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ECONOMIC INTELLIGENCE MEMORANDUM

THE SOVIET RUBBER INDUSTRY DURING THE SEVEN YEAR PLAN 1959-65

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CENTRAL INTELLIGENCE AGENCY

Office of Research and Reports

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FOREWORD

The USSR is planning for the rapid expansion of its chemical industry during 1959-65. Production of synthetic rubber, a product with numerous industrial, consumer, and military uses, will receive considerable emphasis during this period. The technological and other problems associated with increasing production and improving the quality of synthetic rubber illustrate the difficulties that the USSR faces in its ambitious goal for chemicals. Implementation of the plan for synthetic rubber holds additional interest in that the success or failure attained may have an important bearing on future Soviet imports of natural rubber, with possible repercussions on the world market.

This memorandum deals largely with the problems associated with production or importation of rubber and excludes data relating to the fabrication of rubber articles, except where such data are necessary for making estimates of requirements for rubber.

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THE SOVIET RUBBER INDUSTRY DURING THE SEVEN YEAR PLAN* 1959-65

Summary and Conclusions

The Seven Year Plan (1959-65) of the USSR for synthetic rubber is an ambitious one, calling for production to increase 170 percent, from an estimated level of 300,000 tons** in 1958 to an estimated level of 810,000 tons in 1965. In addition to the quantitative increase, a broader spectrum of improved types of rubber is planned, including most types of general-purpose and special-purpose rubber made in the Free World. A significant feature of the plan is the emphasis devoted to the production of synthetic polyisoprene rubber, a possible substitute for natural rubber that is scheduled to comprise almost 25 percent of the total Soviet production of synthetic rubber by 1965.

The Soviet goal for production of synthetic rubber in 1965 is unlikely to be fulfilled, barring extensive assistance from the Free World. The most serious underfulfillment in the plan probably will occur in production of synthetic polyisoprene. Failure to achieve the goal for polyisoprene will result in a continued large Soviet requirement for natural rubber in 1965 (perhaps 150,000 to 200,000 tons), in spite of the statement of the Chairman of the State Committee for Chemistry that the USSR will be able completely to discontinue imports of natural rubber within 7 years. Underfulfillment of the 1965 plan for types of rubber other than polyisoprene also is likely but will be far less than in the case of polyisoprene. The extent of the underfulfillment for these other types will depend largely on Soviet progress in increasing capacities for production of two key intermediates, acetylene and butadiene.

In spite of the probable nonfulfillment of the Seven Year Plan for synthetic rubber, the Soviet rubber industry will develop significantly during this period. Production of synthetic rubber, estimated at 300,000 tons in 1958, may reach 600,000 tons in 1965 compared with a plan believed to call for production of 810,000 tons in the latter year. In addition, new improved types of rubber will

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* The estimates and conclusions in this memorandum represent the best judgment of this Office as of 1 March 1960.

** Tonnages are given in metric tons throughout this memorandum.

be produced and costs of production reduced significantly by the change-over to more efficient production processes and cheaper raw materials. The long-heralded shift to petrochemical raw materials will provide an inexpensive base for continued expansion of the industry.

In the USSR, by 1965, requirements for rubber probably will be about 920,000 tons, and the supply of synthetic rubber and reclaimed rubber may reach 700,000 tons. If requirements are to be met, 220,000 tons, mostly natural rubber, will be required to supplement Soviet domestic production.

In recent years the failure to expand new synthetic rubber capacity at a sufficiently rapid pace has led to an expansion of imports of natural rubber by the USSR, from 35,000 tons in 1955 to about 259,000 tons in 1958 and more than 200,000 tons in 1959. The imports in 1958 and 1959 also may have replenished dwindling stockpiles and thus may constitute a temporary hedge against both continued lags in domestic production and possible increases in prices for natural rubber.

Currently, deficiencies in technology and equipment continue to harass the Soviet synthetic rubber industry, and these deficiencies may prove to be the principal deterrents to fulfillment of the goals of the Seven Year Plan. The failure to put several planned rubber facilities into operation in 1958 and 1959 can be traced to inadequate supplies of equipment and insufficient technological data. Reports of the June 1959 Plenum of the Central Committee of the Communist Party of the USSR reveal that technological demands of the rubber industry already have caused tension between the State Committee for Chemistry and the Academy of Sciences.

The efforts to expand domestic production of chemical equipment in 1959 were hampered by the slow progress in building new chemical equipment plants and by the inadequate experience of the chemical equipment industry in manufacturing some new types of machinery. In light of the domestic situation, the USSR probably will continue to exert heavy pressure to purchase rubber technology and complete plants from the Free World. Much of this pressure ultimately may be directed toward the US, the industry of which possesses the principal patents in the field of synthetic rubber.

I. Introduction

Although a pioneer in the production of synthetic rubber, the USSR has lagged in the development of new and improved types. About 50 percent of total Soviet production consists of sodium butadiene rubber, the original type developed by the USSR and quite inferior to types currently made in the West. Synthetic rubber made from butadiene is produced in the USSR primarily by an expensive process utilizing ethyl alcohol as a raw material. In 1957, more than 1.7 million tons of edible agricultural products* were consumed in the production of industrial ethyl alcohol, used chiefly for production of synthetic rubber.

The inferior quality and limited variety of types of synthetic rubber produced in the USSR, coupled with an inadequate supply of high-abrasion carbon black and the extensive use of cotton cord, has resulted in production of tires with a far lower road life than that common in the West. According to Soviet sources, an annual saving of 2 billion to 2.5 billion rubles** could be effected by the use of improved types of synthetic rubber and by the substitution of synthetic cord for cotton in the manufacture of tires.

During 1959-65 the USSR plans to improve its assortment of types of synthetic rubber and to produce much larger quantities of copolymer (butadiene-styrene) general-purpose types of rubber, synthetic "natural" rubber (polyisoprene), and special-purpose types of rubbers such as butyl and nitrile rubber.*** Production of the above types by the most efficient methods requires widespread use of refinery and natural gases as raw materials, a procedure that, in turn, will be possible only through the development of a large petrochemical industry. Proximity to sources of petrochemical raw materials has been a decisive factor in the selection of many of the new sites for rubber plants.*** In addition to the construction of new rubber plants, the USSR plans a sizable expansion of facilities at many existing plants.

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* In terms of grain.

** The official rate of exchange is 4 rubles to US $1. This ratio is established arbitrarily and should be used with caution, inasmuch as it bears little relationship to the ruble-dollar ratio for the chemical industry.

*** For the location of new or proposed plants and the scheduled dates of operation, see Appendix A.

II. Current Status and Plans

A. Supply of Rubber

1. Synthetic Rubber

The USSR is estimated to have produced about 300,000 tons* of synthetic rubber in 1958, less than one-third of the amount produced in the US. Although a specific goal for production of synthetic rubber was not given in the Seven Year Plan, Khrushchev stated in May 1958 that production of rubber would increase more than 150 percent in the 1959-65 period. Analysis of later reports indicates that the actual goal for 1965 may call for an increase of about 170 percent,*** or a total of 810,000 tons.

The planned improvement in the quality of synthetic rubber is clearly evidenced by the scheduled changes in the types to be produced. The extent to which the production of sodium butadiene rubber is to be deemphasized and the proportion of newer or special-purpose types of rubber increased in the total output of synthetic rubber by 1965 is shown in Table 1.****

The goal for production of polyisoprene rubber, which has properties almost identical to those of natural rubber, has particular importance in the Seven Year Plan for synthetic rubber. If a commercially feasible process is developed, production of polyisoprene could, in time, permit the USSR to curtail imports of natural rubber. Such a curtailment, however, could adversely affect Soviet economic and political relations with such countries as Indonesia and Malaya.

Natural Rubber†

Although the USSR attempted in the 1930's and the early postwar period (1946-50) to cultivate rubber-bearing plants, the

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* Possibly a maximum estimate.

*** Production of synthetic rubber in 1959-65 is scheduled to increase 160 percent in the RSFSR, where the majority of rubber plants are located. According to another report, the average annual increase in production of synthetic rubber in the USSR in 1959-65 will be four times that in the preceding 7-year period (1952-58), at a rate of production that would be consistent with an increase of 170 percent over the 7-year period.

**** Table 1 follows on p. 5.

† In the US, several companies are actively investigating polyisoprene rubber, and one company has begun limited production.

Table 1

Planned Changes in Percentage Distribution of Types of Synthetic Rubber Produced in the USSR a/
1 January 1959 and 1 January 1965

Percent

Type of Rubber	1 January 1959	1 January 1965
Copolymer and latices	38.3	43.6
Polyisoprene (SKI)	Negligible	25.0 b/
Chloroprene	6.4	11.7
Sodium butadiene (SKB)	50.7	8.5
Butyl	0.4	5.3
Nitrile (SKN)	3.8	2.9
Polyisobutylene	0.4	1.3
Other special-purpose	Negligible	1.7
Total	100.0	100.0

a. The time periods stipulated vary slightly from those of the Seven Year Plan (1959-65), but the figures are believed to approximate the plan goals.

b. The official Seven Year Plan calls for polyisoprene to comprise 23.8 percent of the total production of synthetic rubber in 1965.

efforts failed to result in production of significant amounts of domestic natural rubber. Imports of natural rubber, which fluctuated considerably in the postwar period, have been quite high in the past few years. Imports of natural rubber by the USSR in 1953-58 are shown in Table 2. For the period 1955-57 the value of imports of natural

Table 2

Imports of Natural Rubber by the USSR

Year	Metric Tons
1953	41,000
1954	424
1955	35,000
1956	141,000
1957	146,000
1958	259,000

rubber by the USSR amounted to almost 50 percent of the value of all imports of chemicals and chemical products.* In 1958, imports of natural rubber rose to 259,000 tons, reportedly 3.5** percent by value of total Soviet imports. In 1959, also, imports exceeded 200,000 tons. The reasons for the increase of more than 100,000 tons in Soviet imports of natural rubber in 1958 and the continued large imports in 1959 have not been clarified. It is probable that the USSR wishes to be assured of a regular supply of rubber during the period when existing plants will be changing over to production of new types of rubber and also to cover possible delays in construction of new plants. An additional factor may have been the desire to build up stockpiles in the face of predictions that world requirements for natural rubber may exceed production in the early 1960's, possibly resulting in higher prices. Of interest in this regard is a report that the USSR may curtail imports of natural rubber in the early months of 1960 because of dissatisfaction with current prices.***

3. Reclaimed Rubber

The USSR produced 76,000 tons of reclaimed rubber in 1956 and 91,000 tons in 1958. A considerably larger amount of reclaimed rubber must be used to fulfill the same functions as new synthetic rubber; however, and the 91,000 tons of reclaimed rubber produced in 1958 are assumed to be the equivalent of about 50,000 tons of new rubber. Reportedly the supply of reclaimed rubber is inadequate, but production by 1965 is scheduled to be approximately double the quantity produced in 1958.

B. Requirements Versus Supply, 1958 and 1965

1. 1958

Soviet requirements for rubber**** in 1958 are estimated to have been about 460,000 tons, based on assumptions that 288,000 tons

* The term chemicals and chemical products as used in this memorandum refers to items listed under Categories 30 to 35 in official Soviet journals on the annual volume of Soviet trade. The categories do not include data on medicines, medicinal raw materials, chemical fibers, essential oils, or soaps.

** The value of Soviet imports of all rubber (including synthetic) reportedly is 4.2 percent of total Soviet imports.

*** Several recent reports suggest a shortage of Soviet foreign exchange, which also could be a motivating factor in such a decision.

**** For purposes of this memorandum, requirements for rubber are expressed in terms of new rubber plus reclaimed rubber, given in terms of its new rubber equivalent. See II, A, 3, above.

of rubber were needed to produce tires in 1958* and that consumption of rubber for tires accounted for about 63 percent of total requirements for rubber.** The estimated supply of rubber in 1958 totaled 593,500 tons, composed of 300,000 tons of synthetic rubber produced domestically; 243,500 tons (mostly natural rubber) resulting from a net balance of trade ; and reclaimed rubber equivalent to 50,000 tons of new rubber. The estimated surplus available for stockpiling in 1958, therefore, exceeded at least 100,000 tons, probably more than has been available for this purpose in any postwar year.***

2. 1965

Although a firm estimate of production of synthetic rubber in 1965 is not possible at present, the serious nature of the problem confronting this Soviet industry suggests that the plan will not be fulfilled.**** On the assumption that production will not exceed 600,000 tons† and that the goal for production of reclaimed rubber is fulfilled,‡ the supply of rubber in 1965, excluding any available from trade or stockpiles, will amount to about 700,000 tons. The Chairman of the State Committee for Chemistry, Viktor S. Fedorov, has stated that Soviet production of rubber by 1965 will permit the cessation of imports of natural rubber.‡‡ Soviet requirements for rubber in 1965, however, will be at least double that in 1958,††† reaching approximately 920,000 tons. Because it is unlikely that more than 700,000 tons of rubber will be available from domestic

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* Computed from an estimated Soviet consumption of 20 kilograms per tire and reported production of 14.4 million tires in 1958.

** A Soviet journal states that automotive transport absorbs 65 to 70 percent of the total Soviet consumption of rubber, including the rubber used for tires and for other vehicular parts. Tires probably thus absorb about 60 to 65 percent of the total Soviet consumption of rubber.

*** Possible reasons for the sizable surplus already have been discussed in II, A, 2, p. 4, above.

**** For discussion of problems affecting the Soviet rubber industry, see III, below.

‡ For additional discussion on estimated fulfillment in 1965, see IV, below.

†† Production of tires is scheduled to double by 1965, production of rubber technical articles is to be 2.4 times that in 1958, and production of asbestos-rubber technical articles is to be 2.7 times that in 1958.

production, it is probable that 220,000 tons* of rubber in addition to domestic production will be needed in 1965 if planned requirements are to be met. Most of the 220,000 tons required probably would be natural rubber. In any one year, part or even all of the requirements for natural rubber can be met from stockpiles, but it seems clear that the USSR will not be able to cease importing natural rubber by 1965.

III. Problems Facing the Soviet Rubber Industry During the Seven Year Plan

A. Recent Underfulfillment of Construction

The USSR has been traditionally slow in the building of plants for the manufacture of synthetic rubber, and progress has remained unsatisfactory even following the announcement in early 1958 of the decision to accelerate the development of the chemical industry. In the first 8 months of 1958 the annual plan for construction and installation work on plants for the manufacture of synthetic rubber was fulfilled by only 44 percent. A new section of the Sumgait Synthetic Rubber Plant, which was to be the first in the USSR to produce rubber directly from refinery or natural gases, failed to go into operation as scheduled in 1958. At the Sterlitamak Synthetic Rubber Plant, after 6 years of construction, it was reported in 1958 that only 3 percent of the construction and installation work originally planned had been completed. Underfulfillment of construction plans at plants for the manufacture of synthetic rubber continued in 1959, as evidenced by a report for the first 4 months on activities of construction units working chiefly on such plants :

Sites of Plant	Four-Month Plan (Million Rubles)	Fulfillment (Percent)
Sterlitamak	38.3	80.4
Kuybyshev	13.5	86.0
Karaganda	14.3	76.0
Sumgait	10.0	102.0**
Krasnoyarsk	7.1	50.0
Omsk	15.3	137.0

* Of the total supply of rubber, it is believed that a minimum of 25 percent should be natural rubber or an adequate substitute such as synthetic polyisoprene rubber. In the US, about 35 percent of total requirements for rubber are met with natural rubber.

** In spite of the favorable index, the report noted that shops scheduled to go into operation at the Sumgait plant during the first quarter had failed to do so.

B. Underlying Problems

The lengthy delays experienced in bringing new plants into operation are symptomatic of a number of serious problems confronting the Soviet chemical industry in its efforts to implement the ambitious 7-year goals for rubber. The most pressing of these problems concerns the adequacy of present Soviet rubber technology and plant equipment. Other factors that will affect plan fulfillment include the pace of development of industries producing the necessary raw and other materials and the availability of skilled personnel -- particularly engineers who can rapidly adapt new processes to commercial-scale plants -- and employees to man the plants.

1. Technology

The USSR has included ambitious goals for certain types of rubber and rubber intermediates in its 7-year plan for chemicals, apparently without having much experience with the processes involved In some instances, considerable research still must be done to perfect the basic process; in others, additional engineering and design work is required to transform the laboratory or pilot-plant operations to full-scale commercial operations. The technological lag was noted in a speech by Khrushchev in May 1958 in which he accused the Academy of Sciences and the Ministry of the Chemical Industry of failings in the organization of scientific research. A year later, at the June 1959 Plenum, Federov, the Chairman of the State Committee for Chemistry,* admitted that neither the Academy of Sciences nor the State Committee for Chemistry had eliminated the defects mentioned by Khrushchev. Technical failings have been apparent for the types of rubber or intermediates used in producing rubber, which are discussed below:

a. Polyisoprene

At the June 1959 Plenum, Fedorov delivered a highly significant criticism of the work performed on polyisoprene by one of the laboratories of the Academy of Sciences, accusing it of prolonging research on an outmoded process. At the same Plenum the president of the Academy of Sciences, Aleksandr N. Nesmeyanov, replied to Fedorov's criticism in a manner that clearly reflected the growing chasm between their two organizations. Nesmeyanov stated that it had been at the request of the former Ministry of the Chemical Industry that the Academy had continued its efforts to improve the

*The State Committee for Chemistry replaced the Ministry of the Chemical Industry in June 1958.

process for polyisoprene. Moreover, according to Nesmeyanov, the process was a good one, but two other competing processes had emerged since development of the first one, and it was the task of the State Committee for Chemistry to select one of the three processes. With polyisoprene scheduled to comprise almost 25 percent of total synthetic rubber in 1965, these arguments assume increased importance. Although there has been some pilot-plant production of polyisoprene and a basic process reportedly now has been selected, the chemical industry apparently is still reluctant to proceed on the large scale required by the Seven Year Plan. Possible lack of confidence in the process is evidenced by Soviet interest in a recently publicized French process using different raw materials* from those supposedly selected for the basic Soviet process.

b. Butadiene

Another major technological hurdle facing the USSR is production from natural and refinery gases of butadiene, a key intermediate in the manufacture of general-purpose synthetic rubber. At present the USSR produces about 85 percent of its synthetic rubber from butadiene obtained by processing ethyl alcohol, an outmoded and expensive method. The basic process adopted by the USSR for producing butadiene in 1959-65 is a two-step operation, proceeding from butane to butadiene via butylene. The first shop to use the new process reportedly was completed at Sumgait in October 1959, at least a year later than scheduled. This plant probably is the prototype to be used as a model for construction of other plants, and, consequently, any further delays in getting the plant into large-scale production could have major repercussions on fulfillment of the 1965 goals for rubber, particularly if substantial modifications of the process or equipment prove necessary. A US chemical engineer who saw a model of the Sumgait plant at the Soviet exposition in New York in July 1959 stated that the butadiene section would apparently operate on an obsolete, high-cost process.** Although it may be too early to judge the process, it is significant that the USSR has made several attempts to purchase from the US large plants that use a one-step process.

Oil-Extended Rubber

Certain oils can be added to types of copolymer (butadiene-styrene) rubber in sufficient quantities to extend the

* The USSR does claim to have used the same raw materials as the French in an experimental process developed during World War II. In view of current Soviet efforts, however, the Soviet process must be inferior.

** The process, however, would be considerably better and cheaper than the alcohol process currently in use.

amount of rubber produced by 20 to 25 percent. In addition, tires manufactured from oil-extended rubber may have a longer service life than those prepared from rubber that does not contain oil. The rubber produced in the largest amounts in the USSR, a sodium-polymerized butadiene (SKB), apparently is not suitable for oil extension, and Soviet efforts in recent years have been directed to the application of oil extension to styrene-butadiene copolymer rubber (SKS). Under the Sixth Five Year Plan (1956-60) the USSR scheduled production of butadiene-styrene rubber basically in the oil-extended form. Experimental production began in 1955-56 at the Voronezh Synthetic Rubber Plant, but a report in 1958 indicated that the rubber proved unsatisfactory and that commercial production was thereby delayed for several years. One of the reasons for the failure was the selection of an oil* that did not have a sufficiently high content of aromatic hydrocarbons.** An improved oil-extended rubber apparently was not yet in large-scale commercial production in mid-1959. A West German firm reportedly has been engaged by the USSR to develop a process to manufacture oil-extended rubber.

2. Equipment

The Soviet rubber industry continues to be plagued by shortages of equipment, and the effects of these shortages are intensified by weaknesses in planning and organization at levels from Gosplan down to construction subcontractors. Efforts are underway to import complete rubber plants from the Free World.

a. Shortages

Shortages of equipment contribute significantly to the delays experienced in bringing new Soviet rubber plants into operation. A good illustration is the Sumgait Synthetic Rubber Plant, scheduled to be the first plant in the USSR to produce rubber directly from oil gases. In spite of the priority attached to this plant, more than 10 enterprises failed to supply scheduled equipment in 1958, and the situation was unchanged in the early part of 1959. As a result, the new section of the plant failed to go into operation as planned in 1958 and missed the rescheduled starting date in the first quarter of 1959. Similar delays have been experienced at rubber plants being built at Stavropol', Sterlitamak, and Temir-Tau. At the Stavropol'

* The oil apparently was selected largely for the frost resistance that it imparted to rubber, but tires made from the resultant rubber proved to be inferior in other properties to those made from butadiene-styrene rubber that did not contain oil.

** Aromatic hydrocarbons have a ringed molecular structure. Benzene is an example of an aromatic hydrocarbon.

Synthetic Rubber Plant, scheduled to go into operation in 1960, only 10 percent of the equipment scheduled for delivery in the first 4 months of 1959 actually was received, and equipment due in 1958 was still undelivered in October 1959. At the Sterlitamak plant, scheduled for operation in 1959, only 80 percent of the required equipment was received as of November 1959. At the Temir-Tau plant, also scheduled for operation by the end of 1959, a significant portion of the equipment had failed to arrive by October 1959, and, indeed, it had proved impossible even to place orders for much of the required equipment.

Alarmed at the shortages of chemical equipment, Soviet authorities took measures at the June 1959 Plenum to expedite construction of new chemical equipment plants and to divert to the chemical industry a larger share of production from existing machine-building plants. The situation with regard to equipment has remained tense, however. According to Chairman Fedorov of the State Committee for Chemistry, of the more than 1 billion rubles worth of chemical equipment* allocated for his projects in 1959, equipment valued at only 356 million rubles had been delivered after 9 months.

b. Lack of Organization and Planning

Lack of adequate organization and planning has magnified the equipment problems of the rubber industry. Gosplan USSR has been criticized for not planning suitable allocations of technical equipment. Poor scheduling has resulted in failure to use much equipment that has been available, and, in addition, the forced tempo of construction has led to faulty installation of some equipment. At the Sterlitamak plant, in spite of a shortage of required equipment, equipment and tanks valued at 10 million rubles were accumulated at the plant base, although construction crews apparently were not ready for installation. At Sumgait, where a butyl rubber shop was originally scheduled to go into operation in 1957, the engineering drawings for installation of equipment had not been received in mid-August 1959. The scheduling for delivery of equipment is often inconsistent with the projected start of production. At Temir-Tau, production of certain shops was scheduled for the second and fourth quarters of 1959, yet 75 percent of the required equipment was ordered for the fourth quarter.

The efforts at coordination have been hampered by occasional breakdowns of communication. At the Sumgait Synthetic Rubber Plant, poorly designed mixers caused the new catalyst shop

* Presumably including a large amount of equipment for the rubber industry.

to be shut down frequently, yet the Sterlitamak plant, scheduled to receive the same equipment, was not even informed of this problem.

c. Attempts to Purchase Equipment

It has been evident for some time that the USSR wishes to purchase a considerable amount of chemical equipment from the Free World because of the difficulties in domestic supply enumerated above. This intention, voiced by Khrushchev at the May 1958 Plenum, was reiterated at the June 1959 Plenum. Among the items sought by the USSR have been complete plants for producing synthetic rubber or intermediates used in producing the rubber, as follows:

(1) Butadiene from natural and refinery gases (70,000 tons per year).

(2) Acetylene from natural gas (50,000 tons per year).

(3) Butadiene-styrene synthetic rubber (70,000 tons per year).

(4) Butyl rubber (30,000 tons per year).

(5) Oil-extended rubber.*

Many of the basic patents in the field of synthetic rubber are of US origin, and the USSR as yet has been unable to purchase either important technology or integrated equipment in this field from the US. A contract has been concluded with an Italian firm whereby the USSR is to obtain process technology and equipment for an acetylene plant, and a recent Soviet contract with a Scottish firm calls for erection by the latter of a synthetic rubber "finishing"** plant in the USSR.

3. Raw Materials and Electric Power

Fulfillment of the Seven Year Plan for rubber will require production of a large quantity of petrochemical raw materials.

* A pilot plant was desired, and the purchase apparently depended on development of adequate technology by a West German firm.

** A plant for drying, baling, wrapping, and packaging synthetic rubber.

In 1958, 38 percent of the synthetic rubber produced in the USSR reportedly used refinery gas and natural gas as raw materials.* By 1965, 90 percent of the synthetic rubber is scheduled to be produced from petroleum and natural gas. Although it is estimated that production of oil will meet or exceed plans, many of the petroleum products required by the chemical industry require special refining techniques that the USSR is only beginning to apply on a commercial scale. Although the amount of natural gas required by the chemical industry in 1965 is reported to be only 5.7 percent of total production, this amount represents a sixfold increase in absolute consumption by the chemical industry, and realization of such a goal probably is dependent on timely completion of scheduled pipelines.

Plants manufacturing synthetic rubber consume a large amount of electric power. A considerable increase in the capacity for producing electric power must be achieved by 1965 at the sites of new rubber plants to assure operation of these plants at planned capacities. There is evidence that construction is lagging on electric power facilities for at least one of the new sites.

4. Labor

A shortage of both technical and skilled labor in the rubber industry may cause problems during the Seven Year Plan period. There is apparently a shortage of technical personnel capable of taking new processes developed in the laboratory and translating them into operations on a commercial scale. The persistent complaints of lack of technical designs at construction sites may well be an indication of this situation. There is some evidence that the shortage of technical personnel also extends to new branch institutes being set up regionally. At Ufa, scheduled to become one of the petrochemical centers of the USSR, a new branch of the rubber planning institute of the State Committee for Chemistry was criticized because it was not staffed with qualified cadres.

The 7-year goal for synthetic rubber also may require more skilled labor at the operational level than will be available, because of both the emphasis on new processes and the ambitious scope of the plan. The new Sumgait Synthetic Rubber Plant** was taken to task in June 1959 by one of its clients, a tire plant, because of the poor quality of rubber produced, a fault attributed largely to inadequate control of the technological processes. This criticism appeared

* Most of the synthetic rubber made in the USSR in 1958 used ethyl alcohol as a raw material, but part of the ethyl alcohol was derived from petrochemical raw materials.

** Production of rubber at this plant began in 1957.

to reflect a lack of experience on the part of the workers at Sumgait that resulted in poor production procedures.*

IV. Outlook for the Industry

It is unlikely that the current difficulties experienced by the Soviet rubber industry, particularly in technology and equipment, will be eradicated in time to permit fulfillment of the Seven Year Plan. The USSR will continue efforts to minimize some of these deficiencies by purchases from the Free World. These purchases, if effected, will aid materially in the proposed expansion of the Soviet rubber industry, but there is doubt that the aid will be on a sufficient scale or timely enough to assure fulfillment of the plan. Nevertheless, the USSR will develop its capability in production of synthetic rubber significantly in 1960-65, improving the quality of rubber and decreasing costs of production. The USSR may produce about 700,000 tons of rubber in 1965, composed of 600,000 tons** of synthetic rubber and reclaimed rubber equivalent to 100,000 tons of new rubber. Although it is estimated that the USSR will produce 700,000 tons of rubber in 1965, it is estimated that the USSR will require 920,000 tons, leaving a deficit of 220,000 tons. If requirements are to be met, a large amount of natural rubber (possibly 150,000 to 200,000 tons***) will be required in 1965.

Of the 600,000 tons of synthetic rubber estimated for 1965, it is believed that production of polyisoprene or other types of rubber capable of replacing natural rubber**** may reach about 50,000 tons but almost certainly will be far below the 200,000 tons believed to be called for in the plan. The USSR also probably will not fulfill the plan for production of types of rubber other than polyisoprene. Underfulfillment of these types, however, will be more modest, for the technology is more fully developed and the goal for increases in capacity of synthetic rubber in 1965 (3.7 times that in 1958) is considerably above the goal for production (2.7 times that in 1958), so that a significant failure to achieve the goal for capacity would not

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* It is possible that a lack of adequate control and direction by management also could have contributed to the poor production procedures.

** This estimate is predicated on the assumption that the USSR will be unable to purchase a large synthetic rubber plant from the Free World. Domestic production could exceed 600,000 tons if one or more larger rubber plants were imported.

*** Part of the total deficit could be met by the import of synthetic rubber.

**** The USSR, like the Free World, is investigating other types of rubber that may partly replace natural rubber.

necessarily have as drastic an effect on the goal for production. The most important factor affecting the goal for synthetic rubber (other than polyisoprene) probably will be the progress in expansion of the capacities for such key intermediates as acetylene and butadiene. Thus far the USSR has experienced difficulties in introducing new processes for both products. The contract of the USSR with Italy for purchase of process technology and equipment for production of acetylene, however, foreshadows some improvement in this field.

In addition to lags in technology and equipment, other factors affecting fulfillment of the plan for rubber in the USSR will be the adequacy of engineering and skilled workers and the availability of petrochemical raw materials and electric power.

APPENDIX A

NEW RUBBER PLANTS SCHEDULED FOR COMPLETION UNDER THE SEVEN YEAR PLAN IN THE USSR 1959-65

Location	Planned Date of Initial Operation	Remarks
Omsk a/	1960	
Stalingrad b/	N.A.	
Stavropol' c/	Fourth quarter 1960	Referred to as either the Stavropol' Synthetic Rubber Plant or the Kuybyshev Synthetic Rubber Plant
Sterlitamak d/	December 1959	Production by this plant is to include polyisoprene rubber, scheduled for initial manufacture in 1963.
Sumgait e/	1959 (third section of the plant)	Synthetic alcohol has been produced at this plant since 1952. Initial production of rubber was achieved in 1957, and present production includes oil-extended copolymer rubber and nitrile rubber. Although the third section of the plant reportedly was completed in 1959, no production of rubber by the new section was reported as of January 1960. Production of butyl rubber is planned in 1960.

Location	Planned Date of Initial Operation	Remarks
Temir-Tau (Kazakh SSR) f/	1959	This plant produces calcium carbide and acetylene. The rubber section probably did not go into operation in 1959. Future production probably will include oil-resistant rubber produced from acetylene.
Usol'ye-Sibirskoye g/	N.A.	

a.
b.
c.
d.
e.
f.
g.

APPENDIX B

SOURCE REFERENCES

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this memorandum. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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