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ECONOMIC INTELLIGENCE REPORT

A SURVEY OF THE CHEMICAL INDUSTRY OF EAST GERMANY

CIA/RR 74

24 July 1956

CENTRAL INTELLIGENCE AGENCY

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ECONOMIC INTELLIGENCE REPORT

A SURVEY OF THE CHEMICAL INDUSTRY OF EAST GERMANY

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(ORR Project 22.459)

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FOREWORD

The purpose of this report is to describe the chemical industry of East Germany and to show the industry's role in the planned economy of East Germany and of the Sino-Soviet Bloc. Because the operations, products, and functions of a chemical industry are almost innumerable in a highly developed industrial economy such as that of East Germany, it would have been impractical to describe in full all that is known about the industry. This report, therefore, has necessarily been restricted to a few over-all aspects of the East German chemical industry and to detailed discussion of only a few significant products that provide a fair cross section of the function of the industry.

Some important commodities reported by East Germany in 1955 as products of the chemical industry are not discussed in detail in this report -- synthetic liquid fuels, explosives, photographic film, dyestuffs, fabricated plastics, and synthetic fiber goods, among others. These products were considered beyond the scope of this report. Furthermore, the report does not discuss commodity prices, production costs, and capital investments, which are subjects for detailed analysis in future reports.

Fairly complete production data through 30 September 1955 were available for inclusion in this report. Production information of later date was very fragmentary, but it has been included when judged significant. Foreign trade plans for 1956 for several significant commodities have been included, and plans for previous years are used where information on actual trade data is too fragmentary. Consumption patterns have been developed for 1953 because that is the latest year for which detailed, reliable information is available. [redacted] 50X1

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A SURVEY OF THE CHEMICAL INDUSTRY OF EAST GERMANY*

Summary

The chemical industry of East Germany is one of the major components in the industrial economy of the country and is a significant contributor to the economic development of the Sino-Soviet Bloc. Production of chemicals and chemical products accounts for about 16 percent of the value of all East German industrial production. Within the Sino-Soviet Bloc, only the USSR produces more chemical products than does East Germany, and East German production is greater than the combined production of Poland and Czechoslovakia.

In the postwar period the chemical industry of East Germany has recovered from war damage and extensive plant dismantlings by the USSR to the extent that in 1955, production of chemicals had reached an estimated value index of 144, with 1943, the previous peak production year for that area of Germany which is now East Germany, as the base year with a value index of 100. The estimated gross value of the output of the chemical industry in 1955 was about 7.05 billion East German marks (DME), equivalent to about 2.82 billion US dollars. In 1953, the latest year for which nearly complete economic data are available, the gross profits of the industry were 720 million DME, and 247 million DME were returned to the industry as capital investment.

During the period of the First Five Year Plan (1951-55), production of the East German chemical industry grew at an annual rate of about 12.2 percent. During the same period the average annual rate of increase of all industry in East Germany was about 13.7 percent.

Although estimated gross production of chemicals in East Germany in 1955 more than trebled 1936 production for the same area and the value index was about 178, based on an index of 100 for 1950, only about 86 percent of the First Five Year Plan goal was fulfilled. The production targets set for 1955 by the First Five Year Plan were exceeded for sulfuric acid, synthetic rubber, penicillin, motor vehicle

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 15 May 1956.

tires, and possibly potassium fertilizers. Although final production data are not yet available, the goals probably almost achieved were those for nitric acid, nitrogen fertilizers, and crude calcium carbide. Plan targets were not met, however, for caustic soda, soda ash, phosphorus fertilizers, caprolactam (for Perlon products), and refined benzol and phenol.

East German trade in chemicals and chemical products is heavily weighted on the export side of the balance, and of the countries of the Sino-Soviet Bloc, only the USSR has the capability of being a greater exporter than is East Germany. Furthermore, East Germany relies heavily on exports, primarily the products of the machine construction and the chemical industries, to support its economy. Since 1951 the East German chemical industry has had a net export surplus of from 200 million to 300 million dollars.* Exports of chemicals in 1954 are estimated to have had a value of almost 350 million dollars. As much as two-thirds of the 1954 exports possibly went to the USSR.

Imports of the East German chemical industry consist largely of raw materials -- for example, bituminous coal and coke, pyrites, and crude phosphates. Some fine chemicals and aromatic coal chemicals, such as benzol, toluol, and naphthalene, and some construction materials and plant equipment are also imported. Although a major part of the imports come from countries of the Sino-Soviet Bloc, principally the USSR, East Germany is dependent on the Free World for most of its supplies of pyrites and some of its supplies of crude phosphate rock.

Stockpiles of chemicals and chemical products exist in East Germany, but available information does not permit an estimate of their magnitude. The existing evidence indicates that stockpiles, with the possible exception of reserves of pharmaceuticals, are not large enough to provide for an emergency of more than a week's duration.

The material balance between the supply of and requirements for chemicals and chemical products in East Germany can be estimated in a very general way for 1956. The chemical industry satisfies all, or most, domestic requirements for sulfuric acid, synthetic ammonia,

* Shipments of liquid fuels are included in this estimate. Trade values are expressed in terms of US dollars.

nitric acid, caustic soda, soda ash, potassium fertilizers, synthetic rubber, and penicillin, but it does not meet all requirements for aromatic coal chemicals, chlorine, plastics, phosphorus fertilizers, antibiotics (except penicillin), some drugs, and motor vehicle tires. Primarily because of high export commitments, production of calcium carbide and nitrogen fertilizers has been insufficient to meet all domestic demands.

The pattern of consumption of chemicals and chemical products in East Germany is so broad that it is impossible to quantify all of the individual allocations. The products of the chemical industry are used in virtually all sectors of the economy -- in agriculture, food processing, transportation, communications, heavy industry, and the manufacture of consumer goods. A considerable part of the production of the chemical industry, moreover, is consumed within the industry itself.

The major inputs of the East German chemical industry, excepting capital investment, are raw materials, primary and intermediate chemicals, electric power, and labor. Of total inputs, primary and intermediate chemicals constitute the largest category. Most of these are produced within the industry, but some fine chemicals and aromatic coal chemicals must be imported. The major raw materials consumed by the industry are bituminous coal and coke, pyrites, and crude phosphates. It is estimated that in 1953 the East German chemical industry consumed at least 30 percent of the bituminous coke and brown coal briquettes consumed by the entire East German economy. The industry's input of electric power in 1953 also amounted to about 30 percent of the total consumed in East Germany. At the beginning of 1954, about 225,000 persons were employed in the chemical industry.

Current capabilities of the East German chemical industry can be evaluated generally in terms of the material balance, but future capabilities of the industry cannot be forecast with any degree of certainty. East German heavy industry will be emphasized during the period of the Second Five Year Plan (1956-60), and the expansion of the chemical industry has third priority, following that of the coal and power industries. Whereas East German gross industrial production in 1960 is planned to show an increase of 55 percent over 1955 production, gross chemical production is to be about 166 percent of 1955 production.

In addition to marked increases in production by the end of 1960 in several basic chemicals, such as sulfuric acid, soda ash, other alkalies, and chlorine, there will be production increases in fertilizers, synthetic fuels, synthetic rubber, synthetic fibers, and plastics. Also, there is planned the beginning of production of tetraethyl lead, aniline, hydrazine hydrate, and speciality chemical products that formerly had to be imported from the West. In competition with the West, particularly with West Germany, the chemical industry plans to modernize -- to effect industry-wide application of advanced technology, to employ more mechanization and automation techniques, and to improve the quality of production while raising labor productivity.

In a large measure, the future development of the East German chemical industry will be determined by decisions resulting from East German participation in Soviet-sponsored negotiations with other countries of the Sino-Soviet Bloc. These negotiations have been directed toward Bloc coordination of economic planning, raw material resources, production capabilities, foreign trade, division of labor skills, technological achievements, and product standardization through the Council for Economic Mutual Assistance (CEMA). Also, through the mechanism of CEMA, East Germany apparently hopes to coordinate its efforts with other Bloc countries in order to compete with the West, to infiltrate neutral and Western markets, and to integrate its imports and exports so as to reduce Bloc imports from the West. A possible indication of CEMA's growing effectiveness to solve Bloc economic problems is the reduction of East Germany's 1956 exports to the USSR of calcium carbide and other chemicals in short supply in East Germany, thereby strengthening the East German economy.

In the evaluation of the wartime capabilities of the chemical industry, perhaps the most significant factor is the convertibility of the products of the industry from peacetime to wartime use. Many military requirements for the products could be met rapidly by a reallocation of basic chemicals and chemical products from the civil economy to the military.

A major apparent vulnerability of the East German chemical industry is its dependence on imports of raw materials. Although a large part of these imports come from countries of the Sino-Soviet Bloc, East Germany is partially dependent on the Free World for supplies

of pyrites and some chemicals and chemical products used as raw materials. Effective proscription of these imports from the West would create a serious problem for East Germany. Another apparent vulnerability of the industry is a shortage of some construction materials and plant equipment which has created production bottlenecks and has interfered with the expansion of the industry. The industry is also vulnerable in the geographic concentration of its production facilities in a few large chemical complexes and in the internal interdependence of its many productive processes.

The intentions of the East German government cannot be detected with certainty from an analysis of changes in the production patterns of most basic chemicals in the chemical industry. Because many military requirements for chemicals can be met by reallocations from civil to military uses, marked shifts in the production patterns for most chemicals would not immediately precede a conversion to a wartime economy. Perhaps the most significant indication of government intentions would be pronounced shifts in the consumption and trade patterns of allocation of chemicals and chemical products. If, for example, allocations of synthetic ammonia to the manufacture of nitrogen fertilizers were reduced, the reduction probably would indicate that greater amounts of ammonia and its two primary products, nitric acid and ammonium nitrate, were being channeled into production of explosives. Pronounced increases in imports of some raw materials might indicate the intention to build up reserves in preparation for an emergency. Likewise, increased export allocations of some chemical products, particularly to the USSR, might be an indication of Sino-Soviet Bloc intentions.

At the end of 1955, however, the current and projected patterns of consumption and trade in the East German chemical industry appeared to be designed to support the general economic development of the Sino-Soviet Bloc, particularly that of the USSR, and to minimize the economic influence of the Free World on Bloc capabilities. The patterns of consumption and trade do not indicate an immediate military orientation of the industry.

I. Introduction.

A. Scope and Importance of the Industry in the National Economy.

1. Scope of the Industry.

The official 1955 East German standard commodity classification code list (Schluesselliste) is "a basic tool for planning and accounting of production, material supply, and foreign trade." According to the commodity list, the chemical industry of East Germany is divided into four main groups: (a) basic chemicals, (b) pharmaceuticals, (c) rubber and asbestos products, and (d) mineral oil and tar products. The basic chemicals group is subdivided into four additional groups: (a) inorganic basic chemicals, (b) organic basic chemicals, (c) chemical specialities, and (d) chemical-technical special products. Some of the principal products included in these groups are as follows:

Inorganic Basic Chemicals

- Acids (sulfuric, nitric, and the like)
- Alkalies (caustic soda, soda ash, and the like)
- Ammonia
- Calcium carbide
- Carbon blacks
- Catalysts
- Chlorine
- Industrial gases (oxygen, hydrogen, acetylene, and the like)
- Inorganic dyestuffs and pigments
- Nitrogen fertilizers
- Phosphorus
- Phosphorus fertilizers
- Salts* and oxides
- Sulfur

Organic Basic Chemicals

- Acetic anhydride
- Acids (acetic, oxalic, formic, and the like)
- Alcohols (ethyl, methyl, and the like)
- Aniline oil
- Chemicals derived from wood and cellulose
- Dyestuffs
- Formaldehyde
- Glycols
- Phthalic anhydride
- Plastic materials
- Plasticizers and softeners
- Solvents (acetone, ethyl benzol, and the like)

* Potassium salts, used primarily as a fertilizer, are listed by the 1955 commodity code as a product of the mining industry. Administratively, however, the plants that produce potassium salts are under the Main Administration for Potash and Nonmetallic Ore Mining, which is subordinate to the Production Area for Chemistry (see p. 11, below).

Chemical Specialties	Chemical-Technical Special Products
Explosives and explosive materials	Detergents and soaps
Film and photographic materials	Fatty acids and alcohols
Insecticides and pesticides	Gelatines
Tannins (vegetable and synthetic)	Glues
	Lacquers and varnishes
	Oils and fats
	Washing materials

The principal products included in the three other major groups are as follows:

Pharmaceuticals	Rubber and Asbestos Products	Mineral Oil and Tar Products
Anesthetics	Asbestos products	Aromatic coal chemicals (benzol, toluol, naphthalene, phenol, and the like)
Antibiotics	Natural rubber	Coal tars, oils, and pitches
Antiseptics and disinfectants	Reclaimed rubber	Liquid fuels (gasoline, diesel fuels, and the like)
Drugs (various types)	Synthetic rubbers	Lubricants
Insulin	Tires and tubes	Paraffins and waxes
Narcotics	Other rubber products	Petroleum
Salicylic acid derivatives		Special oils
Sera and vaccines		

2. Importance of the Industry.

Virtually all manufacturing industries in East Germany require products of the chemical industry. Virtually every manufactured or processed article has been affected, at some stage of

processing, by chemicals or chemical products. By creating a great number of chemical compounds from domestic and imported raw materials, the chemical industry has become a major supplier of materials and ranks with the other major industries in East Germany in tonnage and in value of production. Many products of the industry are channeled into lines of industrial goods rather than consumer items, a trend which is emphasized by heavy Soviet demands for finished or semi-finished industrial products. A large share of the national income is derived from exports of chemical products. The industry conserves scarce materials and vital resources through its production of synthetic materials and develops natural resources unused by other industries.

B. Historical Development.

At the end of World War II, nearly one-half of the German capacity for production of chemicals was located in East Germany. At that time, plants in the area that is now East Germany accounted for the following percentages of total German production of chemicals: sulfuric acid, 22 percent; calcium carbide, 36 percent; soda ash, 45 percent; caustic soda and chlorine, about 50 percent; and nitrogen and synthetic rubber, about 60 percent.

The chemical industry of East Germany was crippled by war damage and by Soviet dismantling of plants, and its capacity for production of a number of significant chemicals was greatly reduced. It is estimated that production losses from dismantlings alone were approximately as follows: chlorine, 25 percent; calcium carbide, 40 percent; caustic soda and nitric acid, almost 50 percent; ammonia, sulfuric acid, and synthetic rubber, more than 60 percent; and soda ash, 80 percent. In addition, the physical separation of the Soviet Zone of Occupation from the three other zones deprived East Germany of ready access to many essential speciality chemicals, semifinished materials, and pharmaceuticals that were obtainable only from former IG Farben* plants in the west.

In 1946, all East German chemical plants that had belonged to IG Farben and all plants that were concerned with the hydrogenation of brown coal became Soviet-owned corporations (SAG's). The expropriation of these plants gave the USSR a virtual monopoly of the chemical industry. Soviet management controlled, completely or

* IG Farbenindustrie AG.

almost entirely, production of such major chemicals as ammonia, nitric acid, nitrogen fertilizers, calcium carbide, synthetic rubber, plastics, photographic film, and organic chemicals. Furthermore, about 75 percent of the caustic soda and chlorine industry was Soviet-owned. Only sulfuric acid, soda ash, and phosphorus fertilizers were produced in quantity by German-owned plants.

In 1952 a few key chemical plants were restored to German ownership, and in 1953 the SAG percentage of total production of chemicals was reduced to about 36 percent. On 1 January 1954, all remaining Soviet-owned chemical plants were transferred to the East German government.

The reconstruction of the chemical industry of East Germany was almost completed by 1955. Many basic domestic requirements are being satisfied, and in some branches, production exceeds pre-1954 peaks. Many chemical products, including pharmaceuticals, formerly imported from West German plants are now produced in East Germany.

C. Administrative Structure.

1. Organization of the Industry.

The organization of the East German chemical industry in 1955 is shown in Figure 1.* The organization has evolved along lines typical of Communist nationalization of industry. The plants were nationalized and organized into commercial trusts, according to general product lines. Eventually the trusts were brought under tighter government control, and the number of trusts was reduced. By January 1954, nationalization was essentially complete, and the industry had been divided into the following five main administrations** functioning as integral parts of the governmental structure 1/***:

(a) Main Administration for Heavy Chemistry
(b) Main Administration for Liquid Fuels
(c) Main Administration for Potash and Nonmetallic Ore Mining
(d) Main Administration for General Chemistry
(e) Main Administration for Synthetic Materials

* Following p. 12.
** Comparable in organization with the Soviet "Chief Directorate," or "Main Administration."

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These five main administrations constituted the Production Area for Chemistry of the Ministry for Heavy Industry as of late 1955. The Deputy Minister for Heavy Industry administering the Production Area for Chemistry was Dr. Werner Winkler.

Concurrently with the establishment of this administrative structure, a number of plants were transferred to the Ministry for Light Industry (plants transferred produce consumer goods such as cosmetics, dental supplies, and the like). 2/ The most significant pharmaceutical plants operate under the Ministry for Health. Within the structure existing at the end of 1955, about 79 percent of production classified as chemical production by the East German commodity classification system was produced in the plants of the Production Area for Chemistry of the Ministry for Heavy Industry. 3/

When the last of the Soviet-owned chemical enterprises (SAG's) were transferred to the East German government on 1 January 1954, the superimposition of a separate Soviet system of production and allocation upon the industry was ended, and the general efficiency of the domestic administrative organization was increased.

There was no fundamental reorganization of the chemical industry during the period of the First Five Year Plan. During December 1955, however, there was an extensive reorganization of the East German government which was to become effective on 1 January 1956. The decentralizing may be an attempt to reduce bureaucracy and to permit closer supervision of plant managers and their operations in order to increase productivity.

Among the changes brought about by the reorganization, the Ministry for Heavy Industry and its "Production Areas," including the chemical area, were abolished, and the Commission for Industry and Transport was formed to be administered by Deputy Chairman of the Council of Ministers, Fritz Selbmann. This commission is composed of eight ministries, including the Ministry for the Chemical Industry, the Ministry for Coal and Power, and the Ministry for Mining and Metallurgy. 4/ Most of the plants formerly assigned to the Production Area for Chemistry are believed to be subordinate now to the Ministry for the Chemical Industry, with some notable exceptions such as the plants that were under the Main Administration for Liquid Fuels and the Main Administration for Potash and Nonmetallic Ore Mining. The liquid fuel plants, except VEB Leuna-Werke "Walter Ulbricht,"

now belong to the Main Administration for Hydrocarbons, which is subordinate to the Ministry for Coal and Power. The potash plants are under the Ministry for Mining and Metallurgy. 5/

Details of the composition of the Ministry for the Chemical Industry are incomplete. It is believed that the ministry has five main administrations, including those for Heavy Chemistry, Basic Chemistry, General Chemistry, and Synthetic Materials (or Plastics). 6/

East Germany is a participant in scientific-technical cooperation agreements with the other countries of the Sino-Soviet Bloc. These agreements place East German technology at the disposal of the other countries of the Bloc, and East German equipment, documentation, and personnel are consequently in great demand.

The USSR maintains a watchful eye on the East German chemical industry through a Soviet adviser. During 1955 this adviser was Nikolay Podkopayev. 7/ Generally, industrial policy in the chemical industry of East Germany is sensitive to direction from Moscow through the complex CEMA mechanism, the Council of Ministers, the State Planning Commission, and the international Communist Party mechanism.

As integration of the Sino-Soviet Bloc progresses, the East German chemical industry is moving toward closer coordination, particularly with its Polish and Czechoslovak counterparts, and it is possible that a great East European chemical complex, contributing more than one-third of total production of chemicals in the Sino-Soviet Bloc, may develop.

2. Organization of Foreign Trade.

Basically, almost all foreign trade in chemicals by East Germany is conducted through the state foreign trade monopoly for chemicals, DIA Chemie (Deutscher Innen- und Aussenhandel Chemie -- German Domestic and Foreign Trade for Chemicals).* This firm's operations are integrated within the national economic plan. As a governmental enterprise, the firm's export activities can be subsidized to achieve economic or political ends, but its potential for dumping activities is limited by the need to maintain favorable trading relationships in foreign markets. DIA Chemie conducts all East German foreign trade activities in chemicals except those carried out by the so-called "DWV Complex."

* See Figure 2, following p. 14.

FIGURE 1

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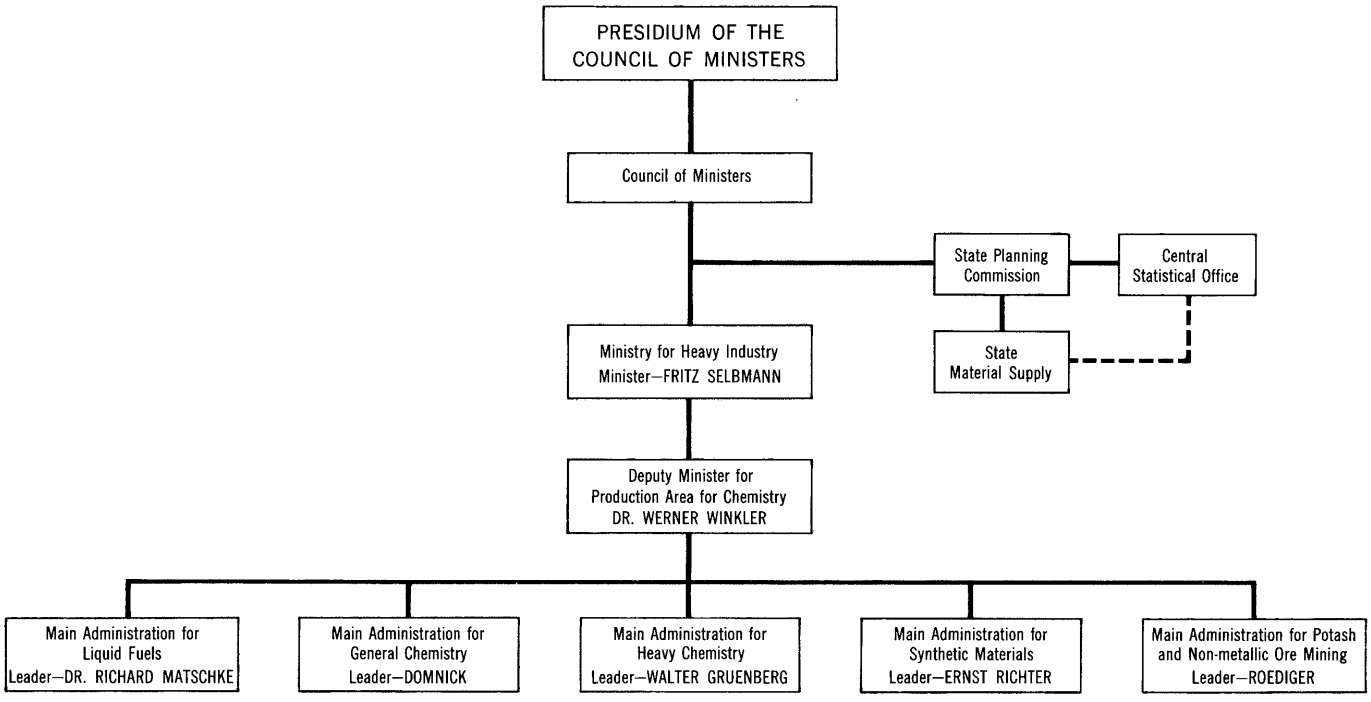
EAST GERMANY

ORGANIZATION OF THE CHEMICAL INDUSTRY,* 1955



*This chart shows only the Chemical Industry that is subordinate to the Deputy Minister for Chemistry.

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The DWV (Deutsche Warenvertriebsgesellschaft) Complex is a multipurpose trading mechanism which exists side by side with DIA Chemie and participates in both legitimate and covert trade activities. It is reported with some authority that this trade complex is administered by the DWV Directorate, which is subordinate to the Central Committee of the Socialist Unity Party (SED) and not to the normal governmental mechanism. 8/ Within this trade complex, two operating companies have been conducting significant chemical trade, the DWV company and Chemipha G.m.b.H. (Gesellschaft mit beschraenkter Haftung -- company with limited liability). Until the end of 1955, the DWV company conducted the legitimate export monopoly of East German potassium and nitrogen fertilizers, but in 1956 these products, along with phosphorus fertilizer imports, will be handled by DIA Bergbau (Deutscher Innen- und Aussenhandel Bergbau -- German Domestic and Foreign Trade for Minerals). 9/ No other chemical products are known to have been handled by the DWV. In the past, the DWV company has participated in covert trade activities, but as of late 1955 it was striving to be legitimate. The other company in the trade complex, Chemipha, plays a shadowy and elusive role, especially since its probable recent merger with the Meletex Company. 10/ [redacted] 50X1

[redacted] 50X1

[redacted] In general, the DWV Complex handles trade which is important as a source of foreign exchange, SED Party revenue, and embargoed commodities. 50X1

FIGURE 2

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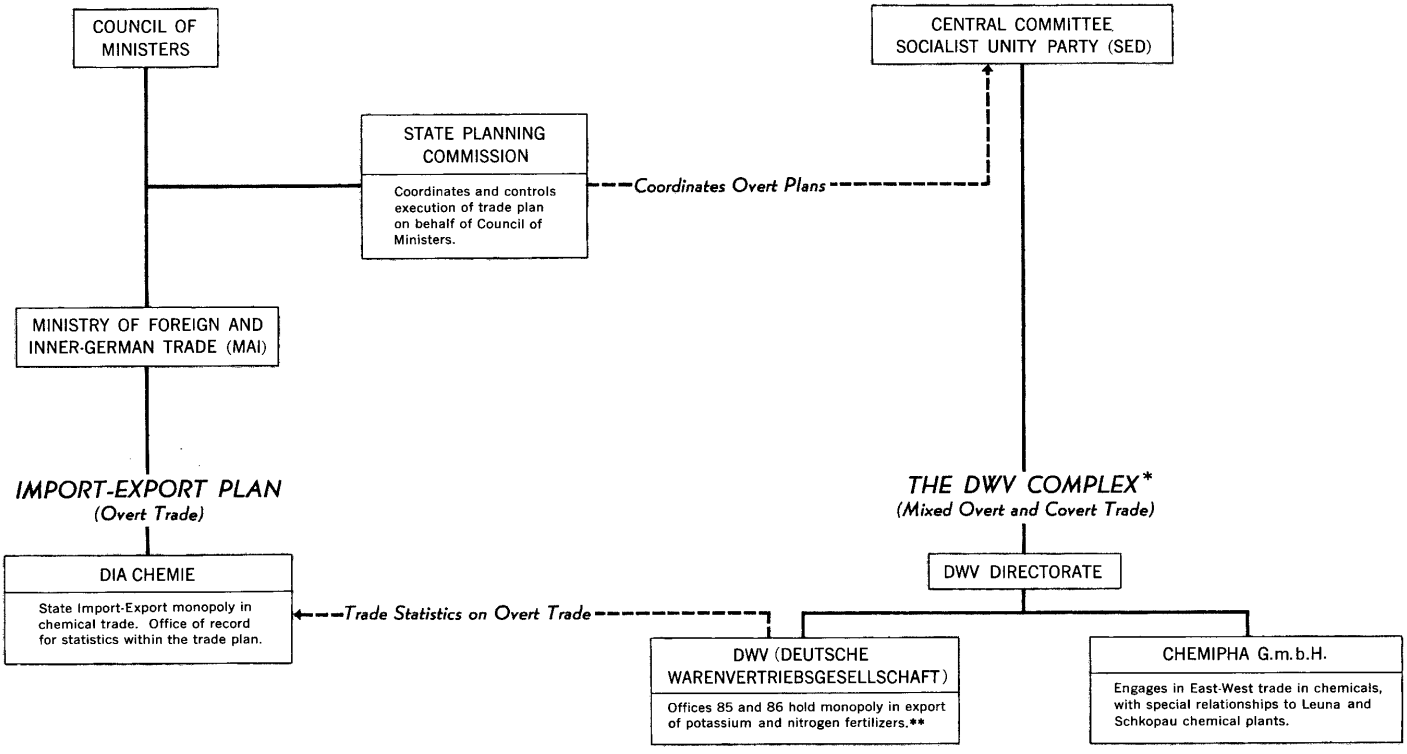
EAST GERMANY

ORGANIZATION OF CHEMICAL FOREIGN TRADE, 1954



*This complex handles trade flows of importance 1) as sources of needed exchange, 2) sources of Party revenue, or 3) sources of embargoed commodities.

**Beginning 1 January 1956, all fertilizer trade will be controlled by DIA Bergbau.

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II. Production.

A. Domestic Production.

1. General.

The gross output of the chemical industry of East Germany represents a significant share of the total value of industrial production. In 1954 the chemical industry's share of total industrial production was estimated as 16.1 percent (in 1953, 16.6 percent), but in 1936 it was only 10.5 percent. 11/

Since 1950, however, the rate of growth (in terms of value of production) of the East German chemical industry appears to have been somewhat less rapid than the general industrial growth of the country. An index of the rate of expansion of the chemical industry as related to the rate of expansion of all industry in East Germany, 1950-55, is shown in Table 1.

Table 1

Index of the Rate of Expansion of the Chemical Industry as Related to the Rate of Expansion of All Industry in East Germany a/
1950-55

1950 = 100

	1950	1951	1952	1953	1954	1955 b/
Chemical industry	100	117	137	157	168 b/	178
All industry	100	122	142	159	176	190

a. 12/
b. Estimated.

The value of production of chemicals in East Germany, in East German marks (DME), by component categories, in 1953 is shown in Table 2.* The relative importance (in terms of value of production

* Table 2 follows on p. 16.

Table 2

Value of Production of Chemicals
in East Germany, by Component Categories
1953

Category	Actual Value a/ (Million DME)	Percent of Total	1953 Plan b/ (Million DME)
Basic chemicals	3,883.9	62.4	3,896.0
Mineral oils and tar products	1,024.5	16.5	935.0
Rubber and asbestos products	735.7	11.8	652.0
Pharmaceuticals	580.9	9.3	372.0
Total	6,225.1 c/	100.0	5,855.0

a. 13/
b. 14/

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in DME -- Messwerte*) of the four components of the chemical industry, as defined in the East German commodity classification code, is shown in the table, and actual 1953 production for each of these categories is compared with the 1953 plan as included in the final revision of the First Five Year Plan (1951-55).

In 1953 the chemical area of the Ministry for Heavy Industry had gross profits** of more than 720 million DME. Of this total, only 247 million DME were returned as capital investment. 15/ The gross value of production of the chemical area is 50 percent of the total for the Ministry for Heavy Industry.*** The chemical area contributes

* Messwerte (standard prices) represents constant prices, generally reflecting 1944 price levels. New fixed plan prices that are to be used in the period of the Second Five Year Plan reportedly were determined on the basis of factory sales prices that existed as of 1 January 1955.
** Gross profits are net profits plus corporation tax plus additions to the Director's Fund.
*** The Ministry for Heavy Industry includes metallurgy, coal, chemicals, gas, and electricity.

71 percent of the total revenues but receives only 18 percent of the investments. 16/ Whereas East German gross industrial production in 1960 is planned to increase 55 percent over 1955 production, gross chemical production is to be about 166 percent of 1955 production, including the category of basic chemicals which is to increase 50 percent over 1955 production. 17/ The gross value of production of the chemical industry of East Germany in 1936, 1938, 1943, and 1946-55 is shown in Table 3 and Figure 3.*

Table 3

Gross Value of Production of the Chemical Industry of East Germany a/
1936, 1938, 1943, and 1946-55

Million DME (Messwerte)

Year	Actual	Annual Plan: Original	Annual Plan: Final Revision	First Five Year Plan b/
1936	2,231 c/			
1938	3,146 d/			
1943	4,908 d/			
1946	1,422 c/			
1947	2,087 c/			
1948	2,742 c/	2,305 e/		
1949	3,273 c/ f/	2,859 g/	3,056 g/	
1950	3,965 c/	3,700 h/	3,841 h/	
1951	4,649 c/ i/	4,502 j/	N.A.	4,502
1952	5,449 c/	5,383 j/	N.A.	5,083
1953	6,225 c/	5,970 k/	5,940 k/	5,855
1954	6,660 l/	6,303 m/	6,520 n/	6,815
1955	7,050 l/	6,980 o/ n/	N.A.	8,226

a. Defined as production of basic chemicals, pharmaceuticals, rubber products, and mineral oil products. The data shown are gross values of production for commodities listed under "chemical industry" in the East German standard commodity classification code. Data for 1936, 1938, and 1943 refer to that area of Germany which is now East Germany.

* Following p. 18.

Table 3

Gross Value of Production of the Chemical Industry of East Germany 1936, 1938, 1943, and 1946-55 (Continued)

b. 18/
c. 19/
d. Estimated. Production indexes for 1938 and 1943 are in terms of 1936. These indexes were applied to the 1936 figure in the table which is in Messwerte. The range of error is plus or minus 15 percent.
e. 20/
f. Part of this increase, 1949 over 1948, reflects commodity classification changes accompanying inclusion of Soviet-owned corporations in 1949 planning.
g. 21/
h. 22/
i. Part of this increase, 1951 over 1950, reflects changes in the commodity classification system.
j. 23/
k. 24/
l. The estimate is based on trend extrapolation and comparison of plan overfulfillment of previous years.
m. 25/
n. 26/
o. Preliminary plan.

2. Industrial Chemicals.

a. Sulfuric Acid.

Consumption of sulfuric acid, the most important basic chemical produced in any country, is a fairly accurate indicator of the progress of industrialization. In 1954, production of sulfuric acid in East Germany, the largest producer among the European Satellites, was equal to approximately 17 percent of Soviet production and 37 percent of total European Satellite production, but only about 25 percent of production of West Germany. 27/

FIGURE 3

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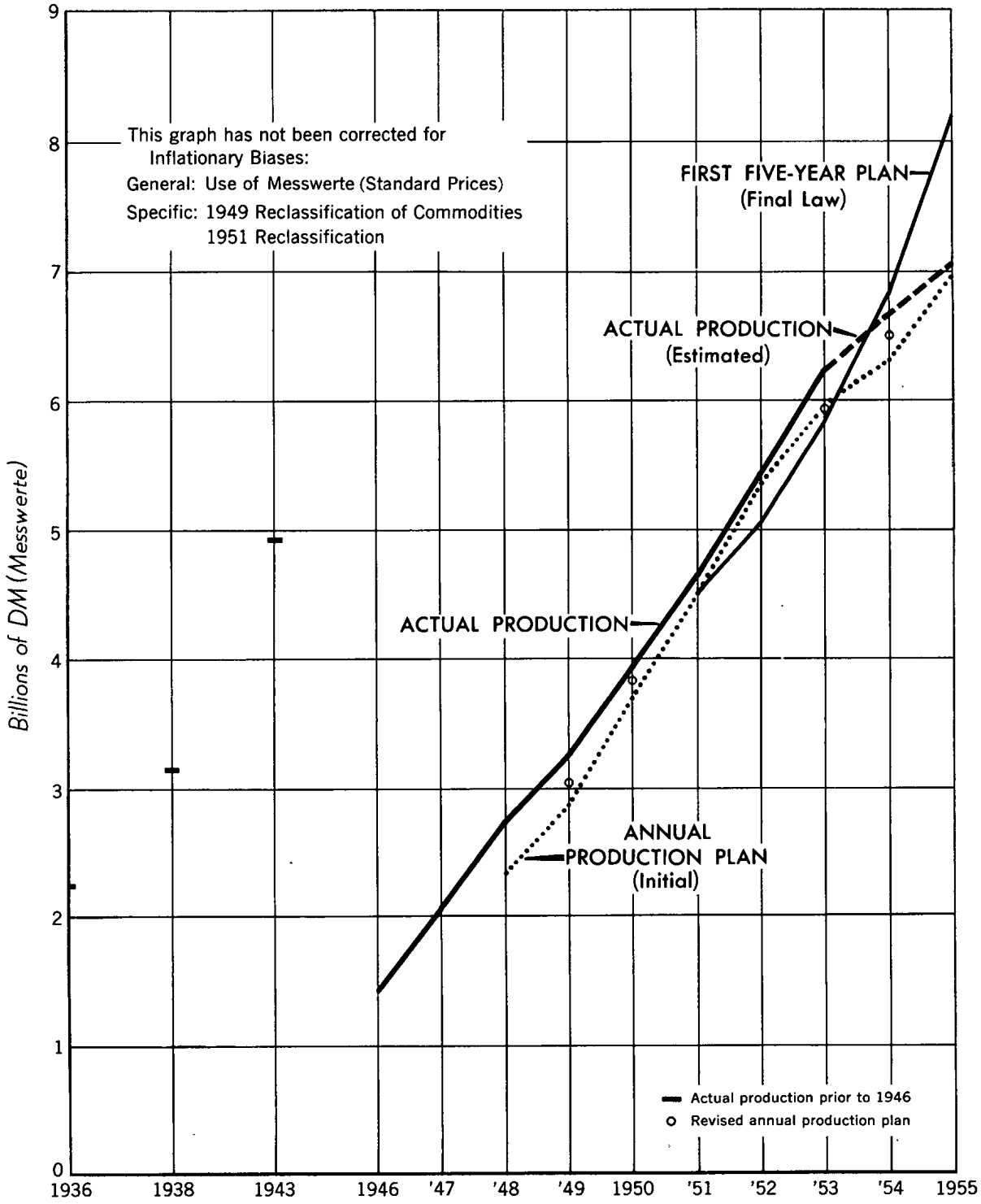
EAST GERMANY
GROSS CHEMICAL PRODUCTION
1936, 1938, 1943, and 1946-55



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50X1

In 1936, production of sulfuric acid in Germany amounted to 1,765,000 tons,* and within the area that is now East Germany, about 21 percent of this total, 370,000 tons, were produced. 28/ In 1938, Germany produced 2,228,000 tons of sulfuric acid, and the contribution of the East German area was 447,100 tons, about 20 percent of the total. 29/ By 1945 the annual capacity for production of sulfuric acid in the East German area was reported to have been about 22 percent, about 621,000 tons, of the total capacity of the German Reich, almost 2.8 million tons. 30/

By 1947, sulfuric acid capacity in East Germany had been reduced by approximately 62 percent, by about 385,000 tons, thus leaving a capacity of about 236,000 tons. 31/ Only a relatively small portion of the loss in capacity resulted directly from war damage; Soviet plant dismantlings provided the crippling blow. Four installations, Wolfen (the gypsum-based units only), Leuna, Doeberitz, and the Georg von Giesches Erben firm at Magdeburg, were completely dismantled, and several others were partially dismantled. The loss in capacity from the four completely dismantled plants alone amounted to 283,000 tons. One of these plants, located at Wolfen, was just beginning to produce up to its capacity of 147,000 tons per year in a new installation by a process based on gypsum. 32/

General overhaul in a majority of the plants was not completed until 1950. By this time, serious efforts to modernize, expand, or reconstruct a number of sulfuric acid installations had begun. The most notable of the reconstruction projects was started at Wolfen. This plant again was to employ gypsum (anhydrite or calcium sulfate) as the raw material.

The problem of adequate supplies of raw materials for the manufacture of sulfuric acid has profoundly affected the chemical industry and the East German economy as a whole. Only relatively small pyrites deposits are located in East Germany, mainly in the Harz region near Elbingerode, so that the bulk of the required pyrites has been imported. These imports, primarily from the West (Spain, Portugal, Norway, Sweden, Finland, and Yugoslavia), have embarrassed East Germany by placing its industry on an uncertain basis. In 1950 an embargo on shipments of pyrites from Spain to the Soviet Bloc increased import problems, and total annual imports began to decline.

* All sulfuric acid data have been converted from metric tons of sulfur trioxide (SO_3) to metric tons of 100 percent sulfuric acid. German practice is to report the acid in terms of SO_3 content. The conversion factor used was 1 metric ton of SO_3 equals 1.225 metric tons of 100 percent sulfuric acid.

At that time it became obvious that East Germany would have to switch to production of sulfuric acid from domestic sulfur-containing minerals, and since 1951, considerable quantities of sulfuric acid now are being derived from gypsum and magnesium sulfate. Experiments utilizing magnesium sulfate were carried out during 1951 at the Oranienburg sulfuric acid plant. Kieserite, a byproduct of the potash industry, was the source of the magnesium sulfate. Sufficient success was achieved to warrant a complete change to this process by the Oranienburg plant. A second plant, Heinrichshall at Bad Koestritz, reportedly was entirely converted to production of sulfuric acid from magnesium sulfate shortly afterwards, and a plant at Nuenchritz was partially converted at about the same time (1952). Although the gypsum process is now in operation at Wolfen, there is continued interest in manufacturing greater quantities of sulfuric acid from kieserite.

For the present, however, the manufacture of sulfuric acid from gypsum appears to be the most economical method. Gypsum is available in East Germany in almost unlimited amounts. In the process used at Wolfen, moreover, a valuable byproduct, Portland cement, is obtained.

Reconstruction of the Wolfen installation began in 1950, and was to be completed in 1952. Two units for production of sulfuric acid from gypsum were scheduled, and the East German 1953 Economic Plan called for both units to be in operation in the second half of 1953. Unit I began operating early in August 1953, but because of continued shortages of equipment, Unit II probably did not produce significantly until the last half of 1954. The combined capacity of the 2 units is believed to be between 165,000 and 175,000 tons per year. 33/ Wolfen also operates a unit for production of sulfuric acid from pyrites. This unit, built before World War II and not dismantled by the USSR, has a production capacity of about 36,000 tons per year. The 1955 production plan called for Wolfen to produce one-third of the total East German production of sulfuric acid in 1955. 34/

The plan called for a second gypsum-based plant, to be built at Coswig, with an original planned capacity of 147,000 tons of sulfuric acid and 180,000 tons of cement as a byproduct. 35/ During 1953, construction was postponed, but is to be resumed during 1956. The plant's capacity from 1958 on is now reported planned as 65,000 tons (SO_3 content) per year, approximately 80,000 tons of acid

on 100 percent acid basis. When the new plant is completed, the ultimate capacity will be 130,000 tons (SO_3 content) per year, almost 160,000 tons on a 100 percent acid basis. 36/

Elemental sulfur and converter gas are also used in East Germany for the manufacture of sulfuric acid, and sulfur burning has been practiced to fortify pyrites of low-sulfur content. Because sulfuric acid produced from elemental sulfur costs almost twice as much as that from pyrites, the use of elemental sulfur probably will be discontinued as soon as possible.

Production of sulfuric acid in East Germany, by raw material source, in 1953 and 1955 (Plan) is shown in Table 4.

Table 4

Production of Sulfuric Acid in East Germany
by Raw Material Source a/
1953 and 1955 (Plan)

	1953		1955 (Plan)	
Raw Material Source	Amount (Metric Tons) b/	Percent of Total	Amount (Metric Tons) b/	Percent of Total
Pyrites	279,900	66.2	314,825	52.4
Magnesium sulfate	45,800	10.8	46,550	7.8
Elemental sulfur	40,800	9.6	24,500	4.1
Gypsum, anhydrite	29,800	7.0	169,050	28.2
Converter gas	27,100	6.4	45,325	7.5
Total	423,400	100.0	600,250	100.0

a. 37/
b. On a 100 percent acid basis.

Of the 423,000 tons of sulfuric acid produced in East Germany in 1953, it is estimated that 365,000 tons (86 percent) were produced by plants belonging to the Production Area for Chemistry, and 57,500 tons (14 percent) were produced by plants of the Production Area

for Metallurgy. Both Production Areas are under the Ministry for Heavy Industry. Planned production of sulfuric acid in East Germany, by administration and plant, in 1954 is shown in Table 5.*

Beginning in 1951, annual production of sulfuric acid in East Germany has increased each year except in 1952, but the original annual production goals for all postwar years through 1954, except for 1949 and 1951, apparently were underfulfilled. The production goals for 1952-54 established by the revised First Five Year Plan were exceeded, however, and the 1955 goal set by the Plan probably also will be surpassed.

East German plans for the future call for a considerable expansion in production in the sulfuric acid industry. [redacted] a preliminary 1960 goal as 824,400 tons. 38/ 50X1
In addition to the plans for a large new plant at Coswig for producing sulfuric acid from gypsum, new installations possibly to employ the dual-tower, or Peterson, system are planned for operation in 1957 at Oranienburg and Salzwedel. 39/ Supplies of construction materials and plant equipment must increase considerably before these ambitious plans can be fulfilled.

Production of sulfuric acid in East Germany in 1933, 1936, 1938, and 1944-60 is shown in Table 6.**

b. Synthetic Ammonia.

Ammonia is used in the manufacture of nitrogen fertilizers, nitric acid, industrial explosives, and in all nonatomic military high explosives and propellants. Among the European Satellites, East Germany is the largest producer of synthetic ammonia, and it is estimated that in 1954 East German production was equal to about one-half of Soviet production 40/ and accounted for more than one-fourth of the entire production of the Sino-Soviet Bloc in that year. East German production, however, was equal to only about 15.5 percent of the production of the US and was equal to about 44 percent of the production of West Germany in 1954. 41/ In spite of the impressive performance of East Germany's ammonia industry, postwar production has not yet reached the prewar peak reached in 1939.

* Table 5 follows on p. 23.
** Table 6 follows on p. 25.

Table 5

Planned Production of Sulfuric Acid in East Germany, by Administration and Plant
1954

Metric Tons a/*

Administration and Plant	Location of Plant	Planned Production
Ministry for Heavy Industry		
Production Area for Chemistry		
Main Administration for Heavy Chemistry		
VEB Farbenfabrik Wolfen	Wolfen	153,125 b/
VEB Schwefelsaeure- und Superphosphatwerk Coswig	Coswig	63,700 b/
VEB Schwefelsaeure- und Aetznatronwerk Nuenchritz	Nuenchritz	57,575 b/
VEB Fahlberg-List	Magdeburg	46,673 b/
VEB Chemische Fabrik Heinrichshall	Bad Koestritz	21,560 c/
VEB Kalichemie	Berlin-Niederschoeneweide	21,131 c/
VEB Chemiewerk Oranienburg (formerly "Pommerensdorf")	Oranienburg, near Berlin	17,150 c/
VEB Schwefelsaeure- und Superphosphatwerk Salzwedel	Salzwedel	10,106 c/
VEB Chemische Fabrik Faehrbruecke	Faehrbruecke, near Zwickau	6,370 c/
Main Administration for Synthetic Materials		
VEB Thueringisches Kunstfaserwerk "Wilhelm Pieck"	Schwarza	39,200 d/
VEB Kunstseidenwerk "Friedrich Engels"	Premnitz/Doeberitz	31,850 d/
Production Area for Metallurgy		
Main Administration for Nonferrous Industry		
VEB Mansfeld-Huettenkombinat "Wilhelm Pieck"	Eisleben	32,463 e/
VEB Huettenwerk Muldenhuetten	Muldenhuetten, near Freiberg	31,850 e/
VEB Huettenwerk Halsbruecke	Halsbruecke, near Freiberg	8,085 e/
VEB Metallschmelzwerk Finkenheerd	Finkenheerd, near Frankfurt/Oder	2,450 f/
Total		543,288 g/

* Footnotes for Table 5 follow on p. 24.

Table 5

Planned Production of Sulfuric Acid in East Germany, by Administration and Plant
1954
(Continued)

a. On a 100 percent acid basis.
b. 42/
c. 43/
d. 44/
e. 45/
f. 46/
g. Reported East German 1954 figure was 543,778 metric tons, converted to 100 percent acid.

Table 6

Production of Sulfuric Acid in East Germany [a]
1933, 1936, 1938, and 1944-60

Metric Tons [b]

Year	Production	Annual Plan [c]	First Five Year Plan [d]
1933	252,400		
1936	369,600		
1938	447,100		
1944	514,500		
1945	612,500 [e]		
1946	125,360	131,100	
1947	129,900	155,000	
1948	185,690	220,500	
1949	237,000	227,850	
1950	279,780	312,970	
1951	362,960	338,100	338,100
1952	362,290	387,300	340,550
1953	423,360 [f]	436,200 [f]	416,500
1954	531,300 [g]	543,780 [h]	490,000
1955	594,000 [i] [j]	595,720 [k]	551,250
1956	620,000 [i] [j]	618,630 [l]	
1957	660,000 [i] [m]	640,680 [n]	
1958	720,000 [i] [m]	738,680 [n]	
1959	760,000 [i] [m]	738,680 [n]	
1960	830,000 [i] [m]	824,430 [n]	

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are rounded to three significant digits. Reported figures are given as reported. The data for prewar and wartime years refer to that area of Germany which is now East Germany.

b. All reported figures have been converted from metric tons of sulfur trioxide (SO_3) to metric tons of 100 percent sulfuric acid. German practice is to report the acid in terms of SO_3 content. The conversion factor used was 1 metric ton of SO_3 equals 1.225 metric tons of 100 percent sulfuric acid.

c. Only the latest annual plan known for a given year is shown.

Table 6

Production of Sulfuric Acid in East Germany
1933, 1936, 1938, and 1944-60
(Continued)

d. 47/
e. Reported as production capacity and not actual production.
f. 48/
g. 49/
h. 50/
i. The estimate was obtained by graphic extrapolation and was further adjusted after considering variables expected to affect production.
j. Range of error, plus or minus 5 percent.
k. 51/
l. 52/
m. Range of error, plus or minus 10 percent.
n. 53/

All production of synthetic ammonia in East Germany is concentrated in one plant, VEB Leuna-Werke "Walter Ulbricht" at Leuna, near Merseburg, the world's largest synthetic ammonia plant. Before 1945, Leuna's ammonia capacity was reported as high as 750,000 tons, in terms of nitrogen content.* The plant's normal operating capacity, however, was only about half of that figure. The remaining capacity was actually devoted to production of gasoline and methanol. 54/ Leuna was constructed by I.G. Farbenindustrie A.G. so that the equipment, especially the compressors and the gas fabrication equipment, could be adjusted to produce varying amounts of ammonia, gasoline, and methanol to suit current requirements.

In 1936, the area that is now East Germany was reported to have produced 55.5 percent of the total production of ammonia in Germany. 55/ In 1938, total German production was about 620,000 tons (nitrogen content), of which the East German area produced about 320,000 tons, about 52 percent. 56/ By 1944 the percentage of production in the East German area had dropped to 33.2 percent. 57/

* Throughout this report, quantities of ammonia are expressed in terms of their nitrogen content. Ammonia is composed of 82.25 percent nitrogen and 17.75 percent hydrogen, chemically combined.

The Leuna plant was reported to have sustained a loss of about 30 percent of its capacity for the synthesis of ammonia as a result of war damage. 58/ After World War II, portions of the plant were dismantled by the USSR. The ultimate loss in capacity from the war and the dismantlings was about two-thirds of the original capacity. 59/ Many reports indicate that some Leuna equipment was installed in a Soviet ammonia plant at Severo Donetsk in the Ukraine. 60/

VEB Leuna-Werke "Walter Ulbricht" is administratively responsible to the Main Administration for Heavy Chemistry, which is within the Production Area for Chemistry and under the Ministry for Heavy Industry.

Leuna produces ammonia by the reaction of nitrogen and hydrogen, using the Haber-Bosch process. Ammonia output is limited by the available supply of hydrogen, which is also required to make methanol and higher alcohols, including isobutyl alcohol, and to hydrogenate crude petroleum, brown coal, and brown-coal tar oils for the manufacture of synthetic oil. In 1953 and 1954, Leuna accounted for about 93 percent of the entire East German production of nitrogen, which includes the nitrogen content of calcium cyanamide produced by another plant. 61/ Late in 1953 or early 1954, Leuna obtained two new ammonia "contact furnaces" (probably converters) from West Germany through several Swiss firms. These converters were to be used to increase production of synthetic ammonia. 62/

Future plans for East German production of synthetic ammonia apparently have not been established definitely. [redacted] 50X1 [redacted] a preliminary production goal of 384,000 tons (as nitrogen) was proposed for 1960. 63/ 50X1 A significant increase in production of nitrogen fertilizer by the end of 1960 is planned, and this increase will demand larger amounts of both ammonia and nitric acid. Expansion of the ammonia industry will have a twofold purpose, to increase production of fertilizer for peacetime use and to provide greater wartime capacity to manufacture military explosives.

Production of synthetic ammonia in East Germany in 1938-60 is shown in Table 7.*

* Table 7 follows on p. 28.

Table 7

Production of Synthetic Ammonia in East Germany a/
1938-60

Metric Tons b/

Year	Production	Annual Plan
1938	320,000	
1939	385,147	
1940	334,000	
1941	323,000	
1942	295,000	
1943	259,355	
1944	128,205	
1945	30,000	
1946	62,346	
1947	122,500	
1948	174,000	130,000
1949	210,000	180,000
1950	235,510	N.A.
1951	270,000	265,000
1952	278,000 c/	N.A.
1953	290,000 d/	278,000 e/
1954	313,895 f/	303,500 g/
1955	335,000 h/	316,000 i/
1956	350,000 j/ k/	325,000 l/
1957	360,000 j/ k/	335,000 l/
1958	370,000 j/ m/	350,000 l/
1959	380,000 j/ m/	370,000 l/
1960	390,000 m/ n/	384,000 l/

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are rounded to two significant digits; reported figures are given as reported. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. In terms of nitrogen equivalent.

Table 7

Production of Synthetic Ammonia in East Germany
1938-60
(Continued)

c. The estimate was based on an expected average monthly output of 23,100 tons of nitrogen. Range of error, plus or minus 5 percent.
d. The estimate was based on an expected average monthly output of 24,200 tons of nitrogen. Range of error, plus or minus 5 percent.
e. 64/
f. 65/
g. 66/
h. The estimate was based on an expected average monthly output of 27,500 tons of nitrogen. Range of error, plus or minus 5 percent.
i. 67/
j. The estimate was obtained by graphic extrapolation based on the reported 1954 actual output and the preliminary 1960 production plan.
k. Range of error, plus or minus 5 percent.
l. 68/
m. Range of error, plus or minus 10 percent.
n. The estimate was based on the preliminary production goal of 384,000 tons of nitrogen in 1960. 69/

c. Nitric Acid.

Nitric acid is essential to the manufacture of all high explosives and propellants and is used as a fuel oxidizer in rocket-propelled guided missiles. It is also used to make nitrogen fertilizers, commercial explosives, dyestuffs, and other chemicals.

No other country of the Sino-Soviet Bloc except the USSR produces more nitric acid than does East Germany. It is estimated that in 1954, East German production was almost one-fifth as large as that of the USSR and accounted for almost one-half of the European Satellite total and about one-seventh of the production of

the Sino-Soviet Bloc. East German production in 1954, however, was equal to almost 15 percent of US production in 1954.

At the end of 1954, East German production appeared not to have reached the peak wartime production of 1944, but it may have done so in 1955. The industry has not recovered fully from Soviet plant dismantlings. Among the plants completely dismantled were the concentrated nitric acid units at VEB Leuna-Werke "Walter Ulbricht" at Leuna (near Merseburg) and VEB Stickstoffwerk Piesteritz at Lutherstadt (near Wittenberg). Perhaps one-third of the East German capacity for production of nitric acid was lost through dismantlings.

All nitric acid commercially produced in East Germany is made by the catalytic oxidation of synthetic ammonia supplied by VEB Leuna-Werke "Walter Ulbricht." In 1955, at least four plants were known to be producing nitric acid, and a fifth plant, located at Piesteritz, may have been in operation. The Leuna plant did not begin production until 1954, 70/ and current production is relatively insignificant. The 1955 production quota for Leuna was only 1,620 tons. 71/ Planned production of nitric acid in East Germany, by plant, in 1953 is shown in Table 8.*

All nitric-acid-producing plants except the Sondershausen plant are responsible to the Main Administration for Heavy Chemistry. The Sondershausen plant is within the Production Area for Chemistry and is subordinate to the Ministry for Heavy Industry. The Kaliwerk "Glueckauf" at Sondershausen is responsible to the Main Administration for Potash and Nonmetallic Ore Mining, which is also under the Production Area for Chemistry and the Ministry for Heavy Industry. Thus, if production by this ministry is reported, the nitric acid production represents total production in East Germany.

Although postwar production of nitric acid may not achieve the apparent wartime peak, current production is adequate for the peacetime economy. In 1954, production had increased about 64 percent over that of 1938 and increased about 156 percent over that of 1947. East German production in the first 4 years of the First Five Year Plan exceeded the goals established by the plan. Except for 1952, revised annual production plans also were exceeded during this period.

* Table 8 follows on p. 31.

Table 8

Planned Production of Nitric Acid in East Germany, by Plant
1953

Plant	Location	Planned Production (Metric Tons) a/	Percent of Total
VEB Farbenfabrik Wolfen	Wolfen	147,600 b/	60.2
VEB Elektrochemisches Kombinat, Bitterfeld	Bitterfeld	96,280 c/	39.3
VEB Kaliwerk "Glueckauf"	Sondershausen	1,120 d/	0.5
Total		245,000 e/	100.0

a. All amounts are given in terms of 100 percent acid.
b. 72/
c. The original production plan for Bitterfeld plant in 1953. 73/
d. The production plan for the plant at Sondershausen is not available. The amount shown represents the difference obtained from the sum of the Wolfen and Bitterfeld plans and the plan for total production in East Germany.
e. The original production plan for East Germany in 1953. 74/

Production of nitric acid in East Germany in selected years, 1936-44, and 1946-60 is shown in Table 9.*

Nitric acid plants in East Germany have been plagued by shortages of platinum-rhodium wire-mesh catalysts, and less efficient cobalt catalysts have had to be substituted in part. What success has been attained is not known, and no annual production goals beyond those of 1955 are available. An increase in production by the end of 1960 is expected to permit increase in production of nitrogen fertilizer of about 15 percent over the 1955 final annual plan. The Piesteritz plant was to have begun reconstruction of its former nitric acid installation during 1953. An annual estimated output of from 40,000 to 50,000 tons was anticipated. Beginning in 1955, the nitric acid was to have been used largely for making a nitrogen-lime-phosphate fertilizer. 75/ The current status of these Piesteritz projects is unknown.

* Table 9 follows on p. 32.

Table 9

Production of Nitric Acid in East Germany [a]
Selected Years, 1936-44, and 1946-60

Metric Tons [b]

Year	Production	Annual Plan [c]	First Five Year Plan [d]
1936	106,000		
1938	164,000		
1939	200,000 [e]		
1943	212,000 [e]		
1944	280,000		
1946	25;262		
1947	105,000 [e]		
1948	130,500 [e]		
1949	162,000 [e]		
1950	183,500 [e]		
1951	234,468	213,000	213,700
1952	246,091	246,250	230,000
1953	254,284 [f]	247,000 [g]	245,000
1954	268,788 [h]	260,016 [h]	260,000
1955	280,000 [i] [j]	266,706 [k]	300,000
1956	300,000 [i] [l]		
1957	310,000 [i] [l]		
1958	330,000 [i] [l]		
1959	350,000 [i] [m]		
1960	370,000 [i] [m]		

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are footnoted; reported figures are given as reported. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. On a 100 percent acid basis.
c. Only the latest annual plan known for a given year is shown.
d. 76/
e. The estimate represents the sum of estimated outputs of individual producing plants. Range of error, plus or minus 10 percent.

Table 9

Production of Nitric Acid in East Germany
Selected Years, 1936-44, and 1946-60
(Continued)

f. 77/
g. 78/
h. 79/
i. The estimate was obtained by graphic extrapolation and was further adjusted after considering variables expected to affect production.
j. Range of error, plus or minus 5 percent.
k. 80/
l. Range of error, plus or minus 10 percent.
m. Range of error, plus or minus 15 percent.

d. Calcium Carbide.

Because it is a base for so many strategic chemical products, calcium carbide probably is the most significant basic chemical contribution of East Germany to the industrial economy of the Sino-Soviet Bloc. East Germany produces more calcium carbide than does any other Bloc country, including the USSR, and in 1954 only West Germany, of all countries in the world, produced more than did East Germany. In 1954, East German production of 735,400 tons was equal to about twice the Soviet production and accounted for about 52 percent of the estimated total production of the Sino-Soviet Bloc.

In 1936, that area of Germany which is now East Germany produced 29.4 percent of total German production, and the estimated 1943 production of 550,000 tons in the East German area was more than 36 percent of the total. 81/ At the end of 1944, production capacity existed for 697,000 tons per year. 82/

Calcium carbide plants in East Germany were subjected to war damage and, following the war, to Soviet dismantling. All, or almost all, of the facilities of the plant at Mueckenberg, which produced nearly 100,000 tons in 1943, 83/ were dismantled. No calcium carbide furnaces are believed to have been dismantled at the largest

producing plant, VEB Chemische Werke Buna at Schkopau, but 4 of 9 installed furnaces probably were removed from VEB Stickstoffwerk Piesteritz.

In 1946, production of calcium carbide in East Germany declined to about 40 percent of the peak wartime production of 1943. The decline resulted from several factors, including shortages of raw materials and electric power, general postwar chaos in the economy, and Soviet dismantling. In spite of difficulties, notably shortages of coke, electrodes, and power, 1954 production of about 735,400 tons was approximately one-third more than 1943 production. Production in 1952 and succeeding years, however, was below the original planned goals established by the First Five Year Plan. In 1954, production fell below the revised 1954 annual plan and was only 92.5 percent of the original quota given in the Five Year Plan.

Production of calcium carbide in East Germany in selected years, 1936-43, and 1946-60 is shown in Table 10.*

The manufacture of calcium carbide is concentrated in 2 plants, VEB Chemische Werke Buna at Schkopau and VEB Stickstoffwerk Piesteritz at Lutherstadt (near Wittenberg), which produce more than 90 percent of the total production of East Germany. Both of these plants were Soviet-owned corporations (SAG's) until 1 January 1954. These plants and a third plant, VEB Elektrochemie Hirschfelde at Hirschfelde, are controlled by the Main Administration for Heavy Chemistry. The remaining producing plants, contributing less than 3 percent of total East German production, are subordinate to the Main Administration for the Iron Industry, which is within the Production Area for Metallurgy but reports to the Ministry for Heavy Industry. Thus, all production of calcium carbide is under the control of the Ministry for Heavy Industry.

Planned production of calcium carbide in East Germany, by plant, in 1953 is shown in Table 11.**

The Schkopau plant is the largest producer of calcium carbide in the world. The plant's reported production goal

* Table 10 follows on p. 35.
** Table 11 follows on p. 36.

Table 10

Production of Calcium Carbide in East Germany a/
Selected Years, 1936-43, and 1946-60

Metric Tons

Year	Production	Annual Plan b/	First Five Year Plan c/
1936	208,800		
1939	390,000 d/		
1943	550,000 d/		
1946	226,666		
1947	309,931		
1948	412,400	325,500	
1949	529,000	438,000	
1950	628,000	627,000	
1951	678,349	666,000	666,000
1952	690,395	687,000	735,000
1953	702,400 e/	695,700 e/	757,000
1954	735,374 f/	775,700 g/	795,000
1955	820,000 h/	811,500 i/	825,000
1956	860,000 h/	850,500 j/	
1957	890,000 h/	881,600 j/	
1958	920,000 h/	918,800 j/	
1959	950,000 h/	958,000 j/	
1960	970,000 h/	990,200 j/	

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are footnoted; reported figures are given as reported. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. Only the latest annual plan known for a given year is shown.
c. 84/
d. The estimate represents the sum of estimated outputs of individual producing plants. Range of error, plus or minus 10 percent.
e. 85/
f. 86/
g. 87/

Table 10

Production of Calcium Carbide in East Germany
Selected Years, 1936-43, and 1946-60
(Continued)

h. The estimate was obtained by graphic extrapolation and was adjusted further after considering variables expected to affect production. Range of error, plus or minus 5 percent.
i. 88/
j. 89/

Table 11

Planned Production of Calcium Carbide in East Germany, by Plant
1953

Metric Tons

Plant	Location	Planned Production
VEB Chemische Werke Buna	Schkopau	470,000 a/
VEB Stickstoffwerk Piesteritz	Lutherstadt/Wittenberg	216,500 b/
VEB Elektrochemie Hirschfelde	Hirschfelde	40,000 c/
VEB Lonza-Werke, Elektrochemisches Fabriken Spremberg	Spremberg	13,800 d/
Other plants e/		5,400 f/
Total		745,700 g/

a. 90/
b. 91/
c. The annual plan for Hirschfelde was later revised to 36,264 tons. 92/
d. 93/
e. Plans for other producing plants are not available. Other plants reported as producers include VEB Ferrolegierungswerk (Ferroalloy Work) Lippendorf and VEB Ferrolegierungswerk Muechenberg.
f. The amount represents difference obtained from the sum of all known plans and total East German annual plan.
g. The preliminary production plan for 1953. 94/

in 1955 was 530,000 tons. 95/ Although since 1943 there has been no increase in the number of electric furnaces (eight) installed at Schkopau, greater production has been achieved by employing more advanced operational technology and by increasing supplies of electric power. Production capacity was gradually increased by replacing older rectangular furnaces with more efficient triangular furnaces, which require about 17 percent less electric power but need special Soederberg-type electrodes of round or oval shape made from better quality graphite. 96/

Electric power shortages have harassed the East German calcium carbide industry since World War II, and in 1954 the industry was unable to satisfy domestic demands for calcium carbide to be used in welding. 97/ The generation of acetylene is the principal use of calcium carbide, and East Germany has given attention to alternate processes for production of acetylene, processes which consume less electricity. There is no evidence, however, that any substitute process will be adopted on a significant scale.

Calcium carbide is a large consumer of bituminous coke. Because domestic supplies of coke are inadequate to cover the requirements of heavy industry, East Germany is dependent on imports. To reduce imports, attempts are being made to substitute a hard coke prepared from domestic brown coal. It is doubtful, however, that brown-coal coke will be used to any great extent for several years.

Preliminary East German plans for 1960 call for an increase in production of calcium carbide of 22 percent over the 1955 plan. The expansion is to cover larger requirements for acetylene to manufacture buna rubber, solvents, and new plastics and synthetic fibers. Production will increase, however, only if the electric power supply is significantly improved. Only one new calcium carbide furnace is known to be scheduled, and that is to be in operation at Piesteritz during 1956. 98/

e. Caustic Soda.

Caustic soda is one of the basic heavy chemicals required in large tonnages by any well-industrialized nation. Caustic soda is produced commercially by the electrolysis of a sodium chloride (common salt) solution and by treating a solution of soda ash with slaked lime (lime-soda process).

In 1954, East Germany produced about one-fifth of the caustic soda produced in the Sino-Soviet Bloc and about 54 percent of estimated total production of the European Satellites. East German production was equal to about 46 percent of estimated Soviet production, 46 percent of that of West Germany, 99/ and less than 1 percent of that of the US.

In 1936 the area which is now East Germany reportedly produced 47.1 percent of the total caustic soda for the German Reich, and in 1943 the share was 50.3 percent. 100/ At the end of World War II the annual production capacity of East Germany was 370,000 tons, of which 238,000 tons were of electrolytic caustic soda and 132,000 tons were made from soda ash. 101/

Postwar production of caustic soda in East Germany has not yet reached the pre-1945 production peak of 298,000 tons. 102/ In 1945-46, Soviet plant dismantlings eliminated all production of caustic soda by the lime-soda process and reduced capacity in electrolytic plants by about 60,000 tons. Electrolytic plants at Zscherndorf, Niederau, Weissig, and Mueckenberg were dismantled, reducing production capacity by the electrolytic process to about 178,000 tons, which was 75 percent of the original capacity and about 48 percent of the pre-1945 peak electrolytic capacity of the area. 103/ In 1952, probably the first postwar production of caustic soda by the lime-soda process was begun at the partially rebuilt Stassfurt plant, and probably not before 1954 did the Bernburg plant produce caustic soda from soda ash. In 1955, there were 8 plants producing caustic soda by the electrolytic process and 2 plants using the lime-soda process.

Planned production of caustic soda in East Germany, by plant, in 1954 is shown in Table 12.*

All plants in East Germany that produce caustic soda, except the plant at Pirna, are controlled by the Main Administration for Heavy Chemistry. The Pirna plant is controlled by the Main Administration for Synthetic Materials. Both main administrations, however, are under the Production Area for Chemistry of the Ministry for Heavy Industry. If total production of caustic soda is reported for the ministry, the figure represents total East German production of caustic soda.

* Table 12 follows on p. 39.

Table 12

Planned Production of Caustic Soda in East Germany, by Plant
1954

Plant	Location	Planned Production a/ (Metric Tons)	Percent of Total
VEB Elektrochemisches Kombinat Bitterfeld	Bitterfeld	67,000	27.5
VEB Chemische Werke Buna	Schkopau	66,200	27.1
VEB Deutsche Solvaywerke Westeregeln	Westeregeln	25,000	10.3
VEB Deutsche Solvaywerke Osternienburg	Osternienburg	19,000	7.8
VEB Farbenfabrik Wolfen	Wolfen	17,200	7.0
VEB Sodawerke "Karl Marx"	Bernburg	15,000 b/	6.1
VEB Sodawerke "Fred Oelssner"	Stassfurt	11,000 b/	4.5
VEB Elektrochemisches Werk Ammendorf	Ammendorf	10,000	4.1
VEB Schwefelsaeure- und Aetznatronwerk Nuenchritz	Nuenchritz	8,600	3.5
VEB Saechsisches Kunstseidenwerk "Siegfried Raedel"	Pirna	5,200 c/	2.1
Total		244,200 d/	100.0

a. 104/
b. These figures refer to production of caustic soda by causticization of soda ash (the lime-soda process).
c. The estimate represents the difference between the total East German plan for production of caustic soda (244,200 tons) and the production plan for the Main Administration for Heavy Chemistry (239,000 tons). 105/ The Pirna plant is subordinate to the Main Administration for Synthetic Materials.
d. 106/

In addition to the great loss in capacity because of Soviet dismantlings, the East German caustic soda industry has been affected by shortages of equipment and electric power. In spite of these difficulties, production has increased in all of the electrolytic plants. Additional facilities were installed in some plants after 1952, particularly those at Osternienburg and Westeregeln. Production of caustic soda in 1954 increased 16.8 percent over 1938 production, 106.6 percent over that of 1948, and about 3 percent over that of 1953. The main reason for the small increase of 1954 production over that of 1953 was the shortage of electric power. After the riots of 17 June 1953, deliberate electric power cutbacks were imposed on caustic soda plants so that more power could be channeled to the East German population. 107/

Beginning in 1953, total East German production of caustic soda has fallen behind the original goals established by the First Five Year Plan. It is estimated that 1955 production will be only about 86 percent of the original 1955 goal.

Production of caustic soda in East Germany in selected years, 1933-44, and 1946-60 is shown in Table 13.*

It is probable that, to relieve the electric power industry of additional heavy demands, more caustic soda will be produced in East Germany by causticization of soda ash. Nevertheless, some increase in production of electrolytic caustic soda will be necessary so that chlorine, a coproduct of the process, will be available in greater quantity to meet increasing requirements. A preliminary production plan for 1960 calls for an increase in production of caustic soda of about 54 percent over actual production in 1954. The 1960 plan calls for 350,000 tons. 108/

f. Soda Ash.

Soda ash, sometimes called "soda," is the commercial name for sodium carbonate, and perhaps ranks second only to sulfuric acid in general industrial significance. Commercial production of soda ash is by the ammonia-soda, or Solvay process. The main raw materials are salt, limestone, coke, and ammonia.

* Table 13 follows on p. 41.

Table 13

Production of Caustic Soda in East Germany [a]
Selected Years, 1933-44, and 1946-60

Metric Tons

Year	Production	Annual Plan [b]	First Five Year Plan [c]
1933	73,000		
1936	124,700		
1938	195,000		
1944	298,000		
1946	66,419	63,200	
1947	86,887	70,000	
1948	110,190	103,500	
1949	138,000	120,600	
1950	148,746	146,490	
1951	183,949	178,550	178,000
1952	208,875	202,900	205,000
1953	221,162 [d]	217,200 [e]	232,000
1954	227,699 [f]	244,200 [g]	260,000
1955	258,000 [h] [i]	250,650 [j]	300,000
1956	270,000 [h] [k]	268,000 [l]	
1957	290,000 [h] [k]	294,000 [m] [n]	
1958	310,000 [h] [k]	294,000 [m] [n]	
1959	330,000 [h] [k]	306,000 [m] [n]	
1960	360,000 [h] [k]	350,000 [m] [n]	

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are footnoted; reported figures are given as reported. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. Only the latest annual plan known for a given year is shown.
c. 109/
d. 110/
e. 111/
f. 112/
g. 113/

Table 13

Production of Caustic Soda in East Germany
Selected Years, 1933-44, and 1946-60
(Continued)

h. The estimate was obtained by graphic extrapolation and was further adjusted after considering variables expected to affect production. The most significant variable is the quantity of caustic soda to be made by causticization of soda ash.
i. Range of error, plus or minus 5 percent.
j. 114/
k. Range of error, plus or minus 10 percent.
l. 115/
m. Reported plan is only for the Ministry for Heavy Industry.
n. 116/

Except for the USSR, East Germany is the largest producer of soda ash in the Sino-Soviet Bloc. In 1954, East German production was about one-sixth of the Bloc's total and about 50 percent of the combined total for the European Satellites, and was equal to about 28 percent of Soviet production. East German production of soda ash in 1953, however, was equal to only about 40 percent of that of West Germany 117/ and 8 percent of that of the US.

In 1936 and 1938 the area which is now East Germany reportedly produced 47.1 percent of the total soda ash for the German Reich and in 1944 produced 45 percent. 118/ Just before the end of World War II the East German area had an annual production capacity of 550,000 tons of soda ash. 119/

The largest soda ash plant in Germany -- the largest in Europe -- was at Bernburg. Its pre-1945 capacity was 425,000 tons per year. 120/

After World War II the plant at Bernburg was completely dismantled, and certain key equipment was removed from the Stassfurt plant. The capacity of the East German soda ash industry was reduced by war damage and Soviet plant dismantling during 1945-47 to about 15 percent of pre-1945 capacity.

Under the First Five Year Plan, East Germany scheduled the reconstruction of the Bernburg plant and the completion of a second installation at Stassfurt, which was to have an ultimate production capacity of 100,000 tons of soda ash. Bernburg's capacity was to be 200,000 tons. 121/ Although Bernburg's buildings were intact and the installation of new equipment began in 1950, actual production in the first unit did not begin until October 1952. 122/ The first draft of the First Five Year Plan established a production goal for East Germany of 380,000 tons of soda ash in 1955. 123/ In late 1951, East Germany made revisions in the First Five Year Plan and raised the 1955 goal for production of soda ash to 640,000 tons. 124/

Because of shortages of material and equipment, the second Bernburg unit did not start production until May 1953, and by mid-1953 Soda Plant II at Stassfurt was still unable to produce continuously at its designed capacity of 300 tons per day, although Plant II had started producing in July 1951. 125/ As a consequence, production of soda ash has not met the production goals laid down in the final draft of the First Five Year Plan. In 1953, output was 70.6 percent of the revised goal of 420,000 tons and in 1954 only 68.9 percent of the goal of 540,000 tons. Estimated 1955 production was only about 72 percent of the goal of 640,000 tons. 126/

Planned production of soda ash in East Germany, by plant, in 1955 is shown in Table 14.*

Although East German goals for production of soda ash have proved too optimistic, 1953 production increased 55.4 percent over 1952, and 1954 production increased 685 percent over 1946 and almost equalled the 1936 production. A preliminary production goal of 700,000 tons in 1960 represents an increase of 88.2 percent over 1954 production. 127/ It is of interest to note that this 1960 plan is but 60,000 tons more than the 640,000 tons planned for 1955 in the First Five Year Plan.

Production of soda ash in East Germany in selected years, 1933-44 and 1946-60, is shown in Table 15.**

* Table 14 follows on p. 44.
** Table 15 follows on p. 45.

Table 14

Planned Production of Soda Ash in East Germany, by Plant a/
1955

Plant	Location	Planned Production b/ (Metric Tons)	Percent of Total
VEB Sodawerke "Karl Marx"	Bernburg	220,000	48.9
VEB Sodawerke "Fred Oelssner," c/ Werk I und II	Stassfurt	170,000	37.8
VEB Deutsche Solvaywerke Buchenau c/	Eisenach	60,000	13.3
Total		450,000 d/	100.0

a. All producing plants are controlled by the Main Administration for Heavy Chemistry, which is under the Production Area for Chemistry and subordinate to the Ministry for Heavy Industry.
b. 128/
c. The plant was formerly owned by Solvay et Cie of Brussels.
d. The annual production plan was later revised to 455,000 tons.

g. Chlorine.

Chlorine is a basic chemical in any industrial economy, and production of chlorine serves as a measure of the industrial development of a country. In East Germany it is produced in electrolytic cells as a coproduct in the manufacture of caustic soda and caustic potash. Production of chlorine, therefore, is directly related to production of caustic soda and caustic potash, and its requirements of raw materials and energy are the same as for the two alkalies. A negligible amount of chlorine is produced in East Germany as a by-product in the manufacture of metallic sodium.

East Germany produces more chlorine than any other country of the Sino-Soviet Bloc except the USSR. It is estimated that in 1954, production of chlorine in East Germany was equal to

Table 15

Production of Soda Ash in East Germany a/
Selected Years, 1933-44, and 1946-60

Metric Tons

Year	Production	Annual Plan b/	First Five Year Plan c/
1933	236,000		
1936	378,000		
1938	496,000		
1944	473,000		
1946	47,389	70,500	
1947	63,569	82,000	
1948	82,134	84,000	
1949	93,700	95,000	
1950	102,666	101,449	
1951	121,787	147,650	147,000
1952	190,834	270,600	270,000
1953	296,561 d/	300,200	420,000
1954	372,024 f/	390,000	540,000
1955	458,000 g/ h/	455,000 i/	640,000
1956	490,000 j/ h/	500,000 k/	
1957	520,000 j/ h/	535,000 l/	
1958	540,000 j/ m/	600,000 l/	
1959	560,000 j/ m/	600,000 l/	
1960	590,000 j/ n/	700,000 l/	

a. The data presented in this table were compiled from many individual statistical reports which it would be impractical to include as source references. Production estimates are footnoted; reported figures are given as reported. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. Only the latest annual plan known for a given year is shown.
c. 129/
d. 130/
e. 131/
f. 132/
g. The estimate was obtained by graphic extrapolation and was further adjusted on basis of sources reporting production on part-year periods.
h. Range of error, plus or minus 5 percent.
i. 133/

Table 15

Production of Soda Ash in East Germany
Selected Years, 1933-44, and 1946-60
(Continued)

j. Estimate was obtained by graphic extrapolation and was further adjusted after considering variables expected to affect production. The most significant variable is the quantity of caustic soda to be made directly from soda ash. Production probably will lag behind announced preliminary production goals because new construction of an installation at the Bernburg plant for 100,000 tons per year was postponed at the end of 1955 because of shortage of funds. 134/
k. 135/
l. 136/
m. Range of error, plus or minus 10 percent.
n. Range of error, plus or minus 15 percent.

more than 70 percent of Soviet production 137/ and accounted for more than 70 percent of the combined production of the European Satellites and about 35 percent of the entire production of the Bloc. East German production of chlorine, moreover, was greater than that of any West European country except West Germany and England. In 1954, East German production was equal to about 56 percent of production of West Germany, 138/ and almost 8 percent of that of the US.

In 1936 the area which is now East Germany produced 48.5 percent of all chlorine sold in Germany and in 1943, 46 percent. 139/ Estimated capacity for production of chlorine in East Germany at the end of World War II was 230,000 tons. Because of Soviet plant dismantling after the war, this capacity was reduced to about 170,000 tons.

East German plants that produce chlorine are the same plants that produce electrolytic caustic soda. Two of these plants, VEB Elektrochemisches Kombinat Bitterfeld and VEB Elektrochemisches Werk Ammendorf, also produce chlorine as a coproduct in the manufacture of electrolytic caustic potash. The VEB Deutsche Solvaywerke Osternienburg produces a negligible quantity of chlorine as a byproduct in production of metallic sodium.

Plants that produce caustic soda and chlorine in East Germany, except the plant at Pirna, are controlled by the Main Administration for Heavy Chemistry. The Pirna plant is under the Main Administration for Synthetic Materials. Both administrations are under the Production Area for Chemistry, which is subordinate to the Ministry for Heavy Industry.

The production problems of the East German chlorine industry in the postwar period have been the same as those of the electrolytic alkali industries. Increases in production of chlorine have nearly paralled increases in production of caustic soda and caustic potash. Before 1952, very little caustic soda was made by causticization of soda ash. In 1954, production of chlorine in East Germany was about 3.5 times the 1946 production but only about 90 percent of that of 1939.

Production of chlorine in East Germany in 1936, 1939, and 1946-60 is shown in Table 16.* Planned production of chlorine in East Germany, by plant, in 1955 is shown in Table 17.**

All East German plants that produce chlorine are captive chlorine plants, plants that consume all or part of their own production. A completely captive plant, because it does not ship chlorine to the market, usually is not equipped to liquefy the product.

The Bitterfeld plant is the largest producer of liquid chlorine in East Germany, and it liquefies about a quarter of its own production of chlorine. In 1954, about 20.5 percent of the East German production of chlorine was liquefied, and the 1955 plan called for 21.4 percent. In 1951 the US had a liquefying capacity for 78 percent of its production of chlorine.

A preliminary 1960 production plan for East Germany specifies a gross production goal of 290,000 tons of gaseous chlorine. This target, a 37-percent increase over the 1955 plan, seems plausible. 140/ Although a considerable increase in production of caustic soda is expected in the next 5 years, some of the increase will result from causticization of soda ash. Consequently, large increases in production of chlorine may have to be obtained from other sources without simultaneous alkali production.

* Table 16 follows on p. 48.
** Table 17 follows on p. 50.

Table 16

Production of Chlorine in East Germany a/
1936, 1939, and 1946-60

Metric Tons

Year	Production b/	Annual Plan c/
1936	83,000	
1939	226,000	
1946	58,000	
1947	82,000	
1948	106,000	
1949	131,000	
1950	142,000	
1951	176,000	
1952	194,000	
1953	201,000 d/	N.A. e/
1954	202,932 f/ g/	190,000 h/ i/
1955	212,000 j/	211,635 k/
1956	215,000 j/	210,000 l/
1957	228,000 m/	222,000 l/
1958	240,000 m/	230,000 l/
1959	260,000 m/	250,000 l/
1960	300,000 m/	290,000 l/

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. All production figures are estimates unless otherwise specified. Data for 1936 and 1939 refer to that area of Germany which is now East Germany.
b. Estimates of production of chlorine are based on theoretical yield and on reported or estimated production of electrolytic caustic soda and caustic potash. The estimates are sums of individually derived chlorine quantities obtained as byproduct in the manufacture of each alkali.

Table 16

Production of Chlorine in East Germany
1936, 1939, and 1946-60
(Continued)

c. Only the latest annual plan known for a given year is shown.
d. Reported production of liquid chlorine was 37,196 tons. 141/
e. Reported planned production for liquid chlorine was 31,813 tons. 142/ No gaseous chlorine production plan is available.
f. 143/
g. Reported production of liquid chlorine was 41,110 tons. 144/
h. 145/
i. Reported planned production for liquid chlorine was 39,036 tons. 146/
j. Range of error, plus or minus 5 percent.
k. Reported planned production for liquid chlorine was 45,300 tons. 147/
l. Reported plan is for the Ministry for Heavy Industry. 148/
m. Range of error, plus of minus 10 percent.

Table 17

Planned Production of Chlorine in East Germany, by Plant
1955

Plant	Location	Planned Production (Metric Tons)	Percent of Total
VEB Elektrochemisches Kombinat Bitterfeld	Bitterfeld	77,000 a/	36.5
VEB Chemische Werke Buna	Schkopau	59,340 b/	28.2
VEB Deutsche Solvaywerke Westeregeln	Westeregeln	19,700 c/	9.3
VEB Deutsche Solvaywerke Osternienburg	Osternienburg	17,277 d/	8.2
VEB Farbenfabrik Wolfen	Wolfen	15,500 e/	7.4
VEB Elektrochemisches Werk Ammendorf	Ammendorf	9,379 f/	4.4
VEB Schwefelsaeure- und Aetznatronwerk Nuenchritz	Nuenchritz	7,950 g/	3.8
VEB Saechsisches Kunstseidenwerk "Siegfried Raedel"	Pirna	4,600 h/	2.2
Total		210,746 i/	100.0

a. 149/
b. 150/
c. 151/
d. 152/
e. 153/
f. 154/
g. 155/
h. The estimate is based on an estimated production of 5,300 tons of caustic soda.
i. The reported East German production plan was 211,635 tons. 156/

Waste potash liquor contains large quantities of magnesium chloride, which can be decomposed in a thermal process into magnesium oxide and hydrochloric acid. The hydrochloric acid can be used directly by industry or can be burned with oxygen to give chlorine, according to the principles of the Deacon Process. Thus, East Germany may not need additional chlor-alkali electrolytic installations to gain

chlorine, some of which would be used to produce hydrochloric acid. East Germany definitely is interested in developing this alternative method of using potash waste products, but no pilot plants are known to have been built. 157/

h. Aromatic Coal Chemicals.

This report will consider only four major coal chemicals -- refined benzol, toluol, naphthalene, and refined (or pure) phenol. These chemicals are most significant as raw materials or "building blocks" for the synthetic organic chemical industry.

Except for phenol, East Germany produces basic coal chemicals primarily through high-temperature carbonization of bituminous coal. The main source of phenol, however, is the low-temperature carbonization of brown coal (lignite) or the hydrogenation of coal, its tar, or its oils. Background details on technology employed and production achievements in the manufacture of coal chemicals in East Germany have been covered in another report. 158/

Lacking reserves of suitable coking coal and an important coke and coke byproducts manufacturing industry, East Germany contributes very little to the coal chemicals industry of the Sino-Soviet Bloc, except for phenol and related tar acids. East German production of refined benzol, toluol, and naphthalene in 1954 is estimated at less than 3 percent of total production of the Bloc. Production of refined phenol, however, was nearly one-fifth of Bloc production and about 43 percent of production of the European Satellites. Both Poland and Czechoslovakia outproduce East Germany, except in phenol. In over-all production of coal chemicals, East Germany probably ranks only fifth in the Bloc.

The coal chemicals considered in this report are produced mainly by 6 plants, 2 of which are coking installations and 4 of which are chemical plants. Not all of these plants, however, produce all four products. The cokeries at Zwickau, VEB Karl Marx Werk, and VEB August Bebel Werk reportedly produce refined benzol, toluol, and naphthalene. The Schkopau chemical plant (VEB Chemische Werke Buna) produces toluol as a byproduct in the manufacture of monostyrene. This plant also fractionally

distills imported crude benzol to obtain refined benzol and additional toluol. Important producers of refined phenol are VEB Leuna-Werke "Walter Ulbricht" at Leuna (near Merseburg) and VEB Farbenfabrik Wolfen at Wolfen. All of the coal chemicals are produced by VEB Teerdestillation- und Chemische Fabrik Erkner at Erkner (near Berlin).

All of the plants are controlled by the Ministry for Heavy Industry. The Zwickau cokeries are directly under the Production Area for Coal and are subordinate to the Main Administration for Hard Coal ("Steinkohle"). The remaining plants are under the Production Area for Chemistry. The Schkopau, Leuna, and Wolfen plants are subordinate to the Main Administration for Heavy Chemistry, and Erkner is responsible to the Main Administration for Liquid Fuels.

The Erkner coal-tar distillery is the most important producer of coal chemicals. In 1954, Erkner produced more than 70 percent of the refined benzol, more than two-thirds of the toluol, about 90 percent of the naphthalene, and almost 18 percent of the refined phenol produced in East Germany. The Leuna-Werke contributed about 70 percent of East German production of refined phenol.

Estimated production of major coal chemicals in East Germany, by product and by plant, in 1954 is shown in Table 18.*

Estimated production of major coal chemicals in East Germany in 1938 and 1948-60 is shown in Table 19.**

There is no certainty that by 1960 East Germany will be able to increase significantly production of any of the major coal chemicals except phenol, and large imports of benzol, toluol, and naphthalene will be required to cover domestic requirements.

Production of refined phenol in East Germany probably will increase considerably in the next few years. East Germany plans to build installations to produce aromatic hydrocarbons (benzol, toluol, and naphthalene) on a large scale from brown-coal tar and the light-oil distillates of the tar by dehydrogenation methods. In addition, production of gasoline, lubricants, and other fuels obtained

* Table 18 follows on p. 53.
** Table 19 follows on p. 54.

Table 18

Estimated Production of Major Coal Chemicals in East Germany
by Product and by Plant
1954

Metric Tons

Product	Total Production [a]	Plant: VEB Teerdestillation- und Chemische Fabrik Erkner [b]	Zwickau Cokeries (Karl Marx and August Bebel)	VEB Chemische Werke Buna Schkopau	VEB Leuna-Werke "Walter Ulbricht"	VEB Farbenfabrik Wolfen
Refined benzol	11,300	8,150	3,100			
Toluol	3,600	2,480	400	700		
Naphthalene	5,100 [c]	4,650	400			
Refined phenol	11,400	2,050			7,800 [d]	1,500

a. Figures are rounded.
b. 159/
c. The amount includes about 100 tons produced by plants other than those listed in this table.
d. 160/

Table 19

Estimated Production of Major Coal Chemicals in East Germany a/
1938 and 1948-60

Metric Tons

Year	Refined Benzol	Toluol	Naphthalene	Refined Phenol
1938	9,500	2,400	N.A.	N.A.
1948	5,900	1,180	2,300	3,600
1949	6,690	1,800	2,400	4,300
1950	8,520	2,500	3,800	5,200
1951	10,150 b/	3,100	4,000	7,900 c/
1952	10,300	3,460	4,700	9,250
1953	10,800	3,600	4,826 d/	10,200
1954	11,300	3,600	5,100 e/	11,400
1955	11,900	3,600	5,300	12,700
1956	12,300	3,900	5,400	13,500
1957	12,900	4,100	5,600	14,300
1958	13,300	4,300	5,800	15,100
1959	13,700	4,500	5,900	15,900
1960	14,000	4,700	6,200	16,600

a. The estimates presented in this table were derived from a great number of individual statistical reports which it would be impractical to include as source references. In most cases, estimates are based on expected production of individual producing plants.
b. Goals of the First Five Year Plan for refined benzol were as follows: 1951, 9,400 tons; 1952, 11,200 tons; 1953, 12,400 tons; 1954, 13,500 tons; and 1955, 15,100 tons. 161/
c. Goals of the First Five Year Plan for refined (pure) phenol were as follows: 1951, 8,000 tons; 1952, 9,600 tons; 1953, 13,000 tons; 1954, 14,300 tons; and 1955, 15,300 tons. 162/
d. 163/
e. The reported production plan was 4,560 tons. 164/

by processing brown-coal tar is to be increased. Construction of the Schwarze Pumpe Kombinat (also known as the Trattendorf Combine) at Hoyerswerda was begun on 31 August 1955. Annual outputs of salable products will include 25,000 tons of crude phenol and 60,000 tons of gasoline. The combine, however, is not scheduled for completion before 1964. 165/ There is no indication that this combine will produce aromatic chemicals other than phenol.

3. Chemical Fertilizers.

a. Nitrogen Fertilizers.

Synthetic ammonia is the basic raw material for the manufacture of nitrogen fertilizer in East Germany. More than 90 percent of the nitrogen fertilizers now produced are derived from synthetic ammonia. Principal fertilizers that stem from ammonia are ammonium sulfate, calcium-ammonium nitrate, potassium-ammonium nitrate, and sodium nitrate. One important nitrogen fertilizer, calcium cyanamide, is produced by reacting calcium carbide and nitrogen obtained from the air.

East Germany is second only to the USSR in production of nitrogen fertilizer in the Sino-Soviet Bloc. It is estimated that in 1954 East German production was equal to about 60 percent of Soviet production and accounted for nearly 30 percent of total production of the Bloc. 166/ East German production in 1954, however, was only 40 percent of 1954 production of West Germany. 167/

In 1936 the area which is now East Germany produced 392,000 tons of nitrogen in the form of nitrogen fertilizers, about 56 percent of the total for the German Reich. 168/ In 1939 the East German area produced more than 400,000 tons.* 169/

Because of losses from bombing and Soviet dismantling of plants, production of nitrogen fertilizers in East Germany during the postwar period has not yet attained the prewar level. Capacity for ammonia synthesis at the great Leuna works was extensively reduced, and units for producing nitric acid, nitrate fertilizers,

* Quantities reported for nitrogen fertilizers are given as metric tons of nitrogen (N) content.

and mixed fertilizers were completely dismantled. Equipment remained for making only one type of nitrogen fertilizer, ammonium sulfate, and part of that equipment was badly damaged.

A second important producer of fertilizer, VEB Stickstoffwerk Piesteritz, had its nitric acid facilities dismantled and could not produce mixed fertilizers containing nitrogen. The Piesteritz plant was left with productive capacity for only calcium cyanamide. Former I.G. Farben plants at Bitterfeld and Wolfen apparently suffered little war damage and were expected to produce calcium-ammonium nitrate by utilizing a large portion of Leuna's available ammonia.

Production of nitrogen fertilizers in East Germany in 1954-55 is shown in Table 20.*

All plants that produce nitrogen fertilizer in East Germany are subordinate to the Ministry for Heavy Industry, and all, except two cokeries at Zwickau, are responsible to the Production Area for Chemistry. The cokeries, VEB Steinkohlenwerk "August Bebel" and VEB Steinkohlenwerk "Karl Marx," produce byproduct ammonium sulfate and are under the Production Area for Coal. They are further controlled by the Main Administration for Hard Coal (Steinkohle). The plants belonging to the Production Area for Chemistry are controlled by several main administrations. About 90 percent of the nitrogen fertilizer produced in the country is made by three plants, VEB Leuna-Werke "Walter Ulbricht," VEB Farbenfabrik Wolfen, and VEB Elektrochemisches Kombinat Bitterfeld, which are subordinate to the Main Administration for Heavy Chemistry. Two other producers under the Main Administration for Heavy Chemistry are VEB Stickstoffwerk Piesteritz and VEB Elektrochemie Hirschfelde. The plants subordinate to the Main Administration for Liquid Fuels are VEB Synthesewerk Schwarzheide and VEB Teerdestillation- und Chemische Fabrik Erkner (near Berlin). One plant, VEB Gaerungschemie Dessau, is under the Main Administration for General Chemistry, and the remaining producer, VEB Kaliwerk "Glueckauf" Sondershausen, belongs to the Main Administration for Potash and Nonmetallic Ore Mining.

Planned production of nitrogen fertilizers in East Germany, by type of fertilizer and by plant, in 1954 is shown in Table 21.**

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* Table 20 follows on p. 57.
** Table 21 follows on p. 58.

Table 20

Production of Nitrogen Fertilizers in East Germany
1954-55

Type	Nitrogen Content (Percent)	Production				
		1954			1955	
		Planned (Metric Tons of Nitrogen)	Actual a/ (Metric Tons of Nitrogen)	Percent of Total	Planned a/ (Metric Tons of Nitrogen)	Percent of Total
Ammonium sulfate	20.5 to 21.0	149,645 b/	156,478	56.6	154,975	54.5
Calcium-ammonium nitrate	20.5	93,220 b/	94,075	34.0	91,940	32.3
Calcium cyanamide	21.0 to 23.0	18,200 b/	10,474	3.8	22,000	7.7
Potassium-ammonium nitrate	About 16.0	10,350 c/	11,209	4.1	11,460	4.0
Sodium nitrate	16.0	3,611 d/	4,148	1.5	4,186	1.5
Total		275,026 e/	276,384 f/	100.0	284,561 g/	100.0

a. 170/
b. 171/
c. 172/
d. 173/
e. The reported East German production for nitrogen fertilizers was 275,661 tons. 174/
f. The reported actual production of nitrogen fertilizers was 276,681 tons; this figure is believed to be more reliable and has been used in other tables in this report, but a breakdown by fertilizer types was not available. 175/
g. The 1955 production plan was later revised to 290,570 tons. 176/

Table 21

Planned Production of Nitrogen Fertilizers in East Germany
by Type of Fertilizer and by Plant
1954

Type	Plant	Location	Planned Production a/* (Metric Tons of Nitrogen)
Ammonium sulfate	VEB Leuna-Werke "Walter Ulbricht"	Leuna, near Merseburg	148,590 b/
	VEB Steinkohlenwerk "Karl Marx"	Zwickau	611 c/
	VEB Steinkohlenwerk "August Bebel"	Zwickau	
	VEB Teerdestillation- und Chemische Fabrik Erkner	Erkner, near Berlin	60 d/
	VEB Gaerungschemie Dessau	Dessau/Rosslau	Negligible
Calcium-ammonium nitrate	VEB Farbenfabrik Wolfen	Wolfen	50,000 e/
	VEB Elektrochemisches Kombinat Bitterfeld	Bitterfeld	36,430 f/
Calcium cyanamide	VEB Stickstoffwerk Piesteritz	Piesteritz, near Lutherstadt/Wittenberg	18,200 g/
	VEB Elektrochemie Hirschfelde	Hirschfelde	0

* Footnotes for Table 21 follow on p. 59.

Table 21

Planned Production of Nitrogen Fertilizers in East Germany
by Type of Fertilizer and by Plant
1954
(Continued)

Type	Plant	Location	Planned Production a/ (Metric Tons of Nitrogen)
Potassium-ammonium nitrate	VEB Kaliwerk "Glueckauf" Sondershausen	Sondershausen	10,985 h/
Sodium nitrate	VEB Farbenfabrik Wolfen	Wolfen	3,142 i/
	VEB Synthesewerk	Schwarzheide, near Ruhland	346 j/

a. The plan figures do not agree exactly with the corresponding totals in Table 20. It is probable that some of the individual plant plans were altered after they were originally established.
b. 177/
c. The amount is the total for the two Zwickau plants; individual plans are not available. 178/
d. 179/
e. 180/
f. 181/
g. 182/
h. 183/
i. 184/
j. 185/

In 1950, production of nitrogen fertilizer in East Germany was only about 58 percent of the approximately 400,000 tons produced in 1939. Production increased gradually after 1950, and 1954 production was about 69 percent of the 1939 figure. Actual production appears to have exceeded yearly economic plan quotas for the 1949-54 period, and goals established by the final draft of the First Five Year Plan were overfulfilled -- except in 1954 when production fell short of the goal by less than 2 percent. Production in 1955 probably was about 25 percent greater than 1950 production.

Production of nitrogen fertilizers in East Germany in 1936, 1939, and 1946-60 is shown in Table 22.

Table 22

Production of Nitrogen Fertilizers in East Germany a/*
1936, 1939, and 1946-60

Metric Tons of Nitrogen

Year	Production	Annual Plan b/	First Five Year Plan c/
1936	392,000		
1939	401,130 d/		
1946	90,900 e/		
1947	128,000 e/		
1948	138,200 e/	128,000	
1949	193,900	165,000	
1950	231,000	208,000	
1951	252,332	231,180	237,000
1952	258,316	255,861	255,000
1953	264,587 f/	256,800 g/	260,000
1954	276,681 h/	275,661 i/	280,000
1955	293,000 j/	290,570 k/	300,000
1956	300,000 j/	300,000 l/	
1957	310,000 j/	304,600 l/	
1958	320,000 j/	311,000 l/	
1959	330,000 j/	324,800 l/	
1960	350,000 j/	334,600 l/	

* Footnotes for Table 22 follow on p. 61.

Table 22

Production of Nitrogen Fertilizers in East Germany a/
1936, 1939, and 1946-60
(Continued)

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are footnoted; reported figures are given as reported. Data for 1936 and 1939 refer to that area of Germany which is now East Germany.
b. Only the latest annual plan known for a given year is shown.
c. 186/
d. The amount reported produced between 1 July 1938 and 30 June 1939.
e. The estimate represents the sum of estimated outputs of individual producing plants. Range of error, plus or minus 10 percent.
f. 187/
g. 188/
h. 189/
i. 190/
j. The estimate was obtained by graphic extrapolation and partly based on a reported preliminary 1960 production plan of 334,600 tons. The estimated margin of error ranges from plus or minus 5 percent to plus or minus 15 percent for 1955 and 1960, respectively.
k. 191/
l. 192/

In the period of the Second Five Year Plan (1956-60), East Germany will have to increase significantly its production of nitrogen fertilizers in order to continue large exports and to raise domestic crop yields. The preliminary 1960 goal for nitrogen fertilizer is 334,600 tons of nitrogen, an increase of 21 percent over 1954 production. 193/ To attain this goal it will be necessary to increase production of synthetic ammonia at Leuna and productive capacities at existing nitric acid installations.

In the 1955-60 period, [redacted] more mixed fertilizers* will be made in East Germany, and there will be little or no expansion in production of ammonium sulfate, calcium cyanamide, and potassium-ammonium nitrate. Production of calcium-ammonium nitrate at the Wolfen and Bitterfeld plants was scheduled to expand, however, and in 1960 these two plants were to produce 589,000 tons (containing 121,000 tons of nitrogen), an increase of more than 28 percent over their combined production in 1954. 194/ 50X1

The Wolfen and Bitterfeld plants also have had plans to produce a nitrogen-phosphate fertilizer called "Nitrophos," which contains 18 percent nitrogen and 12 percent phosphoric acid (P_2O_5). Both plants were allegedly to begin production during 1956. Wolfen's Nitrophos productive capacity was to be 200,000 tons per year, containing 36,000 tons of nitrogen, and Bitterfeld's capacity was to be 133,000 tons, containing 24,000 tons of nitrogen. 195/ Nitrophos is made by treating apatite with nitric acid.

VEB Stickstoffwerk Piesteritz was reported planning to produce what may be "Nitrophoska," a mixed fertilizer formerly made at Piesteritz which will contain not only nitrogen (11 percent) and phosphorus (12 percent P_2O_5), but also some potassium. Production was scheduled to start during 1955, but there is no information that production did commence or that it will in 1956. The ultimate annual capacity would be an estimated 120,000 tons gross, containing 13,200 tons of nitrogen. 196/

b. Phosphorus Fertilizers.

East Germany produces on a commercial scale only three basic types of phosphorus (phosphate) fertilizer: superphosphate, thermo-phosphates, and Thomas phosphate (Thomas slag, or basic slag). The thermo-phosphates may be subdivided into a sintered calcium-magnesium phosphate called "Gluehphosphat" (incandescent phosphate) and an alkali-sinter-phosphate called "Schmelzphosphat" (fused phosphate). By the end of 1954 there was no known production of mixed fertilizers containing phosphorus -- nitro-phosphate ("Nitrophos" or "Stickstoffkalkphosphat") and nitro-potassium phosphate ("Nitrophoska").

* "Mixed fertilizers" are fertilizers containing more than one of the basic plant nutrients -- nitrogen (N), phosphorus (P_2O_5), and potassium (K_2O).

In the manufacture of phosphorus fertilizers, East Germany ranks fourth in the Sino-Soviet Bloc, outproduced only by the USSR, Poland, and Czechoslovakia. In 1954 the USSR is believed to have produced, including ground phosphorite, almost 10 times as much as East Germany, and Poland produced about 1.5 times as much as East Germany. East German production was equal to only about 16 percent of 1954 production of West Germany. 197/

In the 1938/39 fertilizer year* the area of Germany which is now East Germany was reported to have produced 78,270 tons of available phosphoric acid (P_2O_5)** in the form of phosphorus fertilizers. 198/ Postwar production did not exceed that of 1939 until 1954, when production was 79,203 tons (as P_2O_5). 199/

East Germany has no crude phosphates, the raw material for phosphate fertilizers. All supplies must be obtained by imports from the West and the USSR. Most of the raw phosphates have been treated with sulfuric acid to give superphosphate. The critical shortage of sulfuric acid in East Germany since World War II, however, has made it necessary to introduce other methods of treating crude phosphates. Phosphate fertilizers, consequently, are being prepared in increasing amounts by thermal, or fusion, processes whereby decomposition with magnesium compounds or potassium sulfate (as the alkali) is practiced. Thermo-phosphates are said to be equal to superphosphates and are suitable for all kinds of soils, but best results are obtained in acid soils.

Production of phosphorus fertilizers by types in East Germany in 1954-55 is shown in Table 23.***

Most plants that produce phosphorus fertilizers are under the Ministry for Heavy Industry. Two superphosphate plants, VEB Superphosphat- und Mischduengerfabrik at Draschwitz-Reuden and VEB Superphosphatfabrik at Oschersleben, cannot at this time be identified under any ministry or specific administration. The remaining four superphosphate plants are responsible to the

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* A fertilizer year covers the period from 1 July to 30 June of the following calendar year.

** Phosphorus fertilizers are normally expressed in terms of their phosphorus pentoxide (P_2O_5) content -- that is, available phosphoric acid (in reality phosphoric anhydride) as plant food.

*** Table 23 follows on p. 64.

Table 23

Production of Phosphorus Fertilizers in East Germany
1954-55

Type	Phosphoric Acid Content (Percent)	Production				
		1954			1955	
		Planned a/ (Metric Tons of Equivalent Phosphoric Acid)	Actual b/ (Metric Tons of Equivalent Phosphoric Acid)	Percent of Total	Planned c/ (Metric Tons of Equivalent Phosphoric Acid)	Percent of Total
Superphosphate	16 to 18	52,000	49,447	65.4	68,500	57.1
Thermo-phosphates	Variable d/	34,000	18,044	23.9	42,500	35.4
Thomas phosphate	17 to 18	8,400	8,129	10.7	9,000	7.5
Total		94,400 e/	75,620 f/	100.0	120,000 g/	100.0

a. 200/
b. 201/
c. 202/
d. Phosphoric acid contents of Gluehphosphat and Schmelzphosphat are 18 to 22 percent and 20 percent P_2O_5, respectively.
e. The 1954 production plan was [redacted] 98,400 tons. 203/ 50X1
f. [redacted] 1954 actual production as 79,203 tons; this figure is believed to be more reliable and has been used in other tables in this report, but a breakdown by fertilizer type was not included. 204/
g. The 1955 production plan was [redacted] 116,000 tons. 205/ 50X1

Production Area for Chemistry and are directly controlled by the Main Administration for Heavy Chemistry. In 1954 the three plants known to produce thermo-phosphates were controlled by the Main Administration for Heavy Chemistry. Two plants outside of the Production Area for Chemistry, VEB Maxhuette at Unterwellenborn near Saalfeld and VEB Eisenhuettenkombinat "J.W. Stalin" at Stalinstadt, are producers of Thomas phosphate, or basic slag, and are assigned to the Production Area for Metallurgy and further subordinated to the Main Administration for the Iron Industry.

Planned production of phosphorus fertilizers in East Germany, by type of fertilizer and by plant, in 1954 is shown in Table 24.*

Although no plant that produced phosphorus fertilizer in East Germany suffered seriously from war damage or Soviet dismantling, postwar production declined because of insufficient supplies of phosphate rock and sulfuric acid. In 1950 the production of phosphorus fertilizers was only 37.6 percent of the 1939 production, and not until 1954 was the 1939 production exceeded. No annual production plan (1946 through 1955), however, was fulfilled, and production for the 1951-55 period was well below the quotas established by the First Five Year Plan.

Production of phosphorus fertilizers in East Germany in 1939 and 1946-60 is shown in Table 25.**

Operational difficulties and technological problems have precluded the large increases planned for production of the thermo-phosphat, Gluehphosphat. At the end of 1953 the two producing plants, Ruedersdorf and Heinrichshall, still were only large-scale experimental plants, although both had begun operating during 1951. 206/

Other processes for obtaining chemical fertilizers containing phosphoric acid have been tried. The treatment of crude phosphates with acids other than sulfuric acid, such as hydrogen chloride and nitric acid, and the thermal methods were undertaken

* Table 24 follows on p. 66.
** Table 25 follows on p. 68.

Table 24

Planned Production of Phosphorus Fertilizers in East Germany
by Type of Fertilizer and by Plant
1954

Type	Plant	Location	Planned Production (Metric Tons of Equivalent Phosphoric Acid)
Superphosphate	VEB Schwefelsaeure- und Superphosphatwerk Coswig	Coswig	18,000 a/
	VEB Chemische Fabrik Heinrichshall	Bad Koestritz	11,800 a/
	VEB Schwefelsaeure- und Superphosphatwerk Salzwedel	Salzwedel	11,500 a/
	VEB Fahlberg-List	Magdeburg	10,700 a/
	VEB Superphosphat- und Mischduenger-fabrik (formerly Weise and Co.)	Draschwitz-Reuden	N.A.
	VEB Superphosphatfabrik (formerly Julius Grosse)	Oschersleben	Negligible
Gluehphosphat (calcium-magnesium phosphate)	VEB Gluehphosphatwerk Ruedersdorf	Ruedersdorf, near Berlin	34,000 b/ c/
	VEB Chemische Fabrik Heinrichshall	Bad Koestritz	
Schmelzphosphat (alkali-sinter-phosphate)	VEB Kalk- und Phosphatwerk Steudnitz	Dornburg-Steudnitz	N.A.

* Footnotes for Table 24 follow on p. 67

Table 24

Planned Production of Phosphorus Fertilizers in East Germany
by Type of Fertilizer and by Plant
1954
(Continued)

Type	Plant	Location	Planned Production (Metric Tons of Equivalent Phosphoric Acid)
Thomas phosphate and basic slag	VEB Maxhuette Unterwellenborn	Unterwellenborn, near Saalfeld	8,400 b/ d/
	VEB Eisenhuettenkombinat "J.W. Stalin"	Stalinstadt	

a. 207/
b. 208/
c. The amount shown is the combined production of the two plants; individual quotas are not known but the Ruedersdorf plant is the major producer. 209/
d. The amount shown is the combined production of the two plants; individual quotas are not known, but the Unterwellenborn plant is the major producer.

Table 25

Production of Phosphorus Fertilizers in East Germany a/
1939 and 1946-60

Metric Tons of Phosphoric Acid

Year	Production	Annual Plan b/	First Five Year Plan c/
1939	78,270 d/		
1946	6,738		
1947	8,018		
1948	23,575	36,000	
1949	20,000	21,400	
1950	29,400	48,500	
1951	37,539	56,100	69,000
1952	37,133	75,000	84,500
1953	72,310 e/	67,700 f/	100,000
1954	79,203 g/	98,400 h/	120,000
1955	80,000 i/	120,000 j/	140,000
1956	110,000 k/	124,200 l/	
1957	130,000 k/	142,700 l/	
1958	150,000 k/	157,400 l/	
1959	170,000 k/	183,500 l/	
1960	180,000 k/	185,200 l/	

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Production estimates are footnoted; reported figures are given as reported. The figure for 1939 refers to that area of Germany which is now East Germany.
b. Only the latest annual plan known for a given year is shown.
c. 210/
d. Reported produced between 1 July 1938 and 30 June 1939.
e. 211/ f. 212/ g. 213/ h. 214/
i. The estimate is based on sources reporting production on part-year periods. Estimated margin of error plus or minus 15 percent.
j. 215/
k. The estimate was obtained by graphic extrapolation and partly based on a reported preliminary 1960 production plan of 185,200 tons. Estimated margin of error ranges from plus or minus 15 percent for 1955 to plus or minus 25 percent for 1960.
l. The reported production plan is for the Ministry for Heavy Industry. 216/

experimentally. Plans were made to produce a mixed fertilizer called "Nitrophos," a nitrogen-calcium phosphate containing 12 percent phosphoric acid (P_2O_5). At least two plants, VEB Farbenfabrik Wolfen and VEB Elektrochemisches Kombinat Bitterfeld, were scheduled to produce Nitrophos in 1956. Annual production capacity of Wolfen was to be 24,000 tons of P_2O_5 and that of Bitterfeld, 16,000 tons of P_2O_5. 217/ VEB Stickstoffwerk Piesteritz was planning to construct during 1954 an installation to produce a mixed fertilizer called "Nitrophoska"* that would also contain 12 percent P_2O_5. This plant was to have an estimated capacity of 120,000 tons (gross), about 14,400 tons of P_2O_5 per year. 218/ There is no firm evidence, however, that these plans for the three plants are still to be executed.

To improve crop yields, especially those of root crops such as potatoes and sugar beets, and to eliminate dependence on imports of fertilizer from the West, East Germany must make significant progress in the manufacture of phosphorus fertilizers during the Second Five Year Plan (1956-60). One preliminary 1960 production plan for phosphorus fertilizers for the Main Administration for Heavy Chemistry was 200,000 tons (P_2O_5 content), of which 80,000 tons, 40 percent of the total, were to be superphosphate and 60,000 tons, 30 percent of the total, as Nitrophos. 219/ [redacted] the total quantity of phosphorus fertilizer to be produced by the Ministry for Heavy Industry in 1960 will be only 185,200 tons. 220/ [redacted] superphosphate production would be 100,000 tons in 1960 and that 25 million East German marks were allocated for production of phosphorus fertilizers. 221/ Considerable capital investment obviously will be necessary to permit the required expansion. 50X1 50X1 50X1

c. Potassium Fertilizers.

East Germany has extensive rich deposits of potassium salts. Before World War II the East German area produced more than 60 percent of total production of potash of Germany, and Germany produced 55 percent of the world's supply. 222/ In 1954, East Germany was the third largest producer of potash in the world; only the US and West Germany produced more. In 1954, East German production

* It is not certain that Nitrophoska is the mixed fertilizer to be produced; the product may be similar to the fertilizer, Nitrophos, to be produced by the Wolfen and Bitterfeld plants.

accounted for about four-fifths of total production of the Sino-Soviet Bloc, and perhaps was more than six times as great as production in the USSR.

In 1938/39, East Germany was reported to have produced 1,105,200 tons of potassium salts, calculated on the basis of potassium oxide (K_2O) content. 223/ The prewar production peak was surpassed in 1950, and in 1954 production was 17.7 percent greater than that of 1943, the highest known pre-1945 production. 224/ It is probable that East German production in 1955 will exceed the goal set by the First Five Year Plan.

The 15 East German plants that process potassium salts are under the Production Area for Chemistry and are administered by the Main Administration for Potash and Nonmetallic Ore Mining.

The future development of the East German potash industry depends on getting the greatest possible production by means of new techniques and machines which will use advanced processes to convert the crude potassium salts into high-grade potassium fertilizers and other potash products. Major increases in the production of potash will be stressed with the intent of maintaining the excellent foreign trade pattern already established.

Production of potassium fertilizers in East Germany in 1936, 1939, 1943, and 1946-55 is shown in Table 26.*

4. Rubber and Rubber Products.

a. Synthetic Rubber.

The manufacture of "Buna" rubber in Germany was started in the mid-1930's at three I.G. Farben plants, most important of which was the Schkopau plant in what is now East Germany. By 1938 this plant was making 400 tons a month, and in 1939 production increased to a total of about 20,000 tons for the year. During World War II, VEB Chemische Werke Buna at Schkopau accounted for more than 60 percent of Germany's synthetic rubber supply and reached a maximum production of about 71,000 tons in 1943. During the last quarter of the year, however, bombing damage reduced production to about 500 tons a month.

* Table 26 follows on p. 71.

Table 26

Production of Potassium Fertilizers in East Germany a/
1936, 1939, 1943, and 1946-55

Metric Tons of Potassium Oxide

Year	Production	Annual Plan b/	First Five Year Plan c/
1936	948,000		
1939	1,105,200 d/		
1943	1,243,040		
1946	654,000		
1947	800,000 e/		
1948	917,200		
1949	1,164,000	970,000	
1950	1,314,000	1,381,400	
1951	1,397,700	1,370,000	1,370,000
1952	1,331,690	1,431,000	1,405,000
1953	1,378,000 f/	1,350,700 g/	1,440,000
1954	1,463,200 h/	1,464,000 f/	1,475,000
1955	1,550,000 i/	1,610,000 j/	1,500,000

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. Only the latest annual plan known for a given year is shown.
c. 225/
d. Reported produced between 1 July 1938 and 30 June 1939.
e. Estimated. Range of error, plus or minus 5 percent.
f. 226/
g. 227/
h. 228/
i. Estimate based on reported production of 1,032,381 tons in 8 months. 229/ Range of error, plus or minus 5 percent.
j. 230/

Following World War II and the partition of Germany, production at Schkopau was increased immediately, but Soviet dismantling in 1947-48 again reduced plant capacity. Rehabilitation of the plant began in 1949, and production has increased steadily since that time. Production of synthetic rubber at the VEB Chemische Werke Buna in East Germany in 1937-60 is shown in Table 27.

Table 27

Production of Synthetic Rubber
at the VEB Chemische Werke Buna in East Germany a/
1937-60

Metric Tons

Year	Amount	Year	Amount	Year	Amount
1937	2,750	1945	N.A.	1953	62,131
1938	4,850	1946	23,997	1954	67,707
1939	20,800	1947	28,460	1955	70,936 c/
1940	36,400	1948	30,700	1956	74,000 c/
1941	42,700	1949	26,500	1957	76,000 c/
1942	60,000	1950	39,008	1958	85,000 c/
1943	71,100	1951	48,853	1959	85,000 c/
1944	42,050 b/	1952	56,300	1960	85,000 c/

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references.
b. Estimated.
c. Plan figure.

b. Rubber Products.

East Germany manufactures, in addition to synthetic rubber, tires and tubes, footwear, conveyor and V-belts, hose of all types, rubberized fabrics, and other rubber products. Production of major rubber products in East Germany in 1953-55 is shown in Table 28.*

* Table 28 follows on p. 73.

Table 28

Production of Major Rubber Products in East Germany
1953-55

Units

Description	1953	1954	1955
Motor vehicle tires	915,936 a/	1,139,675 b/	1,288,800 c/
Motor vehicle tubes	N.A.	1,078,760	1,195,427 c/
Bicycle tires	3,913,311 a/	4,951,941	4,934,000 c/
Bicycle tubes	N.A.	5,004,941	5,300,000 d/
Rubber shoes (boots in pairs)	N.A.	2,400,067	2,484,000 c/

a. 231/
b. 232/
c. 233/ Plan figure.
d. 234/ Plan figure.

Because of a shortage of fabricating equipment, there has been a severe shortage of tires in East Germany, particularly of truck tires. In the spring of 1954 the deficit was estimated at 500,000 units. 235/ Although expansion of the tire industry has a high priority, no new facilities are known to be under construction. The 1956 production plan is 1.41 million, and a preliminary 1960 production plan for motor vehicle tires calls for 2.5 million. 236/

The supply of rubber shoes in East Germany is rather short, but most other rubber products are in sufficient supply to meet domestic needs and to permit some export. Some special items, however, such as wide conveyor belting and certain sizes of tires are imported in small quantities.

Before World War II, 92 percent of the rubber-fabricating industry in Germany was concentrated in what is now the German Federal Republic. When East Germany was closed to shipments from the West in 1948, the East German government was faced with the problem of rapidly expanding production of tires. The largest tire plant in East Germany, VEB Deka, at Ketchendorf, had been dismantled, and steps were taken to get it back in production and to enlarge three other small plants. A fifth plant came into production in 1952. Prewar

production of tires in the area that is now East Germany was as follows 237/:

1933 -- 96,000 units
1936 -- 176,000 units
1938 -- 313,000 units

Estimated production of tires in East Germany, by plant, in 1946-55 is shown in Table 29.

Table 29

Estimated Production of Tires in East Germany, by Plant a/
1946-55

Thousand Units

Plant	Location	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955 b/
VEB Berliner Reifenwerk	Berlin-Schmoekwitz	1.5	3	10.2	25	64	91	118.5	120	147 c/	165
VEB Heidenauer Gummiwerk	Heidenau	0	0	4	15	49	55	50	30	N.A.	N.A.
VEB Reifenwerk Fuerstenwalde	Fuerstenwalde/Spree	22	32	72	147	200	345	400	530	N.A.	650
VEB Gummiwerk "Elbe"	Wittenberg/Lutherstadt	0	0	0	0	0	0	0.8	6	N.A.	N.A.
VEB Gummiwerk Riesa	Riesa/Elbe	0	4	17.8	30	81	120	203	230	N.A.	350
	Total	23.5	39	104	217	394	611	772.3	916	1,139.7 d/	1,300

a. 238/
b. Plan figure. 239/
c. 240/
d. 241/

2. Other Rubber Products.

East German production data for rubber products other than tires are not available, but information on the value of such products in East German marks (DME) has been compiled. The value of production of the rubber industry of East Germany in 1953 is shown in Table 30.*

* Table 30 follows on p. 75.

Table 30

Value of Production of the Rubber Industry of East Germany a/
1953

Million DME

Product	Value			
	Total	Exports	Reparations	Official Consumers b/
Synthetic rubber	248.0	96.0	4.0	32.3
Motor vehicle tires	257.0	18.6	c/	21.7
Bicycle tires and tubes	58.0	0.8		Negligible
V-belts	3.2			
Transmission belts	1.6			
Rubberized textiles	45.7			1.0
Conveyor belting	86.3	12.9		1.8
Hard rubber goods	20.7			1.1
Rubber soles	37.8	3.4		
Other rubber goods	180.0	20.0		20.0
Total	938.3	151.7	4.0	77.9

a. 242/
b. "Official Consumers" refers to state reserves and military and police units.
c. Absence of an entry in any column indicates zero.

5. Synthetic Plastics, Fibers, and Resins.

a. General.

East Germany has few raw chemicals available in quantities sufficient for production of plastics, and acetylene (obtainable from calcium carbide) is the major material used. East German capacity for the production of calcium carbide has been increased to permit the manufacture of large amounts of polyvinyl chloride, a plastic selected for volume production because of its great versatility. Production of plastic types in East Germany has been controlled by the USSR to fit

the requirements of the Soviet economy. It is understood that during the Second Five Year Plan, East Germany will not only be the main supplier of plastics among the European Satellites but will also conduct most of the research work in this field.

In East Germany the following types of plastics are known to be in current production: polyvinyl chloride, chlorinated polyvinyl chloride, phenolics (molding powders and casting resins), aminoplasts, polystyrene, cellulose nitrate, polyamides, cellulose acetate, polyvinyl acetate, alkyd resins, and polyacrylonitrile. In addition, the following plastic types are produced but are not yet in large-scale production in East Germany: polyester, silicones, methacrylates, and epoxy resins. Available information indicates no known production other than laboratory quantities of the following: polyethylene, fluorocarbons, and isocyanates.

Development work on silicones, fluorocarbons, polymethacrylate, isocyanates, and epoxy resins has been in progress for 2 or more years.

The major plastic materials produced in East Germany are discussed briefly below.

b. Polyvinyl Chloride.

Under Soviet control, the total capacity for production of polyvinyl chloride in East Germany has been increased from about 15,000 tons after the postwar dismantling of plants to about 42,000 tons in 1955. Production of polyvinyl chloride in East Germany, by plant, in 1937-43 and 1947-60 is shown in Table 31.*

c. Chlorinated Polyvinyl Chloride.

The VEB Elektrochemisches Kombinat Bitterfeld produces chlorinated polyvinyl chloride from polyvinyl chloride polymerized within the plant. Only a portion of the polyvinyl chloride produced

* Table 31 follows on p. 77.

Table 31

Production of Polyvinyl Chloride in East Germany, by Plant a/
1937-43 and 1947-60

Metric Tons

Year b/	Amount		
	VEB Elektrochemisches Kombinat Bitterfeld	VEB Chemische Werke Buna, Schkopau	Total
1937	114	0	114
1938	778	0	778
1939	2,674	0	2,674
1940	5,934	1,640	7,574
1941	9,210	2,175	11,385
1942	12,261	2,358	14,619
1943	14,715	2,603	17,318
1947	1,728 c/	4,602 d/	6,330
1948	3,370 e/	13,000 f/	16,370
1949	4,000 g/	10,538 h/	14,538
1950	3,840 i/	16,230 j/	20,070
1951	5,040 k/	24,325 l/	29,365
1952	4,395 m/	30,727 n/	35,122
1953	4,234 o/	32,500 p/	36,734
1954	5,442 q/	34,137 r/	39,579 s/
1955	N.A.	N.A.	42,000 t/
1956	N.A.	N.A.	44,000 u/
1957	N.A.	N.A.	46,000 u/
1958	N.A.	N.A.	48,000 u/
1959	N.A.	N.A.	53,000 u/
1960	N.A.	N.A.	70,000 u/

a. Data for prewar and wartime years refer to production of the plants under the government of Germany.
b. Data for 1937-43 are given as reported. 243/
c. 244/
d. 245/
e. 246/
f. 247/

Table 31

Production of Polyvinyl Chloride in East Germany, by Plant a/
1937-43 and 1947-60
(Continued)

g. Plan figure. 248/
h. Determined on the basis of 8 months' production. 249/
i. 250/
j. 251/
k. Determined on the basis of monthly output. 252/
l. Obtained on the basis of a monthly average. 253/
m. 254/
n. Obtained by compilation of data. 255/
o. 256/
p. Determined on the basis of an average of the first three quarters. 257/
q. 258/
r. Obtained by the difference between reported total production and Bitterfeld production.
s. 259/
t. Plan figure. 260/
u. Plan figure. 261/

by the plant is used for production of chlorinated polyvinyl chloride. Production of chlorinated polyvinyl chloride in East Germany in 1937-43 and 1948-54 is shown in Table 32.*

d. Phenol-Formaldehyde Plastics.

Phenol-formaldehyde plastics are commonly known as Bakelite in the US. Phenolic plastics are produced by the VEB Kunstharz und Pressmassefabrik Espenhain. In 1953 the Erkner plant produced 4,810 tons of molding powder with a resin content** of 2,405 tons, and the Espenhain plant produced 3,442 tons of molding powder with a resin content of 1,721 tons.*** The molding powder produced by the Erkner

* Table 32 follows on p. 79.
** The resin is estimated to be one half the weight of the molding powder.
*** The yearly production for both of the plants was estimated on the basis of the first half-year output. 262/

Table 32

Production of Chlorinated Polyvinyl Chloride in East Germany a/ 1937-43 and 1948-54

Year b/	Metric Tons Amount
1937	0
1938	2
1939	73
1940	437
1941	821
1942	858
1943	980
1948	267 c/
1949	N.A.
1950	524 d/
1951	564 e/
1952	999 f/
1953	1,333 g/
1954	1,224 h/

a. Data for prewar and wartime years refer to that area of Germany which is now East Germany.
b. Data for 1937-43 are given as reported. 263/
c. 264/
d. 265/
e. 266/
f. 267/
g. 268/
h. 269/

and Espenhain plants is the basic material for the manufacture of phenolic plastics. In 1953, about 10,600 tons of phenolic plastics were produced in East Germany, a slight increase over the 8,272 tons produced in 1952 270/ and a marked increase over the 5,900 tons produced in 1951. 271/ Production in 1954 is reported as 14,176 tons. 272/

e. Aminoplasts.

The most important amine-formaldehyde plastics made in East Germany are those resins made from urea and formaldehyde. For several years the USSR has shown great interest in a foamed urea-formaldehyde insulating material called "Piatherm" produced at the VEB Stickstoffwerk Piesteritz. Piatherm is used as thermal insulation for railroad refrigerator cars, cold-storage buildings, ships and trucks, and for covering industrial piping.

Other plastics in this general category are those derived from dicyandiamide (via calcium cyanamide). One of these plastics is called "DiDi-Pressmasse" which is obtained by condensation of dicyandiamide with urea-formaldehyde resin. Another plastic produced is called "Meladur-Pressmasse" and is prepared from dicyandiamide and liquid ammonia and condensed with formaldehyde to form resinous products. The Meladur resins are actually melamine condensation resins, and -- like urea-formaldehyde resins -- they are employed in the manufacture of thermosetting molding compounds, coatings, and adhesives. Both the DiDi and Meladur plastics are produced by VEB Stickstoffwerk Piesteritz. Melamine production facilities at Piesteritz were constructed in 1951.

Evidence indicates that a urea-formaldehyde resin is produced at VEB Plasta, Kunstharz- und Pressmassefabrik Erkner (near Berlin). 273/ The available information, however, does not permit a quantitative estimate of production.

Estimated production of amino plastics in East Germany, by plant, in 1949-53 and 1955 is shown in Table 33.* There are no available data on which to base estimates for 1954.

f. Methacrylates.

Methacrylate plastics have unusual optical properties which make them ideal for aircraft enclosures and for many consumer items. In the US they are sold under the names of Lucite and Plexiglass. Methacrylate plastics were not manufactured in the East German area before World War II, but in 1953 small amounts were being made on a pilot-plant scale and were being offered to the dental profession under the name "Piacryl." At the same time, a plant was being built at VEB

* Table 33 follows on p. 81.

Table 33

Estimated Production of Amino Plastics in East Germany, by Plant
1949-53 and 1955

Metric Tons

Plant	Product	1949	1950	1951	1952	1953	1955
Piesteritz	"Piatherm" a/	450 b/	540 c/	1,500 d/	1,650 e/	1,800 f/	3,060 g/
Piesteritz	"DiDi-Pressmasse" h/	500 e/	1,250 c/	N.A.	1,600 e/	1,700 e/	1,800 f/
Piesteritz	"Meladur-Pressmasse" h/	0	0	N.A.	N.A.	300 i/	500 f/
Erkner	urea-formaldehyde resin	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total		950	1,790	1,500	3,250	3,800	5,360

a. The production figures were converted from cubic meters to metric tons. The density of "Piatherm" is 15 kilograms per cubic meter. 274/
b. 275/
c. Planned. 276/
d. 277/
e. 278/
f. 279/
g. Planned. 280/
h. The production figures are the amounts of actual resin used in molding powders only. The original figures were twice these amounts because the cellulose filler (wood flour) is about half of the weight in this type of molding powder.
i. Planned. 281/

Stickstoffwerk Piesteritz. This plant was reported to have produced 2 tons of Plexiglass during 1954. 282/ Planned production for 1960 at Piesteritz is 480 tons. 283/ The small quantity to be produced probably will be used in strategic products requiring optical-grade quality.

g. Polystyrene.

Polystyrene, a clear plastic used for insulation in electronic equipment and a variety of other products, is produced in East Germany by Bunawerke at Schkopau. The major use of styrene monomer, the basic material for the plastic, is in the manufacture of synthetic rubber, and the use of styrene for plastics is of secondary importance. A major part of the polystyrene produced probably is channelled into military uses. Production of polystyrene in East Germany has increased gradually in the postwar period -- 450 tons in 1947, 284/ 640 tons in 1949, 285/ 828 tons in 1950, 286/ 1,007 tons in 1952, 287/ and 1,946 tons in 1954. 288/ The planned production for 1953 was 1,500 tons 289/ and for 1955, 2,040 tons. 290/ Both plan goals probably were reached.

h. Cellulose Nitrate (Colloxylin).

The principal use of cellulose nitrate in East Germany is in the manufacture of flammable photographic film at VEB Filmfabrik Wolfen and VEB Kodak Filmfabrik Koepenick. Only a small quantity is used as a general-purpose molding material (celluloid plates). By the end of 1956 a large portion of the production of the East German film industry may be safety film made with cellulose acetate. More cellulose nitrate will then be available for plastics. Only one plant in East Germany produces cellulose nitrate, VEB Eilenburger Zelluloidwerke, at Eilenburg. Production has been fairly stable since 1950, when the plant produced 5,448 tons. 291/ Production in 1951 was 6,000 tons; 292/; in 1953, 6,400 tons; and in 1954, 6,181 tons. 293/ Planned production in 1955 was 5,960 tons. 294/

i. Polyamides.

Most of the polyamide produced in East Germany is obtained from caprolactam. Caprolactam is also spun into "Perlon" fibers, which are used in the manufacture of tire cords and parachute material. Perlon is similar to nylon but is made by a different chemical process. "Igamid," another polyamide possibly produced in East

Germany, is more nearly equivalent to nylon than is Perlon. Both Perlon, the caprolactam-based material, and Igamid, which is based on adipic acid and hexamethylenediamine, depend on phenol as a starting material, and a shortage of phenol in East Germany has limited production of both plastics. The only available quantitative data on production of polyamides refer to caprolactam. In 1953, VEB Leuna-Werke at Merseburg, the only plant producing caprolactam in East Germany, produced 2,700 tons. 295/ Production in 1954 was 3,183 tons, 296/ and planned production in 1955 was 4,815 tons. 297/

j. Polyvinyl Acetate.

A large number of plastics -- "Vinyls," dienes, styrenes, and acetates -- are derived from acetylene. In East Germany, VEB Chemische Werke Buna, Schkopau, produces a variety of plastic types, using calcium carbide as the source of acetylene. Vinyl acetate is one of the most useful of these types, but synthetic rubbers and polyvinyl chloride are also derived from acetylene and have had a production priority. Production of vinyl acetate, and, therefore, polyvinyl acetate has been subordinated -- at least until 1954. In 1953, East German plans called for production of only 60 tons, 298/ but production in 1954 was to have been 935 tons of vinyl acetate and 489 tons of polyvinyl acetate ("Vinalit"). 299/ Actual production figures for 1953 and 1954 are not available. The major use of polyvinyl acetate is in the manufacture of adhesives.

k. Summary of Production.

Estimated production of plastics in East Germany, by type, in 1953 is shown in Table 34.*

l. Research and Development.

In East Germany, work has been in progress on the development of polyethylene, fluorocarbon polymers, silicones, and other materials for synthetic fibers and plastics not produced there in large quantities. Because these items are of strategic importance, several of them are discussed briefly.

* Table 34 follows on p. 84.

Table 34

Estimated Production of Plastics in East Germany, by Type
1953

Metric Tons

Type	Amount
Polyvinyl chloride ("Igelit PCU")	36,734
Chlorinated polyvinyl chloride ("Igelit PC")	1,333
Phenolics ("Phenoplasts")	5,300 a/
Aminoplasts ("Piatherm" and others)	3,800
Polystyrene ("Styrol")	1,500
Cellulose nitrate ("Colloxylin")	6,400
Caprolactam (for "Perlon" products)	2,700
Polyvinyl acetate ("Vinalit")	60
Total	57,827

a. The major portion of production of phenolics for use as plastics is in the form of molding powder containing about 50 percent, by weight, of inert filler. The figure given is unfilled resin.

(1) Synthetic Fibers.

(a) Polyacrylonitrile is used in East Germany, to manufacture "Wolcrylon," which has similar properties to natural wool, and is called "Orlon" and "Acrilan" in the US. Acrylonitrile, derived from acetylene, is produced and polymerized to polyacrylonitrile by VEB Chemische Werke Buna, Schkopau. In 1955, VEB Filmfabrik (AGFA) Wolfen expected to produce 100 tons of Wolcrylon spun products, using Schkopau's polyacrylonitrile and dimethylformamide supplied by VEB Leunawerke. 300/ The Schkopau plant hopes to begin its own production of Wolcrylon during 1956. 301/ The production of Wolcrylon in East Germany is to be 720 tons in 1956, and a preliminary 1960 plan calls for 5,000 tons. 302/

(b) Heptamethylenediamine, a pimelic acid copolymer called "Trelon," is a polyamide structurally similar to nylon but which requires furfural, which is obtained from oat hulls and other farm products. Development of this new resin was made in the VEB Deutsches Hydrierwerk Rodleben 303/ and at the Teltow-Seehof Fiber Research Institute. 304/ The production of Trelon products (silk and fiber) was to begin early in 1955 at VEB Kunstfaserwerk "Wilhelm Pieck" at Schwarza. 305/ In some applications the properties of Trelon make it preferable to Nylon or Perlon.

(c) Polyester fibers, called "Lanon" in East Germany, "Terylene" in the UK, and "Dacron" in the US, are of great importance because of mechanical stability and resistance to chemicals. Basic research on this material has been done in the Teltow-Seehof Fiber Research Institute. 306/ Production of 18 tons was planned for 1955 and 1956 and of 1,800 tons for 1960. 307/ The starting materials for Lanon are believed to be terephthalic acid (via alkylation of toluene) and ethylene glycol.

(2) Fluorocarbons.

The plastic, called "Teflon" in the US, is essential for production of guided missiles and aircraft calling for plastic materials of a wide range of temperature tolerances. The VEB Elektrochemisches Kombinat in Bitterfeld has been responsible for the development of this polymer type. Methods used in the US have not been successful in East Germany, because of the lack of high-pressure polymerization reactors, but research work incorporating US practice has been in progress since 1954. 308/ Continuous efforts have been made by the Sino-Soviet Bloc to obtain the strategic and embargoed equipment from the West.

(3) Polyethylene.

Polyethylene, obtained from acetylene, is valuable because of its excellent electrical insulation properties, which make it useful for construction of high-frequency wire and cable used in radar and other electronic equipment. Because of the lack of high-pressure reactors, little progress in volume production has been made in East Germany, but a preliminary 1960 production plan calls for an output of 2,000 tons. 309/

(4) Cellulose Acetate.

After World War II, production of photographic film in East Germany continued on a fairly large scale using flammable cellulose nitrate as a film support material. A Soviet order, however, required that all X-ray film be made with nonexplosive materials, and the replacement of cellulose nitrate with cellulose acetate became necessary. From 1953 through 1954, imports of cellulose acetate and methylene chloride (a solvent) were scheduled to make the change possible. Insufficient supplies of acetic anhydride before 1955 precluded previous hopes to manufacture cellulose triacetate in large volume for significant production of photographic safety film. Sizable production of cellulose acetate ("acetyl cellulose" or cellulose triacetate) was scheduled to begin during 1955 at VEB Chemische Fabrik Finowtal at Finow/Eberswalde. No actual production figures are available, but the 1955 production plan was 420 tons. 310/ A tentative 1960 production goal for East Germany calls for 9,800 tons of cellulose triacetate, of which perhaps about one-half would be used by the varnish industry. 311/

(5) Silicones.

Although research on developing various silicone products has been continuing for several years, current production in East Germany is relatively insignificant. The only known producer of silicones in East Germany is VEB Schwefelsaeure- und Superphosphatwerk Nuenchritz (near Radebeul). Silicones retain their basic physical properties at high temperatures, and because they are inert and oxidation resistant, they make good protective coatings that resist weathering and the corrosive action of many chemicals. Most silicones are also water repellent and are excellent electrical insulators. Silicone products include varnishes, resins, oils, greases, and rubber substitutes. No actual production figures for silicones are available, but the Nuenchritz plant planned to produce 40 tons of silicones in 1955, of which 30 tons were to be varnish and 10 tons were to be an oil. 312/

(6) Epoxy Resins.

Since 1952 the laboratory for plastics of the German Academy of Sciences in Berlin has been developing different types of epoxy resins for use in industry. Early in 1956 the VEB Leuna-Werke "Walter Ulbricht" was to begin actual production of a thermosetting casting epoxy. 313/ This resin is intended to

replace a similar Swiss product called "Araldit," which is extremely expensive and which East Germany, because of its shortage of foreign currency, cannot procure in the necessary quantities. 314/ In the US, epoxy resins are active in the field of protective coatings because of their high resistance to water, detergents, and chemicals. The resins also are used widely as industrial adhesives, such as bonding aluminum to aluminum, and they are employed by electrical and electronic equipment manufacturers. A tentative East German 1960 production plan calls for 500 tons of epoxy resins. 315/

6. Pharmaceuticals.

During the 1949-53 period, total production of pharmaceuticals in East Germany increased steadily. The SAG and VEB plants accounted for a large part of the increase, the privately owned plants gradually falling behind. Production of pharmaceuticals in East Germany, by type of plant, in 1949-53 is shown in Table 35. Actual and planned production of selected pharmaceuticals in East Germany in 1953-55 is shown in Table 36.*

Table 35

Production of Pharmaceuticals in East Germany, by Type of Plant a/
1949-53

Million DME

Type of Plant	1949	1950	1951	1952	1953 b/
SAG	1.5	3.4	7.3	18.4	20.0
VEB	49.5	80.6	104.2	113.1	160.0
Privately owned	69.0	69.0	63.5	59.4	20.0
Total	120.0	153.0	175.0 c/	190.9 d/	200.0 e/

a. 316/ Production data for 1954 and 1955 are not available. The 1954 planned production was a value of 415 million DME, and the 1955 planned production was a value of 464 million DME. The plan figures are those established by the First Five Year Plan.
b. Figures for 1953 are estimated.
c. The planned total was 305 million DME, as established by the First Five Year Plan. 317/
d. The planned total was 335 million DME, as established by the First Five Year Plan. 318/
e. The planned total was 372 million DME, as established by the First Five Year Plan. 319/

* Table 36 follows on p. 88.

Table 36

Actual and Planned Production of Selected Pharmaceuticals in East Germany
1953-55

Product	Unit of Measure	Production					
		1953 [a]		1954		1955	
		Plan	Actual	Plan [a]	Actual [b]	Plan [c]	Actual
Penicillin	Billion units	3,244	3,414	3,248	3,107	4,100 [d]	3,401 [e] [f]
Chloromycetin	Kilograms	200	201	240	489	550 [d]	N.A.
Streptomycin	Kilograms	64	65	200	126	400 [d]	457 [e]
Sulfonamides	Metric tons	N.A.	56	N.A.	85	107.1 [d]	N.A.
Insulin	Million units	277	300	450	330	340 [d]	360 [e]
Morphine (pure)	Kilograms	2,260	2,720	77	N.A.	25 [a]	N.A.
Codeine	Kilograms	1,701	2,030	2,090	N.A.	2,400 [a]	N.A.
Acetylsalicylic acid	Metric tons	96.5	96.9	70.0	N.A.	100.0 [a]	N.A.
Sera	Liters	3,468	3,441	8,937	N.A.	9,000 [a]	N.A.

a. 320/
b. 321/
c. [redacted] 1955 production plans as follows: penicillin, 3,400 billion units; chloromycetin, 350 kilograms; streptomycin, 500 kilograms; sulfonamides, 82 metric tons; and insulin, 270 million units. 322/ 50X1
d. 323/
e. 324/
f. Production of penicillin in 1948 was 0.28 billion units; in 1949, 5.0 billion units; in 1951, 109.0 billion units; and in 1952, 2,874 billion units. 325/

B. Foreign Trade.

1. General.

According to the 1954 East German economic plan, gross exports of chemicals were to amount to about 350 million dollars, approximately 14 percent of the value of total planned production of chemicals. Imports in 1954 were to amount to about 70 million dollars. In recent years, the value of the annual surplus of exports over imports has ranged between 200 million and 300 million dollars.*

Official East German announcements of the trade plans, given in terms of rubles, may not include categories such as trade conducted by semiofficial firms engaged in illegal trading,** reparations shipments, and preferential exports to the USSR known as "T-shipments."*** In addition, the method of ruble valuation used in the official announcements understates the volume of both exports and imports in relation to domestic production measured in terms of domestic prices. The ruble unit values for intra-Bloc trade are derived primarily from the "world market prices" of 1950, actually the London or New York prices of that year, multiplied by four. 326/ An indication of the downward bias created by the ruble unit factor is given by the ruble-dollar ratio for Soviet prices of chemicals -- at least 13 to 1. This ratio should be fairly representative for the Soviet Bloc. Because East Germany is a net exporter of chemicals, the use of artificially low prices for intra-Bloc clearings requires payment of substantial government subsidies to exporters of chemicals.

For realistic assessment of the importance of East German trade in chemicals, a source is required which values trade in East German prices and which includes "extra-plan" trade activities. For 1954, such a source is available. A correlation of the information given in the 1954 East German plans for the over-all material balance

* German records show an export surplus of 500 million to 700 million DME (1944 constant prices). This figure has been converted to US dollars by use of the ratio 2-1/2 marks (Messwerte) equals $1.00.

** Chemipha and the DWV (Deutsche Warenvertriebsgesellschaft) are such companies, conducting both legal and illegal trade in chemicals.

*** "T-shipments" represent payment in goods to the USSR against Soviet credits. Such shipments appear to be at nominal prices and are given a higher priority than normal commercial shipments. In past years they have been poorly coordinated with the trade plan.

in chemicals* and in the 1954 official plan** for trade in chemicals gives an opportunity to adjust for some of the data previously excluded. Because the data given are those for the plans only, they serve only as a guide to the orders of magnitude involved. A comparison of East German plans for trade in chemicals in 1954 is shown in Table 37.***

The 1954 Materials Balance Plan probably includes valuations of exports and imports in domestic prices (in Messwerte), and is inclusive of subsidies and irregular trade channels.**** The 1954 Trade Plan, however, is based on nominal trade "plan prices" and does not incorporate the state subsidies that are paid to make up the difference between the cost of production and the final export price. The USSR, in particular, benefits from the pricing of East German exports with unrealistically low nominal ruble valuations.

Correlation of the Trade Plan and the Material Balance Plan indicates that the Trade Plan understates the volume of exports of chemicals by more than 500 million DME (Messwerte). Discrepancies concerning imports are not as great. The Trade Plan would not include certain illegal imports, and the Materials Balance Plan probably revalues imports at domestic prices. The net effect seems to be that the Trade Plan understates the planned volume of imports by 20 million DME (Messwerte).

Fulfillment of plans for trade in chemicals is contingent on many uncontrollable factors. Generally, East German import plans either have been reduced during the course of the year or have been

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* These plans, hereafter referred to as the Material Balance Plan, include the over-all distribution schedules, in terms of East German domestic valuations, and include more comprehensive data on the scale of exports than do the Trade Plans as such.

** These plans, hereafter referred to as the Trade Plan, include trade data in terms of nominal ruble valuations. Certain major categories of trade activities are not incorporated in the totals given.

*** Table 37 follows on p. 91.

**** A possible exception would be exports from the allocations made to the Technical Supply Offices associated with the Wismut Corporation.

Table 37

Comparison of East German Plans for Trade in Chemicals
1954

Disposition and Product	Material Balance Plan (1,000 DME, Messwerte) a/	Trade Plan (1,000 DME, Current) b/
Exports		
Basic chemicals	415,761	
Pharmaceuticals	71,378	
Rubber and asbestos	117,263	
Mineral oils and tar products	262,573	
Total	866,975	342,628
Imports		
Basic chemicals	92,391	
Pharmaceuticals	30,882	
Rubber and asbestos	20,377	
Mineral oils and tar products	26,352	
Total	170,002	149,496
Total export surplus	696,973	193,132

a. Valuation in current marks would be considerably higher. 327/

b. [redacted] data in rubles, which have been converted to marks by use of the official exchange rate governing after October 1953 -- 1 DME equals 1.8 rubles. The ruble evaluation of export items is nominal and is not related to costs. 328/ 50X1

underfulfilled, as they were in 1951, 1952, and 1953. 329/ The export plan was reported fulfilled in 1951 and underfulfilled in 1952. 330/

An estimate of the fulfillment of the 1952 East German export plan indicated that commodities classified as chemicals constituted 17 percent of the official exports. 331/ In 1954 the Material Balance Plan projected exports of chemicals as 14 percent of total East German production of chemicals. 332/ Of the exports of DIA-Chemie (the official chemical trade monopoly), the USSR received 45 percent, according to official data; 35 percent went to the other countries of the Soviet Bloc, and 20 percent went to the Free World. 333/ These data must be adjusted, however, for the subsidies on exports to the USSR, and the adjusted figures indicate that the USSR received from one-half to two-thirds, in terms of value, of the exports of chemicals. Such shipments are available either for Soviet consumption or for re-export.

As of January 1954, East German reparations to the USSR officially ceased. As a result, the 1954 Material Balance Plan may be considered reasonably accurate as to the extent of shipments of chemicals out of the country. Assuming that planned shipments are not lower than the combined exports, reparations, and T-shipments of chemicals for any preceding year, the plan would appear to set a ceiling of approximately 870 million DME* on such shipments. Perhaps two-thirds of this represents the value of annual shipments of chemicals from East Germany to the USSR,** including reparations.

2. Imports.

East Germany relies heavily on the USSR and the European Satellites to furnish chemical raw materials to sustain its large chemical industry. The most important of the commodities imported are several coal chemicals -- benzol, toluol, and naphthalene -- which are

* This value is in Messwerte, reflecting the 1944 price level. In terms of current prices, it would be significantly higher. An exchange ratio of 2-1/2 DME equals US $1.00 seems applicable to Messwerte, making this ceiling $348 million.

** The current share of the USSR would be somewhat lower, reflecting a shift in chemical trade to countries other than the USSR.

supplied by the USSR, Poland, and Czechoslovakia. Quantities of naphthalene also are obtained from the West. Another product, a coal chemical derivative called "aniline," is imported mainly from the USSR and Poland. Imports from the Free World include pyrites, some industrial chemicals, phosphate fertilizers, and many special-purpose chemicals.

Listed below are important chemical raw materials, compounds, and products most often noted in reports on East German imports:

Aniline
Barium carbonate
Borax
Carbon blacks
Caustic soda
Cellulose triacetate
Citric acid
Coal chemicals (benzol, toluol, and naphthalene)
Drugs, medicinals, and pharmaceuticals (aureomycin, insulin, streptomycin, sulfonamides, terramycin, sera, vaccines, vitamin A, and others)
Dyestuffs, intermediates, and pigments
Essential oils and perfume materials
Fatty acids and alcohols
Fine chemicals
Freons
Glycerin
Iron oxide (red)
Lead tetraethyl
Liquid fuels
Litharge (lead oxide)
Lithium compounds
Lithopone
Methylene chloride
Nickel sulfate
Naval stores (rosin and turpentine)
Phosphate rock and Kola apatite
Photogelatin
Plastics and synthetic resins
Pyrites
Rare gases
Red lead
Rubber, natural
Rubber products (tires, belting, and the like)
Salts and oxides of rare earths
Shellac
Soda ash
Sodium hydrosulfite
Sodium perborate
Sulfuric acid
Superphosphate
Tanning agents (vegetable)
Tartaric acid
Tin oxide
Titanium dioxide
Urea
Vegetable oils (linseed and castor)
Zinc white, oxide, chloride, and dust

The USSR is the largest Soviet Bloc exporter to East Germany In addition to coal chemicals, the USSR has exported natural rubber, rubber tires, tetraethyl lead, photogelatin, sulfuric acid, shellac, organic dyestuffs and intermediates, fine chemicals, pharmaceuticals, and naval stores.

Combined East German imports from the European Satellites are considerably less than imports from the USSR. In addition to coal chemicals, Poland supplies zinc white, and Czechoslovakia furnishes titanium dioxide, rubber tires, and various rubber products. Hungary's exports to East Germany are largely pharmaceuticals -- drugs, vaccines, and sera -- but rare gases and sulfuric acid have also been exported. Rumania has exported sulfuric acid and has supplied soda ash, caustic soda, carbon blacks, and glycerin. Bulgaria's exports have consisted mainly of sulfuric acid, glycerin, and drugs. No other European Satellite furnishes chemicals in significant amounts.

Free World (mostly Western European) exports to East Germany are important, but deliveries have frequently not been on schedule. There have been instances when East Germany, to insure deliveries, was willing to pay more than prevailing prices. In 1953, however, a shortage of hard currency accounted partly for the underfulfillment of the East German import plan. Trade with the Free World on the basis of bilateral barter agreements also has been extensive.

Some of the more significant commodities that have often appeared in East German lists of imports from the Free World are caustic soda, soda ash, superphosphate, photogelatin, naphthalene, borax, titanium dioxide, Blanc Fixe, cellulose triacetate, methylene chloride, polyvinyl acetate (Mowilith), pharmaceuticals and antibiotics, organic dyestuffs and intermediates, sodium hydrosulfite, tanning materials, and various fine chemicals. Nearly two-thirds of East Germany's pyrites requirements are supplied by imports from the West.

Complete data on actual East German imports of rubber products are not available, but planned imports for 1954 and 1955 are indicative of the character and volume of this trade. Planned imports of rubber products by East Germany in 1954-55 are shown in Table 38.*

* Table 38 follows on p. 95.

Table 38

Planned Imports of Rubber Products by East Germany
1954-55

Product	Unit	DME Value per Unit	Year 1954 a/	Year 1955 b/
Bicycle tires	Each	18	11,500	10,000
Conveyor belting	Square meters	48	10,000	10,000
Rubber strips c/	Tons	11,480	140	100
Auto tires	Each		2,000	
Miscellaneous products	Rubles		300,000	400,000

a. 334/
b. 335/
c. This probably refers to V-belting.

Although conveyor belting of special types is exported by East Germany, the item imported is reported to be of heavy construction, 1.8 meters or more in width, for use in coal mines. There appears to be a shortage of belting of this type in East Germany, and deficiencies in the brown coal industry have been attributed to this shortage. 336/ A similar shortage apparently exists in V-belting. A mid-year market analysis made in July 1954 reports V-belts in short supply, with the notation that "planned imports of 100,000 meters would relieve the situation." 337/ The same document reports motor vehicle tires as being in short supply, with "many motor vehicles idle due to a shortage of tires."

Imports of pharmaceutical products by East Germany in 1953 are shown in Table 39.* Imports of selected chemicals and chemical products by East Germany in 1949-56 are shown in Table 40.**

* Table 39 follows on p. 96.
** Table 40 follows on p. 97.

Table 39

Imports of Pharmaceutical Products by East Germany a/
1953

Exporting Country	Thousand DME Value
Sino-Soviet Bloc	
USSR	729.5
Bulgaria	188.2
Czechoslovakia	434.9
Hungary	1,432.2
Poland	151.2
Rumania	131.2
Communist China	8.2
Total	3,075.4
Free World	
Belgium	887.7
Denmark	818.0
Netherlands	617.6
Norway	150.0
Sweden	100.9
Switzerland	3,068.2
West Germany	1,650.8
UK	975.9
Total	8,269.1
Grand total	11,344.5 b/

a. 338/
b. The 1954 import plan was reported as 15,135,600 DME.

Table 40

Imports of Selected Chemicals and Chemical Products by East Germany a/
1949-56

Metric Tons (except as noted)

Product	1949	1950	1951	1952	1953	1954	1955	1956
Aniline	699	921 b/	1,100 c/	1,300 c/	1,686	1,939 d/	1,496	1,800 c/
Benzol (refined)	10,565	18,400 b/	20,500 c/	25,000 c/	27,000 c/	22,000 c/	43,500 c/	43,500 c/
Caustic soda	3,075	10,823 e/	3,727	13,000 c/	8,101	4,731 d/	0 c/	0 c/
Cellulose triacetate	N.A.	N.A.	N.A.	N.A.	1,200	1,550 c/	2,300 c/	2,300 c/
Naphthalene	21,511	16,939	18,600 c/	20,000 c/	20,500 f/	17,000 c/	17,680 c/	21,000 c/
Natural rubber	1,767	1,775	10,681	2,150	3,700	8,600	9,445	10,500 c/
Phosphate fertilizers (P_2O_5 content)	65,731	62,100 b/	42,483	34,175	24,150 b/	60,000 c/	50,759	60,000 c/
Soda ash	2,079	34,195	20,758	16,019	0 c/	0 c/	0 c/	0 c/
Sulfuric acid (100 percent acid basis)	1,360	0	0	8,407	9,621	7,700 c/	0 c/	0 c/
Toluol	261	3,700 c/	4,700 c/	5,400 c/	4,881 c/	3,200 c/	2,500 c/	3,500 c/
Motor vehicle tires g/	25,008	8,700 c/	10,000 c/	30,896	20,860	11,500 c/	62,586	50,000 c/

a. The data presented in this table were compiled from a great number of individual statistical reports which it would be impractical to include as source references.
b. This is the amount received during the first 9 months of the year.
c. Planned.
d. This is the amount received during 11 months of the year.
e. This is the amount received during the first 8 months of the year.
f. Planned. A second report advised of an import plan of 16,418 tons.
g. Numbers of vehicle tires are given in terms of units.

3. Exports.

East German exports of chemicals to the countries of the Sino-Soviet Bloc, especially to the USSR, are particularly significant. Commodities mentioned in trade agreements or reported in other shipments might indicate shortages or requirements in the Soviet economy. Alterations in trade patterns with Bloc countries could reflect economic trends, modifications in industrial emphasis, and even policy changes within those countries. Commodities exported to the Free World are of less strategic importance than are those shipped to countries of the Bloc, but the monetary return in currency or goods is greater.

The following chemicals and chemical products are known to be exported by East Germany:

Acetates (methyl, ethyl, isoamyl, and butyl)
Acetic acid anhydride
Acetone
Alcohols (ethyl, methyl, butyl, isobutyl, isoamyl, and isopropyl)
Aluminum sulfate and chloride
Amines (monomethyl and dimethyl)
Ammonia, liquid
Barium carbonate, chloride and nitrate
Benzoic acid
Bromine, liquid, and bromine salts
Calcium carbide
Calcium carbonate and chloride
Camphor
Caprolactam
Carbon blacks (acetylene and others)
Carbon disulfide
Carbon tetrachloride
Catalysts
Caustic potash
Caustic soda
Cellulose nitrate
Cryolite
Chlorates (sodium and potassium)
Chloride of lime
Chlorine, liquid
Chlorobenzenes and their derivatives
Chlorosulfonic acid
Coal chemicals (pure benzol, cresols, crude and pure phenol, pyridine, and xylenol fractions)
Detergents (Mersol and Mesamoll)
Drugs, medicinals, and pharmaceuticals (acetylsalicylic acid, barbiturates, caffeine, insulin, penicillin, phenacetin, salicylic acid, sulfa drugs, and others)
Dyestuffs, inorganic and organic

Ethyl benzol
Fatty acids, refined
Formaldehyde
Formic acid
Gases, liquefied
Gems, synthetic
Glycols (ethyl, diglycol, and ethylene)
Hexamethylenetetramine
Hydrochloric acid
Hydrogenated naphthalenes (tetralin and decalin)
Hydroquinone
Insecticides and pesticides (arsenic compounds, DDT, Wofatox, BHC, and Selinon)
Ion-exchange resins (Wofatite)
Lacquers and varnishes
Liquid fuels (gasolines, jet fuels, diesel fuels, brown coal tar, and others)
Lithopone
Magnesium chloride, carbonate, and oxide
Nitrates (sodium and potassium) (technical grade)
Nitric acid
Nitrogen fertilizers (ammonium sulfate, calcium-ammonium nitrate, calcium cyanamide, and sodium nitrate)
Oxalic acid
Paraldehyde-ethyl alcohol mixture
Pentaerythritol
Perfumes
Phosphoric acid
Phosphorus, red and yellow
Phthalic anhydride
Photographic film (black/white and color), paper, and photochemicals
Plastics and products (DiDi, phenol, and melamine molded products; Perlon; Perfol; Piatherm; polystyrene; polyvinyl chloride; polyvinyl acetate; and others)
Potassium bichromate and carbonate
Potassium fertilizers
Potassium ferric- and ferrocyanides
Potassium permanganate
Pyrotechnics
Rubber chemicals (accelerators and others)
Rubber products (tires, conveyor belting, and others)
Rubber, synthetic
Saccharin
Salicylic acid
Silicon carbide
Soda ash (calcined soda)
Sodium cyanide
Sodium metal
Sodium nitrite
Sodium sulfate and sulfide
Softeners (Palatinole, tricresyl phosphate, and others)
Solvents, organic (cyclohexanone, cyclohexanol, and methylhexalin)
Sulfur
Sulfuric acid
Trichloroethylene
Trisodium phosphate
Waxes and paraffins
Weed killer (2, 4-D)

Some of the important chemical products shipped to the USSR are calcium carbide, caustic potash, alcohols (methanol and ethyl), acetic acid, acetone, synthetic rubber and rubber products, phthalic anhydride and phthalates, ethyl benzol, paraldehyde-ethyl alcohol

mixture, chlorobenzenes, insecticides and pesticides, sulfur, photographic films and paper, and crude and pure phenol, liquid fuels, chlorates, catalysts, and various plasticizers. In addition, the export of plastics and resins and fabricated plastic materials to the USSR is large and is a steady drain on the East German economy.

Other countries of the Sino-Soviet Bloc, are dependent on East Germany for various chemical products. These countries import large volumes of unexposed photographic films and related materials, insecticides (especially DDT), and organic dyestuffs. Nitrogen fertilizers are shipped principally to Poland, Czechoslovakia, and China. Poland is the largest importer of liquid chlorine and chlorinated chemicals and motor vehicle tires. Polyvinyl chloride is exported mainly to Poland, Czechoslovakia, and Hungary. The manufacture of synthetic fuels in Czechoslovakia has been dependent on the East German supply of catalysts.

Some of the commodities exported to the Free World, particularly to Western Europe, have been ammonium sulfate and potassium fertilizers, photographic film and photochemicals, chlorinated chemicals, polyvinyl chloride, glycols, bromine (liquid), butanol, cresols and xylenol, pyridine, and tricresyl phosphate (a plasticizer). During 1954, East Germany concluded a number of trade agreements with industrially underdeveloped countries in the Far East (Indonesia and India), Near East (Turkey and Egypt), and South America (Argentina and Uruguay). Chemicals and allied products will be exported to these countries in return for agricultural products and raw materials.

East German exports of synthetic rubber are probably distributed to various countries of the Sino-Soviet Bloc, including the USSR, on a basis determined in Moscow. The 1953 export plan called for the following tonnage distribution of 29,400 tons of East German synthetic rubber 339/:

Country	Amount
USSR	15,000
Czechoslovakia	1,863
Poland	1,408
Hungary	564
West Germany	5
Unspecified	10,560

In 1954, East Germany planned to export 42,325 tons of synthetic rubber, or 63.8 percent of its 1954 output. 340/

East Germany also exports finished rubber products. The quantities and prices paid are determined by the East German State Planning Commission with the approval of the USSR. Data on actual exports are not available, but planned exports during a recent year indicate the scope of the export program. Planned exports of rubber products by East Germany in 1954 are shown in Table 41.

Table 41

Planned Exports of Rubber Products by East Germany a/
1954

Product	Unit	Number of Units	Value per Unit (Rubles)	Total Value (Thousand Rubles)
Buna S3 and SS	1,000 tons	34.225	2,204,000	75,431
Pervinin and plasticator	Tons	150	3,740	561
Rubber work boots	1,000 pair	100	7,000	700
Vehicle tires				
Truck tires	1,000 units	56	155,000	8,680
Automobile tires	1,000 units	15	40,000	600
Motorcycle tires	1,000 units	2		
Bicycle tires, complete	1,000	150	8,600	1,290
Conveyor belting	1,000 square meters	80	20,370	1,629.6
Various rubber products				5,921
Total value				94,812.6

a. 341/

The 1954 plan for exports of rubber products by East Germany, in effect in March 1954, was subsequently changed, and the planned exports of Buna became 42,325 tons, which, at the price shown in Table 41, would have a value of 93,284,300 rubles. The prices fixed by the USSR are the amounts credited to the East German export account and bear no relation to either cost of production or world market prices. In addition to the commodities listed in Table 41, East Germany supplies other countries of the Sino-Soviet Bloc with rubber hose. Planned 1955 exports of rubber hose were valued at 10 million rubles. 342/

Data on East German exports of pharmaceutical products are incomplete, but a partial list of 1954 planned exports is available and will indicate the general magnitude of shipments. Planned exports of pharmaceutical products by East Germany in 1954 are shown in Table 42.

Table 42

Planned Exports of Pharmaceutical Products by East Germany a/ 1954

Importing Country	Thousand DME Value
Sino-Soviet Bloc	
USSR	N.A.
Albania	N.A.
Bulgaria	3,089.5
Czechoslovakia	552.7
Hungary	792.6
Poland	1,085.7
Rumania	20.5
Communist China	7,720.9
North Korea	3,769.8
Total	17,031.7

a. 343/

Table 42

Planned Exports of Pharmaceutical Products by East Germany 1954 (Continued)

Importing Country	Thousand DME Value
Free World	
Belgium	532.4
Denmark	249.3
Finland	195.0
India	75.0
Netherlands	314.2
New Zealand	132.5
Norway	0.1
Switzerland	666.8
UK	33.0
US	77.0
West Germany	63.9
Total	2,339.2
Grand total	19,370.9

Exports of selected chemicals and chemical products by East Germany in 1949-56 are shown in Table 43.*

* Table 43 follows on p. 104.

Table 43

Exports of Selected Chemicals and Chemical Products by East Germany a/*
1949-56

Metric Tons

Product	1949	1950	1951	1952	1953	1954	1955	1956
Ammonium sulfate (as nitrogen)	N.A.	31,000	33,921	40,552	55,700 b/	54,000	72,311	N.A.
Benzol (refined)	0	0	0	0	550	4,000 b/	6,500 b/	4,000 b/
Calcium-ammonium nitrate (as nitrogen)	N.A.	5,000	4,922	7,901	10,000 b/	10,000 b/	10,670	N.A.
Calcium carbide	10,000 b/	14,349	34,728	26,247 c/	36,000 b/	33,000 b/	30,958	0 b/
Calcium cyanamide (as nitrogen)	N.A.	0	1,897	1,208	1,000 b/	1,240	1,791	N.A.
Caprolactam	0	0	0	0	0	220	468	300 b/
Caustic potash	2,000 b/	N.A.	2,332	1,571	3,331 d/	5,000 b/	7,500 b/	7,500 b/
Caustic soda	0	0	2,391	7,056	500 b/	1,000 b/	7,282	13,000 b/
Chlorine (liquid)	2,800 b/	N.A.	8,376	8,172	6,500 b/	2,000 b/	7,546	0 b/
Cresol	N.A.	1,600	1,914	1,761	1,300 b/	1,100 b/	1,500 b/	1,700 b/
DDT (100 percent DDT basis)	N.A.	N.A.	1,210 b/	2,971	3,149 b/	4,725 b/	2,400 b/	2,000 b/
Ethyl benzol	N.A.	5,000	9,000	6,012	5,200 b/	0 b/	3,950 e/	4,000 b/
Hydrochloric acid	N.A.	N.A.	224	1,381	521 d/	N.A.	204	200 b/
Methanol	1,120 b/	10,040	17,000 b/	6,546	7,000 b/	17,548	19,897	19,000 b/
Monochlorobenzene	N.A.	186	500 b/	1,005	500 b/	1,000 b/	1,000 b/	1,000 b/
Nitric acid	N.A.	500	1,115	83	1,500 b/	1,500 b/	1,505	1,500 b/
Nitrogen fertilizers (as nitrogen)	67,785	36,000	47,559	51,560	40,000 b/	45,000 b/	84,772	N.A.
Palatinols (phthalate esters)	N.A.	427	445	125	900 b/	915 b/	1,133	1,300 b/
Phenol (pure)	N.A.	696	1,161	230 f/	660 f/	50 b/	75 b/	750 b/
Phthalic anhydride	840 b/	2,162	4,150	N.A.	5,100 b/	5,200 b/	5,242	5,600 b/
Polyvinyl chloride	N.A.	3,500	6,225	8,850	10,200 b/	12,000 b/	12,001	12,000 b/
Potash (potassium carbonate)	4,500 g/	9,744	11,184	6,735	6,000 b/	8,000 b/	9,000 b/	10,000 b/

* Footnotes for Table 43 follow on p. 105.

Table 43

Exports of Selected Chemicals and Chemical Products by East Germany a/
1949-56
(Continued)

Metric Tons

Product	1949	1950	1951	1952	1953	1954	1955	1956
Potassium fertilizers (as K_2O)	875,000 h/	917,000	990,283	803,648	925,000 h/	957,000	1,000,882	970,000 b/
Soda ash (calcined soda)	10,000 g/	N.A.	N.A.	178 i/	20,000 b/	45,000 b/	79,110	80,000 b/
Sodium nitrate (as nitrogen)	300 b/	0	1,052	1,900	2,000 b/	2,000 b/	582	480 b/
Sulfuric acid (as 100 percent acid)	475	12,260	1,290	126 j/	0	14,700 b/	37,764	12,250 b/
Synthetic rubber	15,799	16,900	24,300	28,000	29,400	38,000 h/	39,103	38,500 b/
Toluol	0	0	0	1,353	220	N.A.	0 b/	0 b/
Tricresyl phosphate	100 b/	300 b/	583	754	1,500 b/	1,500 b/	1,829	2,040 b/

a. The data presented in this table were compiled from a great number of individual statistical reports

50X1

b. Planned.
c. The export plan was 30,000 tons.
d. Delivered during the first 7 months of the year.
e. Planned. The alternate plan is 2,950 tons.
f. Delivered during the first 6 months of the year.
g. The planned amount to be delivered as reparations.
h. Estimated.
i. Delivered as reparations during the first 6 months of the year.
j. Shipped as reparations only.

C. Stockpiling.

The magnitude of state reserves of chemicals and chemical products in East Germany is not known. The various chemical products stored in depots and warehouses in East Germany are intended to serve not only as a reserve for the paramilitary police (Kaserne Volks-Polizei, KVP) but also as a cushion for unexpected changes in the economic plan, failures of imports, epidemics, and other contingencies.

It has been reported that the reserves are built up primarily on a quarterly plan worked out by the Council of Ministers and implemented by the State Secretariat administering the reserves. Planned reserves may be augmented when a favorable import agreement is concluded or when there is an unexpected surplus in any particular commodity. Issues from the reserves are made only when replacements are available -- except issues made to the KVP. The date of replacement is decided by the Council. To keep stocks rotating, especially those stocks subject to deterioration in storage, issues are also "offered" with a demand for their return at a later date. 344/

On 10 August 1953 the Council of Ministers established an operational reserve for finished pharmaceutical and medical supplies under the authority of the Ministry for Health. These supplies were to be withdrawn from the state reserves and would then be available in the operational reserve for immediate distribution in the event of an emergency. The state reserves were to retain certain raw materials and basic products which could be made available to manufacturers of finished pharmaceuticals to avoid shutdowns, in case the flow of these materials was interrupted. 345/ State reserves of chemicals and chemical products in East Germany in 1953-55 are shown in Table 44.*

The data shown in Table 44 is incomplete, and the East German stockpile of chemicals and chemical products probably is much greater than the table indicates. Reserves of medical and pharmaceutical products, for example, were valued at about 15 million DME in 1953, and additional products valued at 4 million DME were to be added in 1954. 346/

* Table 44 follows on p. 107.

Table 44

State Reserves of Selected Chemicals and Chemical Products in East Germany
1953-55

Product	Unit	Amount				
		On 1 January 1953 a/*	1953 Plan b/	On 1 January 1954 c/	1954 Plan d/	1955 Plan e/
Acetic acid anhydride	Tons				10	
Acetone	Tons	10			1	
Acetyl salicylic acid	Tons		10			
Aniline	Tons				15	
Borax	Tons	853		153		
Calcium carbide	Tons	50				
Caustic soda	Tons	2,491	650 f/	565		500
Insulin	Million units			105		
Iodine, pure	Tons		2		8	
Lead tetraethyl	Tons		97 f/			
Methylene chloride	Tons				2	
Morphine hydrochloride	Kilograms			50		
Penicillin	Billion units			800		
Phenacetin	Tons		5			
Phenol	Tons				40	
Rubber, natural	Tons	871	20 f/	532		
Rubber, synthetic	Tons	1,000		372		

* Footnotes for Table 44 follow on p. 109.

Table 44

State Reserves of Selected Chemicals and Chemical Products in East Germany
1953-55
(Continued)

Product	Unit	Amount				
		On 1 January 1953 a/	1953 Plan b/	On 1 January 1954 c/	1954 Plan d/	1955 Plan e/
Rubber products						
Motor vehicle tires, unspecified	Units	44,000 g/	9,000 f/			
Automobile tires	Units			2,637		
Automobile inner tubes	Units			5,369		
Truck tires	Units			168		
Truck inner tubes	Units			3,902		
Motorcycle tires	Units			1,278		
Motorcycle inner tubes	Units			472		
Shellac	Tons	15				
Soda ash	Tons	1,005				
Streptomycin	Kilograms			45	24	
Titanium dioxide	Tons	65		65		
Turpentine	Tons	482				
Vitamins C and B_1	Kilograms			260		
Zinc white	Tons	250				

Table 44

State Reserves of Selected Chemicals and Chemical Products in East Germany
1953-55
(Continued)

a. 347/
b. 348/
c. 349/
d. The plan for medical and pharmaceutical supplies of the state reserves. 350/
e. The planned additions only to the state reserves. 351/
f. The planned additions to the state reserves in the fourth quarter of 1953.
g. 352/

D. Material Balances.

The estimated material balances for selected chemicals and chemical products in East Germany in 1952-56 are shown in Table 45.*

* Table 45 follows on p. 111.

Table 45

Estimated Material Balances for Selected Chemicals and Chemical Products in East Germany a/*
1952-56

Metric Tons (except as noted)

Commodity	Year	Production	Imports	Available in Stockpile	Gross Supply b/	Exports	Net Supply c/
Sulfuric acid (100 percent acid basis)	1952	362,290	8,407	0	370,697	126	370,600
	1953	423,360	9,621	0	432,981 d/	0	433,000
	1954	531,300	7,700	0	539,000	14,700	524,300
	1955	594,000	0	0	594,000	37,764	556,200
	1956	620,000	0	0	620,000	12,250	607,800
Synthetic ammonia (as nitrogen)	1952	278,000	0	0	278,000	Negligible	278,000
	1953	290,000	0	0	290,000	0	290,000
	1954	313,900	0	0	313,900	0	313,900
	1955	335,000	0	0	335,000	165	334,800
	1956	350,000	0	0	350,000	206	349,800
Nitric acid	1952	246,091	0	0	246,091	83	246,000
	1953	254,284	0	0	254,284	1,500	252,800
	1954	268,788	0	0	268,788	1,500	267,300
	1955	280,000	0	0	280,000	1,505	278,500
	1956	300,000	0	0	300,000	1,500	298,500

* Footnotes for Table 45 follow on p. 116.

Table 45

Estimated Material Balances for Selected Chemicals and Chemical Products in East Germany a/
1952-56
(Continued)

Metric Tons (except as noted)

Commodity	Year	Production	Imports	Available in Stockpile	Gross Supply b/	Exports	Net Supply c/
Calcium carbide	1952	690,395	0	0	670,395	26,247	664,100
	1953	702,400	0	Negligible	702,400	30,000 f/	672,400
	1954	735,374	0	N.A.	735,374	35,000 f/	700,400
	1955	820,000	0	N.A.	820,000	30,958	789,000
	1956	860,000	0	N.A.	860,000	0	860,000
Caustic soda	1952	208,875	13,000	N.A.	221,875	7,056	214,800
	1953	221,162	8,101	2,491	231,754	500	231,300
	1954	227,699	4,731	565	232,995	1,000	232,000
	1955	258,000	0	N.A.	258,000	7,282	250,700
	1956	270,000	0	N.A.	270,000	13,000	257,000
Soda ash	1952	190,834	16,019	N.A.	206,853	178	206,700
	1953	296,561	0	1,005	297,566	20,000	277,600
	1954	372,024	0	N.A.	372,024	45,000	327,000
	1955	458,000	0	N.A.	458,000	79,110	378,900
	1956	490,000	0	N.A.	490,000	80,000	410,000
Chlorine	1952	194,000	0	0	194,000	8,172	185,800
	1953	201,000	0	0	201,000	5,000 f/	196,000
	1954	202,932	0	0	202,932	2,000	200,900
	1955	212,000	0	0	212,000	7,546	204,500
	1956	215,000	0	0	215,000	0	215,000

Table 45

Estimated Material Balances for Selected Chemicals and Chemical Products in East Germany a/
1952-56
(Continued)

Metric Tons (except as noted)

Commodity	Year	Production	Imports	Available in Stockpile	Gross Supply b/	Exports	Net Supply c/
Benzol (refined)	1952	10,300	25,000	0	35,300	0	35,300
	1953	10,800	27,000 f/	0	37,800	550	37,300
	1954	11,300	22,000	0	33,300	4,000	29,300
	1955	11,900	43,500	N.A.	55,400	6,500	48,900
	1956	12,300	43,500	N.A.	55,800	4,000	51,800
Toluol	1952	3,460	5,400	0	8,860	1,353	7,500
	1953	3,600	4,880	0	8,480	220	8,300
	1954	3,600	3,200	0	6,800	N.A.	6,800
	1955	3,600	2,500	N.A.	6,100	0	6,100
	1956	3,900	3,500	N.A.	7,400	0	7,400
Naphthalene	1952	4,700	20,000	0	24,700	0	24,700
	1953	4,826	19,300 f/	0	24,126	0	24,100
	1954	5,100	17,000	0	22,100	0	22,100
	1955	5,300	17,680	N.A.	22,980	0	22,980
	1956	5,400	21,000	N.A.	26,400	0	26,400
Phenol (refined)	1952	9,250	0	0	9,250	230 e/	9,000
	1953	10,200	0	0	10,200	900 f/	9,300
	1954	11,400	0	0	11,400	50	11,400
	1955	12,700	0	0	12,700	75	12,600
	1956	13,500	0	0	13,500	750	12,800

Table 45

Estimated Material Balances for Selected Chemicals and Chemical Products in East Germany a/
1952-56
(Continued)

Metric Tons (except as noted)

Commodity	Year	Production	Imports	Available in Stockpile	Gross Supply b/	Exports	Net Supply c/
Nitrogen fertilizers (as nitrogen)	1952	258,316	0	0	258,316	51,561	206,800
	1953	264,587	0	0	264,587	67,000 f/	197,600
	1954	276,681	0	0	276,681	70,000 f/	206,700
	1955	293,000	0	0	293,000	84,772	208,200
	1956	300,000	0	0	300,000	85,000 f/	215,000
Phosphorus fertilizers (as P_2O_5)	1952	37,133	34,175	0	71,308	0	71,300
	1953	72,310	30,000 f/	0	102,310	0	102,300
	1954	79,203	39,000 f/	0	118,203	0	118,200
	1955	80,000	50,759	0	130,759	0	130,800
	1956	110,000	50,000 f/	0	160,000	0	160,000
Potassium fertilizers (as K_2O)	1952	1,331,690	0	0	1,331,690	803,648	528,000
	1953	1,378,000	0	0	1,378,000	925,000 f/	453,000
	1954	1,463,200	0	0	1,463,200	957,000	506,200
	1955	1,550,000	0	0	1,550,000	1,000,882	549,100
Synthetic rubber	1952	56,300	0	N.A.	56,300	28,000	28,300
	1953	64,097	0	1,000	65,097	29,400	35,700
	1954	66,323	0	372	66,695	38,000 f/	28,700
	1955	70,936	0	N.A.	70,936	39,103	31,800
	1956	74,000	0	N.A.	74,000	38,500	35,500

Table 45

Estimated Material Balances for Selected Chemicals and Chemical Products in East Germany a/
1952-56
(Continued)

Metric Tons (except as noted)

Commodity	Year	Production	Imports	Available in Stockpile	Gross Supply b/	Exports	Net Supply c/
Motor vehicle tires g/	1952	772,300	30,896	N.A.	803,196	34,800	768,400
	1953	916,000	20,860	44,000	980,860	19,000	961,900
	1954	1,139,700	11,500	4,083	1,155,283	146,000	1,009,300
	1955	1,300,000	62,586	N.A.	1,362,586	10,700	1,351,900
	1956	1,410,000	50,000	N.A.	1,460,000	N.A.	1,460,000
Polyvinyl chloride	1952	35,122	0	0	35,122	8,850	26,300
	1953	36,734	0	0	36,734	10,200	26,500
	1954	39,579	0	0	39,579	12,000	27,600
	1955	42,000	0	0	42,000	12,000	30,000
	1956	44,000	0	0	44,000	12,000	32,000
Penicillin h/	1952	2,874	0	N.A.	2,874	0.34	2,900
	1953	3,414	0	N.A.	3,414	N.A.	3,400
	1954	3,107	0	800	3,907	1,500	2,400
	1955	3,401	0	N.A.	3,401	1,100	2,300
	1956	4,000	0	N.A.	4,000	0	4,000

Table 45

Estimated Material Balances for Selected Chemicals and Chemical Products in East Germany a/
1952-56
(Continued)

a. Explanatory bases for figures given in this table are to be found under the appropriate sections of this report: Production, Imports, Exports, and Stockpiles. In general, material balances for 1954-56 are less accurate than for 1952 and 1953 because of a lack of complete trade information.
b. Gross supply is the sum of domestic production, imports, and stockpile.
c. Net supply is the difference between gross supply and exports. The figures are rounded.
d. Reported [redacted] as 429,970 tons. 353/ 50X1
e. The reported actual shipments during the first 6 months of the year.
f. Estimated.
g. Quantities for motor vehicle tires are given in number of units.
h. Quantities for penicillin are given in billion units.

III. Consumption and Distribution.

A. General.

The chemical industry of East Germany supplies other industries with raw materials and semifinished products such as acids and alkalies, salts, organic compounds, solvents, compressed gases, and pigments and dyes and fulfills its own requirements for the production of chemical products -- explosives, fertilizers, drugs and medicines, synthetic liquid fuels, synthetic rubber and rubber products, synthetic fibers, paints, dyes, detergents and cleansing agents, plastic materials, pesticides, and the like.

The products of the chemical industry are used by industries that produce durable goods such as electrical equipment, motor vehicles and other transportation equipment, building materials, metal products, and furniture, and by industries that manufacture nondurable materials such as food and beverages, leather goods, textiles, and paper and rubber products. The following discussion of the use patterns of some chemicals and chemical products shows how the East German chemical industry is integrated with the national economy.

B. Industrial Chemicals.

1. Sulfuric Acid.

Consumption of sulfuric acid is a measurement of the industrial development of a country. The acid is vital to the production of fertilizers, steel products, liquid fuels, chemicals, explosives, synthetic fibers, plastics, insecticides, dyes, paint pigments, and storage batteries, and to the processing of nonferrous metals.

The postwar sulfuric acid industry in East Germany could not satisfy domestic requirements, and it was necessary to import sulfuric acid and to curtail production in some industries requiring sulfuric acid. Because of the acid shortage, the trend has been toward reorienting the phosphate industry away from superphosphate to other phosphate fertilizers which do not require sulfuric acid. The shortage of acid was so critical during 1953 that the East German Council of Ministers ordered cuts in the production of superphosphate to avoid underfulfilled allocation quotas of sulfuric acid at key industrial plants that otherwise would extend production failures to equally vital manufacturing sectors of the economy. 354/

The use pattern for sulfuric acid in East Germany is considerably different from the use patterns in most other countries. In East Germany during 1953 the manufacture of viscose rayon fiber and staple ("Zellwolle") consumed the largest share of the available supply of sulfuric acid, about 32 percent. In contrast, the German Federal Republic used about 16 percent of its available sulfuric acid in the textile industry in 1953, and other countries -- including the US, the UK, France, and Italy -- used still lesser amounts, on a percent-of-total basis. 355/ The USSR consumed about 2 percent of its available sulfuric acid for the manufacture of rayon.

The manufacture of superphosphate and ammonium sulfate (chiefly the coke-byproduct type) fertilizers is the second largest consumer of sulfuric acid in East Germany and required nearly 26 percent of the supply available in 1953. West Germany used about 42 percent of its total 1953 production of sulfuric acid for fertilizers, about 30 percent for ammonium sulfate, and 12 percent for superphosphate; the US used about 40 percent of its 1953 total for fertilizers, 35 percent for superphosphate; the UK about 45 percent, 28 percent for superphosphate; France about 57 percent, 40 percent for superphosphate; and Italy about 50 percent. 356/ Very little sulfuric acid is required in East Germany to produce ammonium sulfate, almost all of which is manufactured by using gypsum (anhydrite) as the raw material.

The Soviet-owned firm of "Technisches Kontor" (Wismut A.G.) at Karl-Marx-Stadt (Chemnitz), which is concerned with the mining and processing of uranium ores, is a large consumer of sulfuric acid in East Germany. About 21 percent of the supply of acid available in 1953 was used by this firm in processing ore. Deliveries to Wismut A.G. receive high priorities, at the expense of the domestic economy.

The estimated consumption pattern for sulfuric acid in East Germany in 1953 is shown in Table 46.*

2. Synthetic Ammonia.

Ammonia is sold in East Germany as anhydrous liquid ammonia, aqueous ammonia (25 to 28 percent ammonia content), and as ammonium sulfate. Commercial anhydrous ammonia is used for the manufacture of nitric acid, nitrate fertilizers, ammonium nitrate (for explosives), and of other chemicals and products. A grade of higher purity

* Table 46 follows on p. 119.

Table 46

Estimated Consumption Pattern for Sulfuric Acid in East Germany 1953

Use	Amount a/ (Metric Tons) b/	Percent of Total
Viscose rayon fiber and staple	138,060 c/	32.1
Fertilizers	110,250 d/	25.7
Uranium ore processing by Wismut A.G.	88,200	20.5
Mineral oil and liquid fuels industry	20,820 e/	4.8
Miscellaneous		
Hydrofluoric acid	11,760	2.7
Explosives	5,420 f/	1.3
DDT (insecticide)	5,380 g/	1.3
Caprolactam	4,800 h/	1.1
Miscellanous chemicals and other industrial uses	38,600 i/	9.0
Addition to stocks	6,610	1.5
Total	429,970	100.0

a. All amounts given in this table are as reported except as otherwise noted. 357/

50X1

b. Tonnage is given in terms of 100 percent acid.

c. This figure may be broken down as follows: fiber, 23,030 tons; staple, 115,030 tons.

d. This figure may be broken down as follows: superphosphate fertilizer, 105,720 tons; other fertilizers (mostly ammonium sulfate), 4,530 tons.

e. This is the total amount consumed for all products, including carburetor and diesel fuels, basic coal chemicals, and other byproducts, produced by plants under the Main Administration for Liquid Fuels.

f. The estimate is based on an estimated production of 2,000 tons of TNT (trinitrotoluene) and 1,100 tons of DNT (dinitrotoluene). The 1954 production plan was 2,040 tons of TNT (requiring 3,030 tons of acid) and 1,420 tons of DNT (requiring 2,910 tons of acid). Thus, the total acid required was 5,940 tons (as 100 percent acid). 358/

Table 46

Estimated Consumption Pattern for Sulfuric Acid
in East Germany
1953
(Continued)

g. The total 1953 production quota for DDT was 6,600 tons (100 percent effective DDT content). 359/ To produce 1 ton of DDT, 0.815 ton of sulfuric acid (as 100 percent acid) is required. This input factor was employed in the 1953 production plans of the largest East German DDT manufacturing plant, located at Bitterfeld. 360/

h. Caprolactam is the starting material for producing Perlon, a nylon-type material. Estimated 1953 caprolactam output (gross) was 2,700 tons. The reported 1954 acid requirement for 1 ton of caprolactam was 1.776 tons (as 100 percent acid). 361/

i. This is a residual value obtained by difference. Estimated consumption of sulfuric acid by the steel industry in pickling operations is less than 1 percent of the total acid consumed in East Germany.

(99.9 percent ammonia content) is used by the refrigeration industry. Aqueous ammonia is used in making ammonium sulfate and other ammonium salts, soda ash, caprolactam, cuprammonium rayon, textile products, and yeast and for other industrial purposes.

In 1953 there were no reported exports of synthetic ammonia by East Germany, and all domestic production, estimated as 290,000 tons (nitrogen content), probably was consumed within the country. About 90 percent, 260,000 tons, of the total was consumed in the manufacture of nitrogen fertilizers,* including ammonium sulfate and nitrate types. This amount includes the nitric acid, also made from ammonia, required in the production of the nitrate fertilizers. It is estimated that in 1953 the amount of synthetic ammonia consumed in the manufacture of industrial explosives, about 2.8 percent of the available supply, was about 8,200 tons (nitrogen content). This includes both ammonia used directly and ammonia required for the nitric acid used to make ammonium nitrate (technical grade)

* In 1953 the USSR consumed about 49 percent of the total Soviet available supply for the manufacture of fertilizers. 362/

and mixed acids for nitrating purposes. The remainder of the total available supply of ammonia, 21,800 tons (nitrogen content), was used to produce nitric acid for industrial purposes and for various nitrate chemicals, to produce other chemicals and industrial products, and for commercial refrigeration.

The estimated consumption pattern for synthetic ammonia in East Germany in 1953 is shown in Table 47.

Table 47

Estimated Consumption Pattern for Synthetic Ammonia in East Germany 1953

Use	Amount (Metric Tons) a/	Percent of Total
Synthetic ammonium sulfate (fertilizer)	147,500 b/	50.9
Nitric acid	75,700 c/	26.1
Nitrate fertilizers	51,100 d/ e/	17.6
Ammonium nitrate (for explosives)	2,700 d/ f/	0.9
Other nitrates	3,000 g/	1.0
Caprolactam h/	2,500 i/	0.9
Other chemical and industrial uses and losses j/	7,500 k/	2.6
Total	290,000	100.0

a. Tonnage is given in terms of nitrogen content.
b. The estimate is based on an estimated output of 143,000 tons N (nitrogen) of synthetic ammonium sulfate, using an ammonia factor of 1.0315 tons N per ton of product.
c. The estimate is based on a reported output of 254,300 tons of nitric acid (100 percent acid basis), using an ammonia factor of 0.2977 ton N per ton of product.
d. This figure excludes nitric acid required in the manufacture.
e. The estimate is based on the sum of ammonia quantities required for the manufacture of calcium-ammonium nitrate and potassium-ammonium nitrate, and a total reported fertilizer output of 99,936 tons N, using an ammonia factor of 0.5115 ton N per ton of product.

Table 47

Estimated Consumption Pattern for Synthetic Ammonia
in East Germany
1953
(Continued)

f. The estimate is based on a reported output of 5,306 tons N of ammonium nitrate (technical grade), using an ammonia factor of 0.5115 ton N per ton of product.
g. This is an estimate of ammonia (as N) required for the manufacture of all other nitrates produced from ammonia.
h. Caprolactam is the starting material for the manufacture of Perlon, a synthetic similar to nylon.
i. The estimate is based on the estimated gross output of 2,700 tons of caprolactam, using an ammonia factor of 0.94 ton N per ton of product.
j. Other uses include soda ash, ammonium chloride, cuprammonium rayon, other manufactured chemicals, and refrigeration.
k. This is a residual value obtained by difference.

3. Nitric Acid.

In peacetime, nitric acid is used chiefly in the manufacture of nitrate fertilizers, industrial explosives, chemicals, and dyestuffs. In wartime, the manufacture of military explosives and propellants requires the greatest proportion of the available nitric acid.

Almost all nitric acid produced in East Germany is consumed directly by the plants producing the acid, primarily for the manufacture of nitrate fertilizers. Only about 10 percent of the total production of acid is used outside the producing plants. The nitric acid plants at Bitterfeld and Sondershausen reportedly consume all of their own production of acid, but VEB Farbenfabrik Wolfen supplies acid for export and sells directly to plants producing industrial explosives, photographic film, and various chemicals and pharmaceuticals. Wolfen also provides nitric acid to the East German economy for general industrial uses.

In 1953, about 82 percent of the East German supply of nitric acid was consumed in the manufacture of nitrate fertilizers (calcium-ammonium and potassium-ammonium nitrates).* The manufacture of industrial explosives was the second largest consumer of nitric acid. The acid was shipped to the explosives plants in the form of ammonium nitrate (technical grade) and as mixed acids containing nitric and sulfuric acids. It is estimated that 8 percent of 1953 production of nitric acid was used in production of industrial explosives. There is no evidence that any military explosives requiring nitric acid were produced in East Germany during 1953.

The estimated consumption pattern for nitric acid in East Germany in 1953 is shown in Table 48.

Table 48

Estimated Consumption Pattern for Nitric Acid in East Germany 1953

Use	Amount (Metric Tons)	Percent of Total
Nitrogen fertilizers (nitrate types)	209,100 a/**	82.2
Ammonium nitrate (for industrial explosives)	12,300 b/	4.8
Cellulose nitrate (colloxylin) c/	8,600 d/	3.4
Mixed acid (for industrial explosives) e/	8,000 f/	3.1
Other chemicals manufacture g/	8,800 h/	3.5
Various industrial uses i/	6,000 j/	2.4
Export	1,500 k/	0.6
Total	254,300	100.0

* The USSR is believed to have consumed between 35 to 40 percent of its 1953 production of acid for agricultural purposes.

** Footnotes for Table 48 follow on p. 124.

Table 48

Estimated Consumption Pattern for Nitric Acid
in East Germany
1953
(Continued)

a. Primarily this figure is for calcium-ammonium nitrate, but it includes about 1,100 tons of potassium-ammonium nitrate; the amount of 1,100 tons represents estimated nitric acid production by the Sondershausen plant, sole producer of potassium-ammonium nitrate. The remainder, 208,000 tons, was determined from an estimated production of 90,000 tons of calcium-ammonium nitrate (expressed as nitrogen), using a nitric acid input factor of 2.31 tons per ton of product.
b. The estimate is based on a reported output of 5,306 tons of ammonium nitrate (technical grade) (expressed as nitrogen), using a nitric acid factor of 2.31 tons per ton of product.
c. Cellulose nitrate is used mainly in East Germany as a photographic film base.
d. The estimate is based on an estimated output of 6,400 tons of colloxylin produced at the Eilenburg plant, using a nitric acid factor of 1.35 tons per ton of product.
e. Mixed acid shipped to explosives-manufacturing plants for nitrating purposes contains 50 percent nitric acid and 50 percent sulfuric acid.
f. VEB Farbenfabrik Wolfen planned to supply about 16,000 tons of mixed acid in 1953 as a total for the Schoenebeck and Gnaschwitz explosives plants. This amount is equivalent to 8,000 tons of nitric acid (100 percent acid basis). In 1952, about 7,200 tons were shipped for this purpose. 363/
g. Other chemicals include oxalic acid, acetaldehyde, and many chemicals for the dyestuffs industry.
h. This amount represents a residual quantity obtained by difference.
i. Industrial uses include deliveries to the Ministry for Machine Construction, to the local economy, and to a synthetic fuel plant at Schwarzheide for the manufacture of a catalyst.
j. The estimate is based on reported delivery of 964 tons during the first 6 months of 1953 to the construction industry, the local economy, and other consumers. 364/ In addition, 4,000 tons were supplied to SAG plants, including 3,500 tons (planned) to Schwarzheide 365/ and 500 tons to other SAG plants not producing chemicals.
k. This is a planned export. 366/

4. Calcium Carbide.

Calcium carbide is important chiefly as a source of acetylene and as a starting material to produce calcium cyanamide for chemical, industrial, and agricultural purposes.

Acetylene is used for metal cutting and welding, as a raw material or intermediate in the chemical industry, and as an illuminant. Acetylene is most important as a "building block" for the organic chemical industry in the production of synthetic rubber, plastics, chlorinated solvents, acetaldehyde, acetic acid, acetone, acetic anhydride, alcohols, glycols, acetylene black, and pharmaceuticals. In 1953 the East German chemical industry consumed about 80 percent of the total East German production of acetylene.*

Although production of calcium carbide in East Germany is now considerably greater than it has been in any previous period, it is insufficient to cover all domestic requirements and large exports too, mainly to the USSR. No exports are planned for 1956 -- an apparent attempt to relieve the supply shortage.

The manufacture of buna rubber, plastics, and other acetylene-derived chemicals has received the highest priority in East Germany, chiefly to support the export program. As a consequence, the local economy, the construction industries, and transportation (especially railroads) suffer from curtailed allocations of commercial carbide. 368/

In 1953 the Schkopau plant produced about 66.3 percent of the total East German production of calcium carbide and consumed about 69.6 percent of the total. The excess of consumption over production was to have been supplied by the Piesteritz plant. 369/ In 1954, Schkopau planned production of 492,000 tons of calcium carbide and was to purchase 30,000 tons from Piesteritz. 370/ Because Schkopau expects to increase production of synthetic rubber and other chemicals and to begin production of new products, purchases of calcium carbide from Piesteritz are expected to continue.

The estimated consumption pattern for calcium carbide in East Germany in 1953 is shown in Table 49.**

* In 1953 the US chemical industry consumed about 75 percent of total national production. 367/

** Table 49 follows on p. 126.

Table 49

Estimated Consumption Pattern for Calcium Carbide in East Germany a/ 1953

Use	Amount (Metric Tons)	Percent of Total
Synthetic rubber of various types b/	253,000	36.0
General welding, cutting, construction, and mining uses c/	115,400 d/	16.4 e/
Various organic chemical products (by the Schkopau plant) f/	82,900	11.8
Paraldehyde-alcohol mixture (for export) b/ g/	73,400	10.5
Acetylene black (carbon black) h/	54,000 i/	7.7
Vinyl chloride b/	50,200 j/	7.1 k/
Acetic acid b/	29,200 l/	4.2
Calcium cyanamide m/	14,300 n/	2.0
Deliveries to the USSR	30,000 o/	4.3
Total	702,400	100.0

a. Consumption of calcium carbide for various products made by Schkopau was calculated from the plant's 1953 production plan and adjusted to the total carbide believed available to the plant during the year. 371/

b. Produced only by VEB Chemische Werke Buna, Schkopau.

c. Allocations to metallurgical, machine construction, and chemical plants are included, in addition to amounts supplied transportation, mining, and the general local economy.

d. The estimate was based on actual carbide allocations during the first 6 months and the estimated quantity for sale by Piesteritz, exclusive of sales to Schkopau, plant consumption, and export. 372/

e. In 1953 the US metal cutting and welding industry consumed about one-third of total US production of calcium carbide.

f. The chemicals included are butanol, ethyl alcohol, acetaldehyde (for sale), ethyl acetate, ethylene oxide, glycols, trichloroethylene (and tetrachlorethylene), plasticizers, polystyrene, synthetic lubricating oils and "export oil" (SS Oil 906), and ethyl benzol (exported to the USSR).

Table 49

Estimated Consumption Pattern for Calcium Carbide in East Germany a/ 1953 (Continued)

g. The production plan for the mixture was 52,000 tons, all to be delivered to the USSR.
h. Mainly produced by VEB Stickstoffwerk Piesteritz. No acetylene black is made in the US.
i. The estimate is based on an estimated output of 15,000 tons of acetylene black, using a carbide factor of 3.6 tons per ton of black. 373/
j. The estimate is based on a reported production plan of 37,200 tons of vinyl chloride, using a carbide factor of 1.35 tons per ton of product. 374/
k. In 1954 the US used about 19 percent of its total production of calcium carbide for the manufacture of vinyl and vinylidene chloride plastics.
l. The estimate is based on a reported production plan of 18,745 tons of acetic acid, using a carbide factor of 1.558 tons per ton of acetic acid. 375/
m. Produced by VEB Stickstoffwerk Piesteritz for fertilizer and as an intermediate in the manufacture of plastics. No calcium cyanamide is made in the US.
n. The estimate is based on an estimated output of 15,000 tons of calcium cyanamide, expressed as nitrogen content, using a carbide factor of 0.953 ton per ton of product.
o. The estimate is based on actual shipment of 12,700 tons in the first 6 months 376/ and total planned delivery of 36,000 tons for 1953. 377/

5. Caustic Soda.

Caustic soda has no direct military uses, but it is indispensable to production of many commodities essential to both a military and a civilian economy. Caustic soda is used in production or refining of chemicals, rayon and cellulose film, textiles, soaps and cleansing agents, rubber reclaiming, dyestuffs, petroleum and synthetic oil, and pulp and paper.

In East Germany the rayon and cellulose pulp industries depend largely on the supply of caustic soda, and in the synthetic fiber and detergent industries, insufficient supplies of caustic soda have curtailed production. At the end of 1951 the entire textile industry of East Germany was nearly immobilized because of an acute lack of caustic soda. 378/ Imports of caustic soda improved only slightly the critical supply situation. By the end of 1955, however, East German requirements for caustic soda were almost completely satisfied by domestic production; no imports were planned after 1954. On the other hand, relatively large exports were scheduled for 1955 and 1956.

The estimated consumption pattern for caustic soda in East Germany in 1953 is shown in Table 50.

Table 50

Estimated Consumption Pattern for Caustic Soda in East Germany a/*
1953

Use	Amount (Metric Tons)	Percent of Total
Viscose rayon fiber, cord, staple fiber, and other viscose products	104,500 b/	45.2 c/
Chemicals and chemical processing	52,000 d/	22.5 e/
Pulp and paper	22,700 f/	9.8 g/
Soap and washing materials	12,600 h/	5.5
Uranium ore processing (by Wismut A.G.)	12,000 i/	5.2
Mineral oil and liquid fuels industry	10,200 j/	4.3 k/
Fatty acids and alcohols*	5,500 l/	2.4
Calcined alumina	5,100 m/	2.2
Food industry	1,600 n/	0.7
Reclaimed rubber	900 o/	0.4
Miscellaneous and export	4,100 p/	1.8
Total	231,200 q/	100.0

* Footnotes for Table 50 follow on p. 129.

Table 50

Estimated Consumption Pattern for Caustic Soda in East Germany a/ 1953 (Continued)

a. The estimates in this table were derived from a great number of individual statistical reports which it would be impractical to include as source references. In addition, the methodology and calculations employed to obtain these estimates have had to be abbreviated to allow inclusion in the footnotes accompanying this table.
b. The 1953 output of Zellstoffkunstfaser (cellulose artificial fiber, including cellulose staple fiber and jute) was 102,100 tons 379/; by using a caustic soda (NaOH) factor of 0.83 ton per ton of product, the amount of NaOH required was 85,000 tons. In addition, 16,800 tons of viscose rayon fiber and cord were produced; by using the factor of 1.10 tons of NaOH per ton of product, the amount of NaOH required was about 18,500 tons. Other viscose products made by AGFA Wolfen plant consumed about 1,000 tons of NaOH. The total NaOH used was 104,500 tons.
c. In 1953 the US rayon and cellophane industry consumed about 23.7 percent of total US production of caustic soda. 380/
d. Principal chemical plants consuming NaOH for making chemicals are located at Bitterfeld, Wolfen (Farbenfabrik), Westeregeln, Schkopau, Leuna, Ammendorf, and Osternienburg. On the basis of many individual reports, it is estimated that these plants used about 47,100 tons of NaOH during 1953. It is estimated that AGFA Wolfen consumed about 1,000 tons for the manufacture of photographic film and chemicals; the plant's NaOH consumption plan for 1952 was 700 tons and for 1954, about 1,300 tons. 381/ Production or processing of many chemicals and pharmaceuticals in smaller plants brings the total to about 52,000 tons of NaOH.
e. In 1953 the US chemical industry consumed about 26.7 percent of total US production of caustic soda. 382/
f. Pulp and paper is assumed to be synonymous with "textile cellulose," which includes cellulose for manufacturing viscose products and nitrocellulose (colloxylin). The 1953 production plan for textile cellulose was 139,446 tons. 383/ An estimated 130,000 tons of this cellulose was required for viscose fiber, cord, and staple fiber, and if an average NaOH output factor of 0.170 ton per ton of textile cellulose is used, the amount of NaOH consumed would be 22,100 tons. The

Table 50

Estimated Consumption Pattern for Caustic Soda in East Germany a/ 1953 (Continued)

manufacture of 9,000 tons of textile cellulose for other products would require about 600 tons of NaOH (factor: 0.068 ton). The estimated output of textile cellulose is then 139,000 tons, and the total NaOH needed for its production would be 22,700 tons.

g. In 1953 the US pulp and paper industry consumed about 7.3 percent of total US production of caustic soda. 384/

h. East German production of soap in 1953 was 40,100 tons (on a 40 percent fat content basis), 385/ and by using a factor of 0.20 ton of NaOH per ton of product, the amount of NaOH required was about 8,000 tons. Washing agents are made by a plant at Genthin, and in 1952 this plant used 4,423 tons of NaOH. 386/ The estimate for 1953 is 4,600 tons. Thus the total amount of NaOH required is 12,600 tons. Other washing materials made in East Germany are presumed to require soda ash for their manufacture.

i. There is no definitive information on Wismut's 1953 NaOH requirement. The estimate is partly based on a reported 1955 planned allocation of 12,500 tons. 387/ Plants at Bitterfeld, Ammendorf, and Nuenchritz are suppliers. In 1953, Bitterfeld shipped about 5,900 tons to Wismut. 388/

j. The 1953 planned allocation to the industry was 10,218 tons. 389/ In 1954 the industry consumed 11,387 tons. 390/ The amount includes from 600 to 700 tons used by the tar distillery and coal chemicals producing plant at Erkner (near Berlin).

k. In 1953 the US petroleum refining industry consumed about 8.6 percent of total US production of caustic soda. 391/

l. The Rodleben chemical plant and the Fewawerk plant in Karl-Marx-Stadt are the chief producers of fatty acid and alcohols. The 1953 production plan for fatty acids (natural and synthetic) was 17,030 tons and for fatty alcohols, 6,830 tons. 392/ Rodleben's 1953 allocation plan for NaOH was 4,600 tons, 393/ and the plan for Fewawerk was 2,400 tons. 394/ It is assumed, however, that Rodleben did not use more than 3,100 tons for making the fatty chemicals but that Fewawerk required its full allocation. Thus the total is 5,500 tons. The products are used mainly as raw material stock in the margarine and soap industries.

Table 50

Estimated Consumption Pattern for Caustic Soda in East Germany a/ 1953 (Continued)

m. In 1953, production of calcined alumina was 33,800 tons. 395/ If a factor of 0.15 ton of NaOH is used, the amount of NaOH consumed for calcined alumina was about 5,100 tons.

n. The food industry had a 1952 planned allocation of 1,700 tons of NaOH, 396/ but it is doubtful that the plan was fulfilled. In 1953 the industry possibly received about 1,600 tons.

o. In 1952, production of reclaimed rubber was 4,917 tons. 397/ It is estimated that the 1953 output was 6,000 tons. If a factor of 0.15 ton of NaOH per ton of product is used, the amount of NaOH consumed in 1953 would have been about 900 tons.

p. Miscellaneous NaOH uses include unknown amounts for the textile industry (cotton mercerizing and the like) and the leather tanning industry. The 1953 export plan was 500 tons, and the entire amount was shipped by 1 August. 398/

q. The total includes reported domestic production (221,160 tons), an import of 8,100 tons, and an estimated net withdrawal of 1,930 tons from East German state reserves. The state reserves were reported to have a balance of about 2,490 tons of NaOH on 1 January 1953 and 565 tons on 31 December 1953. 399/

6. Soda Ash.

Soda ash is used as a cleansing agent, as a water softener, and in the manufacture of chemicals, pulp and paper, textiles, petroleum products, nonferrous metals, glass, caustic soda, and sodium bicarbonate. Caustic soda, caustic potash, and potassium carbonate (potash) may be substituted for soda ash in certain operations, primarily when an alkali is required, but these substitutes are not preferred and are more expensive.

During the postwar period, there has been a continuing and critical shortage of soda ash in East Germany -- largely the result of Soviet plant dismantlings and reparations payments -- and industries

dependent on soda ash, particularly the glass and washing materials industries, have been restricted in their production and development. Until 1953, soda ash was imported, but the total supply could not meet all East German requirements for soda ash.

During the first half of 1953, deliveries of soda ash to all allotee groups combined, including top priority SAG plants, averaged 80 percent of the half-year allotments. The local economy received only 37 percent of its planned allocation of soda ash. Exports and/or reparations in the same period, however, amounted to 184 percent of plan. 400/

At the same time, there was a shortage of caustic soda in East Germany, but before 1952 practically no caustic soda is believed to have been produced by soda ash plants through causticization; it was necessary to utilize all available soda ash for other purposes. By 1955 the situation had improved to the extent that the Bernburg plant planned to causticize 23,000 tons of soda ash, equivalent to approximately 15,000 tons of caustic soda. 401/

In East Germany, soda ash is used in a significant amount, about 25 percent of total production in 1953, in processing uranium ore by "Technisches Kontor" (Wismut A.G.) at Karl-Marx-Stadt. In 1955 the allotment plan for Wismut amounted to 24.2 percent of total planned production. 402/ Because of the strategic importance of uranium and East Germany's apparent abundance of the raw ore, the consumption pattern for soda ash in East Germany is different from the consumption patterns of other countries.

East German chemical plants, excluding plants belonging to the mineral oil and liquid fuels industry, consumed an estimated 52 percent of 1953 East German production of soda ash. On the same basis, US chemical plants consumed about 53 percent of total US production in 1953.

The estimated consumption pattern for soda ash in East Germany in 1953 is shown in Table 51.*

* Table 51 follows on p. 133.

Table 51

Estimated Consumption Pattern for Soda Ash in East Germany a/ 1953

Use	Amount (Metric Tons)	Percent of Total
Uranium ore processing (by Wismut A.G.)	75,000 b/	25.3
Washing materials and cleansing agents	32,000 c/	10.8
Nitric acid	26,300 d/	8.9
Caustic soda and sodium bicarbonate	17,200 e/	5.8 f/
Mineral oil and liquid fuels industry	3,000 g/	1.0
Barium carbonate	2,800 h/	0.9
Other chemicals and chemical processing	73,000 i/	24.6
Miscellaneous (including glass, textiles, pulp and paper, food, soap, and various industrial uses)	47,300 j/	16.0 k/
Export	20,000 l/	6.7
Total	296,600 m/	100.0

a. The estimates in this table were derived from a great number of individual statistical reports which it would be impractical to include as source references. In addition, the methodology and calculations employed to obtain these estimates have had to be abbreviated to allow inclusion in the footnotes accompanying this table.

b. The estimate is based partly on a reported 1955 planned allocation of 109,000 tons. 403/

c. The estimate does not include soap and washing agents made by plants other than VEB Leuna-Werke, VEB Persil-Werk Genthin, and VEB Elektrochemisches Kombinat Bitterfeld. Leuna's 1954 requirement plan called for 994 tons of soda ash to produce 2,208 tons of washing powder. 404/ Leuna possibly used about 800 tons of soda ash during 1953. The Genthin plant had a 1952 requirement plan of 25,185 tons but used only 21,272 tons. 405/ It is assumed that the amount used in 1953 was 25,200 tons. Bitterfeld used about 6,000 tons of soda ash to make 22,952 tons of "Siliron" and "Trosilin" in 1953. 406/

Table 51

Estimated Consumption Pattern for Soda Ash
in East Germany a/
1953
(Continued)

d. The estimate is based on a reported output of 254,284 tons of nitric acid, using a soda ash factor of 0.1034 ton per ton of nitric acid (100 percent acid basis). 407/
e. The estimate includes caustic soda by the lime-soda process in an amount of 9,000 tons, 408/ which would have required about 13,000 tons of soda ash (soda ash factor: 1.45), and 212,000 tons of electrolytic caustic soda, which would require about 2,600 tons of soda ash for its manufacture (soda ash factor: 0.0124). About 2,300 tons of sodium bicarbonate was made, 409/ and this would need about 1,600 tons of soda ash. Thus the total soda ash consumed would be 17,200 tons.
f. In 1953 the production of caustic soda and sodium bicarbonate (baking soda) in the US consumed about 25 percent of total US production of soda ash. 410/
g. The estimate is based on planned consumption of 4,248 tons in 1955 and actual consumption of 3,534 tons in 1954. 411/
h. The estimate is based on reported output of 1,839 tons of barium carbonate, using a soda ash factor of 1.5 tons per ton of product. 412/
i. The estimate is the difference between an estimated consumption of 150,000 tons of soda ash (73,200 tons in 6 months 413/) by all chemical plants (not including SAG plants) belonging to the State Secretariat for Chemistry and the sum of soda ash needs for washing materials, nitric acid, caustic soda and sodium bicarbonate, and barium carbonate. The figure obtained was 71,800 tons. An additional 1,200 tons were added for SAG chemical plants, exclusive of those plants in the mineral oil and liquid fuels industry, thus giving a total of 73,000 tons.
j. This is a residual value obtained by difference. The sum of the amounts for all uses given in this table, including the amount exported, was subtracted from the estimated total of 296,600 tons. No figures for total production of glass were available for East Germany.
k. In 1953 the manufacture of glass in the US consumed about 28 percent of total US production of soda ash. 414/
l. The estimate covers the first 6 months. 415/
m. Actual reported production of soda ash for 1953 was 296,561 tons. 416/

7. Chlorine.

The chlorine industry in East Germany is essential in the nation's economy because chlorine is vital in the manufacture of numerous chemicals and allied products for both civilian and military use. Because of technological development, the manufacture of chemicals is demanding increasing percentages of the total East German production of chlorine. In wartime, production of military goods creates an additional demand for chlorine. During World War II, although direct US military uses (largely for chemical warfare gases and smoke screen agents) consumed only 3 percent of all chlorine consumed in the US, indirect requirements for essential military end products demanded 50 percent of the installed production capacity.

Chlorine is used for bleaching wood pulp and textiles and for purifying industrial and municipal water supplies. It is used for manufacturing bleaching agents, solvents (including carbon tetrachloride), metal degreasers, plastics and resins, antifreeze agents, hydrochloric acid, automotive fluids, medicines, dyestuffs, insecticides and herbicides, chlorinated rubber, wood preservatives, synthetic detergents, explosives, photographic film, and aluminum. Synthetic hydrochloric acid, made by burning chlorine, is used in metallurgy and ore processing and in production of petroleum, rubber, plastics, and chemicals.

As late as 1953, production of chlorine in East Germany was greater than requirements, and thousands of tons of chlorine had to be destroyed. Demand for chlorine began to increase during 1954, and additional requirements are expected in the growing synthetic organic chemical industry.

The consumption pattern for chlorine in East Germany is markedly different from that of the US. In 1953 the US required chlorine for the production of tetraethyl lead, phenol, aniline, propylene glycol, diphenyl, methylene chloride, and acrylonitrile, but none of these products was manufactured in East Germany. In the US, 75 percent or more of the production of chlorine is used to produce chemicals, but East Germany consumes possibly less than 60 percent for the same purpose. About 17 percent of the US 1953 production of chlorine was consumed for making ethylene oxide and glycol, but East Germany is estimated to have used perhaps less than 4 percent.

Consumption of chlorine in East Germany is expected to increase appreciably. Principal East German consumers of chlorine will include new chemical products such as tetraethyl lead fluid and methylene chloride. Methylene chloride is a vital raw material for the manufacture of cellulose triacetate, which is used in the manufacture of nonflammable photographic films. Both the Bitterfeld plant and the Schkopau plant will consume more chlorine in increased production of vinyl chloride and -- at Bitterfeld -- the possible production of alumina. 417/

The estimated consumption pattern for chlorine in East Germany in 1953 is shown in Table 52.*

8. Aromatic Coal Chemicals.

Aromatic chemicals derived from coal** are essential to a modern industrial economy. They are basic raw materials for products such as photochemicals, rubber, explosives, petroleum, plastics and resins, synthetic fibers, dyestuffs, pharmaceuticals, paints and pigments, and synthetic detergents. Furthermore, chemical end products and intermediates made from aromatic coal chemicals are used in agriculture (insecticides, pesticides, and herbicides), in the food industry (preparation, preservation, and flavoring of products), in the textile industry (dyeing, preservatives, and water repellents), in the leather industry (tanning agents, dyeing, and preservatives), in the lumber industry (wood preservatives), and in the perfume and cosmetic industries.

East German consumption patterns for benzol, toluol, naphthalene, and phenol through 1952 have been discussed and compared with US use patterns [redacted] The following discussion is limited chiefly to estimated 1953 consumption patterns and to future changes in consumption. 50X1

The organic chemical industry of East Germany is based largely on aromatic coal chemicals, and the country is incapable of producing sufficient quantities of benzol, toluol, and naphthalene for

* Table 52 follows on p. 137.

** In the US, aromatic chemicals are also obtained commercially from petroleum sources and may be included among petrochemicals.

Table 52

Estimated Consumption Pattern for Chlorine in East Germany a/*
1953

Use	Amount (Metric Tons)	Percent of Total
Chemicals		
Aluminum chloride	2,140 b/	1.0
Bleaches	5,500 c/	2.7
Chloral	6,450 d/	3.2
Chlorinated benzenes	9,370 e/	4.7
Chlorinated naphthalenes	1,590 f/	0.8
Chlorinated solvents (except chlorinated benzenes)	18,800 g/	9.4
Glycols	6,350 h/	3.1
Hydrochloric acid (synthetic)	92,000 i/	45.8 j/
for: Uranium ore processing (Wismut A.G.)	(38,000) k/	(18.9) l/
Vinyl chloride	(26,800) m/	(13.4) n/
Chemicals manufacture and processing	(18,900) o/	(9.4)
Other industrial uses and export	(8,300) p/	(4.1)
Mersol D	8,100 q/	4.0
Phosphorus trichloride	1,870 r/	0.9
Miscellaneous chemicals	10,000 s/	5.0
Pulp and paper bleaching	20,000 t/	10.0
Export	5,000 u/	2.5
Miscellaneous uses and losses	13,830 v/	6.9
Total	201,000	100.0

* Footnotes for Table 52 follow on p. 138.

Table 52

Estimated Consumption Pattern for Chlorine
in East Germany a/
1953
(Continued)

a. The estimates in this table were derived from a great number of individual statistical reports which it would be impractical to include as source references. In addition, the methodology and calculation employed to obtain these estimates have had to be abbreviated to allow inclusion in the footnotes accompanying this table.
b. The Schkopau plant planned a consumption of 2,135 tons of chlorine to produce 1,500 tons of aluminum chloride. 419/
c. Bleaches considered are soda-bleaching lye (sodium hypochlorite), and chloride of lime. An estimated output of 16,200 tons of soda-bleaching lye would require about 2,280 tons of chlorine (chlorine factor: 0.141). An estimated output of 7,940 tons of chloride of lime would required about 3,220 tons of chlorine (chlorine factor: 0.406). The total chlorine for bleaches is then 5,500 tons.
d. East Germany uses chloral chiefly for making DDT. The only producer, Bitterfeld, produced 2,569 tons during 1953, and this amount consumed about 6,450 tons of chlorine (chlorine factor: 2.510). 420/
e. Chlorinated benzenes include mono- and dichlorobenzenes and benzene hexachloride (BHC). Most of the production of chlorinated benzenes is used for preparing insecticides and pesticides. The estimated 1953 output of mono- and dichlorobenzenes is 9,300 tons, and this amount would require about 8,370 tons of chlorine (chlorine factor: 0.900). Estimated 1953 output of BHC (85 percent gamma isomer content) is 73 tons, which would required about 1,000 tons of chlorine (chlorine factor: 13.8). Total chlorine for chlorinated benzenes is 9,370 tons.
f. Chlorinated naphthalenes include a pour-point depresser ("Fluhyzet A") for lubricating oils and a wood preservative ("Xylamon"). In 1953, 434 tons of Fluhyzet A were produced, 421/ which required about 180 tons of chlorine as a raw material input (chlorine factor: 0.42). Xylamon production in 1953 is estimated at 2,200 tons, and this amount would consume about 1,410 tons of chlorine (chlorine factor: 0.64). The total chlorine required is about 1,590 tons.

Table 52

Estimated Consumption Pattern for Chlorine in East Germany a/ 1953 (Continued)

g. Chlorinated solvents include carbon tetrachloride (a dry-cleaning solvent) and chloroethylenes (metal-degreasing solvents). The estimated 1953 output of carbon tetrachloride is 7,140 tons, 422/ which would require about 8,300 tons of chlorine (chlorine factor: 1.162). The Schkopau plant is the only producer of chloroethylenes (tri-, di-, and perchloroethylenes) in East Germany. The plant planned to produce 9,760 tons of these products and to consume about 10,500 tons of chlorine for their manufacture during 1953. 423/ The estimated consumption of chlorine for chlorinated solvents is 18,800 tons.

h. Glycols are believed to be produced only by the Schkopau plant. At that plant glycol is produced from ethylene oxide, which in trun requires chlorine for its manufacture. In 1953, Schkopau planned production of 3,685 tons of ethylene oxide, and this amount was to consume 7,555 tons of chlorine. An estimated 84 percent of the ethylene oxide was to be converted to glycol. Therefore, about 6,350 tons of chlorine were to be used to produce 2,850 tons of glycol. 424/ A large portion of production of glycol is used by explosive plants for making dynamites.

i. East Germany has seven producers of synthetic hydrochloric acid, made by burning chlorine, and the 1953 estimated combined output of these plants is 92,000 tons. This output would require about 92,000 tons of chlorine.

j. In the US, very little chlorine is used in the production of snythetic hydrochloric acid.

k. Wismut A.G. was reported to have a fourth-quarter 1953 requirement of 10,200 tons of hydrochloric acid (100 percent acid basis). 425/ Wismut's 1955 planned allotment was 38,000 tons. 426/ Estimated consumption by Wismut during 1953 is from 35,000 to 41,000 tons. (Figures in parentheses are components of the category figure and do not contribute to the total.)

l. Possibly 40 percent of the hydrochloric acid produced in East Germany must be shipped to process uranium ores for the USSR in the area of the former province of Saxony.

Table 52

Estimated Consumption Pattern for Chlorine
in East Germany a/
1953
(Continued)

m. In 1953, Schkopau planned to produce 37,200 tons of vinyl chloride and to consume about 26,800 tons of chlorine for the hydrochloric acid needed in the manufacture. 427/
n. In 1953 the US consumed only about 4 percent of its production of chlorine for the manufacture of vinyl chloride. 428/
o. Plant analysis studies indicate that about 18,900 tons of synthetic hydrochloric acid (100 percent acid basis) were used in the manufacture of various chemicals and allied products, including pharmaceuticals and rayon.
p. East Germany had a 1953 export plan for 2,500 tons of hydrochloric acid. 429/ An estimated 5,800 tons of acid were consumed by nonchemical industries.
q. "Mersol D" is a fully synthetic substitute for fatty acids in the soap industry. Thus it is a synthetic detergent. Two plants, Farbenfabrik Wolfen and Leuna-Werke, are the only known producers of the product, and their estimated 1953 combined output was 24,600 tons. The estimated consumption of chlorine for Mersol D is 8,100 tons, based on an input of 0.33 ton of chlorine per ton of product. 430/
r. The Bitterfeld plant is the sole East German producer of phosphorus trichloride, and the plant's 1953 output was 2,307 tons. 431/ The estimated chlorine requirement is 1,870 tons (chlorine factor: 0.811). Most of the phosphorus trichloride is used to make phosphorus oxychloride, which is used chiefly in the manufacture of plasticizers for the synthetic rubber and plastics industries.
s. Some of the miscellaneous chemicals are methylene chloride, dyestuffs, benzotrichloride, benzalchloride, chlorinated polyvinyl chloride (Igelit PC), liquid bromine, herbicide (2, 4-D), ethylene oxide (other than for glycols), and tetrachloroethane distilled. Plant analysis studies show that at least 10,000 tons of chlorine are consumed in the manufacture of miscellaneous chemicals not previously cited in this table.
t. No production data on bleached pulp and paper are available for 1953. It was assumed that chlorine used by pulp and paper plants was supplied to them as liquid chlorine. The estimate of 20,000 tons is a residual value obtained after considering possible uses and distribution of liquid chlorine in East Germany.

Table 52

Estimated Consumption Pattern for Chlorine
in East Germany a/
1953
(Continued)

u. The 1953 export plan for chlorine (liquid) was 6,300 tons, but only 3,287 tons were shipped in the first 7 months. 432/ It is believed that an export of 5,000 tons was all that could be made for the year.
v. Chlorine losses or waste in 1953 are estimated as 6,500 tons. The Bitterfeld plant reportedly wasted 2,000 tons during the first 6 months of 1953. 433/ The residual value remaining, 7,330 tons, is believed to have been consumed chiefly for water purification and sanitation (sewage treatment).

domestic requirements. Annual production quotas for products made by the organic chemical industry can be achieved only if import plans for benzol, toluol, and naphthalene are successful.

a. Benzol (Refined).

It is estimated that in 1953, 27,000 tons of benzol (refined) were imported by East Germany, and with an estimated domestic production of 10,800 tons, the total available benzol was about 37,800 tons. There is no evidence that benzol was used to produce aniline, synthetic phenol, or maleic anhydride, and apparently little benzol was used to prepare resorcinol or was used as "motor benzol" to increase antiknock properties when added to gasoline.* The manufacture of synthetic rubber is the largest consumer of benzol, demanding about 40 percent of the total available benzol. Production of insecticides and pesticides, including DDT, benzene hexachloride (BHC), and dichlorobenzenes, probably was the second largest consumer, demanding about 20 percent of the benzol.

* Negotiations were reportedly conducted during June 1954 between East Germany and Poland for the exchange of 50,000 tons of synthetic gasoline from East Germany for 50,000 tons of motor benzol from Poland. 434/

The estimated consumption pattern for refined benzol in East Germany in 1953 is shown in Table 53.

Table 53

Estimated Consumption Pattern for Refined Benzol in East Germany a/ 1953

Use	Amount (Metric Tons)	Percent of Total
Styrene (for Buna S rubber types)	15,080 b/	39.9
Ethyl benzene (for export)	4,250 c/	11.2
Polystyrene	1,420 b/	3.8
DDT (insecticide)	5,800 d/	15.3
Chlorobenzenes (other than for DDT)	3,220 e/	8.5
Benzene hexachloride (BHC) (insecticide)	1,000 f/	2.7
Miscellaneous chemicals, pharmaceuticals, and solvent and diluent uses	6,480 g/	17.1
Export	550 h/	1.5
Total	37,800	100.0

a. The estimates in this table were derived from a great number of individual statistical reports which it would be impractical to include as source references. In addition, the methodology and calculations employed to obtain these estimates have had to be abbreviated to allow inclusion in the footnotes accompanying this table.
b. Chemische Werke Buna, Schkopau, produces styrene from ethyl benzene. The estimated 1953 production of ethyl benzene is 25,400 tons, of which about 20,200 tons were used to make styrene. About 18,460 tons of ethyl benzene were consumed for styrene that was used directly in the manufacture of Buna S rubbers and 1,740 tons for styrene that was polymerized to prepare polystyrene plastics. The refined benzol input factor for 1 ton of ethyl benzene is 0.817 ton. 435/
c. The 1953 planned delivery of ethyl benzene to the USSR was 5,200 tons. 436/

Table 53

Estimated Consumption Pattern for Refined Benzol in East Germany a/ 1953 (Continued)

d. The 1953 DDT production is estimated as 6,650 tons, which includes actual output of 4,049 tons by the Bitterfeld plant. 437/ The total DDT output would demand about 5,985 tons of monochlorobenzene, which, in turn, would consume about 5,800 tons of benzol for its manufacture. The factors used were 1 ton of DDT requires 0.90 ton of monochlorobenzene; 1 ton of monochlorobenzene requires 0.97 ton of benzol.
e. The Bitterfeld and Wolfen (Farbenfabrik) plants are producers of mono- and dichlorobenzenes, the latter a byproduct. The 1953 combined output of the two plants is estimated at 9,300 tons, requiring about 9,020 tons of benzol. Because 5,800 tons of benzol were consumed to make DDT, the difference, 3,220 tons, is the amount of benzol involved for chlorobenzenes available for export and other uses.
f. Estimated 1953 output of insecticide BHC is 73 tons (85 percent gamma isomer content). This amount would require about 1,000 tons of benzol (benzol factor: 13.8 tons per ton of "85 percent" BHC 438/).
g. This is a residual value obtained by subtracting all listed uses from the estimated total available benzol, 37,800 tons.
h. 439/

VEB Chemische Werke Buna (Schkopau), VEB Farbenfabrik Wolfen, and VEB Elektrochemisches Kombinat Bitterfeld, are believed to have used about four-fifths of all benzol consumed in East Germany during 1953. The Schkopau plant alone may have used 55 percent of the total.

East German demands for refined benzol probably showed a marked increase in 1955. Production of synthetic rubber and insecticides will expand, and the first postwar production of aniline (via nitrobenzene) may begin. VEB Farbenfabrik Wolfen was scheduled to increase nitrobenzene facilities during 1954, preparatory to manufacturing aniline and to increase production of meta-aminophenol (for resorcinol). The Wolfen plant planned to produce aniline either

in 1955 or 1956 and ultimately to produce 3,000 tons of the product. 440/ Anticipated planned production of aniline probably was reflected in the 1955 East German import plan for benzol, which showed an increase of 95 percent over the 1954 plan.

b. Toluol.

In 1953 the import plan for toluol was 4,880 tons, and with an estimated domestic production of 3,600 tons, the total supply of toluol was 8,480 tons. The use of toluol as a solvent and diluent in production of paints, lacquers, and varnishes may have accounted for more than one-half of the 1953 supply of toluol. The second largest consumer, industrial explosives, required about one-fifth of the available toluol, and production of chemicals, pharmaceuticals, perfumes, and the like consumed an estimated one-sixth of the total.

The estimated consumption pattern for toluol in East Germany in 1953 is shown in Table 54.

Table 54

Estimated Consumption Pattern for Toluol
in East Germany
1953

Use	Amount (Metric Tons)	Percent of Total
Industrial explosives	1,844 a/	21.7
Chemical uses	1,400 b/	16.5
Solvent and diluent uses	5,016 c/	59.2
Export	220 d/	2.6
Total	8,480 e/	100.0

a. VEB Sprengstoffwerk I, Schoenebeck/Elbe, is the only producer of trinitrotoluene (TNT) and dinitrotoluene (DNT) in East Germany. The TNT and DNT are used to manufacture industrial explosives by Schoenebeck

Table 54

Estimated Consumption Pattern for Toluol
in East Germany
1953
(Continued)

and VEB Sprengstoffwerk II, Gnaschwitz/Bautzen. The finished explosives are required by the potash mining industry and by Technisches Kontor, Karl-Marx-Stadt (Wismut A.G.), for mining uranium ore. 441/

b. Chemical uses include the manufacture of benzoic acid, saccharin, benzal and benzyl chlorides, benzaldehyde, and the like. These products are used to prepare other chemicals, dyestuffs, food preservatives, pharmaceuticals, rubber accelerators, synthetic perfumes and flavoring agents, and textile processing chemicals. The significant toluol consumers are benzoic acid and saccharin. The estimate of 1,400 tons of toluol for chemical uses is a rough approximation obtained by plant analysis studies for possible toluol requirements by various chemical plants.

c. This is a residual value obtained by difference. It is presumed that a large volume of toluol is required as a solvent and diluent in the manufacture of paints, lacquers, varnishes, adhesives, thinners, and paint removers. Toluol is an especially good, low-toxic, solvent, particularly valuable for cellulose-base lacquers.

d. All toluol reportedly exported was shipped to "capitalistic countries." 442/

e. The estimated total available quantity of toluol is the sum of the estimated 1953 production, 3,600 tons, and the 1953 import plan, 4,800 tons 443/.

Among chemical plants in East Germany the major consumers of toluol are VEB Sprengstoffwerk I, Schoenebeck/Elbe; VEB Elektrochemisches Kombinat Bitterfeld; VEB Farbenfabrik Wolfen; and VEB Fahlberg-List, Magdeburg. In 1954 the Wolfen plant planned to increase production of nitrotoluol and other toluol intermediates for manufacturing dyestuffs, 444/ and the Schoenebeck plant began expansion of facilities to increase production of trinitrotoluol (TNT) at a total cost of 15 million DME, and the plant's ultimate TNT capacity will be 6,000 tons per year. 445/

c. Naphthalene.

It is estimated that in 1953 East Germany imported about 19,300 tons of naphthalene and produced 4,800 tons, a total available supply of 24,100 tons. The production of phthalic anhydride is the largest single use for naphthalene and required almost 35 percent of the total 1953 supply of naphthalene. The manufacture of carbon black, hydrogenated naphthalenes, and beta-naphthol accounted for nearly 42 percent of the remainder of the total naphthalene.

Nearly all available naphthalene in East Germany is consumed by the chemical industry. Approximately 95 percent of the total was used by VEB Chemische Werke Buna at Schkopau, VEB Farbenfabrik Wolfen, VEB Russwerk Oranienburg, VEB Deutsches Hydrierwerk Rodleben, and VEB Deutsches Solvay Werk Westeregeln. The Schkopau plant itself probably consumed more than 40 percent of the total naphthalene supply.

In the future, considerable increases in production are anticipated for phthalic anhydride at the Schkopau plant and beta-naphthol at Wolfen. The latter plant expects to expand its beta-naphthol facilities either in 1956 or 1957. 446/ The estimated consumption pattern for naphthalene in East Germany in 1953 is shown in Table 55.*

d. Phenol (Refined).

The total 1953 supply of refined phenol in East Germany is estimated at 10,200 tons, all from domestic production; there were no imports reported. The production of polyamide-type fibers, plastics, and similar products, in finished form known as Perlon goods, was probably the largest consumer of refined phenol during 1953. The chemical intermediate, caprolactam, which is derived from refined phenol, is the base material for manufacturing Perlon products. This commodity is estimated to have used about 36 percent of the available phenol. The manufacture of phenolic plastics and resins, exclusive of those resins used in preparing synthetic organic tanning agents and ion-exchange resins, was the second largest consumer and used almost 15 percent of the total supply.**

* Table 55 follows on p. 147.
** Continued on p. 149.

Table 55

Estimated Consumption Pattern for Naphthalene
in East Germany a/
1953

Use	Amount (Metric Tons)	Percent of Total
Phthalic anhydride	8,360 b/	34.7
Carbon black	3,610 c/	15.0
Hydrogenated naphthalenes (tetralin and decalin)	3,360 d/	13.9
Beta-naphthol	3,080 e/	12.8
Chlorinated naphthalenes	1,930 f/	8.0
Emulsifier for Buna rubber ("Emulagtor 1000")	1,590 g/	6.6
Miscellaneous uses	2,170 h/	9.0
Total	24,100 i/	100.0

a. The estimates in this table were derived from a great number of individual statistical reports which would be impractical to include as source references. In addition, the methodology and calculations employed to obtain these estimates have had to be abbreviated to allow inclusion in the footnotes accompanying this table.
b. Chemische Werke Buna, Schkopau, is the sole producer of phthalic anhydride, and the estimated 1953 output was 8,200 tons. This amount would consume about 8,360 tons of naphthalene (naphthalene factor: 1.02). Phthalic anhydride is used for the manufacture of plasticizers and softeners for the plastics and rubber industries and for making alkyd resins ("Duxalyd"). It is estimated that more than 60 percent of the product was delivered to the USSR during 1953.
c. Russwerk Oranienburg produces carbon black from naphthalene for the rubber, printing inks, and paint industries. The 1953 output of this carbon black ("Gasruss") is estimated to have been 2,200 tons, which would require about 3,610 tons of naphthalene (naphthalene factor: 1.64).

Table 55

Estimated Consumption Pattern for Naphthalene in East Germany a/ 1953 (Continued)

d. Deutsches Hydrierwerk Rodleben is the only producer of tetralin and decalin, solvents for the lacquer industry and also used to make floor polishes. Based on reported actual production in the first 6 months of 1953, the estimated final outputs of tetralin and decalin are 1,100 tons and 2,100 tons, respectively. 447/ These outputs would correspondingly consume naphthalene in amounts of about 1,180 tons and 2,180 tons (naphthalene factors: 1.075 for tetralin; 1.038 for decalin).

e. Farbenfabrik Wolfen is the producer of beta-naphthol, which is used chiefly to prepare a rubber antioxidant chemical. The 1953 output is estimated to have been 2,500 tons, based on reported production of 1,549 tons in 1951 and 2,043 tons in 1952. 448/ An output of 2,500 tons would require about 3,080 tons of naphthalene (naphthalene factor: 1.23).

f. Two chlorinated naphthalenes are made in East Germany. The Westeregeln chemical plant produces "Xylamon," a wood preservative. The 1953 output of Xylamon is estimated to have been 2,200 tons, based on reported production of 1,062 tons in 1951 and 1,610 tons in 1952. 449/ The naphthalene requirement for 2,200 tons of Xylamon should be 1,822 tons (naphthalene factor: 0.828). The other chlorinated naphthalene is made by a liquid fuels plant at Zeitz, and the product is called "Fluhyzet A," a pour-point depressor for lubricating oils. The 1953 output was reported to have been 434 tons, and about 108 tons of naphthalene were used. 450/ Thus total naphthalene for chlorinated products is estimated as 1,930 tons.

g. The Schkopau plant produces "Emulgator 1000" for an intermediate raw material in the manufacture of Buna rubbers. In 1953 the emulsifier output is estimated to have been 3,900 tons; the plan was 3,855 tons. 451/ Naphthalene consumption would be about 1,590 tons (naphthalene factor: 0.407 452/).

Table 55

Estimated Consumption Pattern for Naphthalene in East Germany a/ 1953 (Continued)

h. This is a residual value obtained by difference. Miscellaneous naphthalene uses probably include the manufacture of dyestuffs, synthetic tanning agents, and insecticides. The quantity may also include some naphthalene disappearance resulting from processing the "hot-pressed" grade to a pure grade of naphthalene.
i. The estimate was made from a reported total consumption of 12,130 tons for the first half of 1953. Actual naphthalene imports for this period were 9,650 tons. 453/

Insufficient production of refined phenol in East Germany has had unfavorable effects on the general economy of the country and has caused underfulfillment of annual economic plans. Both production of vital products made from phenolic plastics (Bakelite) and resins and the manufacture of essential leather-tanning agents have been retarded. Less desirable phenol substitutes, cresol and xylenol, have been used. In spite of the phenol shortage, relatively large quantities of phenol have been shipped to the USSR.

An example of the effects of the shortage of phenol is the revision of the 1955 economic plan for production of caprolactam, a 52-percent downward revision to 4,815 tons. 454/ Thus, instead of 13,700 tons of refined phenol being required for caprolactam, only about 6,600 tons were to be used in 1955.

About two-thirds of the refined phenol available during 1953 in East Germany was consumed by VEB Leuna-Werke "Walter Ulbricht," VEB Farbenfabrik Wolfen, VEB Fettchemie- und Fewawerk at Karl-Marx-Stadt (formerly Chemnitz), and VEB Elektrochemisches Kombinat Bitterfeld. The Leuna plant may have used as much as 49 percent of the total supply.

The estimated consumption pattern for refined phenol in East Germany in 1953 is shown in Table 56.

Table 56

Estimated Consumption Pattern for Refined Phenol in East Germany a/ 1953

Use	Amount (Metric Tons)	Percent of Total
Caprolactam (raw material for Perlon products)	3,700 b/	36.3
Phenolic plastics and resins	1,500 c/	14.7
Cyclohexanol and cyclohexanone (except for caprolactam)	1,300 d/	12.7
Synthetic organic tanning agents	1,100 e/	10.8
Pharmaceuticals	340 f/	3.3
Salicylic acid	240 g/	2.3
Weedkiller (2,4-D)	200 h/	2.0
Refining lubricating oils	180 i/	1.8
Triphenyl phosphate	100 j/	1.0
Miscellaneous chemicals	640 k/	6.3
Export	900 l/	8.8
Total	10,200	100.0

a. The estimates in this table were derived from a great number of individual statistical reports which it would be impractical to include as source references. In addition, the methodology and calculations employed to obtain these estimates have had to be abbreviated to allow inclusion in the footnotes accompanying this table.
b. Caprolactam is produced only by the Leuna-Werke, and the estimated 1953 gross output was 2,700 tons, based on 6 months' production of 1,342 tons. 455/ An output of 2,700 tons would consume about 3,700 tons of phenol (phenol factor: 1.37 456/).
c. 1953 estimated production of phenolic plastics and resins, excluding synthetic tannins and ion-exchange resins, was 10,600 tons. This output possibly consumed about 1,500 tons of phenol. In 1952,

Table 56

Estimated Consumption Pattern for Refined Phenol in East Germany a/ 1953 (Continued)

phenolic plastics and resins production was 8,272 tons, 457/ and 1,175 tons of phenol were used. 458/

d. These phenol-derived products are valuable organic solvents and are made chiefly by Leuna-Werke. It is estimated that Leuna consumed about 1,300 tons of phenol to produce these products -- in addition to what was required directly for manufacturing caprolactam.

e. The two principal producers are Fettchemie-und Fewawerk, Karl-Marx-Stadt (Chemnitz), and Farbenfabrik Wolfen. Fewawerk is estimated to have used about 600 tons during 1953, 459/ and Wolfen about 500 tons, based on an estimated output of 1,400 tons of synthetic tannins. Thus the total phenol required for tanning agents was 1,100 tons.

f. In 1952 the pharmaceutical industry consumed 307 tons of phenol, and the 1953 plan was 340 tons. 460/ Lacking final 1953 information, it is assumed that 340 tons were used.

g. The revised East German 1953 production plan for salicylic acid was 280 tons. 461/ Output, however, was perhaps 300 tons, which would require 240 tons of phenol (phenol factor: 0.8). Portions of the salicylic acid are now used to manufacture aspirin and photographic film (safety type).

h. Elektrochemisches Kombinat Bitterfeld produces "Hormin" and "Hormit," which contain the weedkiller 2,4-D. In 1953, about 200 tons of phenol were used to prepare 2,4-D. The Hormin product is sold as a dust and Hormit as a spray. Output of the dust was 962 tons, and 158 tons of the spray were sold. 462/ The phenol input factors used were: 0.065 for the dust and 0.9 for the spray.

i. Mineraloelwerk Luetzkendorf at Krumpa employs phenol as a selective solvent for refining lubricating oils. In 1951 the plant used 94 tons of phenol and in 1952, 144 tons. 463/ The estimated 1953 consumption was 180 tons.

j. The Bitterfeld plant is the only producer of triphenyl phosphate, a softener for the plastics and photochemical industries. The 1953 output was 114 tons, 464/ and this amount would require about 100 tons of phenol (phenol factor: 0.9).

Table 56

Estimated Consumption Pattern for Refined Phenol in East Germany a/ 1953 (Continued)

k. Miscellaneous chemicals include photochemicals, ion-exchange resins, and dyestuffs. These items are made by Farbenfabrik Wolfen, and it is estimated that the 1953 phenol requirement was 500 tons. Chemische Werke Buna, Schkopau, produces a detergent, alkyl phenol, and other textile auxiliary chemicals. In 1953, Schkopau planned to use 140 tons of phenol to produce these products. 465/

l. East German phenol exports amounted to 660 tons for the first half of 1953. 466/ It is estimated that 900 tons of phenol were exported during the year.

East German phenol requirements are expected to rise for many years, and all phenol produced can be used within the country. Probable expanded production of caprolactam, phenolic plastics, synthetic tannins, salicylic acid, and dyestuffs will require greater supplies of phenol.

C. Chemical Fertilizers.

1. Nitrogen Fertilizers.

Agricultural yields in East Germany are determined, to a large extent, by the amount of nitrogen applied to the soil. Present requirements for chemical-nitrogen fertilizers are much greater than they were before World War II because natural organic fertilizers are not now available to the extent that they were. In 1939, about 45 percent of the nitrogen added to the soil was obtained from chemical fertilizers and 55 percent from organic fertilizers, and in 1948 chemical fertilizers accounted for 50 percent of the total 250,000 tons of nitrogen added. 467/ In 1948, however, the nitrogen supply from chemical fertilizers was only 59 percent of the amount furnished during 1939. By the 1951/52 fertilizer year the amount of chemical

nitrogen consumed by agriculture had increased nearly 60 percent over the 1947/48 consumption, but this still represented only about 95 percent of the 1938/39 amount. 468/

Although current production of fertilizer in East Germany is behind prewar production, it would satisfy domestic requirements if exports were not necessary. Exports, reparations payments, and other special-account deliveries of nitrogen fertilizer to the USSR have received higher priorities than domestic allocations. It is estimated that in 1953 about 25 percent of East German production of nitrogen fertilizer was exported. This included exports of calcium-ammonium nitrate to Poland and Czechoslovakia that amounted to about 16 percent of East German production. It is estimated that in 1954, total exports of nitrogen fertilizer were 70,000 tons (nitrogen content), about 25 percent of total production of fertilizers. 469/ The 1955 export plan called for delivery of 78,500 tons, 27 percent of planned 1955 production. 470/ East German agriculture has benefited very little from annual increases in production of nitrogen fertilizers; higher exports have consumed those increases.

Allocations of chemical nitrogen fertilizers to agriculture in East Germany in fertilizer years 1938/39 and 1945/46 through 1955/56 are shown in Table 57.*

2. Phosphorus Fertilizers.

During the postwar period, East German agriculture has suffered severely from a lack of phosphorus fertilizers. Imports, nearly all from Belgium, Holland, France, and West Germany, have been necessary to supplement domestic supplies. Import plans, however, seldom have been fulfilled, partly because East Germany was usually short of foreign currencies.

In 1939, phosphoric acid (as P_2O_5) was applied to the soil in the area that is now East Germany in the amount of 289,000 tons. About 63 percent of this total was obtained from chemical fertilizers. In 1948, however, only about 29 percent of the 1939 amount was applied, and chemical fertilizers furnished a little more than 35 percent of the total. 471/ By the 1951/52 fertilizer year the amount of phosphoric acid consumed by agriculture as chemical

* Table 57 follows on p. 154.

Table 57

Allocations of Chemical Nitrogen Fertilizers
to Agriculture in East Germany
Fertilizer Years 1938/39 and 1945/46 through 1955/56

Metric Tons of Nitrogen

Fertilizer Year [a]	Amount		
	Actual	Annual Plan [b]	First Five Year Plan [c]
1938/39	218,300 [d]		
1945/46	49,204 [e]		
1946/47	75,694 [e]		
1947/48	129,384 [e]		
1948/49	177,508 [e]		
1949/50	183,400 [d]		
1950/51	192,939 [f]	190,000 [f]	190,000
1951/52	206,253 [g]	190,000 [h]	195,000
1952/53	180,000 [i]	N.A.	200,000
1953/54	198,000 [i]	205,000 [j]	210,000
1954/55	210,000 [k]	N.A.	230,000
1955/56	214,000 [k]	N.A.	

a. A fertilizer year covers the period from 1 July through 30 June of the following calendar year.
b. Only the latest annual plan known for a given year is shown.
c. 472/
d. 473/
e. 474/
f. 475/
g. 476/
h. 477/
i. 478/
j. 479/
k. Estimated.

fertilizer had increased to about 167 percent of the 1947/48 consumption but still represented only 47.5 percent of the quantity consumed in 1938/39. 480/

Actual deliveries to domestic agriculture have lagged markedly behind planned allocations. The highest known quantity actually delivered in any year since World War II was during 1953/54, but the amount was only about 68 percent of the goal previously established for 1954 by the First Five Year Plan (1951-55). It is evident that the quantity of phosphoric acid being added to the soil of East Germany is too small to obtain yields, particularly of root crops, comparable to those of the prewar period.

Allocations of chemical phosphorus fertilizers to agriculture in East Germany in fertilizer years 1938/39 and 1945/46 through 1955/56 are shown in Table 58.*

3. Potassium Fertilizers.

Agriculture is the largest consumer of potassium salts in East Germany. A small part of the East German production of potash salt, about 60,000 tons (potassium oxide equivalent -- K_2O), is used by the chemical industry for the manufacture of potassium carbonate, caustic potash, and potassium chloride. The potassium chloride is further processed into chemical compounds -- potassium chlorate, potassium permanganate, potassium iodide, potassium bromide, and the like. These products are used by the glass, soap, cleansing-agent, paper, dye, and chemical industries.

In 1939, about 583,840 tons (K_2O content) of potassium were added to the soil in the area that is now East Germany. About 325,000 tons, almost 56 percent of the total, was obtain from chemical fertilizers and the remainder from organic fertilizers. 481/ In the 1938/39 fertilizer year, total consumption of chemical potassium fertilizers by Germany was 1,309,843 tons (K_2O). 482/ Therefore, 24.8 percent of this total was used in the area that is now East Germany.

* Table 58 follows on p. 156.

Table 58

Allocations of Chemical Phosphorus Fertilizers
to Agriculture in East Germany
Fertilizer Years 1938/39 and 1945/46 through 1955/56

Metric Tons of Phosphoric Acid

Fertilizer Year [a]	Amount		
	Actual	Annual Plan [b]	First Five Year Plan [c]
1938/39	182,585 [d]		
1945/46	9,630 [e]		
1946/47	7,301 [e]		
1947/48	32,116 [e]		
1948/49	63,057 [e]		
1949/50	102,810 [e]		
1950/51	75,944 [f]	130,000 [g]	150,000
1951/52	85,865 [f]	150,000 [h]	150,000
1952/53	90,000 [i]	N.A.	150,000
1953/54	106,000 [i]	95,000 [j]	155,000
1954/55	125,000 [k]	N.A.	163,000
1955/56	145,000 [k]	N.A.	

a. A fertilizer year covers the period from 1 July through 30 June of the following calendar year.
b. Only the latest annual plan known for a given year is shown.
c. 483/
d. 484/
e. 485/
f. 486/
g. 487/
h. 488/
i. 489/
j. 490/
k. Estimated.

In 1948 the amount of total potassium added to East German soil was approximately 382,000 tons (K_2O), about 65 percent of the 1939 quantity, and chemical fertilizers accounted for about 63 percent of the total. 491/ In the 1949/50 fertilizer year, East German agriculture, however, received more chemical potassium fertilizer than was supplied during 1938-39.

Since 1948/49 the quantity of chemical potassium furnished to East German agriculture has steadily increased from year to year, with the exception of 1952/53. This has been accomplished in spite of large world exports of potassium fertilizers, including reparation deliveries to the USSR. It is estimated that the amount allocated to domestic agriculture in 1954/55 was almost one-third more than in 1938/39 and showed an increase of about 65 percent over the 1948/49 quantity.

Allocations of chemical potassium fertilizers to agriculture in East Germany in fertilizer years 1938/39 and 1945/46 through 1954/55 are shown in Table 59.*

Potassium fertilizers are among the most lucrative of the items exported by East Germany. About two-thirds of annual production is exported, chiefly to countries of the Free World in return for hard currency or goods and equipment in barter.

Because supplies of nitrogen and phosphorus for East German agriculture have been substantially below prewar levels, larger quantities of potassium fertilizers are provided for domestic farming. Amounts delivered to agriculture from 1951 through 1954 have either exceeded or closely approximated the deliveries planned by the First Five Year Plan.

D. Rubber and Rubber Products.

The East German State Planning Commission handles the planning of the distribution of available supplies of rubber, both synthetic and natural, to the various consuming ministries. Data on actual allocations for the years immediately after World War II are not available, but figures for planned distribution of synthetic rubber for 1953-55 and estimates of the consumption of new rubber in the vehicular tire industry in 1953 are available. Planned distribution of synthetic rubber in East Germany in 1953-55 is shown in Table 60,** and estimated consumption of new rubber for motor vehicle tires in East Germany in 1953 is shown in Table 61.***

* Table 59 follows on p. 158.
** Table 60 follows on p. 159.
*** Table 61 follows on p. 160.

Table 59

Allocations of Chemical Potassium Fertilizers
to Agriculture in East Germany
Fertilizer Years 1938/39 and 1945/46 through 1954/55

Metric Tons of Potassium Oxide

Fertilizer Year [a]	Amount		
	Actual	Annual Plan [b]	First Five Year Plan [c]
1938/39	325,387 [d]		
1945/46	418,759 [e]		
1946/47	283,606 [e]		
1947/48	241,883 [e]		
1948/49	260,739 [e]		
1949/50	339,030 [f]		
1950/51	366,195 [g]	300,000 [h]	360,000
1951/52	425,566 [g]	350,000 [i]	400,000
1952/53	390,000 [j]	N.A.	400,000
1953/54	425,000 [j]	N.A.	435,000
1954/55	430,000 [k]	N.A.	460,000

a. A fertilizer year covers the period from 1 July through 30 June of the following calendar year.
b. Only the latest annual plan known for a given year is shown.
c. 492/
d. 493/
e. 494/
f. 495/
g. 496/
h. 497/
i. 498/
j. 499/
k. Estimated.

Table 60

Planned Distribution of Synthetic Rubber
in East Germany
1953-55

Metric Tons

Availability and Distribution	Year 1953 a/	1954 b/	1955 c/
Available			
Inventory, 1 January	950	372.2	N.A.
Production for year	60,800	66,500	70,936
Total	61,750	66,872.2	70,936
Division of available			
Ministry for Heavy Industry	23,300	17,821.20	22,629
Ministry for Machine Construction Industry	2,850	3,905.07	5,419
Ministry for Light Industry	1,180	1,119.71	1,465
Ministry for Construction		0.36	4
Other consumers (local industry)	4,120	1,719.45	1,506
Total	31,450	24,565.78	31,023
Export	29,400	42,325	39,140
Contingent allocations	61		43
Operating reserves	39		230
Inventory, 31 December	800	N.A.	500
Grand total	61,750	66,890.78	70,936

a. 500/
b. 501/
c. 502/

Table 61

Estimated Consumption of New Rubber for Motor Vehicle Tires in East Germany a/
1953

Type of Tires	Number of Tires: Requested by Consumers	"Acknowledged" Requirements b/	Planned Production Plus Imports	Expected Shortage	Actual Production	Metric Tons of Rubber: Require per 1,000 Tires: Natural	Synthetic	Estimated Consumption: Natural	Synthetic
Motorcycle	350,000	165,000	159,000	6,000	174,141	0.3	2.2	52.24	383.11
Passenger car	560,000	360,500	289,700	70,800	279,936	0.5	5.0	139.97	1,399.68
Truck	850,000	519,900	438,000 (39,000) c/	81,900	368,672	2.5	18.2	921.68	6,709.83
Heavy tractor	137,000	47,600	33,200	14,400	36,118	2.8	31.9	101.13	1,152.16
Solid	35,000	7,000	7,000	0	7,000	1.0	5.1	7.000	35.70
Miscellaneous	110,000	6,000	6,000	0	6,000	0.3	4.9	1.80	28.80
Total								1,223.82	9,709.28

a. The data [redacted] refer to new rubber only; they do not include reclaimed rubber. 503/ 50X1
b. Acknowledged requirements fixed by State Planning Commission.
c. This figure represents planned imports and is included in the total.

Estimated consumption of rubber for vehicular tires in East Germany in 1953 is shown in Table 62.

Table 62

Estimated Consumption of Rubber for Vehicular Tires in East Germany 1953

Metric Tons

Use	Natural	Synthetic
Motor vehicle tires	1,224 a/	9,709 a/
Motor vehicle tubes	1,800 b/	
Bicycle tires and tubes		2,250 c/
Tire repair materials		1,500 d/
Total	3,024	13,459

a. These figures refer to new rubber only. See Table 61, p. 160, above.
b. This estimate assumes an average of 5.33 pounds (about 2.5 kilograms) of rubber per tube and production of as many tubes as tires.
c. East Germany produces between 4 and 5 million bicycle tires and about the same number of tubes per year. This estimate assumes a requirement of 0.5 kilogram for each "set," composed of a tire and tube.
d. Tire repair materials are estimated to require about 10 percent of the amount of rubber used in making new tires.

Production of vehicular tires in East Germany consumes more than 80 percent of the natural rubber imported but only 38.7 percent of the available synthetic rubber. The remainder of the natural rubber would be required principally for making surgical goods and drug sundries. The manufacture of about 2 million pairs of footwear each year requires less than 1,000 tons of rubber, all synthetic. There are no available data on which to base estimates of consumption of rubber for other consumer items and industrial goods.

E. Synthetic Plastics, Fibers, and Resins.

The industrial uses of plastics in the economy of East Germany are so many and so varied that the determination of a significant use pattern is impossible. With the expanding research and development in chemical plastics, fibers, and resins, new uses are being found and are being applied on production levels. Because of the versatility of plastic materials and the rapid development of technology in production and use of chemical plastics, any approximate use pattern would be of little aid in evaluating the importance of synthetic plastics, fibers, and resins in the economy of East Germany.

F. Pharmaceuticals.

Little information is available on which to determine a distribution pattern for the complex East German pharmaceutical industry. It is known that there is a shortage of pharmaceuticals in the Sino-Soviet Bloc and that most of the countries of the Bloc depend on East Germany for supplies of pharmaceuticals. It is safe to assume that in 1954 about 50 percent of total East German production of pharmaceuticals was exported to the USSR and that an additional 5 to 10 percent of the total went to Communist China and the European Satellites.

IV. Major Input Requirements.

A. General.

The chemical industry of East Germany is a volume user of raw materials, which are transformed by chemical processing into innumerable end products. The industry also requires in large quantities the products or byproducts of other industries. Because much of the chemical industry is integrated, it uses many of its own products as starting materials and carries them to finished production, and it is by far the largest consumer of the primary chemicals and intermediates which it produces. The wide scope of the industry and the volume of its products have made it a major consumer of raw materials, manpower, and process materials and energy.

B. Raw Materials.

Some of the important inorganic raw materials consumed by the East German chemical industry, other than inorganic chemical compounds, include the following:

Nonmetals	Metals
Limestone	Phosphorus
Rock salt	Sodium
Phosphate rock and apatite concentrate	Lead
Pyrites	Mercury
Gypsum (anhydrite)	Copper
Potash	Iron
Sulfur	Zinc
Barite (blanc fixe)	Silver
Alumina	Platinum
Fluorspar	
Kieserite (magnesium sulfate)	Others
Chrome ore	
Ilmenite	Air
Pyrolusite (manganese ore)	Water

A few of the organic raw materials consumed by the East German chemical industry, other than manufactured organic chemical products, are listed below:

Mineral	Vegetable	Animal
Coke	Fats and oils	Fats and oils
Coal tars and light oils	Sugar and molasses	Milk
Lignite (brown coal)	Lumber and wood	Animal organs
Petroleum	Naval stores	Blood and components
Paraffins and waxes	Cotton linters	
	Starch	
	Vegetable extracts	

Available information does not permit quantitative estimates of all raw materials used by the East German chemical industry in any year, but reliable estimates of some of the major raw-material inputs are possible. Estimated consumption of selected raw materials by the chemical industry of East Germany in 1953 is shown in Table 63.

Table 63

Estimated Consumption of Selected Raw Materials by the Chemical Industry of East Germany a/*
1953

Metric Tons

Raw Material	Amount b/
Barite (barium sulfate)	10,000 c/
Benzol, crude	20,000 d/
Chrome ore (as Cr_2O_3)	4,600 e/
Coal tar (from bituminous coal) f/	100,000
Coke (from bituminous coal)	500,000 g/
Gypsum, anhydrite (calcium sulfate)	842,000 h/
Kieserite (magnesium sulfate; 26 percent sulfur content)	71,000 i/
Limestone	1,400,000 j/

* Footnotes for Table 63 follow on p. 165.

Table 63

Estimated Consumption of Selected Raw Materials by the Chemical Industry of East Germany a/ 1953 (Continued)

Metric Tons

Raw Material	Amount b/
Phosphate rock and apatite concentrate	260,000 k/
Pyrites (42 percent sulfur content)	250,000 l/
Salt, rock (sodium chloride)	800,000 m/
Sulfur	52,000 n/

a. The data presented in this table were derived from a large number of statistical reports which it would be impractical to include as source references.
b. Quantities shown are believed to be minimum amounts.
c. The figure includes barium carbonate and several barium containing compounds, not including lithopone.
d. The amount may be as high as 50,000 tons, if imports must all be processed before use.
e. The figure includes only potassium chromate and other chrominum-containing compounds produced by VEB Elektrochemisches Kombinat Bitterfeld.
f. Coal tar is used primarily for producing aromatic coal chemicals and electrode materials.
g. The figure includes about 420,000 tons for the manufacture of calcium carbide and 37,000 tons for the manufacture of soda ash.
h. The figure includes 777,000 tons for the manufacture of ammonium sulfate and 65,000 tons for the manufacture of sulfuric acid.
i. The figure is for sulfuric acid only.
j. The figure includes about 770,000 tons for the manufacture of calcium carbide, 430,000 tons for the manufacture of soda ash, and 175,000 tons for the manufacture of calcium-ammonium nitrate.
k. The figure includes about 220,000 tons for the manufacture of phosphate fertilizers and 40,000 tons for the manufacture of yellow phosphorus.
l. The figure is for the manufacture of sulfuric acid only.
m. The figure includes 445,000 tons for the manufacture of soda ash and 340,000 tons for the manufacture of caustic soda.
n. The figure includes only 36,000 tons for the manufacture of carbon disulfide and 16,000 tons for the manufacture of sulfuric acid.

The consumption by the East German chemical industry of some basic chemicals not included in Table 63 may be determined from the consumption patterns given for those chemicals in III, above.* Raw materials required by the rubber industry, for example, are calcium carbide, refined benzol, and naphthalene,** and the most important starting materials for the East German plastics industry are calcium carbide and phenol.***

C. Manpower.

Defections from East Germany to the West have imposed a rigid ceiling on the available force of industrial workers and have nullified the normal additions resulting from population increase. Additions to the labor force of the East German chemical industry, therefore, tend to be made at the expense of other industries. The government accordingly emphasizes increases in labor productivity rather than increases in the number of persons employed. The labor problem of the industry is complicated further by a shortage of technically trained personnel. Estimated employment in the chemical industry of East Germany in 1950-53 is shown in Table 64.

Table 64

Estimated Employment in the Chemical Industry of East Germany a/ 1950-53

Year	Persons Employed	Index (1950=100)
1950 (January)	180,865	100
1951 (January)	185,352	102
1952 (January)	195,000 b/	108
1953 (November)	222,155 c/	123

a. 504/
b. Estimated.
c. The figure includes about 44,000 workers employed by the Main Administration for Liquid Fuels. 505/

* P. 117, above.
** Pp. 126, 142, and 147, respectively, above.
*** Pp. 126 and 150, respectively, above.

The chemical industry of East Germany is characterized by a high concentration of employment in a small group of very large enterprises. According to East German statistics, as of 31 December 1951, 62 percent of the labor force of the chemical industry was employed in 33 plants, or 1.2 percent of the 2,700 chemical plants in East Germany. 506/ In late 1953 and early 1954, about 46 percent of the labor force was concentrated in the 18 plants listed below 507/:

Plant	Persons Employed
VEB Leuna-Werke "Walter Ulbricht"	27,757*
VEB Chemische Werke Buna, Schkopau	16,038**
VEB Filmfabrik (AGFA) Wolfen	13,982**
VEB Elektrochemisches Kombinat Bitterfeld, Bitterfeld	13,086**
VEB Farbenfabrik Wolfen	5,823***
VEB Stickstoffwerk Piesteritz	5,000****
VEB Sprengstoffwerk I, Schoenebeck	2,856**
VEB Fettchemie- und Fewawerk, Karl-Marx-Stadt	2,684**
VEB Deutsches Hydrierwerk Rodleben	2,410****
VEB Eilenburger Zelluloidwerk, Eilenburg	2,096****
VEB Sodawerke "Karl Marx," Bernburg	1,929**
VEB Schering, Berlin-Adlershof	1,835****
VEB Fahlberg-List, Magdeburg	1,716**
VEB Sodawerke "Fred Oelssner," Stassfurt	1,620**
VEB Gummiwerk, Bad Blankenburg	1,573****
VEB Schoenebecker Gummiwerk, Schoenebeck	1,201**
VEB Schwefelsaeure- und Aetznatronwerk, Nuenchritz	1,151****
VEB Sprengstoffwerk II, Gnaschwitz	709***
Total	103,466

* Reported as of January 1955.
** Reported as of March 1954.
*** Reported as of January 1954.
**** Reported as of September 1953.

D. Process Materials and Energy.

The East German chemical industry, including synthetic fuel plants, is a major consumer of process materials such as brown coal (lignite), high-temperature coke, low-temperature brown-coal coke, brown-coal briquettes, and process steam. The industry is also the country's major consumer of electric power.

East Germany has admitted that lignite is the most important raw material, for the "entire economy is based on lignite production." It is estimated that in 1953 the chemical industry consumed about 30 percent (11.8 million tons) of the lignite briquettes and more than 70 percent (4.3 million tons) of the low-temperature brown-coal coke consumed in East Germany.

Some branches of the chemical industry of East Germany require high-temperature cokes prepared from bituminous coal ("hard coal," as it is called in Germany) and lignite. It is estimated that about 1.5 million tons, approximately one-third of the total 1953 East German consumption of high-temperature coke, were used by the chemical industry. A portion of the hard-coal coke, however, serves as a raw material in the manufacture of calcium carbide and several other chemical products. Lack of information precludes presentation of quantitative estimates of the amounts of process water and steam consumed by the chemical industry. It is believed that the volume of water and steam used annually is considerable.

The East German chemical industry is not only a large producer of electric power, accounting for about 40 percent of total 1953 East German production, but it is the largest single consumer in the country. In 1953 the industry was reported to have consumed 30 percent, about 7.3 billion kilowatt-hours, of total East German power consumption. 508/ It is estimated that the manufacture of calcium carbide and electrolytic alkalies (caustic soda and caustic potash) combined required 3.26 billion kwh, approximately 45 percent of the total power consumed by the chemical industry. Liquid-fuel-producing plants are estimated to have used another 2 billion kwh in 1953. 509/ On the basis of plant analysis, it is estimated that four chemical plants, at Schkopau, Piesteritz, Bitterfeld, and Wolfen (Farbenfabrik), jointly required about 4.8 billion kwh during 1953. A late 1954 report advised that the Schkopau plant was consuming about 10 million kwh per day for production of acetylene (via carbide) alone. 510/

Significant quantities of process materials are consumed in the manufacture of synthetic rubber. On the basis of data obtained by US and British experts who studied the German synthetic rubber industry immediately after World War II, some estimates of consumption can be made. Estimated major process materials consumed in production of 64,000 tons of synthetic rubber in East Germany in 1953 is shown in Table 65.

Table 65

Estimated Major Process Materials Consumed in Production of 64,000 Tons of Synthetic Rubber in East Germany 1953

Process Material	Unit	Amount per Metric Ton of Rubber	Total Input
Electricity	Kilowatt-hours	155	9,920,000 a/
Steam	Metric tons	3.3	211,200
Water, process	Cubic meters	240	15,360,000 b/
Water, treated	Cubic meters	1.9	121,600 b/

a. Estimated total electricity required, including the amount needed to produce the raw materials used, would be about 998,000,000 kwh (based on 15,594 kwh per ton of rubber).
b. Estimated total water required, including the amount needed to produce the raw materials used, would be about 182,660,000 cubic meters (based on 2,854 cubic meters per ton of rubber).

V. Capabilities, Vulnerabilities, and Intentions.*

A. Capabilities.

Because the chemical industry of East Germany produces such a great variety of end items and intermediates, it is impossible to evaluate the capability of the industry in absolute terms. Soviet control of export commitments further complicates the problem of evaluation. In a very general way, it can be said that as of 1956 the East German chemical industry had the capability of producing supplies of sulfuric acid, synthetic ammonia, nitric acid, caustic soda, soda ash, potassium fertilizers, and synthetic rubber adequate for domestic consumption, but did not have the capability of producing adequate supplies of most other chemical products -- particularly of aromatic coal chemicals, chlorine, phosphorus fertilizers, motor vehicle tires, some plastic materials, and some pharmaceuticals such as antibiotics, insulin, and various sulfa drugs. Only because of high export commitments, production of nitrogen fertilizers and calcium carbide for domestic use has been inadequate.

The future development of the East German chemical industry appears to depend largely on the degree of emphasis allowed under Soviet authority through the directives of the Council for Economic Mutual Assistance (CEMA). There is evidence that CEMA is exerting pressure on each European Satellite to direct its efforts toward that branch of industry which its natural resources and technical skills make it most capable of developing. There are indications, moreover, that East Germany's economic plans from 1956 onward will be more closely coordinated with the plans of other countries of the Sino-Soviet Bloc. In addition, there is likely to be among the countries an exchange of technical knowledge and experience which eventually may lead to common standards for processes and inputs. 511/

No final East German Second Five Year Plan (1956-60) production goals and no particulars of recently signed long-term trade agreements between East Germany and other countries of the Sino-Soviet Bloc are yet known. In July 1955, however, Fritz Selbmann, East German Minister for Heavy Industry, stated that in the Second Five Year Plan, priority would be given to coal, power, chemicals,

* This discussion does not cover synthetic liquid fuels and some other commodities produced under the jurisdiction of the Main Administration for Liquid Fuels.

and metallurgy, in that order, and that in the chemical industry production of sulfuric acid, soda ash, other alkalies, chlorine, synthetic fuels, synthetic rubber, fertilizers, synthetic fibers, and plastics would be emphasized. 512/ The Fourth SED Congress had pointed out previously that one of the principal tasks of the new Five Year Plan was the expansion of the chemical industry. 513/

Perhaps most significant in any evaluation of the chemical industry of East Germany is the fact that in the event of war, both direct and indirect requirements for many major chemical products could be satisfied by reallocation of these products from civil to military use.

B. Vulnerabilities.

The apparent vulnerabilities of the chemical industry of East Germany are its dependence on imports of certain raw materials and some types of construction materials and plant equipment, the interdependence of its various productive operations, its dependence on electric power, and the geographical concentration of its production facilities.

Effective proscription of East German imports of pyrites, phosphorus fertilizers, crude phosphate rock and apatite, hard-coal coke, refined benzol, toluol, and naphthalene would cripple the chemical industry seriously. A major portion of East German imports of pyrites, the source of over one-half of East Germany's sulfuric acid in 1955 (two-thirds in 1953), comes from the West, as does a part of the naphthalene used in production of synthetic rubber and various organic chemicals, all of the imports of phosphorus fertilizers, and some of the crude phosphate ores.

East German production of calcium carbide and aromatic coal chemicals (except phenol) is dependent on Soviet Bloc supplies of hard-coal coke and the bituminous coal from which additional coke is made. Almost 70 percent of combined production of refined benzol, toluol, and naphthalene in East Germany is made from hard coal imported from the Bloc. During 1954, more than 60 percent of East Germany's supply of refined benzol, about 50 percent of the toluol, and almost 70 percent of the naphthalene was imported from the USSR, Poland, and Czechoslovakia.

The chemical industry of East Germany suffers from shortages of construction materials and certain vital plant equipment. These shortages have precluded more rapid expansion of the industry and have restricted production of some chemicals and chemical products. Construction materials in short supply include pit and support timber, stainless steels and other high-quality steels, sheet metal, and seamless boiler tubes. Scarce items of plant equipment include retorts, pressure vessels (especially for high pressures), vacuum pumps, and electrical equipment.

The chemical industry of East Germany is one of the major consumers of its own products. The consequent interdependence of the productive operations within the industry has created a balance which could be destroyed easily by the acute shortage of a single raw material. If, for example, the chemical industry were deprived of its supply of pyrites, production of sulfuric acid would be curtailed seriously, and as a consequence, production of synthetic fibers, phosphorus fertilizers, explosives, synthetic motor fuels, insecticides, and various other products would be retarded or stopped entirely.

The chemical industry of East Germany is almost entirely dependent on the supply of electric power. The disruption of power supplies to a few of the larger chemical complexes would affect the entire industry, and an extended stoppage of electric power at the major plants might lead to a paralysis of the East German economy.

The concentration of the East German chemical industry in the complexes at Leuna, Schkopau, Bitterfeld, Wolfen (Farbenfabrik), and Piesteritz constitutes a significant potential vulnerability. If those plants were incapacitated, East Germany would lose all of its production of synthetic ammonia, nitric acid, and synthetic rubber; almost all of its production of nitrogen fertilizers, organic chemicals, and calcium carbide; and more than one-half of its production of caustic soda, chlorine, and plastics.

C. Intentions.

Because the products of the chemical industry of East Germany are versatile in their industrial applications and can be readily reallocated from the civil economy to the military, a shift or a trend in the intentions of the East German government probably would

not be accompanied by marked increases in production of basic chemicals. Abrupt changes in the consumption and trade patterns of the chemical industry, however, might be clear indications of intentions. Unexpected reallocations of key products or unusually large imports of chemicals or chemical raw materials might indicate mobilization of material reserves and impending increases in production of military-oriented goods. Unprecedented increases in East German exports of some chemicals to other countries of the Sino-Soviet Bloc might also indicate the military intentions of the Bloc. Although changes in the East German consumption and trade patterns would not necessarily imply warlike intentions but might reflect economic trends or modifications of political or economic policy, some analysis of the possible military significance of such changes will be of value.

The synthetic ammonia industry in East Germany is one of the best indicators of military intentions, for a war will require diversion of synthetic ammonia and its two primary products, nitric acid and ammonium nitrate, from the manufacture of large quantities of nitrogen fertilizers to production of explosives. A decrease in production of nitrate fertilizers might indicate consignment of larger allocations of nitric acid to production of explosives, and a reduction in the mixing of ammonium nitrate with calcium carbonate to produce a fertilizer, calcium-ammonium nitrate, might indicate a shift of ammonium nitrate to explosives if there were no simultaneous reduction in production of ammonium nitrate.

A significant increase in production of sulfuric acid probably would not occur if war were imminent, but if the acid were reallocated to produce direct or indirect military items, a noticeable drop in the manufacture of superphosphate fertilizer might be evident. The expansion of production of oleum (fuming sulfuric acid), however, might suggest larger allocations for explosives.

In addition to increases in production of nonatomic explosives, production of the following chemicals and allied products, among many others, probably would be increased if military activity were imminent: acetic acid anhydride, ethyl alcohol, aniline, formaldehyde, hexamethylenetetramine, glycols, methanol, chlorinated organics (including solvents), pentaerythritol, and heavy-duty truck tires.

Production, allocation, and trade of special chemical materials which may be used as constituents of rocket propellants might be significant indicators of intentions. Among a list of rocket fuels that may appear in East Germany are the following: aniline, dimethylamines and trimethylamines, diethylamines and triethylamines, furfuryl alcohol, hydrazine hydrate, and dimethylhydrazine. Among the possible fuel oxidizers are the following: red fuming nitric acid, fluorine (liquid), and chlorine trifluoride. The various amines mentioned above are already in production at VEB Leuna-Werke "Walter Ulbricht." The production of aniline was scheduled to begin during 1955, presumably at VEB Farbenfabrik Wolfen. With the exception of liquid fluorine, which is produced by VEB Fluorwerke Dohna at Dohna, no other items listed above are known to be in production at this time.

Outright confiscation or gradual disappearance of medicinal supplies such as vaccines, antibiotics, and sera from local pharmacutical establishments might possibly indicate preparation for hostilities. It is assumed that State Reserves for pharmaceutical products would be well established, but military requirements might not be satisfied with the amounts held in reserve.

APPENDIX A

STATISTICAL TABLES

The tables in this appendix provide a statistical summary of the production phase of the East German chemical industry from 1936 through 1955. Production of major chemicals and chemical products in East Germany in selected years, 1936-44, and 1946-56 is shown in Table 66.* A comparison of production of major chemicals and chemical products in East Germany with production in the Sino-Soviet Bloc, the European Satellites, the USSR, and West Germany in 1954 is shown in Table 67.**

* Table 66 follows on p. 178.
** Table 67 follows on p. 179.

Table 66

Production of Major Chemicals and Chemical Products in East Germany a/
Selected Years, 1936-44 and 1946-56

Thousand Metric Tons (except as noted)

Commodity	1936	1938	1939	1943	1944	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955 b/	1956
Sulfuric acid (100 percent basis)	369.6	447.1	N.A.	N.A.	514.5	125.4	129.9	185.7	237.0	279.8	363.0	362.3	423.4	531.3	593.1	620
Synthetic ammonia (as N)	N.A.	320	385.1	259.4	128.2	62.3	122.5	174	210	236	270	278	290	313.9	335.1	350
Nitric acid (100 percent basis)	106	164	200	212	280	25.3	105	131	162	184	234.5	246.1	254.3	268.8	275.9	300
Calcium carbide	208.8	N.A.	390	550	N.A.	226.7	309.9	412.4	529	628	678.3	690.4	702.4	735.4	813.8	860
Caustic soda	124.7	195	N.A.	N.A.	298	66.4	86.9	110.2	138	148.7	183.9	208.9	221.2	227.7	256.9	270
Soda ash	378	496	N.A.	N.A.	473	47.4	63.6	82.1	93.7	102.7	121.8	190.8	296.6	372.0	458.5	490
Chlorine	83	N.A.	226	N.A.	N.A.	58	82	106	131	142	176	194	201.0	202.9	212	215
Benzol (refined)	N.A.	9.5	N.A.	N.A.	N.A.	N.A.	N.A.	5.9	6.7	8.5	10.2	10.3	10.8	11.3	11.3	12.3
Toluol	N.A.	2.4	N.A.	N.A.	N.A.	N.A.	N.A.	1.2	1.8	2.5	3.1	3.5	3.6	3.6	3.6	3.9
Naphthalene	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.3	2.4	3.8	4.0	4.7	4.8	5.1	5.3	5.4
Phenol (refined)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	3.6	4.3	5.2	7.9	9.3	10.2	11.4	12.7	13.5
Nitrogen fertilizers (as N)	392	N.A.	401.1	N.A.	N.A.	90.9	128	138.2	193.9	231.0	252.3	258.3	264.6	276.7	297.7	300
Phosphorus fertilizers (as P_2O_5)	N.A.	N.A.	78.3	N.A.	N.A.	6.7	8.0	23.6	20.0	29.4	37.5	37.1	72.3	79.2	82.7	110
Potassium fertilizers (as K_2O)	948	N.A.	1,105.2	1,2[illegible]3	N.A.	654	800	917.2	1,164	1,314	1,397.7	1,331.7	1,378	1,463.2	1,569.6	N.A.
Synthetic rubber	0	4.9	20.2	71.1	42.1	24.0	28.5	30.7	26.5	39.0	48.9	56.3	62.1	67.7	70.7	74.0
Motor vehicle tires c/	176	313	N.A.	N.A.	N.A.	23.5	39	104	217	394	611	772.3	915.9	1,139.7	1,225.2	1,410
Penicillin d/	0	0	0	0	0	Negligible	N.A.	0.28	5.0	N.A.	109.0	2,874	3,414	3,107	3,401	4,000
Polyvinyl chloride	N.A.	0.8	2.7	17.3	N.A.	N.A.	6.3	16.4	14.5	20.1	29.4	35.1	36.7	39.6	41.9	44

a. The data in this table represent a compilation of the data in the tables in the body of the report.
b. Available data on reported actual production in 1955 have been included in this table.
c. The figures given are in terms of thousand units.
d. The figures given are in terms of billion units.

Table 67

Comparison of Production of Major Chemicals and Chemical Products in East Germany with Production in the Sino-Soviet Bloc, the European Satellites, the USSR, and West Germany a/
1954

Commodity	East German Production (Metric Tons)	East German Production as Percent of Area Production b/		East German Production as Percent Equivalent of Area Production b/	
		Sino-Soviet Bloc	European Satellites	USSR	West Germany
Sulfuric acid (100 percent basis)	531,300	11.0	36.6	16.9	25.4
Synthetic ammonia (as N)	313,900	28.1	65.7	53.4	44.4
Nitric acid (100 percent basis)	268,800	13.5	48.6	18.9	c/
Calcium carbide	735,400	52.0	71.4	197.7	91.5
Caustic soda	227,700	21.9	54.0	45.5	45.7
Soda ash	372,000	15.7	50.1	28.2	39.8
Chlorine	202,900	35.0	71.1	71.2	56.1
Coal chemicals (refined benzol, toluol, and naphthalene only)	20,000	2.4	8.3	3.7	15.3
Phenol, refined	11,400	18.4	42.5	33.5	137.3 d/
Nitrogen fertilizers (as N)	276,700	27.8	60.6	58.8	39.8
Phosphorus fertilizers (as P_2O_5)	79,200	7.6	27.3	10.8 e/	16.1
Potassium fertilizers (as K_2O)	1,463,200	83.3	99.3	515.8	90.6
Synthetic rubber	66,300	23.2	91.6	31.1	947.1

a. The data in this table are based on production data and estimates available as of 15 May 1956.
b. The percentage figures are rounded.
c. The production figure is not available, and no percentage equivalent can be derived.
d. Represents only natural phenol production; synthetic phenol production figure is not available.
e. Production figure includes ground phosphorite and Thomas slag.

APPENDIX B

METHODOLOGY

1. Production.

On the basis of available information, this report covers production figures for several prewar years through 1955 and estimates for some commodities for the 1955-60 period. Those estimates necessary to complete a production series for the postwar period through 1955 were developed from plant analyses -- an estimate for a specific year represents the sum of known and/or estimated production of individual plants.

The absolute data presented in the production tables for industrial chemicals and fertilizers for years before 1953 were compiled from a great number of individual statistical reports which, because of their number, it would have been impractical to include as source references.

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Many production figures, especially prewar data for the German Reich and for the areas now called East Germany and West Germany, were obtained from West German publications, including surveys and compendiums prepared by West German statisticians.

Most production estimates beyond 1955 were based on trend extrapolations, occasionally guided by reported preliminary 1956 and 1960 plans, and were adjusted by the analyst's judgment influenced by the following factors:

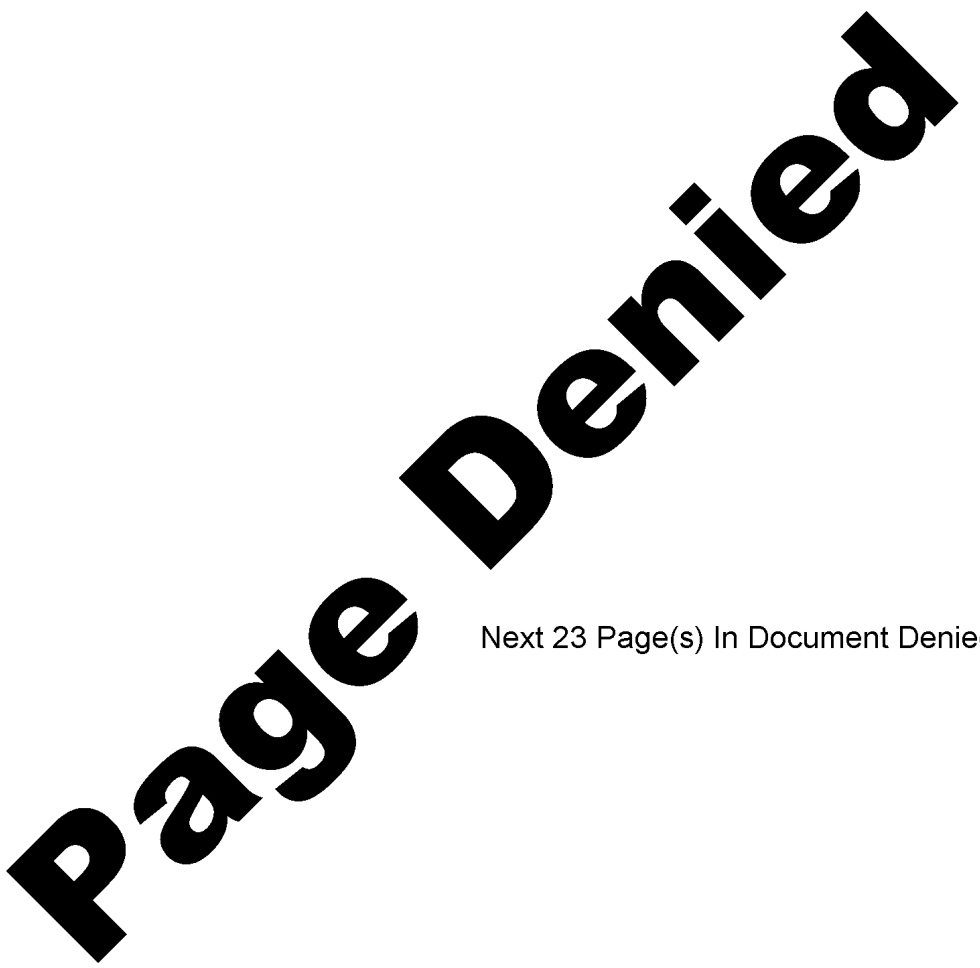
a. Graphical projection of all established postwar production data, including plans
b. Rationalization of previous plan accomplishments
c. Review of construction and equipment capabilities
d. Allowance for possible time lapses for constructing and equipping plant extensions or new installations, whichever seemed more likely, in view of material limitations
e. Availability of raw materials and electric power
f. Technological problems to be overcome and status of research efforts
g. Significance of economic and political factors possibly determining degrees of emphasis and rates of growth

2. Foreign Trade.

The basic method used in making estimates of trade was one of collation of all available information and evaluation of that information on the basis of other information. This procedure disclosed additional quantities of some commodities shipped to the USSR under reparations and other special accounts, which were rarely reported separately.

3. Consumption and Distribution and Major Input Requirements.

Special effort was made to employ reported official East German input factors in the preparation of consumption patterns and of the raw material input table. In those cases where East German factors were unavailable, however, West German or even US factors were applied. Estimates of consumption are generally explained in footnotes to the consumption pattern tables or in the accompanying text. Consumption patterns were developed for 1953, instead of 1954 or 1955, because more detailed information and final statistics were available for 1953.



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East Germany

Major Chemical-Producing Plants

(Excluding Liquid-Fuels Producers)

KIELER BUCHT

MECKLENBURGER BUCHT

BALTIC SEA

Federal Republic of Germany

CHEMICALS

- A Sulfuric acid
- B Synthetic ammonia
- C Nitric acid
- D Calcium carbide
- E Caustic soda
- F Soda ash
- G Chlorine
- H Coal chemicals
- J Nitrogen fertilizer
- K Phosphorus fertilizer
- L Organic chemicals
- M Explosives
- N Synthetic rubber
- O Photochemicals and film
- P Rubber tires
- R Plastic materials
- S Pharmaceuticals

Selected railroad

Stralsund, Rostock, Wismar, Lübeck, Hamburg, Neubrandenburg, Stettin, Kreuz, Küstrin, Frankfurt an der Oder, Poznań, Fürstenwalde, Fürstenberg, Guben, Forst, Cottbus, Breslau, Görlitz, Horka, Hannover, Bremen, Wittenberge, Stendal, Magdeburg, Schönebeck, Westeregeln, Stassfurt, Bernburg, Osternienburg, Eisleben, Halle, Ammendorf, Schkopau, Merseburg, Leuna, Dessau, Rodleben, Goswig, Wittenberg, Bitterfeld, Eilenburg, Leipzig, Espenhain, Riesa-Gröba, Nünchritz, Spremberg, Schwarzheide, Gnaschwitz, Hirschfelde, Radebeul, Dresden, Heidenau, Pirna, Muldenhütten, Karl-Marx-Stadt, Zwickau, Greiz-Dölau, Bad Köstritz, Jena, Dornburg-Steudnitz, Eisenach, Kassel, Sondershausen, Erfurt, Schwarza, Unterwellenborn, Schweinfurt, Nürnberg, Eisenspalterei, Oranienburg, Weissensee, Pankow, BERLIN, Köpenick, Rüdersdorf, Niederschöneweide, Johannisthal, Erkner, Adlershof, Grünau, Schmökwitz, Premnitz-Döberitz, Salzwedel, Ústí nad Labem, Most, Prague, CZECHOSLOVAKIA

NOTE: International boundaries and areas of administration are not necessarily those recognized by the U.S. Government.

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