive sources of supply. The actual amount would in large measure depend on whether such supplementary measures as preclusive buying, black listing, and foreign funds control were systematically applied.

b. In those cases where it became impossible for the Soviet bloc to procure vitally needed imports through such methods as these,

compensating internal adjustments could in some cases be made, but not in all instances simultaneously. The USSR would order a stricter control over the distribution and utilization of critical items within and between members of the orbit. Labor, fabricating facilities, and materials would be reallocated in an effort to produce the products previously imported. Synthetics and substitutes would be utilized wherever possible. Such measures, however, would only partially offset the damage resulting from Western trade restrictions. The orbit, through its planned economies, is operating under a scheme of allocations which has already been decided as the best possible arrangement. Reallocation of labor, materials, fabricating facilities, and products is not always feasible and when it can be accomplished it is time-consuming, inefficient and generally less satisfactory than the previously adopted program. In view of the fact that Soviet plans have already provided for an allocation of resources giving top priority to the development of capacity for military production and heavy industry as opposed to consumers' goods, reallocation of priorities can take place only within an already narrowed area. Any forced change in the planned pattern of allocation would certainly retard the general development of the economy and the potential for war. Beyond this a condition of scarcity is so general throughout the Soviet sphere that there is small cushion for adjustment, particularly if a number of commodities are involved simultaneously.

6. It is therefore concluded that despite Soviet counter-measures significant results could be achieved through a control program encompassing the commodities listed above and receiving the support of at least the major western producers. It is estimated in particular that such a program, if enforced with reasonable effectiveness would have the following impact:

a. Dislocation would be produced in current production operations and fulfillment of existing plans made difficult. In the USSR and the European satellites, especially the latter, at the least a lower standard of living would be forced on the people with a resultant increase in popular discontent and an aggravation of internal security problems. In view, however, of the repressive power of the Soviet bloc security organizations, the political stability of the various regimes would not be seriously jeopardized. Soviet domination of its Eastern European satellites would permit the USSR to assign itself priority on critical items of mutual interest without weakening Soviet control. With respect to China, elimination of a substantial part of the $300-$350 million of imports received in 1950 would have relatively little over-all economic impact but would severely affect the "modern sector" of the economy, which depends upon foreign trade for export markets and for capital goods and raw materials. This "modern sector," utilizing the advantages of exchange offered by world markets and the efficiencies of advanced technology, is highly productive, and a high proportion of its income represents savings which can be diverted to finance current



government requirements. Although the "modern sector" probably accounts for only 10 to 15 percent of the national income, the Chinese Communists planned in 1950 to finance through revenues derived from it some three-fifths of their expenditures in China proper and three-quarters in Manchuria. The imposition of Western economic sanctions may therefore--unless the Chinese people can be forced to accept further direct taxation and deprivation--significantly affect the capacity of the Chinese Communists to mobilize resources at current rates to meet administrative and military requirements.

b. The USSR, and even more the European satellites and China, would find it virtually impossible to carry out their plans for rapid, balanced development of their economies. Such prospects as they now have for reducing the present enormous gap between their productive capacity and that of the West would be decidedly reduced.

c. The Soviet bloc's potential to wage a prolonged war of attrition would be considerably impaired.

d. The capability of the Soviet Union to conduct a general war of limited duration would not be materially affected. The military forces and the economy of the Soviet bloc are already in such an advanced state of preparedness for war that Western restrictive measures even if used in conjunction with military measures would be unable, at this time, to stop any initial Soviet military campaign.

e. There is little evidence, currently or historically, to justify the expectations that internal economic difficulties arising out of Western trade restrictions would force a tactical change in the aggressive foreign policy of the USSR.

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VULNERABILITY OF THE SOVIET BLOC TO EXISTING AND TIGHTENED WESTERN ECONOMIC CONTROLS

I. THE SOVIET BLOC AS A WHOLE

This report attempts to determine to what extent the Soviet bloc is vulnerable to economic warfare on the part of the Western powers. For working purposes the bloc includes the following countries: (1) the USSR, (2) the Eastern European orbit of the USSR consisting of Poland, Eastern Germany, Czechoslovakia, Hungary, Rumania, Bulgaria, and Albania; (3) China in the Far Eastern orbit of the Soviet Union. Korea, Outer Mongolia, and certain Communist-controlled areas in Southeast Asia are omitted because of their minor economic significance and the absence of reliable data on them. The countries outside the Soviet realm are frequently referred to in this study as "the West."

Interference with imports and exports, with efforts to obtain foreign technological information, with transportation links and financial relations abroad is necessarily harmful to the USSR and its sphere of influence. By systematically examining the Soviet bloc's foreign economic relations, its dependence on such contacts, and the effects of a more or less complete blockade, it is possible to spot sensitive areas, both geographical and functional. It need hardly be mentioned that statements on the Soviet bloc economy are to a very large extent based on estimates, many of them tenuous, and that there is no yardstick for measuring and comparing vulnerabilities. Even more important than the limitations of research on the countries behind the Iron Curtain are the limitations of economic warfare itself. The first part of this report assesses the vulnerability of the Soviet bloc in general, its encouraging as well as difficult aspects, from the US point of view, while the subsequent discussion points out specific Soviet bloc vulnerabilities in the different fields of foreign economic relations.

A. Soviet Bloc Dependence on Imports from the Outside World

The core of the problem is the Soviet bloc's vulnerability to Western export controls. Measures in other fields are important chiefly insofar as they affect the bloc's ability to import. Thus an embargo on imports from the Soviet bloc or the freezing of its financial assets endangers the East's capacity to pay for its own imports; severing transportation links prevents the Soviet realm from receiving goods from abroad. The bloc is sensitive to measures against its imports because (1) its industrial establishment is lagging behind that of the West and is being forced into rapid expansion, and (2) because some essential materials cannot be produced or are not being produced in sufficient quantities within its boundaries.

The first reason is the more important one. With the exception of Eastern Germany and the Czech lands, the Soviet bloc consists either of newly industrialized or agricultural economies. Since practically everywhere industries are built up at a fast rate, the bloc as a whole is short of capital in general, of capital goods in particular, of managerial and engineering talents, and of highly skilled labor. All of these countries seeking to obtain from abroad industrial equipment, especially high quality machines and instruments, some vital raw materials and semi-finished goods, and technological information. All of them are after spare parts for the vast amount of assorted foreign equipment acquired in former years and increasingly in need of repair.

Scarcity of raw materials is due only to a small extent to the parsimony of nature. The Soviet bloc covers a large portion of the globe, and with the exception of natural rubber, a few of the rare metals, and certain gems, there is no lack of natural resources. The main problem is to get them out of the ground and process or otherwise utilize them; thus it is not the deposits but the skill and equipment that are wanting.

As a result of US controls and the unwillingness of American business and labor to trade any longer with Communist governments, US exports to the Soviet bloc have all but ceased. In 1947 commercial exports alone (i.e. excluding lend-lease "pipeline" and relief shipments) to the USSR, Poland, Czechoslovakia, Hungary, Rumania, Bulgaria, and Albania amounted to $207.5 million; during the first 10 months of 1950 they dwindled to $26.1 million; in the month of October they did not even reach the million dollar mark. But trade between the Soviet bloc and the rest of the world has remained fairly stable in recent years; a rough estimate for 1950 shows that the USSR and its satellites, including China, managed to import about $1.7 billion worth of goods from the West.

It is true that this amount is less than one-fifth of what the US imported ($9 billion in 1950) and that in comparison with the aggregate national output of the Soviet bloc, it is little more than 1 percent. But with few exceptions it consists of goods essential for military preparedness and for the economic basis of military preparedness. Consumers' goods hardly figure among the imports; the bulk consists of vital raw materials and semi-manufactured goods such as metals and metal products, industrial diamonds and abrasives, important fibers, basic chemicals and rubber as well as all sorts of capital goods, machinery, and equipment, both for current use and for stockpiling purposes. Lack of statistical data prevents a commodity breakdown of the entire Soviet bloc trade, but in 1950 crude rubber imports alone amounted to about $150 million, raw cotton imports to $175 million, wool imports to $75 million, if not more, and industrial machinery and transportation equipment to a minimum of $200 million. More information is available for Western Europe's 1949 exports to the USSR and its Eastern European orbit. These exports amounted to $750 million, thus representing almost half of the Soviet bloc's entire imports, the remainder consisting chiefly of raw materials purchased in the Far East and other parts of the world. The major commodity groups within Western Europe's exports are the following (in millions of dollars):

Agricultural products	40.7
Textiles	97.2
Chemicals	54.1
Iron and steel products	57.8
Nonferrous metals and manuf.	42.7
Machinery	165.1
Transportation equipment	31.7

The effectiveness of existing controls over exports to the Soviet bloc and of a complete future embargo on such exports can be appraised in terms of two objectives of economic warfare:

(1) reduce current levels of production in the Soviet bloc;

(2) reduce or arrest the expansion of Eastern productive capacities.

The following survey groups commodities now being shipped to the East -- or at least in demand by the Soviet bloc -- according to whether their embargo would satisfy objective (1) or (2).

(1) Embargo on the export of these commodities to the Soviet bloc would impair maintenance of existing levels of production within the Soviet bloc:

Iron ore: a Swedish embargo would seriously lower satellite steel output until reconversion to Soviet ores was effected.

Steel: alloying metals, including nickel, but excluding manganese and chrome.

Tin:

Copper:

Industrial diamonds and gems (difficulty to enforce controls should be noted)

Piezo-electric quartz

Sulphur, pyrites, and sulphuric acid

Graphite)
Mica) and manufactures thereof, but special types only
Asbestos)

Natural rubber, of which, however, substantial stockpiles exist

Textile fibers, especially long-staple cotton, apparel wool: embargo would cause 10-15 percent decline in Soviet textile output and very substantial decline in satellite output.

Ball and roller bearings, including high-grade bearing steels and parts; present controls have little effect or are evaded; chief sources are Sweden, Switzerland, Italy, Austria; embargo would have serious effect, especially on satellite output, although stockpiles exist.

Electronic equipment, as well as materials and component parts for it; embargo would have direct effect on military potential.

Abrasives, especially critical grain sizes; embargo might impair present levels of output of bearings, precision instruments, military items, etc; chief sources are: Norway and other European countries.

Spare parts: numerous types of replacement parts for equipment previously acquired by the Soviet bloc in the West are essential for continued operation of the equipment. In the cases where they can be reproduced within the bloc, a significant drain on the bloc's skilled labor and productive capacity may result.

(2) Embargo on the export of these commodities to the Soviet bloc would substantially impair ability to raise production above existing levels:

Equipment for petroleum exploration, drilling, and refining, especially certain crucial components, such as drills.

Power generating equipment and, in this connection, copper, already listed in group (1).

Anti-friction bearing producing equipment.

Machine tools (only complex, specialized, automatic types)

Precision instruments: present controls probably ineffective: embargo would substantially retard expansion in a number of important industries, would also hamper research

Shipping, viz. an embargo on acquisition of new vessels and on chartering operations

B. Soviet Bloc Vulnerability to a Ban on Its Exports

It was mentioned earlier that interference with Soviet bloc exports would be effective chiefly as a way of cutting off the means to purchase abroad. There would be no general crisis as, say, in Brazil in case of a blockade of its coffee exports. Most of the Soviet bloc's export goods could be easily diverted to domestic use; a reallocation of resources would be necessary in only a few instances. Thus grain which could not be sold abroad would be used to increase livestock herds or strategic stocks, and some acreage now under grains might be employed for technical crops. The obvious areas of possible crises are the Polish coal industry and various industries in Czechoslovakia producing luxury and semi-luxury goods for export to the West. In these cases some capital waste and temporary unemployment would be inevitable, but the degree of vulnerability of the countries immediately affected is low, to say nothing of the Soviet bloc as a whole.

C. Limitations of Soviet Bloc Vulnerability

This leads to the limits of Soviet bloc vulnerability. The effectiveness of economic warfare against the Soviet bloc is limited, first, because the area is little exposed to Western economic action, and, second, because it has forces of resistance and recuperation.

With respect to the first point, it must be repeated that the Soviet realm has a high degree of self-sufficiency. Not much more than 1 percent of its gross national income is derived from exchange with the outside world, as compared with 3 percent for the US and 18 percent for the UK. Moreover, part of the Soviet bloc trade is out of reach of the US; it is carried on with countries which, for political or other reasons, are interested in continued commercial relations with the USSR and its retainers. Sweden and Iran are examples of countries which prefer to humor a dangerous neighbor by doing business with him. In addition a vast net of more or less covert trade channels has developed in recent years through which the Soviet bloc contrives to obtain products which figure on Western control lists. Such shipments are, of course, expensive because of circuitous hauls, price gouging, and middleman commissions, and it is known that Soviet and satellite leaders are greatly annoyed by the adverse effects of US policy on the terms of their trade. In this connection it must be pointed out that economic warfare is also a costly operation for the West and particularly for the US and that the relation between effects on the East and cost to the West must be kept in mind.

Soviet power of resistance is based on the following circumstances:

(1) Modern technology is well adapted to finding substitutes, at least for marginal purposes.

(2) In the course of a few years labor and capital can be reallocated so as to alleviate critical shortages.

(3) In a socialist economy it is relatively easy to spread the damage done by economic warfare over the economy as a whole. No private firm will succumb under the weight of losses; workers temporarily idle can easily be kept on the payrolls.

(4) The gradual development of centralized planning for the Soviet bloc as a whole means that deficits in one part of the Soviet bloc are covered, as far as possible, by surpluses available elsewhere and a more or less common strategy is applied to dealings with the outside world. In the long run the integration of the satellites into the Soviet economy involves a new, Moscow-directed division of labor between the members of the Communist empire. This aspect of the vulnerability problems requires separate consideration.

D. Soviet Bloc Integration as a Hedge Against Western Measures

The effectiveness of Western economic measures against the Soviet bloc depends to a considerable extent on the degree to which the bloc has been, or can be, effectively integrated into a single economic unit and the flexibility with which it can respond to changing circumstances, such as a Western embargo. Flexibility of adjustment may be hampered by institutional obstacles and rigidities and, to some extent, by transportation bottlenecks. The limitations in terms of general economic resources are covered throughout this report.

A fairly high degree of integration of the Soviet bloc (though not yet with the newcomer, Communist China) has already been achieved. Despite the fact that the economies of the Soviet Union and its Eastern European satellites are more marked by similarities than by complementarity -- i.e., that their commodity surpluses and deficits tend to cumulate rather than to offset each other -- the Soviet Union and its European orbit have achieved a fairly high level of interchange of goods. The turnover of commercial trade between the Soviet Union on the one side and Poland, Czechoslovakia, Hungary, Ruamnia, and Bulgaria on the other rose to approximately the equivalent of one and one-quarter billion dollars by 1949. The prewar volume of this trade was negligible. Trade among the satellite countries mentioned above was about $100 million in 1938 and reached almost $400 million in 1949 (current prices in both cases). In addition, Eastern Germany is rapidly becoming a full-fledged trading member of the Soviet bloc. Outer Mongolia has been an active trading partner of the USSR for some 25 years now, and the USSR is apparently obtaining the chief exportable surpluses of Manchuria. Finally, reparations out of current production (chiefly from Eastern Germany, but also from Rumania and Hungary) and similar noncommercial receipts add to the commodity flow to the Soviet Union. As a result, a fairly high degree of redistribution of commodity "surpluses" -- chiefly petroleum, coal, iron ore, certain nonferrous metals, raw cotton, textiles, and industrial equipment -- has been achieved. The far-reaching current economic plans of the satellites suggest that to some extent they are to share in the limited supplies of industrial equipment available within the bloc.

This redistribution of supplies within the bloc, resting ultimately on the effective political control of the whole area by the Soviet Union, seems to be the primary function of the so-called Council for Economic Mutual Assistance (CEMA). 1/ In particular, CEMA appears to coordinate national economic plans, the interchange of surpluses within the bloc, and -- by means of a reported Committee for Trade with Capitalist Countries within the CEMA -- the sale and purchase of supplies in the West as well. Other coordinating machinery may also exist.

On the other hand, the presence of substantial institutional weaknesses and rigidities within the Soviet bloc must be emphasized. These include:

(1) The presence of about a dozen national units (not counting the constituent republics of the USSR), each with its own government, bureaucracy, and party structure.

(2) The rigidities inherent in the Soviet planned system, (now adopted by the satellites), with its inflexible plans for each enterprise, with minute and constraining prescriptions for economic behavior, and with its top-heavy centralized planning and inspection strucutres.

(3) The presence of a perpetual "sellers' market", encouraging hoarding of supplies and diminishing managerial energies.

(4) General discouragement of individual initiative and of willingness to accept individual responsibility, which is inherent in the Soviet system of rewards and punishments.

(5) Disaffection from Soviet domination in the satellite countries.

It is believed that these weaknesses and rigidities may appreciably offset the organizational gains made by the Soviet bloc, such as the creation of the CEMA, and the advantage enjoyed by a totalitarian system in speed of adjustment to changing circumstances.

II. DEFICIT COMMODITIES

A. Methods of Detecting Deficits

While obviously almost all goods are more or less scarce there are some for which essential Soviet bloc requirements can be met only through imports. Requirements can be for current use as well as for normal or strategic stockpiling. The Soviet bloc governments may, of course, deliberately decide or be compelled to disregard even essential requirements. In such a case marginal requirements are likely to be sacrificed, but if management is bad, high priorities may be neglected.

1/ China is the only major member of the Soviet bloc not belonging to the CEMA.

The existence of a commodity deficit can be detected by several methods:

(1) Computations of availabilities and requirements, possibly based on reliable Soviet or satellite statements (in some cases data revealed during the lend-lease negotiations are still profitably used.)

(2) Evidence of shortages of essential goods, even if the underlying data for availabilities (output and inventory) and requirements are not known.

(3) Actual imports, overt or covert. Imports by devious means, being expensive and time consuming, are likely to indicate pressing needs.

(4) Reported negotiations, overt or covert, revealing Soviet and satellite interest in Western goods.

B. Fuels and Power

Of the three major sources of the fuel and power supply (coal, petroleum, and electric power) of the Soviet bloc, only coal appears to be completely invulnerable to restrictive trade measures by the non-Soviet world. Oil supplies, while adequate to provide for a reasonable level of peacetime economic development and apparently sufficient to provide immediate military striking power, would probably be scarce in a large-scale war of long duration; furthermore, prospects for future quantitative and qualitative development of production and refining are limited by deficiencies in oil production and refining equipment. Electric power generation is now at an all-time high, but failure to install sufficient new generating equipment during the recent great expansion of industrial electricity consumption affects both the present reliability of the service and the prospects for a future rise in output.

1. Coal and Coal-Mining Equipment

a. The USSR. Never an importer of coal from the West, the USSR is now producing more coal than ever before, and about 6 percent more by weight than planned. Coal production was planned at 250 million metric tons for 1950, and total production in that year was actually about 265 million tons. In case of development of local shortages, or temporary shortages of coking coal, the USSR has at its disposal large resources of high quality coal from the Polish Silesian fields which could be used, as they have been while the Donbass was being restored, to provide coking coals for the Ukrainian metallurgical and coke-chemicals industries.

The postwar restoration and further development of Soviet coal production have been accomplished in spite of a poor implementation of the government's drive for increasing mechanization of mining and preparation processes and higher labor productivity. On the other hand, there is little evidence that the USSR has been interested in importing coal-mining machinery. The few purchases and attempts to obtain this type of foreign equipment since the war have

been largely limited to orders for single machines, obviously to serve as prototypes for domestic manufacture. 1/ If such prototypes are withheld, the coal mining industry will continue to constitute a drain on Soviet manpower, but this situation did not prevent the USSR during the last war from increasing coal production in those basins which were not occupied by the Germans, and apparently is not now a problem of great concern.

b. The European Satellites. Of the Eastern European satellites, only Poland is a major producer and exporter of coal. In 1949 Poland produced 74 million tons of coal; 18 million tons were exported to other countries in the Soviet bloc and 11 million tons to Western Europe. Poland expects shortly to be able to export 12 to 15 million tons to the West.

Czechoslovakia is the only other substantial coal producer in the European orbit, having produced 17 million tons in 1949, but it, along with Eastern Germany and the other European satellites, depends on imports of coal. Almost all of these imports come from within the bloc.

Very little is known about the production or supply of coal mining equipment in the European orbit. Poland, where domestic production of certain types of coal mining machinery began only last year, is primarily dependent on foreign sources for any improvement in the level of mechanization of its coal mining industry. Some of this equipment has been supplied by the USSR and Czechoslovakia, but the amounts are small, and in 1950 most Polish needs were met from Western European countries, principally the UK, Belgium, France, Italy, and Sweden.

2. Petroleum and Petroleum Equipment

a. The USSR. The Soviet Union is producing more crude oil than before the war and more than had been planned. The 1940 output, the prewar peak, was 31.1 million metric tons. Plans for 1950 called for 35.4 million tons, but actual production was probably 37 million tons. However, the goals of the oil industry in the Fourth Five-Year Plan (1946-50) were modest, taking into account the long-standing shortages in oil-field equipment and, in particular, the difficulties in restoring the important Baku fields after wartime neglect.

By far the greatest increases in the postwar period have occurred in the relatively new "Second Baku" fields in the Volga-Urals region, while the old Transcaucasian center of Baku, with its large, fixed installation in refining, pipeline, and tanker facilities, has neither regained its prewar level nor produced in accordance with its modest goals.

The obvious cause for this shift of production is the shortage and inadequate quality of oilfield equipment available for the difficult job of restoring the rich Baku fields, which are suffering from the effects both of forced exploitation in the 1930's and complete neglect of many operating wells

1/ For further details on Soviet manufacture and attempted imports of coal-mining equipment, see DRE Information Paper No. EER-86, Annex A, November 1, 1950, SECRET.

during the last war. Production problems in the newer eastern fields are apparently less troublesome, and furthermore, the work of prospecting and exploratory drilling during the Second World War was materially aided by the shipment of significant quantities of oil-field equipment from the US under lend-lease. All types of oil field equipment figured heavily in US shipments to the USSR in the first years after the war before the imposition of export controls, and still figure heavily in trade agreements with orbit countries, such as Czechoslovakia, and also with Sweden. 1/ Furthermore, there have been numerous attempts throughout the past two years to secure this type of equipment from the United States through clandestine transit trade via Canada, the Netherlands, the UK, Germany, Belgium, and Trieste.

Known Soviet refining facilities appear to have more than adequate crude oil throughout capacity to process amounts of oil now being extracted, but a great deal of the equipment is old and outmoded, and adequate facilities are lacking for the processing of those petroleum products the supply of which is most critical -- namely high octane aviation gasoline and high-grade lubricating oils. Before the war, the USSR had none of the technologically advanced refinery equipment that allows the use of heavier fractions for making larger quantities of valuable lighter fractions -- namely catalytic cracking, alkylation, polymerization, and other such equipment. Under lend-lease, four Houdry units were shipped from the United States, but two were incomplete and the other two were apparently not in operation for some years after the war.

During the Second World War lend-lease imports of petroleum products from the West made a significant contribution to Soviet petroleum supply. Such imports dwindled in the early postwar years and stopped almost completely with the imposition of US export controls in 1948. 2/ Western shipments of oil field equipment and advanced refinery equipment during the war were of great use, the former contributing significantly to the degree of success achieved in expanding oil output in the eastern fields, and the latter giving the refining industry prototypes and workable units for catalytic cracking, which otherwise might not have developed domestically for many years. Present export controls on petroleum products, as well as oil field and refinery equipment, cover most of the items in which the Soviet Union is to any degree deficient, and so far as is known they have been largely effective except in the case of oil field equipment, some of which may have reached the USSR by way of third countries. Yet the degree of harm so far inflicted by these denials does not appear to be impressive, mainly, perhaps, because the benefits guaranteed by the earlier shipments of equipment are only now showing their full effect.

1/ For further details concerning Soviet imports and trade agreements involving oil field equipment before the imposition of US export controls, see OIR-4689.3, The Significance of Imports from the West for the Soviet Economy III Equipment for the Petroleum Industry, June 14, 1948. SECRET.

2/ See OIR-4689.2, The Significance of Imports from the West for the Soviet Economy: II. Petroleum Products, May 27, 1948, SECRET.

There is no way, short of war and destruction, that the Soviet bloc can be denied a supply of petroleum products adequate for present peacetime military development plus a certain, though undoubtedly less than optimum, surplus for military stockpiling; nor is there any way that the Soviet Union can be denied its present, albeit limited, resources for further development of oil extraction and refining. What has already been done, and what can still be done to a further degree, is to retard both military stockpiling and the qualitative improvement of the petroleum industry, in short to limit these developments to the tempo dictated by Soviet shortages and weaknesses.

b. The European satellites. The Eastern European satellites produce an aggregate of a little over 7 million tons of crude oil annually at the present time, including both the production of Austrian fields under Soviet domination and the crude oil equivalent of products of the East German synthetic oil industry. The estimated 1950 output of the various countries, in thousands of metric tons, is as follows:

Rumania	4,200	
Austria	1,300	
East Germany	800	(synthetic)
Hungary	500	
Poland	200	
Czechoslovakia	100	
Total	7,100	

So far as is known, none of the satellite countries imports oil from the West, and the only instance of Eastern European supplies to areas outside the orbit is in the case of Austria, where about one-fifth of the production normally goes to the western part of the country.

The four largest producers -- Rumania, Austria, Germany, and Hungary -- export petroleum products to other parts of the orbit, principally the USSR and the oil-deficit countries -- i.e., Poland, Czechoslovakia, Bulgaria, and Albania. Thus orbit needs are apparently satisfied by intra-orbit trade, although in some cases at a very low level

In general the orbit oil industries have the same problems as the Soviet oil industry, viz., a prevailing shortage of oil field equipment and outmoded refining facilities. The result is that increases in output in the main oil-producing area, Rumania, occur very slowly, and the quality of refined products available from the orbit is such that only a very minor contribution can be made by the orbit toward relieving the quantitative or qualitative deficiencies in Soviet oil production. Exceptions to this general rule are Austria and Eastern Germany. In the case of Austria, attempts to obtain oil field equipment from outside the orbit have been more successful than in the case of the other countries, with the result that the production of Austrian fields increased from about 900,000 tons in 1949 to 1.3 million tons in 1950. In the case of Eastern Germany, the synthetic oil industry provides superior gasoline and fuel oils, but not in large enough quantities to have any great effect on the Soviet bloc's deficiencies.

3. Electric Power and Power Plant Equipment

a. The USSR. The Soviet Union now manufactures all types of electric power generating and distribution apparatus required for central power stations and networks, but apparently not in the quantities needed to implement fully its plans for expansion of electric power capacity and transmission facilities. The program of new installations under the Fourth Five-Year Plan was badly underfulfilled, even allowing for the possibility of a sizeable secret program of installations to provide power for atomic energy development.

Electric power output in 1950 was almost 80 percent higher than before the war, and more than had been planned for that year. The 1940 output had been 48.3 billion kwh.; 1950 output, planned at 82 billion kwh., probably reached 86-87 billion. This output appears to have been sufficient to meet industrial demands but not without strict allocations to civilians in some areas and careful regulation of the peak loads in others. The reason for the latter is that the amount of standby capacity planned for the power industry at this time has not been provided. In general, the current level of output must be accomplished by working equipment at high rates and deferring maintenance, in short, the very conditions that existed before the war and which postwar developments were intended to overcome. This situation increases the probability of chronic breakdowns and has unfavorable implications for the anticipated life of the equipment and hence for future replacement needs.

Since the end of the war, the Soviet Union has sought, by one means or another, to augment its own production of power station equipment by receipts from abroad. Up to 1947, the combined total of such receipts, acquired through dismantlings in Germany and Manchuria, reparations from Eastern European countries, and trade with the US and UK, amounted to at least 3.7 million kw. in primary generating equipment, plus a great deal of transforming and power station auxiliary equipment. 1/ At present, large amounts of power equipment are still reaching the USSR through trade with Sweden, the UK, Belgium, and Switzerland, 2/ and perhaps from other Western European countries. In addition, the USSR is obtaining this type of equipment from

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1/ OIR-1785.71, Situation Report, USSR, June 26, 1946, SECRET; OIR-4322, Requirements and Supply of Fuels and Power in the USSR, 1946-1950, May 1, 1947 CONFIDENTIAL; OIR-4689.8, The Significance of Imports from the West for the Soviet Economy: VIII, Electrical Equipment, January 28, 1949, SECRET.

2/ For citations, see DRE Information Paper No. EER-86, October 19, 1950, SECRET.

Eastern Germany and Czechoslovakia.

Present export control provisions agreed to by the Western powers do not restrict shipment of power plant equipment to the Soviet bloc, although quantitative control has been proposed for generators and prime movers of 500 hp. and over. Since the Soviet Union, aided by large receipts from abroad, has not been able to provide equipment for the kind of electric power supply envisaged by the planners of postwar development in 1945-46, it appears that considerable harm could be done by withholding shipments in the future. For the most vital military programs which is a large consumer of electric power -- namely the atomic energy program -- this would probably not be allowed to have an appreciable effect. But whether the Soviet Union could provide sufficient power for atomic energy development and at the same time implement its planned industrial expansion in other less strategic but also vital directions without continued Western shipment is doubtful.

b. The European Satellites. The European satellites in 1949 produced a total of about 36 billion kilowatt hours of electric power, placing their consumption, on a per capita basis, at a level somewhat higher than that of the USSR in the same year (Soviet per capita consumption was about 364 kwh., that of the satellites about 405).

The major satellite countries do not appear to be suffering any shortages of power for their industries at present. However, as both industrial output in general and electrification of industry are scheduled for large increases in the near term, some tightness in the supply of power may be expected to arise because of the lack of adequate quantities and types of power equipment from domestic sources. Power plant equipment is produced in Czechoslovakia and Eastern Germany, but the latter is a net importer of such equipment and Czechoslovakia, although possibly a net exporter, needs to import specialized types. The only source for these import needs, as well as the smaller ones of other satellite countries which do not produce significant quantities of power plant equipment, is the West. Thus the satellite problem with regard to power plant equipment is approximately the same as that of the USSR.

C. Metals and Metallurgical Equipment

1. General Observations on the Soviet Supply Position. Despite a steadily growing output, the supply of most metals in the USSR, including imports, is believed to be adequate for the planned development of essential industries and for peacetime requirements of the army. Any additional military allocations would beat the expense of essential industrial supplies or minimum stockpiles.

Domestic production of ordinary steels and of aluminum is relatively more adequate to meet existing and prospective needs than the output of any

other strategic metal. In the case of most nonferrous metals and certain types of special steels, the USSR must depend upon imports to supplement its own output. This dependence appears to be greatest in the case of tin, but extends also to copper, lead, zinc, tungsten, molybdenum, and bauxite. There is little information on the Soviet supply of cobalt, mercury, and cadmium. These metals are reportedly being smuggled into the USSR from the West. There is even less information on other nonferrous metals.

It is believed that the USSR is able to satisfy its current import needs in large measure, but not entirely, through receipts from other Soviet bloc countries, with China and Korea delivering tin, tungsten, and molybdenum; Poland, lead and zinc; and Hungary, bauxite. Relatively small quantities of these metals are obtained in the West; however, Western sources supply the USSR with its entire import needs for copper and unknown quantities of ferroalloys and alloying metals. It is believed that Czechoslovakia may be delivering to the USSR as much as 200,000 tons of high-grade alloy steels per year. Until the imposition of US export controls, the USSR imported from this country large quantities of pipes and tubing, wire and cable. Czechoslovakia is now supplying some of these products while others are being procured in Western Europe.

Any increase in the tempo of Soviet armaments production would create shortages of various degrees of severity. Increased domestic output may not be expected to fill this gap in the short run. Possibilities of covering the shortages through substantially larger imports from the Soviet satellites are limited, because of the unsettled conditions in the Far East and because the USSR could not afford to push exploitation of its European satellites to the point of seriously weakening their own economies.

The development of the economic and war potentials of the USSR would probably be retarded by a loss of supply sources for metals and metal products outside the Soviet bloc. The ability of the USSR to assist in the industrialization of the more backward satellites, and to keep the industries of the technologically more advanced countries operating at full capacity, would also be noticeably reduced. In such an eventuality the USSR would give priority to its own needs and its satellites would therefore be the first to suffer the consequences.

Internally, the repercussions would be felt primarily in the machine-building, electrical equipment, electronics, and oil industries, with secondary effects throughout the rest of the economy. Marginal consumers of metals might find their allocations further reduced or entirely cut off. It is not known to what extent, if any, Soviet programs for the development of atomic energy and jet propulsion would be affected. In general, the USSR would be able to adjust itself to the altered conditions of supply, but the rate of its industrial progress would be retarded.

2. Steel

a. The USSR. In 1950 the USSR met its planned production goal of 25.4 million metric tons of crude steel and exceeded its goal of 17.8 million tons of rolled steel by about 700,000 tons. Total supply should therefore be adequate to satisfy requirements as originally planned in 1946, including an estimated 3 million tons of crude steel for military end items. It is reasonable to assume, however, that current allocations to the military are greater than originally planned. The general stringency of the steel supply will therefore continue. Since military requirements include a large proportion of high-grade alloy steels, non-military consumers may find such steels particularly short.

Figures on output of alloy steel in the USSR have never been announced. On the basis of data in the Soviet plan for 1941, a copy of which was captured in Germany, it is estimated that at least 1 million tons of alloy steel (legirovanaya stal') were to be produced in that year. This level of output may have been reached in the postwar period before 1948 (when Soviet steel production regained the prewar level), since increased emphasis was put on alloy steel production during and after the war. Assuming that damaged facilities were restored by 1948 and that the equipment received under lend-lease was then in operation, the USSR would have had a minimum capacity of 1.7 million tons in 1948. Since there has been considerable construction and expansion of metallurgical plants in the past two years the present alloy steel capacity is probably well over 2 million tons. A current output close to this magnitude appears to be well within the capabilities of the Soviet steel industry.

This quantity of alloy steel represents a somewhat higher proportion of total steel output (viz. about 7.8 percent) than was planned in 1941, when the USSR was gearing its economy for a full-scale war. Its domestic alloy steel supply position should therefore be better than it was at the outbreak of the Second World War. In addition to its domestic production, the USSR is believed to be receiving as much as 200,000 tons of high-grade alloy steels annually from Czechoslovakia. Stricter controls of Western exports of such steels could not, therefore, prevent the USSR from carrying out a fairly large armaments program; but they could reduce its ability to meet both military and industrial requirements for alloy steel and thus indirectly retard the growth of its military potential.

Available information is not specific enough to determine what alloy steels are likely to be in shortest supply. It is probable that the supply of alloys containing cobalt, molybdenum, and titanium is more stringent than that of steels alloyed with other metals more readily available to the USSR, such as nickel and tungsten. It is also likely that the greater the technical difficulties in producing an alloy (e.g., die steels for hot work), the greater are the chances that it is short in the Soviet Union.

In addition to alloy steels, the USSR seems to be in the market for seamless pipes and tubing and for steel wire and cable, both of which are essential for the oil industry. Denial of these products to the USSR would slow down the rate of expansion of oil output.

b. Eastern European satellites. In 1950 the USSR and the satellites are estimated to have produced about 32.5 million tons of crude steel, of which 25.4 million tons were produced in the USSR and the remaining 7.1 million tons in Czechoslovakia (2.9), Poland (2.2), Hungary (0.9), Eastern Germany (0.8), and Rumania (0.3). This output appears to have been inadequate to meet total bloc needs, as evidenced by imports of some 180,000 tons from Western sources into Eastern Germany, and further imports of unknown magnitude into the bloc as a whole. Moreover, current production of steel in Czechoslovakia and Poland depends in part upon imports of iron ores from Sweden (about 1.7 million tons per year), and output of alloy steels in these countries, and to some extent perhaps in the USSR, upon imports of all types of ferroalloys from Western countries.

Expansion of existing steel mill capacity in the USSR and all the major satellite countries is planned, in the long run, to make the bloc independent of Western sources for finished steels, while a readjustment of Czech and Polish steel mill technology, coupled with expending ore output in the USSR, is expected to eliminate the need for ore imports from the West.

Pending realization of these long-term goals, the Soviet bloc remains vulnerable to a Western embargo on shipments of ore, ferroalloys, and finished steels. The damage which might be inflicted by such an embargo would probably be greatest in the case of Czechoslovakia and Poland. Since the superior Swedish iron ores are used by these countries in admixture with local and Soviet ores, rather than being smelted by themselves, production of pig iron and, consequently, steel would decline far more than the supply of ores. Judging from the experience of Soviet plants, it may take the steel mills one or more years to adjust to the altered conditions of supply.

3. Aluminum

a. The USSR. The Soviet Union appears to be self-sufficient in crude aluminum and also in aluminum sheets, strips, and other forms. It might encounter difficulties in the production of strategic aluminum foil, although there is no direct evidence on this point.

Currently, the Soviet Union is the third largest producer of aluminum in the world, ranking behind the United States and Canada. The production goal for 1950 has been estimated at about 271,000 tons, of which 195,000 tons is primary aluminum and 76,000 tons secondary. 1949 production is estimated at about 200,000 tons, or more than double the prewar peak. The postwar gains in production have been facilitated by the receipt of equipment from Germany and imports of bauxite ore from Hungary. While the

USSR's deposits of aluminum bearing ores are currently adequate, they are not fully developed for exploitation, and the large receipts of ore from Hungary (Europe's largest producer of bauxite), which are rumored to have been around 400,000 tons in 1949, equivalent to 100,000 tons of refined metal, serve to release badly needed manpower and equipment for other purposes.

Requirements for aluminum in the USSR depend almost entirely on the level of aircraft production, since other industrial uses are restricted and the use of aluminum in consumers' goods is held down to the barest minimum. During the Second World War the USSR, aided by substantial lend-lease imports, consumed an average of 169,000 tons of aluminum per year, but found this amount inadequate for optimal requirements. The present availability is substantially above the wartime level, and appears to be adequate for peacetime needs and some military stockpiling. On the other hand, the USSR has imported small amounts of aluminum in postwar years from the Soviet Zone of Germany and from Norway, and has been intreated in developing refining facilities in Hungary. Although these imports are small, they suggest that qualitative requirements might not be fully met by domestic aluminum production. Imports of aluminum foil would allow the Soviet Union to circumvent the embargo on foil rolling equipment. An embargo on imports of other forms of aluminum into the USSR might cause some difficulties in the restricted cases where extremely fine metal and its products are required, but would probably have little effect on over-all Soviet economic-military capabilities.

b. Eastern European satellites. About one-half of Czechoslovakia's 1950 requirements of 18,000 tons of aluminum came from the West. Otherwise the satellites are not dependent on Western supplies of aluminum, owing to Hungarian output and possibly Soviet exports as well.

4. Copper

a. The USSR. The domestic supply of copper is believed to be deficient to meet the needs of all essential Soviet consumers. Before the outbreak of Korean hostilities, Soviet copper requirements in 1950 were estimated at about 325,000 tons, and domestic output between 250,000 and 300,000 tons. It is likely that current requirements are substantially larger than the earlier estimate.

For years the USSR depended upon imports of copper to supplement its domestic output. In the four years 1937 to 1940 the USSR imported a total of 385,000 tons, or about four-fifths of its own production during this period. Copper also played a large role in lend-lease aid during the war, and its imports in 1944 reached an all-time peak of about 131,200 tons. In the following year imports declined to about 51,400 tons. Quantitative estimates for later years are unreliable.

Current imports of copper are believed to come primarily from Finland and from Belgium, but the USSR is said to be seeking copper in all parts of the world. A total of some 7,000 tons this year is reported to have passed on its way East through Germany alone. Large transshipments of copper are also reported through the port of Rotterdam.

With the exception of two types of copper products for direct military application, there is no effective international control over shipments of copper and copper products to the USSR or the Soviet bloc. A recommendation has been made to the Coordinating Committee (COCOM) for Western export control for inclusion on the international embargo list of copper ores, refined copper, and miscellaneous copper products, and less rigid control has been recommended over shipments of semi-finished copper. It is believed that application of the proposed controls would perceptibly reduce supplies of copper allocated to essential industries, and thus help retard the development of the Soviet economic and military potential.

b. The Satellites. The major satellite requirements for copper from the West are those of Czechoslovakia, estimated at 34,000 tons per annum, or some 60 percent of its total copper needs. Hungary's copper import requirements are about 5,000 tons a year; though small, they supply the important Hungarian electrical machinery industry.

5. Lead and Zinc

a. The USSR. Soviet production of lead and zinc, amounting to some 100,000 tons each in 1950, is believed insufficient to meet the country's needs. Imports of some 37,000 tons of lead and 20,000 tons of zinc were received in 1947, and total imports in 1950 may be significantly higher. The main foreign source for lead and zinc for the USSR is Poland. Under pressure, the USSR might obtain large portions of the Polish output, and thus cover its own increased requirements at the expense of its satellite. The Western countries have not exported significant amounts of lead and zinc to the Soviet Union since the termination of lend-lease.

b. Eastern European Satellites. The only major demand for lead and zinc from the West by the satellites is that of Czechoslovakia, which may have obtained 8,000 tons of lead and 10,000 tons of zinc from the West in 1950. However, vulnerability is uncertain because at least some of these requirements might be obtained from Poland.

6. Brass and Bronze. Substantial imports by the Soviet Union during the Second World War (356,000 tons), and smaller imports in the postwar period, suggest that domestic production of brass and bronze is significantly below requirements. Alloying facilities in the USSR are limited and it is known that the Soviet Union has to import base stock for brass and bronze -- viz. copper, zinc, and tin. Part of the imports, however, originate in areas under Soviet control.

Denial of bronze and brass from the West may have some adverse effect on output of shells and cartridges, parts of naval vessels, bearings and anti-friction alloys. Whether stricter controls would materially reduce Soviet war potential is impossible to determine. They would help to make the supply of copper and tin more stringent and, indirectly, would eliminate one way in which the USSR might circumvent export controls on these metals.

7. Nickel

a. The USSR. Nickel production in the USSR is now larger than before the war because of the acquisition of the Finish Petsamo mines and expansion of facilities elsewhere. Whereas the country was short of nickel before the war, it is believed to be essentially self-sufficient for peacetime needs at present. Moreover, the Soviet Union has abundant supplies of chromium, which in some cases may be substituted for nickel. However, the USSR may not be able to refine adequate quantities to the highest degree of purity, as evidenced by repeated efforts to import from Western Europe 99.9 percent pure nickel cathodes.

It is unlikely that the USSR has significant stockpiles of nickel, and the current supply may not be large enough to support large-scale preparations for war. Thus while denial of nickel to the USSR from Western sources would not significantly interfere with future peacetime development, it would probably retard the growth of Soviet aggressive strength.

b. Eastern European Satellites. Definite information on satellite imports of nickel is lacking. Czechoslovakia, the largest consumer, apparently requires some 5,000 tons annually, its supplies may come chiefly from the East.

8. Tin and Tin Plate

a. The USSR. The Soviet Union is short of tin. It cannot economize its tin supply by substituting lead, which is possible in a few cases, because the latter metal is also scarce. However, it does have access to Chinese tin production and probably acquires some tin through the European satellites - either by forcing them to re-export tin metal or by obtaining end-items containing tin. Short of a full-scale war, the USSR may be able to meet its minimum requirements in this way, which implies some sacrifices on the part of the satellite countries and, indirectly, on the part of the less essential industrial consumers in the USSR; but with increased requirements caused by stepped up military production, the tin shortage is likely to become acute. Prior to 1936, the amount of tin produced in the Soviet Union was very small, but reports of large increases in subsequent years suggest that by 1945 production was about 6,500 tons. Output in 1950 may be as high as 10,500 tons. Requirements for tin have always exceeded production. In the five year period 1936-40, the Soviet Union operated its economy on an

average annual supply of 11,040 tons of tin, of which about 10,000 tons were imported. During the war requirements for tin were said to be 20,000 tons per year, but they were not fully met. Requirements initially declined in the postwar period, then began to increase with the rebuilding of industry, and are estimated to be about 15,000-17,500 tons for 1950. The latter estimate does not, however, allow for any unusual increase in requirements occasioned by large-scale military production. If Soviet production of military end-items were stepped up to a level comparable to 1941-45, tin requirements would undoubtedly be at least 20,000 tons per year. The indicated "peacetime" deficit is therefore about 4,500-7,500 tons, while the "wartime" deficit may be assumed to be not less than 10,000 tons per year.

It is believed that currently the USSR is barely able to make up its tin deficit by imports. Known postwar imports have been smaller than prewar, but probably have been augmented by smuggling from Southeast Asia and China. In 1946 a shipment of 2,857 tons of tin was made under the UNRRA program to Belorussia and the Ukraine; imports in 1947 and 1948 were smaller, but the USSR also bought babitt metal and tin-plate from Western sources. Known shipments in 1949 to the USSR proper, from all countries except China, were only 78 tons; for the first half of 1950 they were 1,865 tons.

Shipments of tin into the Soviet sphere in 1949 amounted to 4,770 tons, some of which may have been re-exported to the USSR at the expense of meeting domestic requirements in the satellite countries. The largest potential shipper to the USSR is China, where prewar production was 12,000-15,000 per year. Current output, however, is no more than 4,000 tons. With the Communists in power, the USSR is probably receiving virtually all of China's output. If so, the total supply available to the USSR would be close to minimum Soviet requirements. Higher requirements probably could not be met by large imports from China in the near term, since the restoration of Chinese output to the prewar level would require considerable investment and would take time. Consequently, tin is likely to be in short supply in the USSR and perhaps critically short when war production is stepped up.

While there is no direct information on the current production and essential requirements of tin plate in the Soviet Union, available data suggest that imports are not sufficient to eliminate the gap between domestic output and total requirements.

This shortage is caused in part by an insufficient supply of tin; it has been maintained because imports of tin plate have been less than the USSR desired. For example, the USSR insisted that tin plate be included in its trade agreement with Great Britain in 1947, but actual shipments under this agreement have been modest - only 2,827 tons in 1949.

The planned production of tin plate for 1941 was 74,000 metric tons but undoubtedly was not realized owing to the outbreak of war, in the course of which important tin-plating facilities in the Ukraine were destroyed. It

is possible that Soviet planned output in 1950 may be as high as 85,000 tons, although this figure is highly speculative.

The requirements for tin plate for preservation of food, meantime, have increased. The Fourth Five-Year Plan calls for a "substantial" increase of canned goods in comparison with prewar. The Soviet press admits that large amounts of food are spoiled instead of being preserved.

The cessation of tin plate imports into the Soviet Union would serve to increase the already severe tin shortage in the country and would prevent the evasion of restrictions on tin imports by receipts of tin plate. The immediate effect of more stringent controls would probably be felt by the civilian economy, since military needs for packaging and food rations would have highest priority.

b. Eastern European Satellites. Allocations of tin to the satellites by the Combined Tin Committee (CTC), now disbanded, were during the second half of 1949 at an annual rate of just over 6,000 long tons. Requirements are taken to be higher than this amount. Czechoslovak requirements alone are estimated at some 3,000 tons per annum, as against a CTC allocation of 1,600 tons (annual rate) in the last half of 1949.

9. Metallurgical Equipment

a. Pressure Top Equipment. The use of high pressure blast in the operation of blast furnaces is a recent development in the United States, which is reported to increase the productivity of blast furnaces by 15 to 20 percent. It is also said to facilitate the utilization of low-grade coke and ores. The USSR does not yet use high pressure blast, which implies that its furnaces are not yet equipped with pressure top elements. The castings required for pressure top equipment are very heavy but probably could be produced by Soviet engineering plants; however, the equipment also requires special steel alloys with a high melting point and elaborate control apparatus, both of which are in great demand in the Soviet Union. Their tight supply may retard the introduction of pressure top equipment for some time to come. Thus, imports of this equipment from the West would help the Soviet Union to increase its pig iron production considerably without making extensive new blast furnace installations.

b. Rolling-mill Equipment. Soviet plants have been making rolling-mill equipment since the early 1930's. Before the war domestic production consisted mainly of extremely simple types of equipment and in most prewar years a sizeable percentage of the metallurgical industry's needs had to be met by imports of the more specialized types of rolling-mill equipment. During the war, Soviet heavy engineering plants were either captured by the Germans or converted to military production, so that domestic output of rolling-mill equipment declined drastically.

The postwar recovery of this industry was very slow. Soviet planners estimated that the steel industry would need 405,000 tons of new metallurgical equipment (most of which is thought to refer specifically to rolling-mill equipment) in the five-year period 1946-50. It is estimated that domestic sources will have produced only about 310,000 tons of such equipment in this period, leaving a deficit of about 95,000 tons.

Part of this deficiency was compensated for in the immediate postwar period by takings in Eastern Germany and Manchuria and by postwar shipments from the US before the imposition of export controls. Known receipts of rolling-mill equipment from abroad in the period 1946-50 totalled 78,000 tons, still leaving the Soviet steel industry some 17,000 tons short of its anticipated requirements. There is, furthermore, the possibility that in estimating requirements for this period, Soviet planners took account of removals and intended that Soviet domestic industry would itself produce the projected 405,000 tons of equipment. In that case, acquisitions of rolling-mill equipment from all sources during this period would be even less adequate for the requirements than the above calculations indicate.

As of late 1948, Soviet sources were still referring to the necessity of designing and producing domestically many heavy-duty specialized types of rolling-mill equipment which heretofore had not been designed or manufactured in the USSR. These were specifically identified as rail and structural steel mills, wheel-rolling mills, tube mills, combination mills, 800 and 650 millimeter heavy section mills, continuous billet mills, alternate light section mills, tin-plate mills, and pipe-welding mills. It was further indicated that the principal difficulty in manufacturing such equipment was in the standardization and supply of components for such diverse rolling-mill equipment, specifically tables with self-contained electric drive, conveyor rollers with group drive, large reducing gears, small and medium cylindrical and worm reducers, gear casings of special sizes. The East German engineering industry, having been originally quite specialized in its rolling-mill equipment production, is probably supplying some of this specialized equipment as part of its reparations, but the amounts are not likely to be large enough to satisfy Soviet needs completely. As the Soviet engineering industry improves its designs and organization, there is no doubt that it can eventually produce all types of rolling-mill equipment needed in a modern metallurgical industry, but for the present, failure to produce or import sufficient quantities of specialized rolling-mill equipment will have a continuing adverse effect on the flexibility and diversity of the Soviet steel industry.

D. Nonmetallic Minerals and Selected Manufactures

Few opportunities exist for retarding the development of the war potential of the Soviet Union through further limitations on imports of nonmetallic minerals, for on the whole the country is richly endowed with this group of raw materials. A case of clear-cut vulnerability of a limited scope exists with respect to industrial diamonds and gemstones. Although the evidence

is meager, it seems that there is also an opportunity to hamper the development of the Soviet war potential by an embargo of piezoelectric quartz and of several other minerals and certain selected manufactures involving them, such as graphite anodes and coolers, and mica-lined insulators. The Soviet Union has large accessible and developed deposits of the basic raw materials in each of the above cases, but it might be short of particular grades needed, either for reasons of natural unavailability or mining difficulties, or what is more likely, because bottlenecks exist at the manufacturing levels owing to lack of skilled labor and "know how."

The vulnerability of the satellite countries, particularly those which possess sizeable manufacturing industry, i.e., Czechoslovakia, Hungary, Poland, and Eastern Germany with respect to non-metallic minerals, closely resembles that of the Soviet Union. They are vulnerable to an embargo on industrial diamonds, and their development may be hampered somewhat by an embargo on asbestos, abrasives, graphite, mica, and strategic quartz, in a raw or manufactured state.

1. Industrial Diamonds

a. The USSR. Industrial diamonds are critically needed in the Soviet Union and the more industrialized satellites. Production of industrial diamonds began in the Soviet Union only a few years before the start of the Second World War and at present amounts to no more than a few thousand carats, whereas requirements are estimated at 40,000-100,000 carats annually. None of the satellites produces diamonds; they too must import their supply from the lead-producers of the world - Brazil and South Africa or through the principal distributors mainly in London, Amsterdam, and Brussels.

Since the end of the war the Soviet Union has imported diamonds both openly and covertly. In relation to estimated requirements, the purchases appaar to have been substantial. In 1949 the USSR bought about 99,000 carats from Belgium openly, but this amount was augmented by black market acquisitions elsewhere. In 1950 the known open purchases seemed to have declined. It cannot be ascertained if a stockpile of any significant magnitude has been acquired. Since the requirements of the Soviet economy are likely to expand (despite Soviet progress in substituting carborundum grinding for diamonds, - which is but one of the several uses), an embargo on diamonds and instruments containing them would ultimately slow down the Soviet production of precision tools and instruments and hamper the expansion of atomic energy developments.

b. Eastern European Satellites. Industrial diamonds are not produced in the satellite countries and are critically needed by Czechoslovakia, which has tried to obtain them by covert and overt means in Latin America. Its requirements are estimated to be about 20,000 carats per year; the requirements of Eastern Germany are not known, but are probably in the same order of magnitude. The requirements of other satellite countries are

negligible.

2. Other Industrial Gemstones. The Soviet Union appears to be short of other industrial gems used in balances and bearings. While the Soviet Union has a large variety of precious stones and gems in the Urals (e.g., emerald, beryl, topaz, aquamarine, smoky quartz, tourmaline, etc., - all of them much softer than diamonds or rubies), it seems to have no rubies or sapphires which are needed for watch mechanisms, and little agate, used in analytical balances. Moreover the USSR may be short of the highly skilled labor needed to prepare these gems for industrial use.

The Soviet Union has imported artificial gems from Switzerland which in some cases are cheaper than the natural stones. It has also imported bearings and instruments containing such stones. The stoppage of these imports would hamper the production of special gauges, chronometers, watches and balances, dies, nozzles and other precision equipment.

3. Graphite and Electrodes.

a. The USSR. The strategic importance of graphite arises from its use in production of crucibles and electrodes. The Soviet Union has large deposits of graphite, but its supply of strategic grades is unknown and the workmanship in the extraction of pure graphite has been poor. Current availability of the raw materials for the production of natural graphite electrodes is uncertain. The USSR has recently begun to manufacture artificial graphite electrodes, but their manufacturing capacity seems to be small.

Up to 1938 the Soviet Union was obliged to supplement its supply of electrodes by imports - about 4,000 tons were imported in that year. During the war about one half of the production capacity was lost. The Soviet Union received several million dollars worth of raw graphite, graphite, carbon brushes, and electrodes from the US under lend-lease. Currently the country might have an electrode mass capacity of 175,000-200,000 tons. This might be enough for the needs of the rapidly growing aluminum industry, but it is not known if needs of other industries can be met.

Imports of raw graphite of strategic grade have occurred since the end of the war. Imports of graphite electrodes, anodes, and coolers have continued up to the present time, but in relatively small amounts. In view of Soviet plans to expand the production of aluminum and of electric power generally, an embargo on startegic graphite, graphite brushes, electrodes, and similar products may throw an additional burden on the plants producing these commodities. Any induced shortage of these parts would, of course, hamper the growth of the war potential.

b. The European Satellites. The graphite requirements of Czechoslovakia (1,600 tons) and Hungary (small) are met by and large by domestic production and imports from Eastern Germany, but Czechoslovakia also

imports anodes from the Western countries. Hungary appears to be importing special purpose anodes from the West and Poland. Poland in turn is expected to receive a few hundred tons of raw amorphous graphite from France and Norway. Thus the satellites are barely able to meet mineral needs and stockpiles seem to be small. Cessation of even the limited exports from the Western countries would have an adverse effect on the bloc, if only by increasing the burden on Eastern Germany and the Soviet Union.

4. Asbestos. The USSR has very large deposits of all grades of asbestos, including the strategic grades (long fibre or textile grades) used to make brake linings, belts, etc.. The supply of non-strategic grades has been sufficient to permit exports. The limited development of textile grade asbestos mining, by the start of the Second World War seems to have made the Soviet Union independent of imports.

Soviet production of asbestos textiles and linings, judging by small amounts received under lend-lease, has been satisfactory. However, in recent years the greatly increased number of motor vehicles, and possible dependency of the satellites, might strain the existing facilities of the Soviet Union. There is no record of sizeable postwar imports but 2,500 tons of asbestos brake plates were shipped in May 1950 to Odessa from Italy, allegedly for Bulgarian account, and the shipment may have remained in the Soviet Union.

In view of the greatly increased requirements of the Soviet bloc, and still greater requirements in the future, a restriction on shipments of asbestos brake lining might hamper the development of the Soviet and satellite war potential by reducing the number of vehicles that may safely be operated.

5. Piozoelectric Quartz. Pieezoelectric quartz is needed for oscillators for radio sets, especially those subjected to violent usage and rapid changes of temperature, e.g., in airplanes. Only two countries in the world possess commericial deposits of strategic grade - Brazil and the Soviet Union. During the last war the Soviet Union exported a small quantity of crystals (540 pounds) to the United States, but in August 1950 Czech representatives in South America began to buy large quantities of quartz crystals for shipment to their own country and allegedly for reshipment to the Soviet Union.

The exact position of the Soviet Union with respect to these crystals is, therefore, difficult to determine. The extraction and grading of quartz crystals requires carefully trained labor, the USSR, despite natural availability of the crystals, may not be able to extract the amounts needed to meet its own greatly increased demands. The satellite countries are entirely dependent on imports for their supply of piezoelectric quartz. The main consuming countries are Eastern Germany and Czechoslovakia, whose needs, if partly met by the USSR, represent an additional drain on Soviet resources.

A recent study estimates that the electrotechnical industry of the entire Soviet bloc depends on external imports of piezoelectric quartz to the extent of 50 percent of its requirements. An embargo on the strategic grades of quartz and its manufactures would hamper the development of the war potential of the Soviet bloc by lowering the quality of radio sets and related equipment that can be built or by forcing the Soviet Union to allocate scarce capital and manpower to develop the production of this mineral.

6. Mica. Strategic mica is currently in demand all over the world. The requirements for this grade of mica have remained at high levels during the past several years due to the growth of the electronics industry. The possible vulnerability of the Soviet Union lies in the realm of the manufactures of mica rather than of the raw material. In a natural state the Soviet Union has very large deposits of strategic mica, which have been exploited for centuries. The production of the superfine strategic grades is not ascertainable (it has been assessed at 750 tons). Mica products were imported under lend-lease, and additional imports of manufactured mica from the United States in the amount of 8,000-13,000 pounds per year took place in 1946 and 1947. In 1949 Soviet agents were ordered to purchase strategic mica wherever available.

The roughly estimated requirements for fine strategic mica for the satellite countries are small: about 125 tons for Czechoslovakia and smaller amounts for Hungary and Poland. The satellite countries are consumers rather than exporters of mica products and probably depend on the Soviet Union and on India for their supply of the raw material. While an embargo on strategic mica may have no adverse effect on the Soviet bloc, an embargo on its manufactures, such as insulators would probably lower the quality or restrict the production of military grade radio tubes, radar equipment, and other electric equipment.

E. Chemicals

1. The USSR

a. Basic chemicals. The USSR has a well developed basic chemicals industry, which has increased considerably since the war. It is based on local supplies of raw materials, in which the USSR is for the most part self-sufficient, the major exception being sulphur and pyrites, developed deposits of which are as yet not sufficient for normal requirements.

Although the Soviet Union has very extensive deposits of sulphur and pyrites, output seems to be slightly short of current needs. The production of sulphur in 1950 is roughly assessed at about 1,350,000 tons. Due to the fact that some of the deposits are located in arid and undeveloped parts of Central Asia, the Soviet Union may find it difficult to expand its output. While occasional token exports of sulphur and pyrites to the satellite countries have occurred, the Soviet Union was a small net importer of sulphur-

bearing raw materials during the years 1947-49. In the last few months of 1950 it imported about 10,000 tons of sulphur from Eastern Germany, which is itself short of this material. In addition, Soviet agents in Western countries tried to buy sulphur for the paper mills of Sakhalin. Both of these facts suggest a continuing and possibly increasing shortage of this material.

Otherwise, the production facilities for basic chemicals (e.g., nitric acids, alkalies, chlorine, and calcium carbide) are adequate to provide for normal economic development. In case of war, however, the Soviet chemicals industry would be hard-pressed to supply a major war effort of long duration, unless it could count on occupying Western Europe and using the basic chemicals production facilities of that area. Since basic chemicals do not generally lend themselves to stockpiling for needs of more than two to four weeks, the USSR cannot provide a reserve supply for heavy wartime demands; it could, however, accumulate stocks of military end products which incorporate basic chemicals.

In the event of war, it is probable that the USSR could, by utilizing for its war effort about 90 percent of the basic chemicals normally going into the manufacture of consumers' goods and fertilizers, carry on for at least a year with no help from outside the Soviet bloc. An example can be found in the diversion of sulphuric and nitric acid from the manufacture of fertilizers to that of explosives. Such a diversion, however, would in time reduce yeilds of such important industrial crops as cotton, sugar beets, and flax. Because of the unsuitability of basic chemicals for stockpiling, the industry is particularly vulnerable to transportation bottlenecks, which could seriously disrupt the orderly flow of basic chemicals to processing and consuming points. In the case of gases such as chlorine and ammonia, and to a lesser degree in the case of liquids, the shortage of tank cars would accentuate such difficulties.

b. Specialty items and chemical end-products. With respect to less basic chemicals, and particularly certain specialty or key chemicals and chemical end products, the USSR is in a less favorable position than in the case of basic chemicals. In connection with Soviet requirements for such chemicals, it must be noted that ability to improvise or substitute even at a sacrifice of the quality of end products is an important factor. Furthermore, compared with the array of direct and indirect military chemical products required by the US, those of the USSR are relatively simple, so that its requirements, both in volume and kinds of special chemicals, are correspondingly less. Nevertheless, the repercussions of shortages of these chemicals upon diverse sectors of industrial and military potential are so far-reaching that the vulnerabilities suggested by these shortages should not be overlooked.

For many of the specialty or key chemicals, the USSR depends on reparations and commercial exports from Eastern Germany and to a lesser extent from Czechoslovakia; for others it has shown a fairly high degree of dependence

on the West. In the case of those items subject to export controls, it has been obtaining or attempting to obtain supplies from the West by such methods as transshipments, clandestine transactions (including smuggling from West Germany), and other means.

Among the special chemicals which, according to Soviet imports and import attempts, appear to be in particularly short supply in the Soviet Union at present are the following: Freon, Teflon, and other plastics; azides; chromic acid; antibiotics, sulfa drugs, and many other pharmaceuticals; rubber chemicals and carbon black; benzol; shellac; and chemical cellulose of nitrating grade, i.e., purified alpha cellulose from sulfite pulp and second cut of cotton linters. There are also probably others in short supply that have not as yet been revealed by intelligence sources, and it is certain, considering the nature of the chemicals industry and the variety of end uses for basic chemicals, that still different shortages will develop from time to time. Considering the impossibility of keeping abreast of precise current developments in the Soviet chemicals industry, the only reliable guide to such shortages will continue to be whatever intelligence becomes available concerning Soviet attempts to procure specific items from the West.

2. The European Satellites

a. Czechoslovakia and Poland. Czechoslovakia and Poland are able to produce their requirements of most basic chemicals, and their respective economic plans provide for substantial increases in output. However, along with Eastern Germany, they depend principally on imported pyrites and sulphur as raw materials for the manufacture of sulphuric acid. Most of the pyrites imports come from Italy, Yugoslavia, and Spain (largely through transit trade via the UK, Cyprus, Norway, and Sweden).

Shipments of pyrites to Eastern Europe (excluding the USSR) from Western European countries rose from roughly 132,000 tons in 1947 to about 300,000 tons in 1949. Quantitative controls on exports from the United States were imposed in December 1950, partly to conserve the domestic supply in the face of a world-wide shortage. The extensive vulnerability of the Eastern European countries to the embargo on sulphur shipments is increased by the fact that some of the sulphur shipped from the Soviet Union to Czechoslovakia was found to be contaminated and unusable in the Czech roasters. The increased production in the Soviet Union, even if achieved, may not immediately ease the shortage in the satellite countries until processing difficulties have been solved. Western export controls on shipments of pyrites to Czechoslovakia and Poland would very seriously affect their explosives, pulp and paper, rayon, fertilizer, and other important industries.

As in the case of the USSR, Czechoslovakia and Poland are even more dependent on Western sources for special chemicals than for basic chemicals. They are still endeavoring to obtain supplies of rubber chemicals, carbon

black, antibiotics, certain plastics, reagent chemicals, hexamethylene tetramine (for the manufacture of the explosive RDX), strontium nitrate for tracer bullets, sodium azide, and quebracho extract for tanning leathers.

b. Soviet Zone of Germany. Eastern Germany, although a large producer of chemicals, is dependent to a large degree on certain raw materials and special chemicals, mostly from Western Germany, but also from elsewhere in the Soviet bloc and from Western Europe. The USSR itself supplies Eastern Germany with apatite for processing into phosphate fertilizers; Poland supplies benzol, naphthalene, and toluol, and Czechoslovakia provides soda ash, but there is also some degree of dependence on Western Germany for the latter four chemicals. Other chemicals regularly imported from outside the bloc are: pyrites, obtained mainly from Norway, Sweden, Yugoslavia, and Spain; soda ash, from various Western European countries; dyes, dye intermediates, and rubber chemicals from Western Germany, and rayon grade of cellulose from Norway and Sweden.

c. Hungary, Rumania, Bulgaria, and Albania. The chemicals industries of these countries are on the whole so little developed that their requirements for basic chemicals and special chemicals must be almost entirely met from the outside. To the extent that they are met from Soviet bloc resources, these countries therefore constitute a liability on the chemicals industries of other Eastern European countries.

F. Rubber and Rubber Products

1. The Soviet Supply Position

a. Rubber. The USSR has the second largest synthetic rubber industry in the world, producing at present between 220,000 and 270,000 metric tons per year. Most of this production (180,000 - 200,000 tons) consists of alcohol-based divinyl (comparable to the US synthetic rubber, GR-S, also known as Buna-S), and the remainder (40,000 - 60,000 tons) consists of sovprene, an acetylene-based rubber comparable to US neoprene. This supply is regularly supplemented by imports from the synthetic rubber industry in the Soviet Zone of Germany, amounting to about 7,000 tons annually of Buna-S.

At the current level of synthetic rubber availability, the USSR requires about 75,000 - 90,000 tons per year of natural rubber for admixture with synthetic in tire manufacture and for articles that must be made from the natural product. For these vital needs, the USSR is virtually completely dependent on outside sources, as Soviet attempts to grow rubber-bearing shrubs have so far yielded a very small output of natural rubber, estimated currently at only 3,000 - 4,000 tons annually. Extraordinarily large purchases of natural rubber, consisting mostly of Malayan exports and of re-exports from the UK, and to some extent the Netherlands, have allowed the USSR not only to meet its natural rubber requirements, but to stockpile sufficient natural

rubber to supply normal requirements for at least one and possibly two years even if foreign sources of supply should be cut off. A rough balance of Soviet requirements and availabilities in the past four years follows.

Table #1. SOVIET REQUIREMENTS AND SUPPLIES OF RUBBER

(In thousands of metric tons)

Year	Synthetic Rubber Supply a/	Natural Rubber Requirement b/	Natural Rubber Availability c/ (Minimum)	Natural Rubber Surplus (Minimum)
1947	85-100	28-33	46	13-18
1948	142-167	47-56	111	55-64
1949	190-225	63-75	110	35-47
1950	227-267	76-89	89 d/	0-13
				103-142

a/ Includes domestic production and imports from Eastern Germany.

b/ Based on a ratio of 25 percent natural rubber to total new rubber supply, which is calculated on the basis of past Soviet experience.

c/ Includes a minimum estimate of imports, plus the small domestic production. Imports are considered minimum because they take into account only recorded shipments from Malaya and re-exports from UK. There have been persistent rumors of unofficial shipments, further re-exports (i.e., from the Netherlands) and smuggling operations and transit trade originating in Indonesia and Thailand. These cannot be substantiated at present, but it is likely that total imports from all sources are somewhat greater than is shown here.

d/ Very provisional estimate based on data supplied through October, 1950 only. It is very likely that when all trade reports are in, Soviet imports for 1950 would amount to at least 100,000 tons.

Two factors suggest that the theoretical surplus is now at least 142,000 tons, and probably higher: (1) the natural rubber figures are estimates of minimum availability and probably underrate imports because of the indeterminable magnitude of transit and other roundabout trade, (2) in general, while a range is given for synthetic rubber availability because of uncertainty about the magnitude of Soviet synthetic rubber production, more credence can be placed on the lower figure, which has the effect of making more plausible the lower figure for natural rubber requirements, and hence the higher figure for natural rubber surplus.

This surplus of natural rubber could have been stockpiled either in crude form or incorporated into superior rubber products. In either case its existence means that the intrinsic absolute vulnerability of the USSR as regards natural rubber cannot be immediately exploited to the fullest extent. The unrestricted purchases of natural rubber in the past three years have allowed the USSR to bridge one of the potentially most vulnerable gaps in its strategic supply position, and, by providing for future needs, have strengthened the Soviet military position immeasurably.

Control of legal shipments of natural rubber to the USSR, even if countered by vigorous Soviet attempts to obtain this commodity by smuggling, would force the USSR to dip into its stockpile sooner than it intends. Leaving aside the possibility of military conquest of rubber-producing areas, this might cause the immediate introduction of conservation measures in the use of natural rubber, with a consequent adverse effect on the quality and longevity of rubber products, especially tires. The cumulative adverse effects would be considerable in the long run, and, barring unforeseen technological developments which would permit satisfactory heavy tires to be made completely of synthetic rubber, the situation with regard to tires and other industrial and military rubber products would eventually become critical.

b. Tires and tubes. In view of the rubber supply situation in the USSR, it is not surprising that postwar imports of tires have been negligible, and that there have even been token exports of tires to satellite countries. Production of tire casings and tubes of all sizes in the USSR in 1950 was more than double the prewar peak (7.9 million tires and tubes in 1950, compared with 3.9 million in 1940). The demand was also at an all-time high because of great growth in the motor vehicle inventory. Thus it is likely that even with the large rubber supplies and the greatly increased tire output, tires are still not in abundant supply, and that Soviet motor vehicles are still operated to some extent, as in the past, by repairing and reconditioning a large number of used tires rather than equipping them with new tires.

Since rubber supplies are abundant, such difficulties as still prevail in the quantity and quality of tire production can be traced to the organization of the flow of materials to factories, procurement of modern equipment,

and engineering and technical skills at the operating level. The adequacy of the supply of tire-cord and of carbon black is also questionable. A combination of these factors has, until recently, created particular difficulty in producing sufficient tires with a cross-section exceeding 7 inches, especially those with high-ply ratings. It is this type of tire which is now most in demand, because it is used on the most important types of Soviet trucks of postwar manufacture, as well as on a great many trucks of prewar manufacture that are still in the operating inventory and have replacement needs.

It is very difficult to determine, as has been attempted in the formulation of existing export controls on tires, reasonable cutoff points in terms of tire size and ply rating, above which stoppage of imports from the West would exploit a Soviet point of vulnerability. Strict control over shipments of all sizes of tires, coupled with both an embargo on tire-manufacturing equipment, tire-cord, and carbon black, and control over shipments of natural rubber as described above, would be the only really effective means of exploiting this potential vulnerability in Soviet self-sufficiency. If those types of tires thought to be useful only for passenger cars, light pickup trucks, and agricultural machinery are shipped, this would enable the Soviet Union to circumvent to some degree the effect of controls on natural rubber. It would also allow the Soviet Union to concentrate materials, engineering skill, and scarce production equipment on increasing the manufacture and improving the quality of more strategic sizes of tires. Imports of larger sizes would be directly helpful in providing tires that last longer than domestic ones and would aid the USSR indirectly by providing prototypes for Soviet engineers to test and study in their persistent efforts to improve the quality of large sized domestic tires.

2. The European satellites. The requirements for natural rubber of those of the European satellites which have domestic rubber goods industries (East Germany and Czechoslovakia, and to a lesser extent, Poland and Hungary) must, like those of the USSR, be supplied entirely from outside the Soviet bloc. Throughout the postwar years these countries have received by export from Malaya and through re-export from the UK and the Netherlands what appear to be sufficient quantities of natural rubber to keep their fairly small industries going. Synthetic rubber is produced in the orbit mainly in Eastern Germany, where 1950 production was about 40,000 tons, mainly Buna-S. There is also said to be some synthetic rubber production in Poland but details about this industry are lacking. So far as is known, synthetic rubber is not imported into any of the satellites from outside the bloc.

Tire production in Eastern Germany in 1950 totalled about 450,000 units, of which perhaps half went to the USSR and the remainder to the East German economy. Czech tire production was close to 500,000 units in 1947, but later data are lacking. There is no information concerning the production of tires elsewhere in the orbit.

The quality of East German tires has been severely criticized; this may reflect an abnormally high percentage of synthetic production, as German receipts of natural rubber have been small. Czech tires, on the other hand, are probably of somewhat better quality as the figures on imports of natural and synthetic rubber seem to indicate that the Czech tires have a larger percentage of natural rubber than tires produced elsewhere in the orbit.

It is doubtful if any of the satellites have been able to stockpile natural rubber, so that stoppage of imports from outside the bloc might effectively limit the total rubber supply of the satellite countries to the 40,000 tons of synthetic rubber produced in Eastern Germany, plus such increases as might be feasible in this industry in Germany and perhaps in Poland. Such a development would have adverse effects, particularly on the quality of rubber products produced in the satellites. The USSR, also deprived of sources for natural rubber, would have added to its own requirements, most of the satellite requirements, so that the forced consumption of its natural rubber stockpiles would necessarily proceed at a faster rate. Furthermore, the present bonus which accrues to the USSR from its privilege of using satellite rubber manufacturing facilities to supply a small, but perhaps qualitatively important, part of Soviet domestic requirements, would be severely curtailed.

G. Industrial Machinery and Equipment

1. Metalworking Machine Tools

a. The USSR

i. General strategic supply. The machine tool category covers a wide range of metal cutting, forming and shaping machines which are of basic importance to Soviet industrial strength and war potential. Planned 1950 output, believed to be fulfilled, was 74,000 units, of which 12,500 were specialized types. Although the present production and inventory of machine tools meets and probably slightly exceeds current quantitative requirements for peacetime purposes, serious qualitative deficiencies continue to exist which would be prolonged and aggravated by the increased restriction or cessation of all supplies from non-orbit sources. Vulnerability is greatest in the field of specialized and automatic machine tools, which the USSR does not possess in required quantities, has had continued difficulty in manufacturing, and has imported in significant numbers from the West since the war. It is extremely doubtful that Soviet production of specialized types of machine tools during the next three years will be sufficient for normal industrial requirements. It will definitely be below requirements for a full-scale war. As a result of Western export controls, Soviet imports of metalworking machinery from sources outside its orbit have been steadily decreasing. However, their direct use in the production of munitions and military equipment and their use as models of the newest Western technical developments and designs means that the stoppage of even this small but extremely valuable trickle will directly retard over-all Soviet war potential. Over 90 percent of Soviet postwar machine tools imports from the West have been advanced specialized types.

ii. Deficiencies of Soviet inventory and domestic output. A close appraisal of the Soviet supply position for machine tools reveals four major weaknesses. All of these would be directly prolonged and aggravated by increased Western export controls. These weaknesses are as follows:

(a) Shortage of specialized types. At the present time between 10 and 15 percent of total Soviet machine tool inventory of about 1,300,000 units consists of automatic, semi-automatic, special purpose and aggregate types. Although this is the largest quantity of specialized machine tools ever at the disposal of Soviet industry -- the result of voluminous lend-lease imports, reparations, seizures and forced draft, top priority output by domestic industry during the last five years -- reliable evidence from a number of different sources indicates that it is not sufficient for current peacetime industrial requirements. Production in the immediate future will not be in quantities desired by Soviet planners for normal industrial expansion or a war effort. The direct result of this shortage is lower qualitative and quantitative production of a number of strategic industrial and military items. An indirect result is the forced allocation of large quantities of skilled and semi-skilled labor urgently needed in other industries.

(b) High percentage of foreign-made machinery in inventory. An estimated 35 percent of Soviet machine tool inventory is of foreign manufacture. The bulk of these units are now over five years old and are already beginning to present serious maintenance problems because of the non-availability of spare parts and difficulties encountered in manufacturing them in the USSR. The problem is further complicated because the great majority are special purpose, aggregate and other complex types, purposely obtained from foreign sources because of Soviet inability to produce them domestically. In fact, an estimated 75 percent of Soviet specialized machine tools are of foreign make. Hence, this constantly growing foreign-made spare parts problem is concentrated in the weakest and most important sector of Soviet inventory.

(c) Improper maintenance and overwork. Huge production schedules combined with insufficient equipment have considerably shortened the normal use-expectancy of Soviet inventory. The extensive campaign for high-speed metal cutting which has been prevalent during the last two years has been particularly detrimental to older machine tools not specifically designed for high speeds and heavy loads. Periods between overhauls are excessively long and repairs are often makeshift and inadequate. Direct consequences are frequent breakdowns.

(d) Poor quality of domestic production. In comparison with United States and European standards, Soviet machine tools are usually made of inferior grades of steel, inferior castings, anti-friction bearings, and other component parts. The extremely high degrees of precision found in specialized tools produced by United States, Swiss, and other European manufacturers are rarely attained. With one or two minor exceptions the USSR has produced no

original designs or developments in the machine tool industry and practically all of the machines produced domestically are copies of foreign models.

iii. Extent of imports from the West. With the exception of relatively small shipments from Czechoslovakia and Eastern Germany, the bulk of Soviet postwar machine tool imports have consisted of specialized, high-quality units from Western Europe and the United States. These imports have been steadily decreasing 1/ because of US export controls, parallel action by some European nations and the high level of competing demands for specialized machine tools in the non-orbit countries themselves. Although Soviet machine tool imports from non-orbit sources probably amount to lessthan 15 percent of domestic production, their qualitative value is infinitely greater. Almost without exception, the not much less than $20 million worth of machine tools shipped to the USSR from Western Europe during 1949 and the slightly smaller quantity shipped during 1950 consisted of items requiring special materials, specialized engineering know-how, a high degree of skill in their manufacture, and specialized manufacturing equipment.

Denied access to US manufacturers and faced with expanding export controls by Western European nations, the USSR has increased trading with such countries as Switzerland, Sweden, and Austria, which have instituted very few export restrictions. Of much greater significance is the accelerated tempo of a wide variety of covert trading operations such as false export licenses, transshipment through a third country, and outright smuggling. The great expense, effort and risk required are indicative of their highly strategic value in Soviet industry.

iv. Effects of increased Western restrictions or embargo. Increased restriction or embargo on Western exports of machine tools to the USSR would directly retard but not disrupt Soviet military and industrial potential in the near term. Production of some categories of industrial, transport, and military equipment would fall below planned goals in proportion to Soviet dependence on new imports of specialized machine tools from the West. A large number of simple machine tools and skilled labor and the limited stock of special purpose units would continue to be retained for high-priority military industrial purposes.

1/ For example, the value of US exports of metalworking machinery to the USSR totaled $13,600,000 during the first six months of 1947 but dropped to only $108,000 during the corresponding period in 1949. Exports during 1950 were negligible.

In the long term the increased shortage of spare parts and inability to produce certain complex models previously obtained from the West could create severe bottlenecks in the production of certain militarily strategic items, -- for example, the manufacture of precision gears for certain types of aircraft. An additional long term result would be the gradually increasing gap between Soviet and Western technological development and design.

(a) Ability to cushion impact of increased Western restrictions. Probable Soviet measures to counteract the stresses caused by denial of non-orbit supplies would include increased production of simple machine tools, and increased training and allocation of skilled labor to accomplish production quotas. Greater pressure would be exerted on the European satellites to increase production, primarily to enable them to meet their own requirements. Czechoslovakia and Eastern Germany would be expected to supply certain advanced types formerly obtained from the West but it is very doubtful that desired quotas could be met. An all-out program to obtain units of greatest scarcity from the West by illegal methods would be carried on through every possible channel.

(b) Areas of maximum harm. Soviet supply and demand for virtually all categories of specialized machine tools may be considered uniformly vulnerable to increased restriction or embargo of non-orbit sources of supply. Their importance to Soviet war potential and the probable impact of prolonged shortages can best be illustrated by the following typical examples. During the past five years the USSR has imported or attempted to import from the West all of the machines cited below.

(1) Cam and crankshaft grinders. These machines grind regular or irregular curves (cams) to precise dimensions. The operation can be done individually or on a series of cams mounted on a shaft. The end products produced are major components of all mechanized armament, including airplanes, submarines, rapid-fire mechanisms, and tanks.

(2) Multiple and single-spindle automatic lathes. All are high-production machines used for producing a finished component from raw stock, a casting or a forging blank. They are indispensable in any arsenal or munitions plant. During the Second World War these machines were prominent on the list of machine tools in critically short supply.

(3) Honing and lapping machines. A honing or lapping machine makes precise finishes with measurements expressed in millionths of an inch. The operation is essential to the production of precision ball bearings of all types, retractable airplane landing struts, high-speed airplane engines, jet motors, and many other items essential for modern warfare.

(4) Large size planing machines. Used for planing or "truing" flat surfaces; they are the only machines which can perform this basic metal cutting operation on a number of items - e.g., beds for machine

tools, rail switch points, artillery gun mount sections, and rocket launching struts.

(5) Gear cutting, finishing and testing machinery. All machinery for precision gear-making requires the highest levels of technical-skill and design. Its output ranges from the small gears used in gun sighting and firing mechanisms to large marine and power-generating gears of special form - such as spiral bevel, open and closed herring bone and double helix. World production of some specialized types of these machines is centered in only one or two companies in the US and Europe.

(6) Horizontal combination boring, drilling and milling machines. Capable of performing three different operations at the same time, this machine can handle large and bulky objects yet is capable of cutting operations to within two-ten-thousandths of an inch. It is invaluable for production of a wide range of industrial and military products.

b. Eastern European satellites. Satellite vulnerability to loss of Western machine tool imports closely parallels the effects which would occur in the USSR. Both satellite inventory and production are substantially below minimum requirements and are qualitatively weak with respect to adequate supplies of precision, special purpose, aggregate, and automatic types. Total 1950 satellite output amounted to approximately 30,000 units, almost all of which was manufactured by Czechoslovakia, Eastern Germany, and Poland. With the exception of a small portion of Czech output, virtually all of these were simpler types and below Western standards of quality.

The effect of Western export restrictions on shipments of machine tools to the satellites would be even more severe than the same action on the USSR. A probable result would be the allocation of the scarcest types only for high-priority, Soviet ordered military items.

2. Abrasives

a. The USSR

i. General assessment. Increased restrictions or embargo on Western shipments of abrasives to the USSR would hamper Soviet industrial-military potential but would not seriously disrupt it. Current annual Soviet production of abrasives is estimated at 40,000 tons of crude and grain. This compares with a peak wartime production in the US and Canada of approximately 290,000 tons annually. Of the 40,000 tons produced in the USSR, 10,000 tons consist of natural corundum, and the remaining 30,000 of artificial abrasives (produced in electric furnaces) -- fused aluminum oxide and silicon carbide. Production of aluminum oxide supplemented by imports from Eastern Germany probably meets minimum domestic requirements, except for critical grain sizes and white aluminum oxide. Domestic production of silicon carbide is not sufficient to meet minimum requirements.

The bulk of the abrasive material produced in the USSR enters into the manufacture of bonded abrasives (grinding wheels, segments, sticks and hones) and only a small amount is used for refractories. Although production of grinding wheels may be quantitatively adequate, there is a qualitative deficit. Certain types of precision grinding wheels are either not manufactured or are being produced only on an experimental basis. There is evidence that the Soviet abrasives industry is incapable of manufacturing the complete range of types and sizes of grinding wheels required for the large number of foreign-made grinding machines in the USSR.

ii. Dependence on non-orbit sources of supply. Soviet deficiencies in abrasives have been emphasized by imports and attempted imports of a number of different types during the postwar years. Brief appraisals of dependence on outside sources for the major categories follow:

(a) Fused aluminum oxide. The USSR can probably get along without imports of aluminum oxide from the West. Since the war this product has been imported from Czechoslovakia and Eastern Germany. Until 1949, 70 percent of East German production was allocated to the USSR, but that figure has now been reduced to between 25 and 30 percent. This may mean that Soviet production has increased sufficiently to handle the bulk of domestic requirements. Nevertheless, the USSR has attempted to import critical grain sizes of the regular aluminum oxide from the West and the Soviet press has made several references to the scarcity of white aluminum oxide.

(b) Silicon carbide. Production is insufficient for current demand. Power requirements for production are three times those for aluminum oxide. During 1949 the USSR requested from Norway 1,000 tons of critical grain sizes and micro-grain powders, but was able to obtain only about 500 tons. Cessation of Norwegian exports of this product to the USSR would seriously affect Soviet supply.

(c) Bonded abrasives. There is a critical shortage in the USSR of certain specialized types of grinding wheels, particularly of rubber-bonded wheels for the manufacture of bearings. During 1949 the Soviets made several unsuccessful attempts through clandestine channels to obtain over 50,000 rubber-bonded wheels from the US. Diamond wheels, used for grinding tungsten carbide tools, are manufactured only in negligible quantities. Soviet industry has, however, developed a substitute for diamond wheels, a new process called "anode-mechanical grinding." This process may eventually eliminate the need for diamond grinding wheels.

iii. Effects of increased restrictions or embargo. The impact of increased restriction or embargo on Western exports of abrasive materials to the USSR would be felt directly in the metalworking, optical, and precision instruments industries, thereby affecting a wide range of vital military and industrial equipment. Soviet production capacity and inventory for the majority of categories which would be affected, such as bearings, range finders,

precision gears and valves, is already below requirements for normal peacetime expansion. Under wartime conditions a prolonged shortage of abrasives would sustain and probably aggravate these existing production deficits.

b. Eastern European Satellites. Czechoslovakia, with a production of approximately 6,000 metric tons of aluminum oxide, and Eastern Germany, with 10,000 tons annually, are the only significant satellite producers of abrasives. Both countries export abrasive grain and the finished grinding wheels to the USSR. Czechoslovakia has a considerable business in grinding wheels, primarily with the satellites but some also with non-orbit countries. The quality of Czech grinding wheels has been steadily deteriorating.

There is ample evidence of a critical shortage of abrasives in the satellite countries, despite successful overt and covert efforts of these countries to obtain abrasive grain and grinding wheels from Norway, Switzerland, Austria, and the UK. The satellites are currently attempting to establish an abrasives industry but it will probably be at least five years before its production facilities will be a significant factor in their economy. 1/ Until that time an embargo on Western supplies of abrasives would be extremely effective.

3. Bearings

a. USSR. Current production of all types of anti-friction bearings in the USSR is quantitatively and qualitatively below minimum industrial requirements. 2/ Under conditions of normal economic expansion this deficit will probably continue through the next three or four years because of the limited capacity of the Soviet bearings industry and the high rate of bearing replacement necessary for Soviet machinery. Increased restriction or embargo of non-orbit sources of bearing supplies would, therefore, have an immediate and long term restrictive effect on the entire Soviet industrial structure.

i. Weaknesses. A general review of the weaknesses and limitations of the Soviet bearing industry indicates the extent of Soviet vulnerability to increased Western export controls.

(1) Quantitative and qualitative limitations on capacity. The Soviet bearing industry has been slow to develop and is poorly equipped. The majority of the machinery in the eight producing plants was obtained through

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1/ Hungary has begun construction of a plant for smelting aluminum oxide, Poland is building a silicon carbide plant, and Eastern Germany has recently begun the production of silicon carbide in small quantities.

2/ Estimated anti-friction bearing production for 1950 is 60 million units as compared with estimated 1950 requirements of 85 million units. Total orbit 1950 production (USSR and European satellites) is estimated at 66 million units against total requirements of 111 million units.

prewar imports, lend-lease, and postwar reparations. More than 80 percent is of prewar manufacture and is currently old and obsolete.

(2) Shortage of high-quality raw materials. Although domestic production of bearing steels is adequate for simpler bearing types, there is a critical shortage of special, high-alloy varieties necessary for precision bearings. Swedish steel is used whenever available.

(3) Lack of skilled labor and advanced technical know-how. The chronic Soviet shortage of skilled labor, combined with the extremely complex, precision processes required for bearing manufacture, have caused the Soviet bearing industry to lag far behind the high technological levels maintained by its Western counterparts.

(4) Poor quality and limited number of types. Soviet bearings are generally recognized as being qualitatively inferior to those manufactured in Western Europe and the US. In some instances Soviet authorities have refused to accept equipment from the satellites which contained Soviet-made bearings. Indicative of the limited range of bearing types manufactured by the USSR is the fact that before the Second World War the USSR manufactured only one thousand different types of roller bearings while in the West some 12,000 different types were available. A considerable number of high-quality precision bearings are not produced at all in the USSR and foreign sources are relied upon to supply such units. In the production of bearings for jet aircraft, for example, the Soviet Union relies on non-orbit manufactured types almost exclusively, the Swedish SKF plant being the principal supplier.

ii. Extent of imports from the West. Soviet imports from the West since the war have continued at a rate not far below prewar and wartime levels. Before the war the USSR depended heavily upon Sweden and Germany for supplies of precision bearings as well as large quantities of the simpler types. During the war a very large share of requirements was supplied by the United States, which shipped an estimated 25 million units. Imports from Sweden were also increased. Official foreign trade statistics for postwar years provide ample evidence that imports have declined relatively little in volume or quality. During 1947 as much as 60 percent of Sweden's SKF output is estimated to have gone to the USSR. The majority of legal shipments from Western Europe have been based on trade agreements. Principal suppliers have been Sweden, Italy, Austria, and Switzerland, with smaller shipments coming from the UK, France, and Benelux. US exports have dropped precipitously from $1 million worth in 1947 to negligible quantities during the last few years.

The following table gives some indication of the approximate volume of Western bearing exports to the USSR:

Table 2. ESTIMATED EXPORTS OF ANTI-FRICTION BEARINGS TO THE USSR FROM SELECTED EUROPEAN COUNTRIES, 1949

(In thousands of units)

Italy	1,200
Austria	1,000
Sweden	440
West Germany	10
Covert Shipments	2,000 a/
TOTAL	4,650

a/ Includes units from the UK, France, Switzerland, Benelux, and the US.

An additional source of supply and one which is extremely difficult to estimate consists of reallocated Western shipments to the satellites. There is considerable evidence that the USSR was the ultimate destination of the more than 14 million units estimated shipped to satellite addresses by non-orbit suppliers during 1949. Of probably even greater value to the Soviet Union than the large volume of these Western exports 1/ is their better-than-Soviet-standard quality and the high percentage of precision types.

Clandestine trade in bearings between Western Europe and the Soviet orbit has grown to large scale proportions during the past five years. Shipments vary in size from carload lots to suitcase loads. Besides providing further proof of the pressure of Soviet demand, these shipments serve as an accurate barometer of the types and sizes most critically needed. Analysis of a large number of reliable intelligence reports indicates beyond doubt that satellite illegal purchases and imports are centrally directed by Moscow. The specifications and characteristics of the bearings involved in these shipments are frequently identical and indicate a high priority being given to sizes needed for tanks, aircraft, and other military items. The principal routes are through Western Germany, Switzerland, Austria, and Italy.

1/ Western shipments between 1945-50 may equal as much as one-fifth of Soviet domestic output during that period.

Additional and undetermined increments of bearing supply from Western sources reach the USSR through imports of bearing parts and in units already installed in machinery imports. These hidden imports are most significant for the specialized types which they provide, and there has been evidence that the USSR imports some machinery purely to secure the particular sizes of bearings contained in them.

iii. Effects of increased Western restrictions or embargo. Increased or complete isolation of the USSR from Western supplies of anti-friction bearings, high-grade bearing steels, and specialized bearing equipment would have an immediate and prolonged restrictive effect on Soviet industrial output. Although it is impossible to estimate the precise degree of damage or restriction which a bearings embargo would incur, it is obvious that the effects would be far-reaching and cumulative throughout the economy -- for example, restriction of output of certain types of machine tools might cut down output of Diesel motors, delays in production of oil drilling equipment might reduce planned fuel output. Inability to obtain Western bearings would compel the more extensive use of inferior Soviet types in a wider range of industrial equipment, with the resultant increased breakdowns and lower productivity. An immediate and extremely import effect would be the interruption of Soviet military stockpiling programs and in the long term their probable diminution to meet urgent demands formerly satisfied directly by Western imports. In the event of war the strains imposed by the absence of Western bearing supplies would be much greater, and extremely critical shortages interdicting production of essential military and industrial items could only be avoided by the use of foreign-made stockpile supplies.

iv. Ability to cushion impact of increased Western restrictions. The impact of a loss of Western imports would be countered almost entirely by resort to stockpiles. There is no substitute for anti-friction bearings. Under some circumstances plain bearings will function satisfactorily but they cannot be used for replacements in equipment designed originally for anti-friction types. Assuming that the most extensive possible redesign of equipment would be undertaken, it is doubtful that existing anti-friction bearing requirements could be lowered by more than a few percent. Strict allocation of the cream of domestic production to the most strategic industrial and military users and renewed efforts to obtain critical bearings through clandestine trade would be of limited value.

Although it is a known fact that stockpiling has probably been going on during the last several years, there is no available evidence concerning size of these stocks. Undoubtedly they consist largely of the specialized and precision types which the USSR is incapable of producing. It is virtually impossible to determine whether Soviet imports of anti-friction bearings have been in excess of normal requirements (because of the variance between planned and real expansion), but the unique Soviet policy of giving strategic stockpiling requirements priority over those of normal stock inventory makes it seem probable that reserve quantities may by now be fairly large. Consequently,

although a Western embargo might have considerable effect on normal peacetime industrial expansion, the hampering effect on the military-industrial potential under war conditions might be considerably eased. It seems obvious that the power of Soviet bearing stockpiles to reduce vulnerability to Western embargoes depends directly on the length of time that Western East-bound bearings exports are permitted to continue.

v. Area of maximum harm. Although the entire anti-friction bearings category is one in which the USSR is directly vulnerable to Western export restrictions, the specialized and precision types mentioned above are outstanding as items in critically short supply. Required primarily by aircraft, metallurgical, petroleum and machine tool industries, their chief producers are Switzerland, Sweden, and Austria.

b. Eastern European satellites. The USSR is the only major producer of anti-friction bearings within the Soviet orbit. Total satellite output of approximately 6 million units yearly comes almost entirely from Czechoslovakia and Eastern Germany and is far below the minimum requirements of these two countries alone. The bulk of even this negligible output is dependent upon the import of bearing parts (steel balls, races, and other sections) from the USSR or the West so that in strict terms most satellite output must be classified as assembly rather than manufacture.

The following table indicates the inability of satellite industry to meet its minimum bearing requirements without outside help:

Table 3. THE EUROPEAN SATELLITES' ESTIMATED 1950 PRODUCTION AND REQUIREMENTS FOR ANTI-FRICTION BEARINGS
(In millions of units)

Country	1950 Output	1950 Requirements
Czechoslovakia	1.0	12.0
Eastern Germany	4.5	8.0
Rumania	.35	2.0
Hungary	0.0	3.0
Poland	0.0	2.0
Bulgaria	0.0	0.5
Albania	0.0	0.5
Austria (Soviet Zone)	0.0	3.0
TOTAL	5.85	31.0

Increased restrictions or embargo of Western anti-friction bearing shipments would severely limit satellite military and industrial potential. During the entire postwar period deficit bearing supplies have beena critical obstacle to every branch of satellite industry. All of the bearings problems prevalent in Soviet industry -- shortage of specialized and precision units, limited range of sizes and types, obsolete and worn-out equipment, lack of skilled labor and abnormally high rates of replacement, -- are greatly intensified in the satellite countries.

Satellite industry is totally dependent upon Moscow for allocation of anti-friction bearing supplies received from the USSR and outside the orbit. Likewise, Moscow determines what percentage of East German and Czech production will be retained for their own or other satellite needs. Consequently, the intensity of satellite bearing shortages depends directly on Soviet immediate and long-term requirements. Available evidence indicates that the USSR has supplied only a negligible quantity of bearings to satellite industry, barely enough to permit production of high-priority military and industrial items designed solely for Soviet use.

Because of Soviet allocation of non-orbit anti-friction bearings shipments, it is extremely difficult to estimate exactly their importance in easing satellite bearings shortages. The following table shows estimated exports from the West to the satellites during 1949.

Table 4. SATELLITE IMPORTS OF ANTI-FRICTION BEARINGS FROM SELECTED NON-ORBIT COUNTRIES DURING 1949
(In thousands of units)

Italy	4,000
Austria	3,600
Sweden	1,500
UK	150
France	270
Switzerland	230
US	100
West Germany	590
Illegal shipments of different origin	4,000
TOTAL	14,440

As has been the case with legal shipments a great majority of the units received by the satellites through clandestine channels may be presumed to go directly to the USSR.

In view of the almost total dependence on foreign-made bearing supplies, the denial of Western shipments to the satellite countries would undoubtedly have an immediate and severe effect on their industrial and military output. Because of their "servant-master" relationship to the USSR, which is itself dependent on Western shipments, it seems inevitable that resultant satellite bearing shortages would be more severe than those of the Soviet Union. In the face of such bottlenecks almost all satellite output requiring precision or high quality bearings would be that specifically designated by the USSR, the necessary bearings being doled out from Soviet stockpiles. A long term effect would be to increase the tendency of the satellites to become an economic burden to the USSR, -- in this case due to their constant need for specialized and precision types essential for the maintenance of minimum industrial output and transport requirements.

H. Electronics and Precision Instruments

1. Electronics Equipment. The Soviet electronics industry is currently unable to meet minimum military production and research requirements. The shortage is so great that allocation of electronics equipment for civilian or ordinary industrial purposes is permitted only in token quantities amounting to roughly 10 percent of total output. Before, during, and after the Second World War the USSR's electronics industry received major contributions in technology and facilities from Western nations. Available evidence indicates that during postwar years the USSR has imported substantial quantities of electronic products and supplies from Western sources.

Slightly more than half of Soviet bloc manufacturing capacity is within the USSR itself. The balance is concentrated in Eastern Germany, the Soviet Zone of Austria, Hungary, and Czechoslovakia. Despite local independence of operations in the satellite countries, close coordination exists over the use of all facilities in an attempt to fulfill top-priority Soviet military requirements. Consequently in estimating production capabilities and vulnerabilities to Western restrictions the entire orbit electronics industry must be considered as an entity.

a. Weaknesses. The strategic importance of maintaining an adequate inventory of electronic equipment and the necessity of keeping in step with advanced technological developments of the West has led to vigorous efforts to expand production facilities in the USSR, Czechoslovakia, and Eastern Germany. Soviet deficiencies in electronics production are similar to Soviet deficiencies in other highly technical branches of industry. At the present time all are eased by Western imports they include:

i. Extremely limited capacity. This has forced concentration of production on only high priority military projects with the resultant neglect of some basic electronics fields.

ii. Lack of advanced scientific personnel and technical information. Every possible effort is made to accelerate and encourage research and development. The living conditions of scientific personnel are those of a privileged class. Constant attempts are made to obtain information on latest Western achievements -- either through direct acquisition of data and prototype items or through espionage.

iii. Lack of certain highly specialized raw materials and finished items. Soviet shortages of the essential components for electronics production are reflected in imports from the West of such items as industrial diamond dies and die stones, vacuum tubes, electrolytic copper wire bars, and billets. At the same time plans to develop domestic production of these items have been vigorously, but often unsuccessfully, pushed.

b. Imports from non-bloc sources. Soviet bloc postwar imports of electronics equipment from the West provide a direct barometer of their importance to domestic industry as well as those items which are in most critically short supply. Since the types of products and equipment required for electronics development are extensive in number and often consists of items unrelated in kind, accurate figures on the total quantities of equipment imported from the West are difficult to obtain. The following estimates made during 1950 indicate Soviet bloc dependence on Western imports for specific items.

Table 5. PERCENT OF SOVIET BLOC 1950 REQUIREMENTS OF ELECTRONICS EQUIPMENT FILLED

Items	Percent
Quartz crystals	50
Industrial diamond dies and die stones	100
Molybdenite	50
High conductivity copper	significant amounts
Thin paper for electrical capacitators	50
Getters and cathodes for vacuum tubes	25
Vacuum tubes	10
Molybdenum and tungsten wire and metal products	40
Electrical-grade steel	significant amounts
Small and medium size electric motors	25

Although Soviet bloc imports of electronics equipment have been considerably hampered by the imposition of US export controls and parallel action by some Western European nations, shipments from other European suppliers have increased. Clandestine traffic in a wide variety of electronic raw materials and finished products has decidedly increased. A typical commodity (much of which is US equipment transhipped) is crystal diodes, a device used in certain radar applications and not developed or manufactured in the Soviet orbit.

c. Effects of increased Western restrictions or embargo. Denial of Western-manufactured electronics raw materials, parts, equipment, technical information and producing machinery would considerably hamper Soviet bloc electronics development and production. Because of the limited application of the Soviet bloc electronics industry to civilian uses, this vulnerability would be felt directly by the military in such fields as radar, guided missiles, radio, aircraft navigational aids, and atomic energy. The expansion of the Soviet electronics industry into some fields would probably be greatly slowed or completely halted.

d. Ability to cushion impact of Western restrictions. Because of the highly developed and specialized processes, equipment, and raw materials required for electronics manufacture, it would be extremely difficult to obtain suitable substitutes. Increased efforts to attain self-sufficiency by larger monetary appropriations, training programs, and diversions of high-priority equipment would have little short term effect, particularly in view of the unlimited attention which Soviet electronics development has already received.

2. Precision Instruments. Soviet bloc vulnerability to increased Western restrictions or embargo on shipments of electronics equipment is essentially the same as for precision instruments. Although domestic production is sufficient to permit some allocation for industrial uses, the entire Soviet bloc is critically short of a number of specialized measuring, analytical, and control instruments essential for a wide range of industrial and military demands. Such basic instruments as spectographs, vacuum measuring gauges, pyrometers, and oscilloscopes are not merely in short supply but in addition, those produced domestically are qualitatively inferior to Western imports. As in the electronics industry, the three primary producing countries -- the USSR, Czechoslovakia, and Hungary -- lack one or more of the elements necessary for high-standard, adequate output -- technical knowledge, proper grade materials, or equipment used in production.

The USSR has had considerable success in circumventing postwar US export controls on precision instruments by increasing orders placed with European suppliers. Exports from Benelux, Sweden, Switzerland, and Austria have all been significant during the past five years and have included primarily such categories as electric indicating instruments, recording instruments and testing apparatus, starting and controlling equipment, testing machines, industrial indicating, recording and control instruments, microscopes and laboratory apparatus. Clandestine traffic has also been substantial.

Embargo of Western supplies would directly hamper Soviet bloc production of a wide variety of military and industrial items, some of which are highly strategic. In some cases new production facilities for precision instruments and other precision equipment would be curtailed and some plants would fail to attain planned increases in production where such increases were predicated on imports of Western equipment.

I. Transportation Equipment

1. Railroad Equipment. The Soviet position in respect to railroad transportation equipment has improved considerably in the past two years and at the present time there is no evidence of acute over-all shortage of the more common items of rolling stock such as steam locomotives and all-purpose railroad freight cars. At present the Soviet inventory of steam locomotives is

approximately 20 percent above the estimated prewar number of 25,700 and the average unit is more powerful; the inventory of freight cars in terms of two-axle units is up about 15 percent as compared with some 815,000 available in 1940. Specialized equipment is generally in short supply, but this shortage is being met by using standard types of steam locomotives, box and flat cars.

While the railroad transportation equipment industry is capable of producing sufficient equipment to keep the railroads in position to meet the present needs of the economy, military requirements are already forcing the industry to divert part of its total capacity to production of war equipment and hence preventing it from fulfilling previously set goals. The diversion has not yet had serious effects, but the increasing emphasis on greater utilization of available equipment suggests that shortages of axles, wheels, and other parts are developing.

2. Automotive equipment. The output of all purpose trucks of 1.5 to 3 ton capacity has more than doubled as compared with prewar. Though a large proportion of the inventory is constantly unserviceable, there is no over-all shortage of motor trucks.

The constant problem of shortage of replacement parts continues to prevent the efficient utilization of equipment. This situation is caused in part by insufficient production of replacement parts, as a result of concentrating all available facilities on production of completed pieces of equipment; but equally responsible for the shortage of parts where and when they are needed is poor distribution and red tape connected with obtaining parts by the users. To some extent this problem is relieved by production of parts by local work shops and by cannibalizing, but on the whole the maintenance and condition of equipment remains substandard. Denial by the West of more powerful vehicles which may be used as prime movers for large artillery units, trailer cabs of 5-ton capacity and larger, and other specialized equipment of which Soviet Union still produces very limited numbers, will serve to produce more immediate adverse effects but only of very limited nature.

J. Construction and Road-Building Machinery

1. The USSR

a. General supply position. About four years ago more than one-third of the limited Soviet inventory of construction and road-building machinery consisted of American supplies shipped during the war and in 1946. Their value amounted to about $60 million. Another $40 million worth of equipment had been removed from Soviet-occupied countries in Eastern Europe. The remaining inventory, less than half of the total, was Soviet prewar machinery, and after hard wartime use with a minimum of maintenance and no replacements, it was badly worn and depleted.

After the Soviet Government took strong measures to increase domestic production of construction and road-building equipment, it even established a new ministry to supervise production of this type of equipment. The chief emphasis has been on excavators, which were planned to constitute 66 percent by value of all construction and road-building equipment produced in the period 1946-50. By 1949 output of all construction equipment greatly exceeded that of any previous year and seemed to be at a level that would assure the USSR of a greater volume of equipment than had actually been planned. At the same time, the USSR pressed hard for imports of construction and road-building equipment, and has subsequently received considerable amounts of it from abroad.

In spite of this progress, reconstruction and the huge program for new construction of public buildings, housing projects, prot facilities, canals, and hydroelectric stations has all proceeded far more slowly than had been anticipated, and Soviet road-building, always limited in scope, has made little improvement. Construction projects have continued to absorb an excessive amount of manpower, and as late as 1949 Soviet experts blamed the poor progress of construction more upon an acute shortage of construction machinery of all kinds than on the continuing shortage of building materials and the poor utilization of what equipment is on hand. Even if there is some improvement in the latter respects, the USSR will continue to be dependent upon outside sources of supply of construction and road-building equipment, particularly the heavier and more specialized types for any marked progress of construction work. Much of the currently increasing domestic output will be offset by a high retirement rate of foreign-made units as the result of a lack of spare parts, improver maintenance, and excessive use.

If the USSR is forced by effective Western export controls to rely completely on domestic production of this equipment, the deficiencies in the Soviet inventory would be prolonged and the potential of the Soviet armed forces for rapid construction of military installations, strategic roads, and airstrips, would be limited to its present low level. The Soviet Union would have to continue indefinitely employing large numbers of workers at occupations that could more effectively be performed by mechanical means. Such controls would also prevent the diversion of certain domestic and satellite production facilities, which must now concentrate heavily on the manufacture of construction and road-building machinery, to the output of other types of strategic industrial equipment or of military end items, for which they are readily convertible.

b. Specific types of machinery

i. Concrete mixers. The USSR can easily produce the smaller types of concrete mixers but has difficulty in supplying the larger capacity mixers required on bulk concrete structures. Soviet sources have admitted that concrete mixers now in use have insufficient capacities for such work as the recently proposed Volga River dams.

In 1946 and 1947 approximately 100 small concrete mixers were imported from the United States; no information is available on further imports. Domestic production of large mixers is probably hampered because of their relative complexity and the shortage of large gear grinding tools. Failure to receive any imports of large concrete mixers from Western countries will retard work on which great value is apparently placed by Soviet leaders.

ii. Excavators and power shovels. Before the war Soviet industry made some medium excavators (up to about 3.9 cubic yards capacity), and since the war has stressed production of all types of excavators more than any other category of construction equipment. Considerable success has been achieved, with production of all excavators rising from about 400 units in 1946 to about 3,000 units in 1949, but at present the largest standard excavator made still has a capacity of just under 4 cubic yards. It is reported that the Soviet Union plans to produce huge self-propelled dragline excavators with a capacity from 13-33 cubic yards, a size most useful for planned large-scale construction projects, but there is no record that any such gradiose plans have as yet been carried out. Domestic production of cranes appears to be considerably behind tha of excavators, and domestic output appears to have been limited to smaller sizes, with capacities of less than 30 tons.

Large shipments of US excavators and cranes during the war and in 1946-47 probably accounted for a considrable part of the Soviet inventory of all excavators and cranes in 1947, and may have been the only source of the heavier types available to the USSR after the war. The Soviet Union pressed hard for excavators during 1947 trade negotiations with Western European countries and early in 1948 also began receiving small capacity excavators manufactured by the Skoda works in Czechoslovakia.

In 1947 excavators were singled out by a Soviet expert as constituting the weakest component in a generally inadequate inventory of construction equipment, the complaints being that they were outmoded, in bad repair, and suffering from lack of spare parts and accessories. It is doubtful that even the large upsurge in domestic production of excavators since 1947 has done much to ameliorate this situation, particularly since the heavy types of excavators, which would save the largest amount of time and labor on big construction projects, as well as the larger-capacity cranes, are still not being manufactured in Soviet plants. Controls on exports of heavy excavators and cranes would therefore exacerbate a long-standing deficiency.

iii. Road-building machinery. Over-all priorities after the war have not permitted the USSR to embark on the development and production of road-building equipment on a scale commensurate with its needs. The original plans stipulated that road-building machinery should constitute only about 16 percent by value of total 1946-50 production of construction and road-building machinery. Although it was reported that 1948 production of road-building

equipment was many times above prewar, a Soviet expert characterized the equipment on hand in early 1950 as inadequate both quantitatively and qualitatively.

Even though some imports have been received from the US and Western Europe, and some road-machinery was probably produced by the Skoda Works in Czechoslovakia, the USSR still needs to import substantial quantities of such equipment from outside the bloc before it can carry out its plans for improving its road system. On the whole Soviet road-building equipment is some 15-20 years behind US technological developments. Some bulldozers are available, but their use is not widespread, while simple Diesel asphalt rollers, imported from Belgium, are reported to have created considerable excitement among the population of Moscow.

If reliance must be placed solely on domestic production of road-building machinery, the USSR will not have the means for efficient construction of modern roads in the foreseeable future. Denial of imports from the West will prevent any significant improvements in the Soviet road network which, because of its limited extent, affords little assistance to the hard-pressed railroad system, and, because of its poor condition, has an adverse effect on the longevity of Soviet motor vehicles and tires.

K. Agricultural Equipment

1. The Soviet Supply Position. This category includes a wide variety of machines and implements, the need for and availability of which vary greatly. While the Soviet Union produces domestically all of its own such machines, and, in this sense, may be said to be invulnerable to Western economic warfare, nevertheless considerable shortages exist at present in the case of certain types of machines and implements. Inventories of usable tractors are, at best, equal to their 1940 level, and those of combines are below that level; production of plows, drills, threshing machines, and cultivators was specifically mentioned early in 1950 as being behind plans. All types of haying machinery are also in short supply, judging from difficulties encountered at haying time. Failure to fulfill the production plan for Diesel tractors and considerable defects in those produced came in for criticism by the Minister of Agriculture in mid-1950.

In accordance with plans to increase mechanization of agriculture, considerable expansion is scheduled in numbers and types of machines produced. The goal is to construct and bring into serial production machinery for operations otherwise requiring a large labor input, e.g., cotton picking, flax pulling, potato and sugarbeet digging, and chopping of feed. It appears that much remains to be done in this respect, and many models have not passed the experimental stage. Soviet failure to obtain samples of complex modern machinery and pertinent technical information will retard the program, and may lead to costly mistakes.

From an operational standpoint, Soviet agricultural machinery is quite vulnerable in that it is dependent upon large supplies of petroleum fuel and lubricants. Fuel consumption by agriculture amounted to 7 million metric tons in 1940, about one fourth of that year's total supply of refined products. Hence any measures that would bring about a more stringent oil situation would affect tractor operations. While requirements for high-grade fuels are being reduced by substitution of Diesel and gas-generating engines, such savings are likely to be more than offset by the increasing mechanization of farm operations.

a. Tractors. Tractors are absolutely essential to the functioning of Soviet agriculture and thus to the food supply of the country, since a number of important farm operations are highly mechanized. Tractors are also needed for road-building and forestry.

At present, the need for tractors is greater than before the war for a number of reasons: (1) there are fewer work horses; (2) the farm labor force is smaller and contains a larger percentage of women; (3) the work load is greater due to acquisition of new territories and to the additional work in connection with soil improvement, shelterbelts, and similar projects. Futhermore, for political and economic reasons, the USSR exports tractors to its orbit and elsewhere. Exports so far have not been large as compared with current domestic production, but they are important because they furtner farm collectivization in the Soviet orbit and enhance the USSR's prestige as an industrial nation in such countries as Iran.

Production of tractors in 1950, though below plans and below the 1936 peak of 116,000 physical units, was about three times the 31,000 units produced in 1940 and can thus be termed large. As a result of postwar production, chiefly during the last three years (1948-50), the tractor inventory is estimated to have been restored to approximately the 1940 level; the total actually available horsepower, though statistically higher than before the war (due to a greater share of large units), is unlikely to be above prewar levels, since some of the prewar tractors still on the books are too worn to be of much use.

Because of the decline of animal draft power, the total draft power available to agriculture is lower than before the war, making for a less favorable ratio between acreages sown and total draft power than in 1940; however, an improvement in this ratio can be expected in a year or two, provided no further plant facilities are diverted to tank production.

b. Combines. With respect to combines which, next to tractors, are the most important machinery used in Soviet agriculture, an analysis of official statements clearly indicates that postwar production has fallen greatly behind plans: total output during 1946-50 probably did not exceed 85,000-90,000 units

as compared with 174,000 units planned. A favorable feature of the current output is the fact that self-propelled combines are beginning to be produced in sizeable number. During the first nine months of 1950, about half of all combines (16,000 units) received by agriculture were of the self-propelled type. The availability of such machines is freeing tractor power for other work, thus indirectly increasing the efficiency of the tractor inventory.

The present combine inventory is probably still lower than at the end of 1940 (182,000 units).

2. Eastern European Satellites. European satellites are not dependent upon imports of agricultural machinery from the West. Although the increasing trend toward collectivization in the satellites is bound to increase requirements, the latter are likely to be supplied by sources within the Soviet bloc. The Eastern Zone of Germany and Czechoslovakia are apparently net exporters, and most satellite trade agreements with the USSR have specifically mentioned Soviet deliveries of agricultural machinery.

L. Textiles and Cordage

A Western embargo on cotton and wool fiber exports to the USSR and Eastern Europe would have relatively little effect upon the economy of the bloc as a whole. The impact upon the USSR would not be large in view of the relatively small share of Soviet imports compared with domestic output. The impact would be considerably greater upon such industrial satellites as Poland and Czechoslovakia. These countries have a well-developed textile industry of long standing, but lack the broad domestic raw material base that the Soviet Union possesses. An embargo would definitely necessitate the closing down of some textile plants. Some difficulties are likely to be experienced, principally in the USSR, as a result of the loss of high-quality grades of both cotton and wool. Reduced supplies could be partially offset by increased domestic production of synthetic fibers, particularly in Poland, Czechoslovakia, and Eastern Germany, and in an expansion in the numbers of sheep.

Military and industrial requirements would not be permitted to suffer from reduced supplies from the West. The whole brunt of the reduction would have to be borne by the civilian consumers. This diminution of civilian consumption would start from an already low level in the USSR, as current per capita consumption of textiles other than wool is below even the low level obtaining before the war.

The effect upon morale, particularly if combined with other shortages, might be marked, particularly after a year of two. Nevertheless, the capacity of the Soviet population to put up with inadequate supplies of consumers' goods should not be overlooked.

1. Cotton. The USSR's current domestic supplies of cotton, on a per capita basis, are below even the low prewar level due to the annexation of western territories which do not produce cotton. The statistical deficiency is further increased by the relatively large requirements of the satellites, particularly Czechoslovakia and Poland.

The USSR has been a net exporter of cotton since the war. While importing cotton, chiefly from Egypt and Pakistan, it has been exporting to its European orbit a considerably larger quantity, some of which returns to the USSR in the form of textile goods.

Imports by the Soviet bloc (excluding China) in 1948-49 are estimated at 130,000 metric tons, or slightly less than one-fifth of that year's consumption, and at 120,000 metric tons in 1949-50. The bulk of these imports went to the satellite countries, rather than to the USSR. It is highly improbable that the USSR would attempt to supply from its own reduced resources the deficit which would be created in the satellite countries by a cessation of Western exports; in 1948-49 and 1949-50 exports to the satellites, expressed in percent of current Soviet cotton production, would have amounted to 15 and 10 percent respectively. Soviet cotton imports amounted to 32,000 in 1948-49 and 54,000 tons in 1949-50 and were thus 6 and 9 percent of domestic production in those years. See Table

Table 6. MAJOR SOURCES OF SOVIET BLOC COTTON IMPORTS
(In thousands of bales)

Exporting Country	Satellites 1948-49	Satellites 1949-50	USSR 1948-49	USSR 1949-50	Total 1948-49	Total 1949-50
Brazil	120.2	13.2	---	---	120.2	13.2
Egypt	117.4 a/	102.8	70.0	164.5	187.4	267.4
Mexico through US Ports	6.0	17.0	---	---	6.0	17.0
Pakistan	30.8	44.2	52.2	89.2	83.0	133.4
Turkey	37.6	25.1	---	---	37.6	25.1
US	136.5	104.8 b/	25.6	---	162.1	104.8
Total	448.5	307.1	147.8	253.8	596.3	560.9
Total in thous. m. tons	96.0	65.8	31.6	54.3	127.7	120.1

a/ Excludes Bulgaria, Hungary, and Rumania, which are listed by the source as "included in others."

b/ Excludes Bulgaria and Hungary; estimated total including these two countries: 134,000 bales.

Source: Cotton Quarterly Statistical Bulletin, December 1950.

The cessation of imports, therefore, would not affect the country's economy, particularly in view of the rising trend in domestic production. Elimination of imports of high-quality cotton, however, would have the effect of hampering, at least temporarily, production of commodities normally requiring long staple fiber.

2. Wool. As in the case of cotton, the loss of imports of wool into the Soviet bloc would decidedly affect such satellite countries as Poland and Czechoslovakia more than the Soviet Union itself. In fact, if FAO computations of postwar foreign trade are to be taken at their face value, it would appear that the Soviet Union exported — presumably to its neighbors — at least as much wool as it imported in recent years. Nevertheless, there is undoubtedly some qualitative dependence on import trade in that better types of apparel wool constituted the bulk of Soviet imports, but not of exports.

Total imports from outside the Soviet bloc amounted to slightly over 100 million lbs. in 1948-49 and 95 million in 1949-50, of which 50 and 60 million respectively were shipped directly to the satellites, chiefly Poland and Czechoslovakia. The Soviet Union's output of wool during the past two years amounted to 315 and 325 million lbs. respectively; hence total imports into the bloc were equivalent to 34 and 29 percent of the USSR's output. The major sources of Soviet sphere supply are indicated in the following table.

Table 7 . MAJOR WOOL IMPORTS OF THE USSR AND THE EASTERN EUROPEAN ORBIT

(In millions of pounds) a/

Exporting Country	Satellites b/ 1948-49	Satellites b/ 1949-50	USSR 1948-49	USSR 1949-50	Total 1948-49	Total 1949-50
Australia	18.1	35.5	42.0	30.0	60.1	65.5
New Zealand	2.8	2.8	11.6	4.0	14.4	6.8
Union of South Africa	1.3	1.3	neg.	neg.	1.3	1.3
Argentina	neg.	2.4	1.6	neg.	1.6	2.4
United Kingdom c/	27.9	10.9	0.8	0.3	28.7	11.2
France d/	n.a.	7.4	n.a.	neg.	n.a.	7.4
Total	50.1	60.3	56.0	34.3	106.1	94.6
China	n.a.	n.a.	n.a.	33.0 e/	n.a.	33.0
Total (including China)	n.a.	n.a.	n.a.	67.3	n.a.	127.6

n.a. Not available.

neg. Negligible.

a/ Actual weight roughly equivalent to greasy basis in the case of most imports listed below.

b/ Bulgaria, Czechoslovakia, Hungary, Poland, Rumania, and Eastern Germany.

c/ British re-exports in the calendar years 1948 and 1949.

d/ Wool tops.

e/ Estimate.

Source: Wool Intelligence, Commonwealth Economic Committee, June 1950.

Foreign supplies of wool for the southeastern satellites (Hungary, Rumania, and Bulgaria) were unimportant, while their own production of wool (carpet-type) is relatively large. Even if trade in finished or semi-finished products is included, imports were not large. The effect of any elimination of import trade in this case may therefore be ignored.

As to Poland and Czechoslovakia, the situation is quite different. There, a well-developed manufacturing industry supplies the native population with a much larger output and, in addition, produces for export both to the East and the West.

In case of a stoppage of imports from the West, the Soviet Union -- even with continued imports from China and the Middle East -- could not make up more than a fraction of the bloc's deficit. A serious reduction of output and employment in the wool industry of both Poland and Czechoslovakia would result.

Because of the situation indicated above, the Soviet Union itself would be only moderately affected by a Western embargo, though the difficulties which Poland and Czechoslovakia would face would be a matter of considerable concern to the USSR. The loss of imports into the USSR from countries other than China would probably amount to less than 15 percent of the total present raw material supply for its woolen industry. Such a loss would be painful for the civilian population, notably if military needs were to increase further, but would not in itself engender serious difficulties.

3. Cordage fibers. Hard fibers, such as jute and sisal, are not produced domestically in the USSR and its European satellites. Only small amounts of jute are imported from India and Pakistan; no sisal is imported at present, but attempts were made during 1950 to secure large quantities from Haiti for import into the USSR. Henequen, a hard fiber similar to sisal, is imported from Mexico. Shipments to the USSR amounted to 31,000 tons in 1948, 10,000 tons in 1949, and 5,000 tons for part of the year 1950, as compared with an average annual import of 14,000 tons in late prewar years.

The hemp production of the USSR and its European satellites is the largest in the world. Even though this production is currently much lower than before the war, hemp is in adequate supply in the area. Together with other soft fibers (flax, kenaf, etc.) hemp has been widely used in the USSR in place of hard fibers.

Cessation of imports of hard fibers into the Soviet bloc would probably not have any disastrous effect on the industrial and military economy, because of the substitutability of domestic fibers, but the past imports and efforts to obtain more hard fibers indicates that some importance is attached to their use for special purposes, on naval vessels, in binder twine for agriculture, etc.

III. SURPLUS COMMODITIES

A. General Consequences of a Western Ban on Imports from the East

The total value of exports from the USSR and its Eastern European satellites to the Western world comprised about $1,350 million in 1949, and the current (1950-51) rate of exports is about the same as shown in the table below:

Table 8. EXPORTS FROM THE SOVIET BLOC (EXCLUDING CHINA) TO THE WEST, ANNUAL RATE, END OF 1950 AND BEGINNING OF 1951
(Rough order of magnitude in millions of dollars)

Total exports	1,200 - 1,400
of which:	
Grains	180
Other foodstuffs	50
Timber and lumber	100
Coal	200
Furs	30
Manufactured goods	250 (?)

Somewhat over one percent of the gross output of commodities and services in that area is thus being exported to the West. It is clear that, except in certain narrow economic sectors and geographical areas, the cessation of exports to the West cannot create a major economic problem within this part of the Soviet bloc. 1/

The prevailing sellers' market in virtually all major commodities in the Soviet bloc assures that the cessation of exports would mean to a large extent a mere redirection of the same commodities to end-uses within the bloc. This is to be expected since in virtually all major instances the exported

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1/ The problem of cessation of Chinese exports is taken up under Part VII, where a similar conclusion is reached.

amounts are small fractions of the total supplies of the same commodities in the bloc while the demand for virtually all commodities is strong and is increasing at a rapid pace. Furthermore, a substantial part of the exports from the East to the West are either consumers' goods (e.g. Czech manufactured consumers' goods, Czech sugar, Polish meats) or raw materials primarily for consumers' goods production (grain, flax, raw furs, hops). The diversion of these supplies to internal consumption within the bloc would have beneficial effects on consumer morale, labor incentives, and monetary stability. (Taxation of consumers' goods is by far the chief deflationary measure in all of these countries; e.g., retention of some 2 million tons of grain and its diversion to internal consumption would bring additional net revenue of some 3 billion rubles to the Soviet treasury, or enough to offset the inflationary impact of adding some 350,000 persons to the State's payroll.) In terms of employment, the present strong pressure on the supply of nonagricultural labor in these countries suggests that a fairly rapid re-employment of those displaced by the cessation of exports to the West may be expected, albeit with some loss of specialized skills. It must be also stressed that a considerable fraction of Eastern exports to the West orginates with the peasant economy, where the problem of employment does not arise in its ordinary form.

B. Specific Surplus Problems

1. The USSR. The adjustments which would be required within the Soviet economy in the event of a discontinuation of exports to the West would be minor for two main reasons: (1) the proportion of exports of the principal export commodities to their total production is already small (except in the case of some relatively minor commodities, such as furs and some rare metals); and (2) the resources available as a result of a ban on exports can be shifted without great difficulty due to the Soviet Government's relatively tight control over its economy and to the general sellers' market for most resources. Seen as a loss of foreign exchange (should some payments abroad still have to be made), the curtailment of exports would not seriously inconvenience the USSR as long as it can use its large stock of gold for payments abroad.

The export of grain and flax from the USSR is not based on genuine surpluses, but rather is created for both political and economic reasons. This conclusion seems particularly clear in the case of grain because of the current stress by the Soviet Government on increasing livestock production. Moreover, at the present rate of development, grain production is approximately keeping pace with the growth of the population. The economy could probably absorb grain now being exported with little difficulty (human consumption, animal fodder, stockpiling, or industrial use), or the acreage, labor, and other resources now devoted to grain production could be shifted to other crops. Labor released could be also absorbed into industrial occupations where demand persistently exceeds supply, although in this respect the limitations may be on the side of urban housing and worker-training facilities. The same can be said in the case of flax.

The curtailment of manganese and chrome exports could quickly be absorbed by temporary stockpiling until metallurgical capacity in the USSR and in satellite countries catches up with the supply of these metals. For example, output of manganese in 1950 is estimated at approximately 3 million metric tons, whereas steel consumption requirements (at the rate of 100 kilograms of manganese per metric ton of steel) equalled about 2.6 million tons. Since production exceeded requirements by only a little over 400,000 tons, this surplus could be utilized in the near future (something like a year's time) at the present rate of expansion of steel capacity.

Timber and lumber exports to the UK and Western Europe have been infinitesimal relative to total production since the end of the last war. Some difficulty would arise here, however, as timber for export is produced in areas remote from the main domestic consumption areas; thus some shift of labor, etc., might have to take place even if timber production were not curtailed.

2. Eastern European Satellites. In the event of cessation of exports to the West the impact would be hardest on two major areas of the economies of the satellite countries of Eastern Europe, viz., Polish coal and Czech manufactured products. With respect to Polish coal the adjustment problem is not deemed to be very great when seen in its perspective. Poland now exports some 12 million metric tons a year to the West, or about 16 percent of its output. A sudden cessation of these exports might cause a certain cutback in output, and hence some unemployment. Nonetheless, with Poland's own coal consumption planned to rise by some 2 million tons per annum in the current (1950-55) plan period, and with total coal consumption of the Soviet bloc (excluding China) increasing by some 30 million tons a year, the problem of internal absorption of the 12 million tons of coal currently exported to the West cannot be regarded as serious, even if transportation difficulties are taken into account.

Czechoslovak manufacturing may be hit more seriously, since the industries involved (largely manufactured consumers' goods industries) still depend on Western markets to a large extent, and on raw materials from the West (textile fibers, hides, chemicals, etc.) as well. However, if the supply of raw materials to these industries from the West is not seriously curtailed and only their sales in the West are affected, the consumers' goods-hungry East should provide substantial outlets for such products. The favorable influence on incentives and monetary stability of such a reorientation to internal markets has already been mentioned.

IV. TECHNICAL AID

A. Availability of Technical Aid to the Soviet Bloc

Broadly speaking, the Soviet bloc might obtain four types of technical aid from the West either overtly or through various covert means. First, it could procure prototypes for the purpose of study and imitation; second, it could obtain technical information in a variety of forms 1/ such as published literature on all branches of technology, patents and licenses, and unpublished technical data from industrial concerns; third, it could purchase technical know-how through contracts with foreign manufacturers, consulting engineers, etc.; finally, it could train its own personnel in foreign universities and factories.

None of these types of technical aid is formally controlled in the United States or Western Europe, except prototypes of items on commodity export control lists (e.g. the US positive list, International List I). Prototypes of many strategic commodities are embargoed by the United States and a few are also embargoed by most Western European countries; but the Soviet bloc is not prevented from purchasing prototypes of items subject only to quantitative control and it can obtain prototypes of embargoed items indirectly through third country deals.

Western European countries have not as yet attempted to control the other forms of technical aid and the United States has done so only to a limited degree and on an informal basis. Since November 1949 the United States has had a voluntary program of pre-shipment control of exports of technical data that concern advanced technological developments, know-how, prototypes, special installations, and military items which do not have a security classification; it has also had a program for voluntary protection of unclassified technical information disseminated within the country. While these measures make it somewhat difficult for the Soviet bloc to obtain technical information, they do not apply to the exportation of published technological literature and technical information generally available to the trade. Furthermore, American firms and individuals are not prohibited from exporting unpublished technical data or providing know-how to the Soviet bloc; they are only advised exporting such data or know-how. In actual practice, no technical assistance contracts with Soviet or satellite principals have been negotiated for several years and it is presumed that most of the attempts to procure technical data from US companies have been reported whenever there was any suspi-

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1/ In the present context, technical aid in the second sense mentioned above excludes classified information of a technical or scientific nature (e.g. in the field of atomic energy, munitions, etc.), since the latter is obviously not under consideration in a discussion of vulnerability to economic controls.

cion that the USSR would be the ultimate recipient of such information. The fact remains, however, that technical information and know-how are not controlled to anywhere near the extent that strategic commodities are subject to export control.

The availability of technical training for foreign nationals is only indirectly related to the vulnerability of the Soviet sphere to more stringent economic controls, since such training is a means of obtaining better trained future technicians rather than a form of technical aid that is more or less immediately useful. Few, if any, citizens of Soviet bloc countries would be permitted by their governments to study in America. Nevertheless, as far as the United States is concerned, individuals from the Soviet bloc who are not denied a visa on security grounds could not be legally prevented from acquiring advanced technical training at any accredited academic or industrial institution that was willing to accept them. As a general rule, there is even less restriction on the availability of technical training in Western Europe.

It is impossible to determine how much technical aid in the form of prototypes, technical information, and know-how has been obtained by the Soviet bloc in recent years. During 1948-50 there were about 300 known instances of attempts to get technical data from the United States, either along with some strategic commodity or in lieu thereof; probably other attempts were made in Western Europe which are not known to the US Government. The Soviet Government has had access to the patents in the German Patent Office in Berlin and, of course, has been able to purchase virtually unlimited quantities of published technical information generally available in the Western World. Hence, it may be assumed that despite partial control of technical aid, the Soviet bloc has received substantial quantities of technical information in the past few years.

B. Importance of Western Technical Aid to the Soviet Bloc

Any technical aid obtained from the West would be of potential value to the Soviet bloc in the sense of providing it with knowledge and skill which it might not otherwise have. Whether prototypes, technical information, and know-how can be effectively used by the countries in the Soviet sphere, however, depends on the level of industrial and technological development prevailing in the country concerned.

This fact cuts two ways. On the one hand, the conditions which make technical aid useful to the Soviet bloc countries also tend to make them less dependent on foreign technology. On the other hand, the Soviet bloc's technical and industrial resources are not on a par with those of the West, so that it would gain much by acquiring technical aid from abroad even though it could eventually develop a comparable technology.

The USSR and the more advanced satellites certainly have enough competent scientists, engineers, technicians, and skilled workers to profit by

the acquisition of Western technical aid; but the present technical resources of these countries are deficient in several respects. In the first place, the technical aid which they have to extend to backward nations in the Soviet sphere constitutes a drain on their existing pool of technicians. Second, the concentration of scientific and engineering talent on projects of direct or indirect military significance deprives many industries of the technicians they require for other purposes. Third, technical personnel in the USSR are hurriedly trained in order to make the number of engineers and technicians commensurate with the requirements for rapid industrialization and postwar reconstruction; as a result, Soviet technical personnel tend to be less proficient in their specialities and less able to provide guidance for new trainees. Fourth, the industrial experience of the USSR has not been as varied as that of Western countries, so that Soviet technicians have had less opportunity to acquire know-how and develop engineering insight. Finally, the political control of scientific research and development tends to stifle the initiative of Soviet technical personnel and to channelize their efforts along predetermined lines that may not be fruitful.

In view of these quantitative and qualitative deficiencies in technical resources, the Soviet bloc would probably gain most by obtaining the services of experienced engineers. Their know-how would enable the Soviet Government to make better use of the industrial resources which it controls and to introduce new techniques in those industries which have been developed in the USSR relatively recently. It is very likely that full use of foreign technical assistance, if it were available, would still be hampered by insufficient skilled workers and by political interference; but the principal obstacle to technological progress in the Soviet sphere is the lack of a sufficient number of technicians who can bridge the gap between a working model and quantity production, between a flow chart of some new process and the operating installation.

Judging by the number and persistence of Soviet attempts to get technical data in recent years, the bloc's most pressing need for technical assistance is in the fields of electronics, specialized metalworking machinery, testing equipment, rubber products, special chemicals, and petroleum refining. Needless to say, the published technological literature which the bloc has procured or sought to procure would provide information that is applicable in practically all branches of industry, but the USSR and advanced satellite countries undoubtedly use such information primarily in the fields just mentioned and in other industries that directly support military production.

C. Adverse Effects on the Soviet Bloc of Curtailment of Technical Aid

The adverse effect of denying the bloc as much know-how as possible would be to deprive it of one means of meeting its pressing need for engineers. The immediate value of engineering know-how, if it were received, is to eliminate the "bugs" in industrial production (particularly in those industries which have been built up with American equipment of advanced design, such as

catalytic cracking) and to facilitate the introduction of new techniques in industries that are technologically backward in comparison with the West. The immediate effect of denying the bloc this know-how would be, at worst, to keep the "bugs" from being eliminated and to prevent the new techniques from being introduced. This adverse consequence might very well be most serious in precisely those industries where Soviet engineers are having their greatest trouble or where, because of the limited number of competent technicians, the technical difficulties have not been attacked, much less solved. Whether, as a result, the USSR or any of its satellites would be any worse off than they already are is very debatable, since no technical assistance contracts with American firms have been consummated for several years and it is unlikely that Western European engineers are offering their services to the Soviet bloc. Hence, the vulnerability of the bloc in this area probably has been exploited as much as it can be.

Prototypes and technical data may be regarded as a substitute for know-how; that is, instead of procuring the services of experienced engineers, one gets working models or operational information which may enable Soviet technicians to render the services that might be obtained directly from foreign engineers. In this sense, denying the bloc these other forms of technical aid would reinforce the adverse effects of denying them know-how. It may also have the additional effect of retarding the bloc's technological development in the long run, but it is worth noting in this connection that more stringent control of technical information may accelerate the process of discovery in these fields in which the Soviet Government concentrates its limited technical resources.

V. TRANSPORTATION

A. Shipping

1. The Merchant Marine of the Soviet Bloc in 1951. In consequence of generous US lend-lease assistance and a stiff reparations policy, the USSR emerged from the Second World War with a pool of seagoing merchant vessels more than double in tonnage than that registered under the Soviet flag in 1940. Subsequent addition of a satellite empire in Eastern Europe and the fall of China to the Communists establishes the Soviet bloc maritime registry in 1951 at some 622 vessels totalling 2.1 million gross tons registered.

Table 9. SOVIET BLOC MERCHANT FLEET AS OF MID-1950
(1,000 gross tons and over)

	Total number of ships	Gross tonnage	Types of vessels			
			Combination	Freighters	Tankers	Misc.
Soviet bloc	622	2,163,250	95	449	31	7
USSR	530	1,968,359	86	409	30	5
Eastern European satellites	52	194,891	9	40	1	2
Communist China	40	100,000		?	?	?

Evidence accumulated over the past year supports the assumption, however, that the addition of China to the bloc, and more recently, the prolongation of the Korean conflict, have increased substantially the tasks of Soviet-controlled transport. In maritime transport, heightened priority accorded the shipping program is reflected by (1) a gradual shifting of geographic tonnage distribution to the Far Eastern theater, (2) a heightened emphasis on the merchant shipbuilding program as reflected in trade agreement negotiations with ERP countries (51 ships with 64,479 GTR now under construction); (3) accelerated Soviet satellite efforts to purchase shipping on the open-market; (4) rationalization, integration, and coordination of the maritime operations of the satellite countries; and finally (5) coordination and accelerated activity on the international charter market, which at present is believed to supplement the maritime operations of the Soviet-controlled merchant fleet by more than 200 percent.

2. Current Deployment of Soviet Bloc Fleets. A current survey suggests a rough distribution of the 500 odd vessels under Soviet flag with approximately 55 percent in Far Eastern waters and the remainder split between Baltic and White Sea operations in the northwest and the Black Sea, Mediterranean, and Near East operations in the southwest. The principal trade

routes for Soviet vessels, in order of importance are between (1) the Black Sea and the Far East; (2) the Baltic and Western Europe; (3) ports within the Baltic; and (4) the Black and Baltic Seas. The estimated 40 vessels of the Chinese Communist flag are apparently engaged entirely in Chinese coastal waters, with import-export trade handled entirely by foreign shipping. The 52 merchant ships of the Eastern European satellites, most of them Polish, are engaged primarily in trade with Scandinavia, Western Europe, and the Near East. Carriage to the Western Hemisphere or transit via the Panama Canal by vessels of the Soviet bloc has in the past year been reduced to insignificant proportions. For example, the calling of Polish ships at South American ports has virtually ceased and of the 13 cargoes of chrome and manganese arriving in the US from the USSR during the first 10 months of 1950, only two were conveyed by Soviet flag vessels. It is perhaps notable that more than one-fourth of the Soviet merchant fleet (83 ships, 517,000 Gross Registered Tons) are made up of lend-lease vessels under clear title to the US Government. Qualitatively, these lend-lease vessels are of even greater significance in the Soviet maritime picture as reflected by the inclination to use a relatively heavier proportion of them on distant hauls and in trade with the non-Communist world, despite the risk of US Government action, which theoretically might be aimed at the repossession of this tonnage.

3. Ship Chartering Supplements Soviet Bloc Maritime Operations. As previously indicated, it is probable that the active maritime operations of the Soviet bloc fleet between the ports of the Communist and non-Communist world (and to a lesser extent between Soviet bloc ports) are supplemented at any given time by approximately 200 percent chartered vessels. Thus, the Soviet bloc is rather heavily dependent upon the shipping of the Western world. A recent survey suggests the following pattern in deployment of charter shipping engaged in commerce with the Soviet bloc (262 non-orbit vessels engaged). The British listed 41 vessels in this trade. The Scandinavian countries naturally are engaged heavily in Baltic traffic. An average of 40 vessels of Greek or Panamanian registry are engaged in traffic with Soviet bloc ports. Seventeen Panamanian ships, for example, are presently servicing Chinese Communist ports in the Far East, and it is probable that the Panama registry veils the Chinese ownership of some of these vessels. The survey failed to disclose any charter traffic between the Black Sea and the Far East, doubtless a consequence of the sensitive nature of the cargoes involved.

The Soviet bloc is undoubtedly a net spender on its international transport account, primarily because of its dependency on foreign charter bottoms in the fulfillment of its maritime transport plan. Current intelligence, however, does not permit a calculation of the annual cost of these services to the bloc at large. This is primarily a consequence of the secrecy of the Soviet operation itself, particularly since a majority of charters are fixed through third parties as a matter of policy. Moreover, international charter shipping is a highly competitive market permitting the Soviet foreign trade monopoly its usual advantage of reducing costs to a minimum through selection of competitive bidding.

4. Areas for Potential US Action. As an indication of the significance of maritime tonnage to the economy of the Soviet bloc, it is notable that some 2,500 additional freight cars per month would be required to move the tonnage currently carried overseas from the Soviet Port of Odessa to the Far Eastern ports of the empire (assumption: 60,000 tons from Odessa). Consequently, US Government policy designed to curtail shipping available to the Soviet bloc holds the prospect of increasing substantially the stresses and strains of the Soviet bloc economy. The following appear as potentially fruitful areas open for policy consideration with the above ends in view:

(1) Repossession or neutralization of the 83 US lend-lease vessels currently operated under the Soviet flag.

(2) Allied government agreements looking toward:

a. Increasing the exchange of information as to allied merchant shipping available to and exploited by the Soviet bloc. Improvement of field intelligence covering commercial and espionage activity of Communists in this field.

b. Curtailing the availability of shipping for purchase or charter to Soviet bloc governments or agents.

c. Agreements to heighten costs of shipbuilding, resale, chartering services, and port and canal services to Soviet bloc government and agents.

d. Formulation of a flexible program for harassment and slowdowns to interfere at appropriate times and appropriate places (Suez and Kiel canals) with the movement of Soviet bloc cargoes.

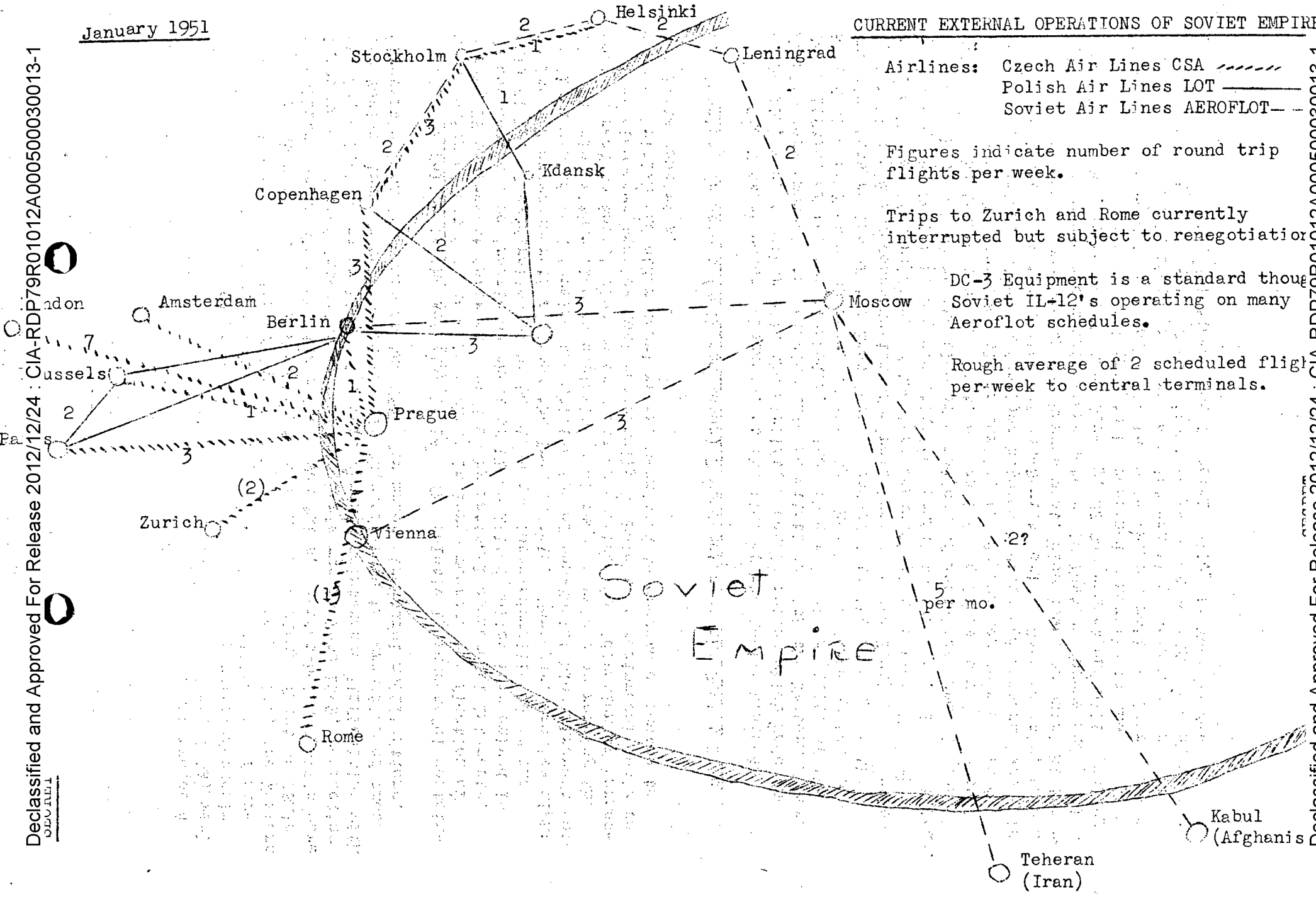
B. Air Transport

1. External Air Transport of the Soviet Bloc. Quantitatively, the Soviet bloc is not heavily dependent in any economic sense upon its aviation operations and connections with the outside world. Measured qualitatively, and in other than purely commercial terms, the significance of the operations is undoubtedly greater. As can be seen in the accompanying map, the Kremlin, primarily through its Czechoslovak and Polish satellites, maintains a network of air routes and connections serving the principal European countries, plus connection with Iran and Afghanistan in the Middle East. No connections are known to exist between Communist China and other nations in the Far East.

Most notable in connection with the Soviet-controlled aviation activity is the fact that a vigorous US-British civil aviation policy vis-a-vis the USSR and its satellites in the postwar period has been successful not only in containing the Kremlin's efforts to extend its international air network, but in forcing the retrenchment and cessation of a number of important connections, mainly former Czech routes to the Near East and most recently to Rome and Zurich. Moreover, the effective application of the US export control program, which served to prevent any substantial quantity of aircraft

January 1951

CURRENT EXTERNAL OPERATIONS OF SOVIET EMPIRE



parts and equipment from reaching the Soviet-controlled area, has produced noticeable effects. Thus, until late in 1949, the Czech airlines (CSA) were able to maintain schedules only by transfer to Europe of aircraft formerly used on Near East routes, rescheduling, more intensive utilization of aircraft, and cannibalization of its air fleet. By the end of 1949, the Western powers' embargo on DC-3 parts appeared to be having serious effect on CSA's capability for meeting even its reduced schedules. Soviet-built IL-12's were introduced and used intermittently on the Paris run in late 1949, reflecting the Czech DC-3 parts problem. However, chronic maintenance difficulties with the Soviet aircraft culminated shortly thereafter in the grounding of these aircraft and their return to the USSR for major structural modifications.

2. US Policy in the Aviation Field. The relatively successful containment policy effected to date is perhaps in large measure a reflection of strong US Government interest backed up by national commercial interests. In consequence, no drastic overhaul of US or Allied policy is required in this field. Consideration might be given to closer surveillance of the crafts and crews operating beyond the Iron Curtain. Moreover, studies might be inaugurated to determine the utilization of non-Soviet bloc aircraft outside the bloc with a view to curtailment of these services or raising the cost thereof to Soviet bloc governments or agents. Consideration of harassment or slow-down tactics must necessarily be held to a reciprocal basis so long as British and other carriers are permitted to operate on routes to satellite countries.

C. Overland Transport (Rail and Motor) Dependencies of the Soviet Bloc

The Western counterblockade, at the time of the Soviet blockade of Berlin, was, together with the airlift, a consideration which made the Kremlin more amenable to entering into negotiations with the Western Powers for a lifting of the two blockades. Since then the vulnerability of the Soviet bloc to Western pressure of this type has been reduced by the progressive integration of the East German economy into the economy of the Soviet bloc and the construction of a rail bypass around Berlin. Nevertheless, a Western interdiction of the land communications between Western Europe and the Soviet bloc would still be harmful to the East. It is obvious, however, that so long as the flow of a modicum of East-West trade is considered in the interest of the West, and so long as it is deemed important to maintain the Western foothold in Berlin, the dependency upon overland transit connections and communications between Western and Eastern Europe is of mutual interest of the Soviet and non-Soviet world. Consequently, though there exists ample opportunity for harrassment, slow-down, or outright interdiction of the overland communications network in Western Europe and particularly through Austria and Western Germany, US Government and Allied policy appears, for the present at least, to be confined generally to the mapping of a general strategic and tactical plan which will permit the increase and decrease of communications pressures and interruptions on a more or less reciprocal basis to counter Soviet-inspired moves of an offensive character in the conduct of its politico-economic total policy in Western Europe.

VI. MONEY AND FINANCE

The vulnerability of the Soviet bloc to financial sanctions alone is deemed to be rather limited. The West may (1) freeze liquid assets (chiefly bank balances) held by Soviet bloc countries in the West, (2) prohibit liquidation of such assets and block off the income accruing from them, (3) prohibit extension of credits to Soviet bloc countries, (4) refuse to purchase precious metals, chiefly gold, known to have originated with Soviet bloc countries, and prohibit private transactions in such precious metals. Of these forms of financial sanctions only (1) and (4) are of major importance. As far as is known, Soviet bloc countries do not own significant assets other than liquid asset (bank balances) in the West, thus eliminating (2) as a major course of action; nor is the Soviet bloc granted credits other than possibly some ordinary bank credit in connection with current trade transactions.

A. Freezing of Liquid Assets

Although the freezing of their liquid assets in the West would substantially hamper the acquisition of essential commodities and services by Soviet bloc countries in the West, the following limitations must be considered:

(1) "Dummy" accounts may be used.

(2) Financial institutions can be circumvented by barter transactions. Under this heading may be also subsumed the direct exchange of precious metals against commodities.

(3) In the event that some major trading country in the West (e.g. Switzerland) would not participate in freezing liquid assets of Soviet bloc countries, the East could carry on foreign economic transactions in terms of the currencies of such country.

(4) Should the freezing action be undertaken by all the major trading countries of the West, the Soviet bloc countries could still resort to setting up an international financial mechanism in terms of their own currencies and at their own financial institutions. It is conceivable that, given sufficient inducement, some traders in the West might collaborate in such an arrangement. A freezing action against Eastern assets would be effective only if Western nationals were prohibited from holding claims against Soviet bloc countries.

In view of points (1 through (4 above it is evident that financial measures would have to be supplemented by direct controls over the movement of goods and services.

The immediate impact of a freezing order in the United States would inflict only a relatively small loss on the financial resources of the Soviet bloc, as each of the countries in question is maintaining dollar balances of less than $10 million. Communist China is an exception but it has already been subjected to a freezing order. Because of the large stock of the Soviet Union, the loss of international purchasing power which would be involved in such a freezing order must be considered as relatively very small. No information

is readily available on balances of Soviet bloc countries in other major currencies, e.g., Swiss francs.

B. Refusal to Buy Gold

The gold stock of the USSR, estimated at $3 to $5 billion, is potentially a most important means of paying for imports of the Soviet bloc, and refusal to acquire gold originating with the Soviet bloc must be considered in this light. Whether controls can be devised to stop covert as well as overt sales of Soviet gold in the West would require further investigations.

It may be concluded that monetary and financial controls can be evaded and circumvented and that, taken by themselves, their effectiveness is limited. They must therefore be considered as measures supplementing direct controls over the movements of commodities and services.

VII. THE SOVIET SPHERE OF INFLUENCE IN THE FAR EAST

In Vietnam, Burma, and the Philippines, Communist groups control some areas in constant struggle against the legitimate governments. In Korea a full-scale war is in process. In all these areas economic warfare has become a part of military operations. Large-scale economic warfare is possible against China and its vulnerability to Western controls is examined on the following pages.

A. Economic Integration of China with the Soviet Bloc

Factors of geography and economic structure seriously limit the degree to which economic relations between China and the Soviet sphere can be mutually beneficial. These factors largely explain the lack of trade in the past and will undoubtedly constitute obstacles to an expansion of such trade in the future. Both areas are net exporters of agricultural products and raw materials and net importers of capital goods. In addition, the long and costly transport routes involved tend to limit trade between the two areas to goods high in value per unit of weight.

Under these circumstances large-scale trade between China and the Soviet sphere is likely to involve losses on the part of one or the other of the trading partners. A large part of China's agricultural and mineral exports could be used advantageously in the rest of the Soviet bloc. But China could receive full payment for these exports in commodities that it requires only at the expense of domestic requirements in the USSR or in Eastern Europe.

The USSR, nevertheless, appears to be making strenuous efforts to integrate the trade of China with that of the Soviet sphere. Yet, despite evident progress along these lines, the USSR and the Eastern European countries accounted

for minor portion of China's trade in 1950, and the balance of the trade appears to have been directed by the Chinese Communists to meet the specific needs of the Chinese Economy.

During 1949 and 1950 Sino-Soviet economic relations were formalized in a series of agreements, including the Manchurian-Soviet barter agreement announced July 31, 1949, the Sino-Soviet trade agreement, announced April 21, 1950, and the five-year $300 million Soviet credit ($60 million annually), signed in February 1950. These were followed by negotiations between China and the Eastern European countries, and trade agreements have subsequently been signed with Poland, Czechoslovakia, and Eastern Germany. Little is known of the details of these agreements, although it has been stated that China would exchange foodstuffs and raw materials for capital goods.

The available evidence suggests that China's exports to the Soviet sphere in 1950 amounted at most to $100 - $150 million (at world market prices) out of total exports of $400 - $500 million. Despite the trade agreements and the broadening of China's exports to the USSR to include such surpluses of China proper as nonferrous minerals, tea, silk, tungoil, wool, furs, and bristles, it appears that there was no substantial change in the volume of exports to the USSR. Manchurian soybean exports to the USSR may well have been smaller than in previous years, and were certainly reduced by the 100,000 tons exported to Japan as well as lesser quantities to other destinations. Exports to the Eastern European countries, although increasing are believed to be negligible.

The USSR has secured preclusive purchasing rights over China's nonferrous minerals exports (tungsten, tin, antimony) on strategic grounds; commercial sources in China believe that the remainder of Soviet-Chinese trade is fixed from period to period under current trade agreements. Although the USSR has imported Chinese bristles and furs for re-export, this has not constituted a major re-direction of the trade in these items, nor has it been a significant factor in the total export trade.

Chinese Communist statements and commercial intelligence have failed to indicate compensating imports from the Soviet sphere. It is reported that China has received limited quantities of rails, petroleum, newsprint, vehicles, chemicals, machinery, and consumers' goods from the USSR, but in amounts which would offset only a fraction of export receipts. This may suggest the following possibilities, singly or in combination: (1) Soviet economic exploitation; (2) the return of the industrial equipment looted by the Soviet authorities in 1945, unpublicized to maintain the fiction that the industrial damage was done by the Japanese; (3) Chinese payments for technical services; and (4) Chinese payments for military supplies and training.

B. Dependence of China on Non-Soviet Trade

Although China has a predominantly primitive rural economy, the introduction of modern transport and industry in response to the opportunities offered

by foreign trade and technology has created a small sector 1/ of the economy which is highly productive. The high proportion of savings which can be made available out of the income of this "modern sector" to finance current government requirements gives this area of the economy a special significance. According to 1950 budgets, the Chinese Communists planned to finance through urban revenues and the earnings of government enterprise some three-fifths of their expenditures in China proper and three-quarters in Manchuria.

The productivity of this "modern sector" is intimately related to the conditions of China's foreign trade. Most of China's exports represent the activation of marginal resources which would otherwise remain wholly or largely unemployed (and the major portion of their total costs consists of the transport, marketing, and processing services performed in and from the port cities.) China's imports have been devoted primarily to maintaining the population and facilities of the "modern sector", and have included foodstuffs and consumer manufactures for the urban populations of the main port cities, capital goods for the maintenance and development of transport and industrial facilties, and a wide range of raw materials for China's industries.

This "modern sector" contributes to China"s military strength primarily in providing civilian-type goods (uniforms, etc.) and transport facilities. It is also able to provide a certain amount of munitions, such as small-arms ammunition, mortars, and grenades which require few technical facilities. However, assuming military priorities over civilian requirements, it is doubtful that a cessation of foreign trade could materially reduce the supplies and services provided by the "modern sector" to China's military forces for at least a year and probably longer.

Chinese Communist imports from the non-Soviet world are estimated at $300 - $350 million in 1950. Raw materials and producers' goods for the operation of China's industries, including raw cotton, crude rubber, industrial chemicals and dyes, petroleum, and jute, are estimated to account for nearly three-quarters of the total. Imports of capital goods (machinery, vehicles, metal manufactures) made up about one-fifth of total imports, and were chiefly items for the maintenance and reconstruction of China's transport and communication facilities. There were also small imports of foodstuffs (rice and sugar) and consumers' manufactures (medical drugs).

In the face of a cessation of trade between China and the non-Soviet world, China would probably look to the USSR to meet essential import requirements. These requirements would probably be small, including primarily transport equipment and arsenal facilities and materials. The majority of China's present imports serve chiefly to maintain the productivity of the "modern sector", and in view of the competing requirements and costs involved, it is doubtful that the USSR would consider the requested commodities of such critical

1/ To generalize, about 80 percent of the population is located in rural villages, 15 percent in pre-industrial urban areas and 5 percent in the "modern sector."

importance as to warrant their diversion from other areas of the Soviet sphere.

C. Areas of Vulnerability

The record of China's imports is a general indication of the commodities which China does not produce in sufficient volume or in such qualities as to meet the needs of the Chinese economy. China's commodity imports from non-Soviet countries have been estimated on the basis of the latter's trade returns for the first nine months of 1950 as follows:

Table 10. CHINESE IMPORTS FROM COUNTRIES OUTSIDE THE SOVIET BLOC

(In millions of US dollars)

Raw cotton	75
Chemicals, dyes, drugs	30
Crude rubber	25
Iron and steel products	25
Machinery and vehicles	15
Cereals	14
Petroleum products	12
Jute products	10
Nonferrous metals and manufactures	10
Other	41
Total	257

1. Textiles. The major import was raw cotton, totalling nearly 400,000 bales, despite which it is estimated that raw cotton consumption by the mills was little more than one-half of the 1947-48 level, as shown in the following table:

Table 11. CHINESE SUPPLY AND CONSUMPTION OF RAW COTTON

(Quantity in thousands of 500-lb bales)

	Crop year 1947-1948	1950
Domestic output (preceding year)	2,050	1,650
Hand-spinning consumption	1,200	1,000
Domestic supplies available to the spinning mills	850	650
Imports and stock drawdowns	1,100	400-450
Supplies available to the mills	1,950	1,050-1,100
Percent of capacity	85%	46%-48%

The Chinese Communists have made the increase of cotton production a central objective in their agricultural program, and have claimed a substantial increase in the 1950 harvest. It is, however, probable that without cotton imports the 1951 mill production would remain at approximately the same low level as in 1950.

The importance of the cotton textile industry to the Chinese Communists lies primarily in maintaining urban stability and securing government revenues. In 1948 the industry employed 542,352 workers out of a total of 1,004,356 factory workers in 14 major cities. State enterprises are reported to have purchased 75 percent of the output of private mills, which possess about three-fifths of the total spindleage, and sales of cotton textiles were reported to have made up 20 percent of the total retail sales of state concerns. The earnings of state enterprises were budgeted in 1950 at half the total revenues in Manchuria and 18 percent of total revenues in China proper. In addition, cotton textiles provide the major source of the commodity tax, and the cotton textile industry is an important contributor to the business tax. Urban taxes made up one-quarter of the 1950 budgeted revenues in Manchuria and 40 percent in China proper.

Other clothing fibers are of lesser importance in the Chinese economy.

Import requirements for jute and gunny bags are related chiefly to the volume of exports of staple commodities, since straw sacking and other domestic

packaging materials are adequate for the local trade in commodities. Imports during the first three-quarters of 1950 are estimated at about $10 million.

2. Chemicals. The production of chemicals and dyes in China is small, high-cost, and of inferior quality. The Japanese built a sizable chemical industry in Manchuria, but the equipment of this industry has been damaged and its output is limited by the present lack of electric power and the low operational level of the iron and steel industry on which it relied for a part of its raw materials. Certain basic chemicals are, however, produced in China in significant quantities in relation to requirements as follows:

Table 12. PRODUCTION AND IMPORTS OF SELECTED CHEMICALS IN CHINA (EXCLUDING FORMOSA), 1947

(In thousands of metric tons)

	Production	Imports
Caustic soda	8.7	11.0
Bleaching powder	2.0	6.1
Hydrochloric acid	7.1	.4
Sulphuric acid	15.3	2.2
Nitric acid	2.3	.6

Dyes and chemicals appear to have been imported during 1950 at a rate consistent with the levels of industrial activity. Imports of certain chemical items, such as caustic soda, was restricted during the first half of the year in an attempt to encourage the domestic industry. In the third quarter of 1950, an active import demand developed, apparently from the rising industrial activity and the realization that stocks were perilously low. Failure to secure imported chemicals would have a serious effect on the quality of industrial output, and in some lines might seriously curtail production.

A very heavy demand for antibiotics developed during the third quarter of 1950, which was probably partly military in origin. The government tried to control civilian demand by placing antibiotics under a state monopoly and issuing warnings that the United States was trying to flood the market with fraudulent and inferior drugs. This action may have reflected concern over a leakage of foreign exchange, or alternatively have been an attempt to mobilize all available supplies for government use. Antibiotics would certainly be useful in reducing infectious diseases among troops and in restoring slightly wounded personnel to combat fitness.

3. Rubber and Rubber Products. China does not produce crude rubber, but it does possess a sizable rubber-processing industry. Chiefly because of plants constructed by the Japanese in Manchuria and North China during the Second World War, China at present has the capacity to produce most of the rubber products it requires, with the exception of large-size motor vehicle tires and tubes, particularly heavy-duty types.

China's imports of crude rubber have been exceptionally large in 1950, as shown in the following import figures of rubber and rubber products:

Table 13. CHINESE CRUDE RUBBER IMPORTS

	1937	1946-48 Average	11 months, 1950
Crude rubber (000 m. tons)	6.3	17	65
Scrap rubber " " "	6.7	11	*
Tires (000)	86	157	*
Tubes "	75	99	*

* Data not available.

The large imports of crude rubber have raised speculation that this trade may be, in part, on Soviet account. However, commercial sources in China do not confirm this belief, and it is held that imports have been aimed at rebuilding commercial and strategic stocks and maintaining a high level of output on government contracts. This view is supported by the fact that there was a heavy accompanying import demand for rubber-processing chemicals.

The main products of military value would be rubber-soled, canvas-topped shoes--which are standard military footwear--and motor vehicle tires and tubes, for which there is a reported capacity of about 20,000 per month. If China failed to secure rubber or rubber products from non-Soviet countries, the Chinese Communist armies would probably return to grass sandals or felt boots without serious effect. However, an effective rubber embargo would probably idle much of the motor vehicle fleet, which was estimated at 56,000 in 1947 and is probably little changed, except for those military vehicles for which the USSR might be willing to supply tires. It would probably have little effect on the civilian economy.

4. Metals and Metal Manufactures. China has a small iron and steel industry in Manchuria, and in addition produces small quantities of copper, lead, and other minerals. However, because of the limited range of its metal processing facilities, most of China's requirements for metal manufactures must be met through imports. Iron and steel and nonferrous metals production in Manchuria was reported as follows:

Table 14. MANCHURIAN METALLURGICAL PRODUCTION, 1949-50

(In thousands of metric tons)

	Output Jan.-June, 1950	1950 Target	1949 Output
Pig iron	283	720	172
Steel ingot	193	540	100
Rolled steel	167	340	72
Copper	2.7	4.0	1.9
Lead	2.5	4.0	2.1

The production of pig iron was surplus to China's requirements, and negotiations were begun earlier in 1950 to export substantial quantities to Japan.

China's imports of metal products from the non-Soviet world amounted to about one-fifth of its total imports from this area. Most of these were designed to maintain its transport and communications facilities, and included railway materials, copper wire, and automotive parts. In addition, there were imports for normal industrial uses, such as tinplate for the food processing industry, blackplate for the enamelware industry, etc.

The import of metal products is probably strategically significant primarily in maintaining China's transport and communications facilities. Without these imports there would be a rather rapid deterioration of China's motor vehicle fleet, but a somewhat lesser decline in the facilities of the other sectors. However, should this decline threaten the stability of the civilian economy or necessary military requirements, it is probable that the

USSR would supply the limited requirements necessary to prevent a breakdown in services. It may be noted that of the 22,000 kilometers of rail lines now in operation, probably 10,000 kilometers are important traffic-carriers. The present rolling stock is estimated at 2,500 locomotives and 30,000 - 40,000 freight and passenger cars, and the maintenance requirements for this small plant would be a small fraction of Soviet supplies.

5. Cereals. China's imports of cereals from the non-Soviet world during the first nine months of 1950 were probably made largely to meet military requirements during the Hainan campaign. There have been no rice imports since June 1950, and it is reported that the Chinese Communists have since signed a barter agreement with India exchanging 50,000 tons of rice for jute.

6. Petroleum Products. In 1935-37 China imported an annual average of about 7.5 million barrels of refined petroleum products, of which kerosene accounted for 37 percent. China's peak postwar petroleum imports were recorded in 1947 when UNRRA and commercial shipments totalled over 15 million barrels and military imports added another 1.5 to 2.0 million barrels. The increase in consumption may be credited to the acquisition of a large oil-burning merchant fleet and the conversion of public utilities and other industries to oil fuels.

During 1949 and 1950, the total imports of petroleum products to Communist China are estimated at approximately 2 million barrels. There has also been a reduction of stocks of about one-half million barrels, and possibly a small addition from domestic output in Manchuria and Northwest China. While multilateral export controls over the export of petroleum products to Communist China have been effectively applied since the outbreak of the Korean crisis, prior to that time there was no great effort on the part of Chinese Communists to safeguard their position through the import of petroleum products.

It appears that the Chinese Communists have minimized their petroleum requirements through a near-complete conversion of industrial and transport facilities to coal or other petroleum substitutes, and through a sharp reduction in the supply of kerosene (for lighting purposes) to the rural areas. It is also reported that vegetable oil substitutes have been employed for lubricants. It appears, therefore, that the chief effects of a cessation of petroleum imports from the West would be an increasing inefficiency of certain industrial operations and an accelerated deterioration of industrial and transport facilities.