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ECONOMIC INTELLIGENCE REPORT

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THE SHIPBUILDING INDUSTRY IN EAST GERMANY

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CIA/RR 42

1 October 1954

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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(ORR Project 35.242)

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THE SHIPBUILDING INDUSTRY IN EAST GERMANY*

Summary

The demands of the USSR for ship construction, repairs, and component parts have pushed the shipbuilding industry of East Germany into a major position in the national economy. Vessels constructed or repaired in East Germany, as a result of the Soviet policy, relieve Soviet shipyards of nonnaval work with a tonnage equivalent to 15 destroyers per year. In addition, the industry furnishes the USSR with advance repair bases and makes the technological knowledge of the Germans available for research and development.

The original 1953 plan called for a production of 202,505 gross register tons (GRT)** of vessels. This plan was unrealistic and in June 1953 was reduced by approximately 18 percent. Shortages of materials, funds, and skilled labor were important factors in underfulfillment of the plan. The tonnage produced in 1952, 113,000 GRT, was greater than the tonnage reported for Denmark, which ranked ninth among the shipbuilding countries of the West in 1952.

By 1955, the planned shipyard expansion program will give East Germany facilities for building a maximum of 235,000 GRT annually. Unless a more dependable flow of supplies to the shipyards is assured, it seems likely that much of the new capacity will not be utilized.

Production has been severely handicapped by shortages of certain raw and finished materials. Indigenous facilities for the production

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 April 1954.

** Gross register tonnage is a measure wherein the entire internal cubic capacity of the vessel is expressed in registered tons (100 cubic feet to the ton). Certain items are not included in the measurement, such as peak tanks and other tanks of water ballast, open forecastle, bridge and poop, hatchway excess, certain light and air spaces, anchor gear, steering gear, wheelhouse, galley, cabins for passengers, and other minor spaces specified by law.

of thin and medium sheet metal are adequate for shipbuilding needs, but East German rolling mills have been unable to provide the heavy ship plates required. Importing of heavy sheet plates and copper alloys has been necessary to maintain the program.

The labor employed by the industry in 1952 represented 3 percent of the industrial labor force of East Germany. The morale of the workers is very low. Resentment towards the Communist domination has shown itself in the form of slowdowns, acts of sabotage, and poor workmanship.

Although old shipyards have been modernized and new shipyards constructed, Soviet control of the output of the industry has prevented the development of an efficient, independent industry that could compete with the West German or other European shipyards in a free market.

I. Introduction.

A. History of the Industry.

The shipbuilding industry was relatively unimportant in East Germany before 1945. None of the large prewar German shipyards (those employing more than 5,000 persons) were located in this area. The first project in 1946 was to repair the few remaining vessels and to clear the inland shipping lanes of wreckage. 1/* During the first half of 1946 the USSR placed reparation orders for the repairs of fishing craft. These orders acted as the first stimulant to the shipbuilding industry and necessitated the expansion of various yards.

The shipbuilding industry grew rapidly in 1948 and became more important to the economy of the country. Nationalization of the larger yards was started, and a central control organization was formed to regulate and assist in the production of each plant. During the first half of 1948 the German Economic Commission developed extensive shipbuilding programs for 1949 and 1950 (basically a Two Year Plan). The 1950 shipbuilding program was so extensive that it was decided to

* Footnote references in arabic numerals are to sources listed in Appendix D.

build several new shipyards and to redesign other yards. The three major projects are as follows 2/:

1. Volkswerft Stralsund. A prewar plant entirely redesigned to handle the serial production of fishing loggers and other vessels of comparable size.

2. Bodden Shipyard at Damgarten. A new plant designed to take over the serial production of fishing cutters.

3. Peene Shipyard at Wolgast. A new plant designed to take over the completion and fitting out of fishing vessels built at the inland yards.

The first Five Year Plan for East Germany, which went into effect in 1951, planned the building of a large fishing fleet and a number of oceangoing vessels for the East German merchant marine. 3/ Thus the capacity of the shipyards increased greatly during 1945-51 and raised the shipbuilding industry from a very minor industry in East Germany to one of the major industries in the country.

B. Importance of the Industry.

The US Technical Industrial Disarmament Committee for the German Shipbuilding Industry made the following comments on the shipbuilding industry:

> "There is hardly an industry which cannot be utilized, in one way or another, for military purposes. However, certain industries stand out above others in their relationship to the ability of a country to make war. Among them is the building and operation of ships ... The technique required for building merchant ships is roughly the same as that required for the building of war ships. The skills utilized are almost identical and yards may be switched from one type of construction to the other with little difficulty. Practically all German shipyards were used in the present war for the production of submarines or other vessels of a military nature ... . The training acquired in commercial shipping operations can be readily adapted to the needs of war ... . Domestic shipping is vital to the

recovery and preservation of the German economy. Many vessels normally operate in the coastal trade, while inland waterways are an essential part of the transportation structure of the country." 4/

Shipbuilding has become a major heavy machinery industry in East Germany. The industry employed approximately 56,000 persons in 1953, not including those employed by the component industry, an increase of 2,800 percent since the beginning of 1947 5/ and approximately 1,000 percent greater than the prewar level.

The Russians are having the German shipyards along the Baltic Coast enlarged to such an extent that they will be able, by the end of 1955, to handle the construction of merchant vessels up to 10,000 GRT and the repairs to vessels up to 25,000 GRT, thus enabling the Russians to repair both merchant and naval vessels at the entrance to the Baltic Sea. At present these coastal yards are handling repairs to minor Soviet naval craft, thereby supplying the Russians with advanced naval repair bases. 6/ By 1955, East Germany will be in a position to build larger merchant ships to engage in international trade.

The majority of the vessels needed to handle the inland transportation of goods are built and repaired at East German inland shipyards. An estimated 2.5 million metric tons* of freight was moved over the inland waterway system in 1952, operated by the German Shipping and Transshipping Office (DSu). 7/

Table 1* gives data on vessels in the inland waterway system of East Germany.

The East German shipyards have been constructing auxiliary naval craft, such as minesweepers and coastal patrol vessels, for the East German Sea Police. By 1953, the schedule called for 35.3 percent of the shipyard production to go to the Sea Police. 8/

C. Organization of the Industry.

Shipbuilding in East Germany is under the control of two separate governmental departments. The greater number of the ship-

* Table 1 follows on p. 5.

Table 1

Vessels in the Inland Waterway System of East Germany
1952

Type of Vessel	Number of Vessels	Total (Deadweight Tons)	Out of Service for Repairs: Number of Vessels	Out of Service for Repairs: Total (Deadweight Tons)
Barges	1,654	584,058	180	64,264
Self-Propelled Barges	277	40,841	58	8,143
Tugs	356	49,941	75	13,004
Total	2,287	674,840	313	85,411

building and repair orders are placed with the individual shipyards by the Ministry for Construction of Transportation and Agricultural Machinery through the Main Administration for Ship Construction (HVS). The remaining orders are placed by the State Secretariat for Shipping (formerly the General Directorate for Shipping, GDS) with the shipyards under its jurisdiction.

The Main Administration for Ship Construction controls 16 VEB (Volkseigene Betriebe -- People-Owned Enterprises) shipyards, 3 ship-outfitting firms, 2 government yards, and the Central Construction Bureau. These shipyards handle work for the entire East German economy, as well as reparation orders.

The State Secretariat for Shipping controls 10 shipyards which handle mostly repair work for the inland shipping fleets. In addition, these yards handle some new construction work on a subcontract basis from the VEB shipyards or on orders from the State Secretariat for Shipping. The Secretariat for Shipping also controls the operation of all government-owned inland and seagoing vessels and maintains the vessels, the harbors, and the waterways, and technically supervises private shipyards. 9/

The State Secretariat for Shipping replaced the General Directorate for Shipping (GDS) on 1 May 1953. 10/ Since all current orders bear the initials GDS, these initials will be used in this report to separate the yards and orders issued by this office from those issued by the Main Administration for Shipbuilding.

II. Facilities.

A. Types of Facilities.

The shipbuilding facilities in East Germany range from new, efficient plants to old, antiquated installations and can be divided approximately into the following groups:

a. Coastal Shipyards.

New Plants	4
Modernized Plants	3
Old Plants	16
Total	23

b. Inland Shipyards.

New Plants	1
Modernized Plants	12
Old Plants	52
Total	65
Grand Total	88

The modernization of existing yards and the construction of new yards were accomplished under the instruction of the Soviet Control Commission (SKK). The modernization of the shipyards varied from just the installation of needed machinery to the complete rebuilding of the plants for more efficient operation and increased production. The newly constructed yards still in operation are as follows:

1. VEB Mathias-Thesen Werft, Wismar. A modern yard with 4 scheduled building ways capable of constructing vessels up to 10,000 GRT and planned to handle the complete repairs of vessels up to 25,000 GRT.

2. VEB Warnow Werft, Warnemuende. A modern yard equal in size to the Mathias-Thesen Werft except that it will handle complete repairs of vessels up to only 12,000 GRT.

3. VEB Volkswerft, Stralsund. A modern yard constructed to handle the serial production of vessels up to 1,000 GRT.

4. VEB Peenewerft, Wolgast. A modern yard to handle the construction and repair of naval vessels and auxiliaries up to approximately 1,000 GRT.

5. VEB Staatswerft, Rechlin. A modern yard to handle the construction and repair of river vessels and other small craft.

One other shipyard was built, Boddenwerft at Damgarten. The yard was built to construct fishing cutters on the serial production basis. In 1951 the yard finished vessels under construction and was dismantled. 11/

The modernization program has varied from minor changes to very extensive improvements. The extent of modernization and improvement has varied directly with the importance of the plant to the Soviet program and not in relation to the necessities of East Germany. The most extensive modernization and expansion program has been carried on at the VEB Neptun Werft at Rostock.

As of 1953, the Neptun Werft and the Volkswerft Stralsund ranked on a par as to mark value of scheduled work and each exceeded any other shipyard. These two yards, however, are diametrically opposite in layout, construction methods, and size of work to be handled.

The Neptun Werft conforms in layout and method of construction of ships to typical old yards in other countries. The firm is over 100 years old and grew as all old-time shipyards; that is, buildings were added as needed in the available areas. The original building ways have the standard bridge-type cranes. The new building ways, giving a total of six building ways, have gantry-type cranes. The largest vessel that can be constructed is approximately 3,000 GRT. 12/ The firm has 2 floating drydocks, 1 of 4,000-GRT capacity and 1 of 6,000-GRT capacity.

The Volkswerft Stralsund was designed for serial construction of vessels up to 1,000 GRT entirely inside the buildings. The plant consists of many buildings located about a central construction hall. Subassemblies are prefabricated in these buildings and transported to the main assembly hall. Parts that require only layout and cutting

enter the main hall at the south end. All the precut and prefabricated materials move to the three assembly tracks, where they are assembled on a production line basis. The vessels move progressively through the shop on dollies. Outside the shop, there is an area for installing masts and other items too high for the vertical clearance of the shop. The completed vessels then move to a marine railway on which they are launched sideways. 13/

The Mathias-Thesen Werft at Wismar ranks third in mark value of scheduled work for 1953. This plant, although built around the old Hansa Werft, is an entirely new plant. Large, modern shops have been built and equipped with new machinery. This construction is still in progress and not scheduled for completion until 1955. The 4 building ways can handle vessels up to 10,000 GRT. The building ways have cable craneways which are unique to some European countries.

The Warnow Shipyard at Warnemuende is also a new shipyard built around an old shipyard, the Krueger Werft. Although the layout varies from that of the Mathias-Thesen Werft because of the topography of the land, it is to be the same size and have basically the same types of buildings. This yard is scheduled for completion in 1955.

The only other yard that requires special mention is the Boat and Ship Repair Yard at Gehlsdorf. This yard is important because of its ability to make fast repairs on small craft ranging up to 600 GRT. The yard has been completely rebuilt with new marine railways, transfer platforms, and repair areas, making it admirably suited for the repair of PT boats and similar craft.

Table 2* lists the shipyards located in East Germany and outlines their major activities, manpower, drydocking facilities, and building capabilities. Most of the yards do not have any building ways listed, although this does not imply that the yards are unable to build any vessels. These yards built vessels either on the marine railways or on temporary ways along the river banks.

B. Location of Plants.

The shipyards in East Germany are located in Berlin and in all the Laender (provinces) except Thueringen. The locations of the shipyards by cities and coordinates are listed in Table 2. The

* Table 2 follows on p. 9.

Table 2

Shipyards in East Germany

Yard	Location	Owner	Number of Workers 1952	Marine Railways		Building Ways		New Construction Capacity	
				Number	Capacity (Tons)	Number	Size a/* (Meters)	1953 (GRT)	1955 (GRT)
Bauer Werft	Wormsdorf	Private	8	2	350				
Berlin Werft	Zehdenick	Private	3	3	225				
Bobert Werft	Fuerstenberg	Private	1		N.A.				
Bolle Werft	Derben	Private	30	2	700			1,400	1,400
Bootswerft	Postelwitz	Private	30	3	60				
Bootswerft Horn	Wolgast	Private	N.A.		N.A.			500	500
Bootswerft Kruse	Ueckermuende	Private	N.A.		N.A.			500	500
Bootswerft Sanitz	Barth	Private	N.A.		N.A.			400	400
Bootswerft Thiele	Malchin	Private	N.A.		N.A.				
Bootswerft Wessel-Lauterbach	Ruegen	Private	N.A.		N.A.				
Christians Werft	Marienwerder	Private	5	3	500				
Droescher Werft	Rathenow	Private	11	2	600				
Elbewerft	Boizenburg	VEB	2,300	2	N.A.			15,500	15,500
Ertel Werft	Woltersdorf	Private	13	3	550				
Finke Werft	Fuerstenberg	Private	4	1	50				
Frans Werft	Niederlehme	Private	7	2	250				
Haase Werft	Mullrose	GDS	25	3	550				
Hansa-Werft	Berlin	Private	3	5	5				
Henning Werft	Barby		N.A.	3	N.A.				
Hoehne Werft	Hohensaaten	Private	3	2	240				
Hoffman Werft	Berlin	Private	N.A.		N.A.				
Hoppner Werft	Weseram	Private	8	2	250				
Janitschke Werft	Fuerstenberg	Private	2		N.A.				
Jerichow	Milow	Private	6	1	250				
Julichau Werft	Dresden	Private	N.A.		N.A.				
Klotz Werft	Schwerin	Private	9		N.A.				
Kuntzke Werft	Rathsdorf	Private	16	4	500				
Loberenz	Marienwerder	Private	10	3	500				
Loesche	Derben	Private	18	3	760				
Mathias-Thesen Werft	Wismar	VEB	9,500 b/			4	220 x 40	24,000	48,500
Matthes	Ruedersdorf	Private	6	2	250				

* Footnotes for Table 2 follow on p. 13.

Table 2

Shipyards in East Germany
(Continued)

Yard	Location	Owner	Number of Workers 1952	Marine Railways		Building Ways		New Construction Capacity	
				Number	Capacity (Tons)	Number	Size a/ (Meters)	1953 (GRT)	1955 (GRT)
Mette	Brandenburg	Private	8	3	250				
Moehring	Ketzin	Private	7	3	300				
Moeser	Mullrose	Private	19	3	550				
Neptun Werft	Rostock	VEB	7,500 b/	1	1,500	2	100 x 32	9,100	23,200
				1 c/	6,000	1	100 x 23		
				1 c/	4,000	1	100 x 22		
						2	100 x 40		
Nienburg Schiffs-werft	Nienburg	Private	13	2	400				
Otto, R. Schiffswerft		Private	7	2	400				
Otto Ludewig and J. Moller Werft	Rostock	Private	28	1	100				
				1	350				
Peenewerft	Wolgast	State	3,000 b/	2	1,500	2	120 x N.A.	5,000	11,000
Plauer Schiffswerft (Work 2 of "Ernst Thaelmann")	Plaue Havel	VEB	198	1	600	1	N.A.		
Poeche and Soehne	Zehren	Private	18	3	760				
Reg. Werkstatt Schirner	Hohensaaten	Private	3	N.A.					
Ritter Schiffswerft	Koenigstein	Private	17	3	760				
Rosslauer Schiffs-werft	Rosslau	VEB	2,500 b/	1	500			10,000	10,000
				1	700				
Schiffbau- und Reparatur Werft	Stralsund	VEB	1,600 b/	1	1,200				
				1	1,000				
Schiffs- und Bootswerft	Altwarp	State	148	N.A.				1,000	1,000
Schiffs- und Bootswerft	Gehlsdorf	VEB	1,600 b/	1	250			3,800	3,800
				1	1,000				
Schiffswerft	Dolgenbredt	Private	12	3	250				
Schiffswerft	Fuerstenberg	VEB	620	1	400			1,100	1,600
				1	400				
				1 c/	N.A.				

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Table 2

Shipyards in East Germany
(Continued)

Yard	Location	Owner	Number of Workers 1952	Marine Railways		Building Ways		New Construction Capacity	
				Number	Capacity (Tons)	Number	Size a/ (Meters)	1953 (GRT)	1955 (GRT)
Schiffswerft	Magdeburg	GDS	56	1	700				
Schiffswerft	Oderberg	VEB	865	1	N.A.			1,100	2,500
Schiffswerft	Rechlin	VEB	1,400 b/	1	250	1	N.A.	700	2,000
Schiffswerft	Riesa	Private	23	3	760				
Schiffswerft	Tangermuende	GDS	124	3	760			3,000	3,000
				1	250				
Schiffswerft	Uebigau	VEB	1,300 b/	1	N.A.			7,500	7,500
Schiffswerft	Zehdenick	Private	45	4	250				
Schiffswerft	Genthin	Private	17	2	760				
Altenplatow									
Schiffswerft	Wurserwitz	Private	7		N.A.				
Heopfner									
Schiffswerft	Dresden	GDS	114	7	1,000			1,000	1,000
Laubegast									
Schiffswerft	Alsleben	Private	25	4	450			500	500
Muerena				1	250				
Schiffswerft	Aken	Private	31	4	1,000				
Placke									
Schiffswerft	Genthin	Private	21	2	760				
Schuetze									
Schinke Werft	Schandau	Private	20	3	1,000				
Schuetze, H. Werft	Aken	Private	200	1	1,600	1	150 x 30	1,000	1,000
Schuppen Werft	Berlin	Private	11	3	285				
Siebert Werft	Fuerstenberg	Private	4		N.A.				
Sonntag Werft	Rogatz	Private	27	2	1,000				
				2	700				
Staatswerft Frohse	Schoenebeck	GDS	82	2	1,000			1,000	1,000
				2	250				
Staatswerft	Malz	GDS	69	1	600			500	500
Staatswerft	Rothensee	VEB	1,900 b/			1	N.A.	7,000	10,200

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Table 2

Shipyards in East Germany
(Continued)

Yard	Location	Owner	Number of Workers 1952	Marine Railways		Building Ways		New Construction Capacity	
				Number	Capacity (Tons)	Number	Size a/ (Meters)	1953 (GRT)	1955 (GRT)
Transp. Gen. Damn-Host	Zehdenick	GDS	3	3	240				
Volkswerft	Anklam	Private	N.A.		N.A.				
Volkswerft	Stralsund	VEB	5,533	1	1,000	1	(launching way of 400 tons)	12,500	14,200
				1	250				
Volkswerft "Ernst Thaelmann"	Brandenburg	VEB	2,200	2	N.A.			8,000	12,400
Vopel Werft	Alsleben	Private	8	2	450				
W. Werft	Fuerstenwalde	GDS	55	3	200				
W. Werft	Genthin	GDS	138	2	650				
W. Werft	Rathenow	GDS	56	2	125				
Warnow Werft	Warnemuende	VEB	10,000 b/			4	220 x 40	20,000	48,500
Werft Blad	Stralsund	Private	N.A.	0					
Werft Bucholz	Greifswald	Private	N.A.		N.A.			2,000	2,000
Werft Clement	Tarnewitz	Private	N.A.		N.A.				
Werft Yahrling	Freesendorf	Private	N.A.		N.A.				
Wilke Schiffswerft	Zehdenick	Private	8	2	233				
Winkler Schiffs-werft	Ruedersdorf	Private	4	2	350				
Woth Werft	Parchim	Private	7	1	200				

Table 2

Shipyards in East Germany
(Continued)

Yard	Location	Owner	Number of Workers 1952	Marine Railways Number	Marine Railways Capacity (Tons)	Building Ways Number	Building Ways Size a/ (Meters)	New Construction Capacity 1953 (GRT)	New Construction Capacity 1955 (GRT)
Yachtwerft	Berlin	VEB	2,400 b/	2	N.A.	1	50 x N.A.	11,400	11,400
				2	125	1	N.A.		
Ziller Schiffswerft	Havelberg	Private	50	3	600				
Total			56,119					149,500	235,100
VEB - 16 GDS - 10 State - 2 Private - 60 Total 88									
Sources 14/									

a. Some shipyards construct vessels on their marine railways or on temporary ways along the river banks. No size for these is available.
b. Employment figure for 1953.
c. Floating drydocks.

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majority of the shipyards are located along the Baltic Coast in Land Mecklenburg. Land Mecklenburg including Berlin is second in total number of yards and is first in number of inland shipyards.

The central and northern sections of East Germany are well served by rivers, canals, and bays. Along these inland waterways are located medium-size and small shipyards serving the river fleet. The coastal shipyards are relatively new yards developed to serve a potential merchant fleet as well as the immediate requirements of the USSR.

III. Technology and Training.

A. General.

The shipbuilding industry of East Germany is short of all types of qualified personnel. A concerted effort is being made to improve the technical ability of the shipyard personnel through training and research programs.

In July 1952 it was announced that the machine building industry (including shipbuilding) had about 38,000 scientists, engineers, technologists, production managers, and designers, as well as approximately 600,000 workers. Of the 38,000, however, only 2,000 are fully qualified for their work. 15/

The shortage of qualified personnel is well illustrated by an article on the East German shipbuilding situation written by a shipbuilding specialist. This article dated December 1952 stated 16/:

a. The absolute lack of qualified personnel in specialized fields retarded the actual production output, since the shipbuilding specialists were required to render their assistance to production technicians who were not in a position to complete the more difficult aspects of production problems.

b. The leading personalities were incompetent and showed a general indifference and unconcern. Individuals who were never associated with the shipbuilding or ship engineering trade were appointed to top positions.

c. There were continual changes of plans.

d. The German Ship Register and Classification Society (DSRK) employed ill-qualified and incompetent individuals, who were not in a position to carry out a complicated stability computation problem.

e. Many blunders in design, discovered after work had been started, greatly increased costs.

The many problems encountered on the 3,000-GRT freighter Kolomna, both during and after design and construction, exemplify typical results of the lack of competence in the industry.* 17/

B. Research.

The pressing need for even the basic information on shipbuilding and components has been recognized from the beginning of the East German shipbuilding program. Various technical committees have been set up covering wide areas of research. 18/

In addition to the research and development programs devoted to components, research on ship designs, production techniques, and materials is under way. Some examples of the projects are as follows: research to find a substitute material for bronze in ships' propellers; design and production of an automatic autogenous cutting torch guided by means of a photoelectric cell; and the development of automatic welding methods for fabricating small parts. 19/

C. Ship Design. 20/

Three large design offices support the shipbuilding industry: the Central Design and Construction Office in Berlin-Koepenick, the Design Office in Wolgast (Bureau Schlaak), and the Design Office in Warnemuende. Minor design offices are located at other plants.

* The original German design was sovietized in 1945, re-Germanized in Rostock in 1951. Plates delivered from the USSR were entirely unsatisfactory as to chemical content and size tolerances. Defects in the main as well as in the auxiliary components which developed during yard trials were apparently not corrected satisfactorily. Fourteen days after acceptance of the vessel by the Russians the engines, boilers, and dynamos were not operable, and the vessel was towed back to the Neptun Werft for repairs.

The Central Design Office in Berlin is headed by a nonexpert in shipbuilding, Hoendorf. This office is presently occupied with the designs of small ships and pontoons and recently designed a 60-meter Volga-Don passenger vessel, floating docks, floating cranes, and coastal motor ships.

Attached to the office in Berlin is the Technical Projects Office, which supervises the expansion work of all shipyards and examines all ship designs with a view to adapting them to the construction facilities of various yards.

The Design Office in Warnemuende, headed by a shipbuilding engineer, Franz, is presently occupied with the designs of freighters.

The Design Office in Wolgast, headed by a shipbuilding engineer, Schlaak, has been designed to carry out the project and design work on ships for the Sea Police. The office employs approximately 240 designers but is understaffed. The following projects are currently being worked on: (a) a destroyer, 120 meters long, (b) submarines (details unknown), and (c) M-boats (minesweepers).

A Ship Construction Center (Design Office and Model Test Station), which will be located in the area northeast of Rostock between Gehlsdorf and Tottwenwinkel, is due for completion in 1954 at a cost of 20 million East German Marks (DME). This station will include a 300-meter towing basin and a closed circuit propulsion canal. The director, Hantschke, is an expert shipbuilding engineer.

D. Engineering Schools.

To alleviate the shortage of trained personnel, engineering schools have been established as follows:

1. Wismar — Technical Schools for Shipbuilding. Divided into two parts:

   Shipbuilding and Ship Machinery Construction. About 580 students are currently attending. 21/

2. Warnemuende — Same as at Wismar but smaller. Approximately 300 students are attending at present. 22/

3. Rostock — University of Rostock in 1951 added a faculty to teach shipbuilding techniques. It was to

train graduate engineers in Naval Construction. 23/

4. Wustrow Navigation School for mariners. 24/

The schools at Wismar and Warnemuende, which are under the direction of the Administration for Ship Construction, train foreman-assistants, technicians, and engineers in the specialized work of shipbuilding, marine engine construction, and shipyard construction. 25/ There is a definite lack of qualified instructors and text books for use in these schools. 26/

IV. Production.

A. Present and Estimated Future.

1. General.

Although the shipbuilding industry of East Germany showed a steady increase during 1949-52, production has never equalled planned construction. Fig. 1* shows the relationships between planned and actual construction for 1949-52 and the planned construction for 1953. The increase in production by the end of 1952 was 187.5 percent over that of 1949.

The scheduled and actual production of vessels by yards and types is summarized in Table 3.** In reading this table, certain factors must be kept in mind. Work was subcontracted to firms other than shipyards, but the production has been credited to the shipyard that accepted the order. Such a case is the production of BMK boats at the Yachtwerft, Berlin. 27/ In the case of the production for the Volkswerft Ernst Thaelmann, in 1952, the pontoons were probably subcontracted, although no direct report on the subject has been noted.

A summary of the production for years 1949-52, planned and actual, by end users is given in Table 4.***

2. Five Year Plan, 1951-55.

The Five Year Plan envisaged a total output of 291,414,000 DME in 1951 increasing to 660,510,000 DME by 1955. This plan was not

* Fig. 1 follows p. 18.
** Table 3 follows on p. 18.
*** Table 4 follows on p. 19.

Table 3

Shipbuilding Production Schedule, by Yards
1949-53

GRT

Shipyard	1949		1950		1951		1952		1953
	Scheduled	Delivered	Scheduled	Delivered	Scheduled	Delivered	Scheduled	Delivered	Scheduled
Schiffs- und Bootswerft Altwarp	N.A.	N.A.	N.A.	N.A.	969	639	151	160	N.A.
Boddenwerft - Damgarten	8,000	4,000	10,113	9,813	4,649	3,836			
Elbewerft - Boizenburg	7,950	7,150	6,000	6,000	10,400	10,400	16,600	14,400	20,600
Mathias Thesen Werft - Wismar	N.A.	N.A.	559	559	0	0	5,775	2,200	24,117
Neptun Werft - Rostock	16,432	14,432	20,960	20,960	32,000	32,000	26,800	26,800	26,835
Peenewerft - Wolgast					840	0	4,920	180	4,994
Rosslauer Schiffswerft - Rosslau	4,800	4,000	5,200	4,800	8,824	6,840	14,919	9,457	24,733
Schiffswerft Fuerstenberg	N.A.	N.A.	800	600	3,459	3,259	1,200	0	4,800
Schiffswerft Oderberg	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	600	0	750
Schiffswerft Uebigau	N.A.	N.A.	N.A.	N.A.	1,000	1,000	12,430	8,100	5,900
Schiffs- und Bootswerft-Gehlsdorf	1,500	1,500	1,500	1,500	1,771	1,745	1,862	1,463	2,824
Staatswerft - Rothensee	2,000	800	3,500	2,000	3,300	2,400	12,096	7,870	6,926
Volkswerft Ernst Thaelmann-Brandenburg	4,400	1,800	6,800	6,800	10,425	10,425	26,570	12,034	14,384
Volkswerft Rechlin			8	0	12	12	90	90	508
Volkswerft Stralsund	8,000	2,400	13,200	7,200	15,977	7,227	19,797	20,439	31,720
Warnow Werft - Warnemuende							17,300	0	20,542
Yachtwerft - Berlin	988	988	3,232	3,544	3,791	3,389	10,094	9,347	12,122
Minor Shipyards	2,815	2,015	1,800	800	3,660	2,685	1,550	800	750
Total	56,885	39,085	73,672	64,576	101,077	85,857	172,754	113,340	202,505

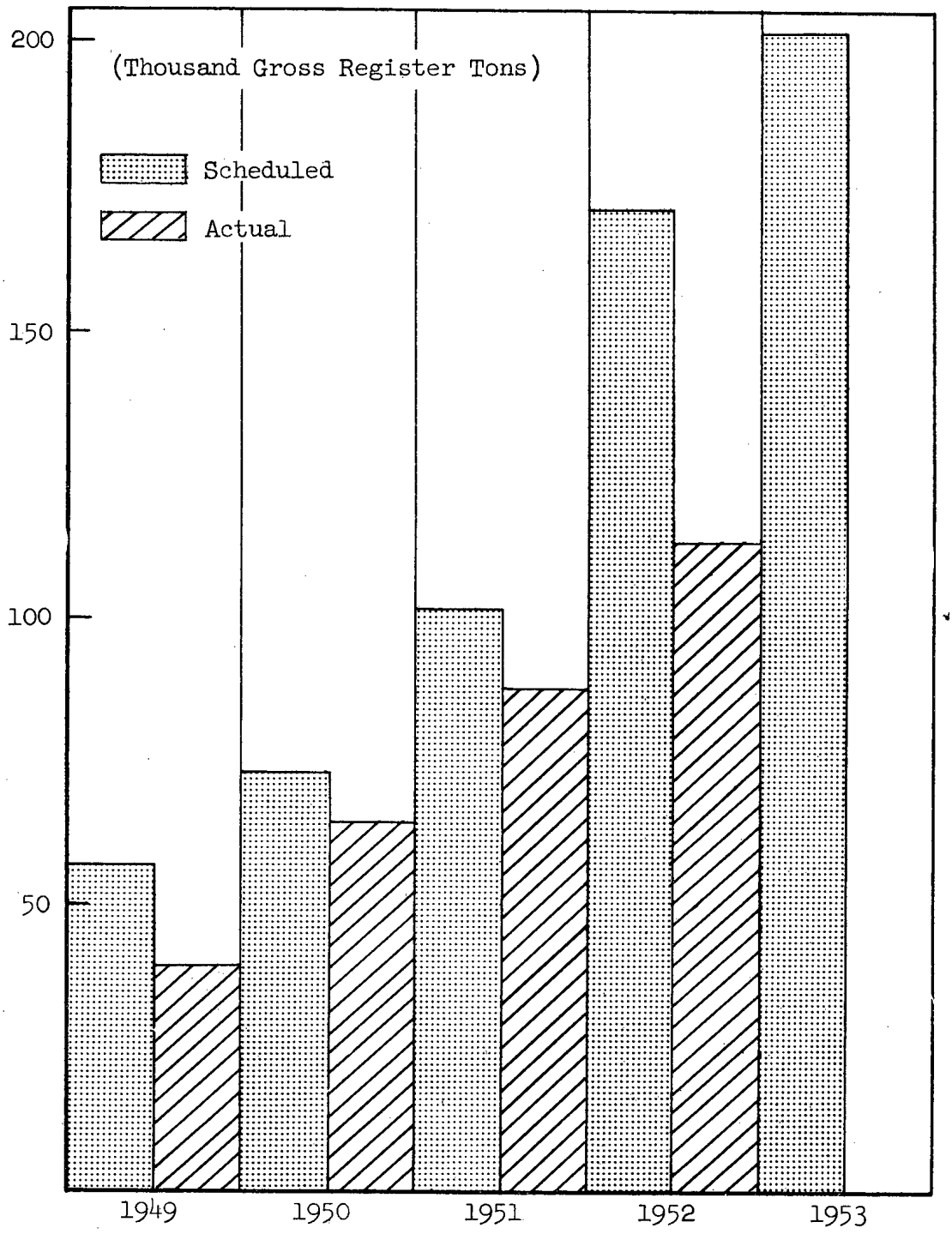

FIGURE 1
Scheduled and Actual Production, 1949-53

Table 4

Summary of Production Schedule, by End Users
1949-52

Delivered to	Scheduled GRT	Percent of Total	Delivered GRT	Percent of Total	Percent of Fulfillment
USSR	299,319	74.0	249,929	82.5	83.5
Export	5,538	1.4	2,577	0.9	46.5
BfW a/	22,138	5.5	9,224	3.0	41.7
Civilian Sector	77,393	19.1	41,128	13.6	53.3
Total	404,388	100.0	302,858	100.0	74.9

a. Central supply office for paramilitary organizations.

realistic since it covered only the construction of fishing vessels and freighters. The actual production of vessels included not only these types of vessels but many others such as tugs, barges, fire boats, and East German Sea Police vessels. The plan was prepared by the East Germans, who optimistically planned on an East German merchant fleet. The occupation authorities did not allow the plan to be carried out, because it did not give the USSR sufficient vessels. 28/ On 4 December 1952 a report of the Ministry for Machine Construction gave a revision of the basic Five Year Plan as it had developed. 29/

The revision of the Five Year Plan proposed production assignments for eight types of vessels. This plan is shown in the upper section of Table 5.*

The revised plan for the production of these basic types was later scaled down to provide capacity for the production of other craft for the USSR. A detailed breakdown of this further revision is shown in the lower section of Table 5.

* Table 5 follows on p. 20.

Table 5

Planned Production of Ships, Revised Plan of 1952
1951-55

Units

Type	1951	1952	1953	1954	1955	Total
Cutter	276	60	60	60	60	516
Seiner	40	40	40	40	40	200
Logger	64	83	123	143	150	563
Trawler	3	15	18	20	25	81
Freighter, Type I			3	7	2	12
Freighter, Type II				1	4	5
Freighter, Type III					3	3
Freighter, Type IV				2	1	3
Total	383	198	244	273	285	1,383

Planned Production of Ships, Revised Plan of 1952
Approved Plan for 1952 and 1953

Units

Type	Five Year Plan Proposed for 1952	Plan Approved for 1952	Actually Completed 1952	Five Year Plan Proposed for 1953	Plan Approved for 1953
Cutter	60	60	62	60	30
Seiner	40	16	16	40	20
Logger	83	71	71	123	81
Trawler	15	12	2	18	1
Freighter, Type I		1.2	Negligible	3	2
Freighter, Type II					
Freighter, Type III					
Freighter, Type IV		0.5	Negligible		

Because of material shortages, even the approved plan could not be met, and manpower was diverted from construction of trawlers and freighters for the German civilian sector and for export to repair work and to some additional new construction on reparations contracts. The final allocation for the several end users for 1952 is shown in the upper section of Table 6.*

* Table 6 follows on p. 21.

Table 6

Planned Production of Ships, by End Users
Revised Plan for 1952

Item	Statutory (Thousand DME)	Plan (Percent)	Actual (Thousand DME)	Plan (Percent)	Difference (Thousand DME)
Reparations	170,958	52.2	214,442	65.5	+ 43,484
New Construction	61,037	18.6	79,521	24.2	+ 18,484
Repairs	109,921	33.6	134,921	41.3	+ 25,000
Export	6,334	1.9	2,514	0.6	- 3,820
BfW	72,658	22.1	73,444	22.4	+ 786
Civilian Sector	78,060	23.8	37,610	11.5	- 40,450
Total	328,010	100.0	328,010	100.0	

The plan for 1953 reduced the Civilian Sector still further to 34,283,000 DME, a reduction of 56 percent, changing it from 23.8 percent to 7.5 percent of the total plan.

The revised plan for 1953 is as follows:

Planned Production of Ships, by End Users
Revised Plan for 1953
(Continued)

Item	Amount (Thousand DME)	Gross Production (Percent)
Reparations	240,811	52.3
New Construction	126,411	27.5
Repairs	114,400	24.8

Table 6

Planned Production of Ships, by End Users
Revised Plan for 1953
(Continued)

Item	Amount (Thousand DME)	Gross Production (Percent)
Export	28,023	5.0
BfW	162,961	35.2
Civilian Sector	34,283	7.5
Total	466,078	100.0

3. Revised Program, 1953.

Political, social, and economic developments in East Germany during the spring of 1953 caused a revision to be made in the shipbuilding program as scheduled for 1953. The program was revised by canceling the construction of some vessels, postponing the construction of others, and redistributing vessels among the various yards to create a more economical production. Since lack of materials and manpower would have prohibited the fulfillment of the program as originally planned, the revision probably did not reduce the actual production that could have been carried out. 30/

Some curtailing of the shipbuilding program was made as early as 9 June 1953 as a result of financial difficulties, shortages in material and labor, and the speed-up of the reparations program. 31/ It is doubtful that the civil disturbances during June had any real effect on this program.

The expenditure for ship construction, excluding reparations, for the year 1953 was drastically reduced because of material and labor shortages. It was estimated that this reduction would release 7,000 to 10,000 workers from the industry, or a maximum of 18 percent of the planned labor force. 32/ Including the reparations account, the shipbuilding industry, however, would still be working at approximately 82 percent of the originally planned program.

Since the June 1953 cutback, there have been indications that the industry is still short of workers. During July and August, workers were being recruited for the Warnow Werft and Neptun Werft from all parts of East Germany to meet the yards' requirements even with the reduced programs. 33/

The steel required for the original 1953 program was not available. The final allotment made by the Ministry to the shipyards amounted to 77.5 percent of their requests, 34/ and a reduction in the planned program was absolutely necessary.

The implementation of this reduced program was actually started on 8 July 1953 at a Socialist Unity Party (SED) Conference held in Rostock. The shipyards were instructed at this time that all vessels being built for East Germany which were 50 percent or less completed were to be "moth-balled" immediately. All vessels for East Germany over 50 percent completed were to be examined individually to determine whether they would be completed. 35/

The changed program also slowed down the capital investment program. Craneways 3 and 4 at the Warnow Werft and Mathias-Thesen Werft were deleted from the 1953 program. The floating drydock that was under construction for the East German Sea Police was stopped. 36/

This "new course" in the shipbuilding industry appears to be principally paper work designed to cover up the fact that plans could not be fulfilled and to insure the fulfillment of the reparations orders. Whether or not the expansion of the shipyards will be resumed and brought to the position planned in the Five Year Plan has not been indicated.

B. Maximum Capability.

The maximum capacity of the shipyards at present and as planned by the end of 1955 is given in Table 2. This shows a maximum capability of 149,500 GRT in 1953 and a maximum of 235,000 GRT by the end of 1955. The figures in each case are based on the following conditions:

a. Operating on a one-shift basis.
b. Adequate supply of labor and material.
c. Using the existing amount of subcontracting.

d. Maintaining the existing volume of repairs.
e. Same variety of vessel types as now being produced.
f. Present method of fabrication used at each yard.

Using the estimated maximum capability for a 3-shift basis as derived by Volkswerft Stralsund of 63 percent of the maximum production being performed on the day shift, a maximum capability of 376,000 GRT would be obtained for 1955.

This figure is merely relative and dependent on many factors. The conditions affecting the maximum production of shipbuilding are such that no maximum production figure can be set as a limit. A variation in any of the factors listed above would vary the results considerably. Also, if ship construction is of prime importance in the time of an emergency, as was the case in the US during World War II, any nation with a sound shipbuilding industry can rapidly expand its facilities. It should be pointed out, however, that shortages of materials which have plagued the East German shipbuilding industry for the past 4 years show no sign of easing. Accordingly, planned capacity and maximum capacity are 2-3 times probable future production.

C. Subcontracting Program.

Subcontracting (the purchase of parts or fabricated ship subassemblies that can be or are normally manufactured by the shipyard) is widespread in East Germany. There are two basic reasons for this program: (a) to utilize all existing facilities and (b) to reduce the flow of labor into areas where housing is in short supply.

Deck houses, masts, ships' frames, and other steel items are subcontracted by the major shipyards to the smaller state-owned yards, private shipyards, and steel fabrication plants. 37/ Complete vessels are subcontracted by one shipyard to another yard. 38/ The "end-construction" work performed by coastal shipyards is a form of subcontracting, since the inland yard holds the contract for the completed vessel. 39/

This subcontracting program has helped to maintain the smaller state-owned yards in an operating condition 40/ and has kept the private yards in business, since they cannot obtain material for private work.

As an example of how this program is definitely taken into account when planning the yearly programs, the work assigned the Volkswerft Stralsund for 1951 was planned by the government to be handled as follows 41/:

40 loggers - 2,400,000 man-hours - 16 percent to be subcontracted.
12 trawlers - 1,560,000 man-hours - 10 percent to be subcontracted.
8 fishing service boats* - 2,160,000 man-hours - 20 percent to be subcontracted.

This subcontracting represents 972,000 man-hours or 16 percent of the assigned load of 6,120,000 man-hours.

D. Plant Expansion.

1. Past and Present Expansion.

The East German shipyards have been expanded since the end of World War II. This expansion in some cases has been very extensive.

Table 7** gives the capital investments in the shipyards planned under the Five Year Plan. 42/

The figures in Table 7 do not include the shipyards of Neptun, Oderberg, and Fuerstenberg since these yards were Soviet-owned enterprises (Sowjetische Aktiengesellschaft, SAG)*** plants when the plan was formulated.

The revised plan for 1953 capital investment in shipyards is 85 million DME. This revision includes higher costs, correction of errors made in estimating, and an allowance of 11 million DME to the three former SAG plants. The result is a net reduction in over-all actual work to be performed. 43/

Rising costs, revised estimates, and revised expansion plans have actually raised the total plan figure of 278.3 million DME to 605.3 million DME. 44/ This figure does not include the

* Actually minesweepers.
** Table 7 follows on p. 26.
*** Later changed to Staatliche Aktiengesellschaft -- State-Owned Enterprises.

Table 7

Planned Capital Investments
1951-55

Million DME

Plant	Values					
	1951	1952	1953	1954	1955	Total
Mathias-Thesen Werft	29.0	29.2	28.1	11.3	4.3	102.0
Warnow Werft	25.1	32.3	32.2	18.1	7.5	115.2
Volkswerft/Stralsund	4.5	5.0	4.0	6.8	0.3	20.6
Balance under HVS	4.3	9.9	6.1	4.2	3.0	27.5
Other Plants	5.4	5.6	5.6	1.6	0.9	19.1
Total	68.3	82.0	76.0	36.0	16.0	278.3

Peenewerft, Wolgast, which was under the direct control of the BfW at the time this estimate was made.

The reported amounts invested in the various shipyards are shown in Table 8.

Table 8

Reported Capital Investments, by Shipyard
1949-53

Thousand DME

Shipyard	1949	1950	1951	1952	1953
Mathias-Thesen Werft	N.A.	15,976	29,045	29,200	28,100
Warnow Werft	N.A.	6,800	25,100	32,300	32,200
Neptun Werft	3,450	N.A.	10,000	3,260	8,787
Gehlsdorf	N.A.	N.A.	N.A.	3,500	4,600
Schiffsmontage	N.A.	N.A.	N.A.	N.A.	250
Volkswerft/Stralsund	N.A.	N.A.	4,500	5,000	4,000
Elbewerft	N.A.	N.A.	N.A.	270	1,178
Volkswerft Ernst Thaelmann	N.A.	1,450	1,047	389	333
Rothensee	N.A.	N.A.	N.A.	450	2,211

Table 8

Reported Capital Investments, by Shipyard
1949-53
(Continued)

Thousand DME

Shipyard	1949	1950	1951	1952	1953
Yachtwerft	N.A.	N.A.	700	336	900
Uebigau	N.A.	N.A.	98	187	860
Fuerstenberg	N.A.	N.A.	10,000	N.A.	620
Oderberg	N.A.	N.A.	N.A.	N.A.	865
Rechlin	N.A.	N.A.	N.A.	N.A.	1,400
Peenewerft	N.A.	N.A.	N.A.	526	24,000
Rosslauer	N.A.	N.A.	N.A.	1,168	3,476
Ship Repair/Stralsund	N.A.	N.A.	N.A.	300	207
Ships' Electric	N.A.	N.A.	N.A.	N.A.	12,000
Construction Bureau	N.A.	N.A.	N.A.	N.A.	80
Incomplete Totals	3,450	24,226	80,490	76,886	126,067

These funds were not expended entirely on production facilities. They include funds for such items as housing of workers, office building, and recreational facilities. 45/

Late in 1952, the East German Ministry announced that shipyard expansion was to be halted immediately except for work which was nearly completed and which would directly increase the productive capacity. 46/ Reports of July 1953 indicate that expansion work had been nearly stopped or completely halted. At the Warnow Werft and the Mathias-Thesen Werft, the completion of the third and fourth craneways over the building ways had been halted. 47/

Actual capital available for capital investment in VEB plants during 1953 amounted to only about 10 percent of that provided during 1952, resulting in a severe curtailment of the plan. 48/

2. Planned Expansion.

On 4 September 1952 the Council of Ministers issued directives to the nationalized industries in East Germany concerning

preparation of expansion and reorganization plans (technical and organizational). According to these directives, each centrally controlled plant is to prepare an expansion plan and submit the plan to the HVS for approval. The plans were to be long-range plans, which were to cover not only the technical and economic development of the plant within the framework of the Five Year Plan but to go far beyond it. 49/

The most outstanding project planned by tne Russians was a naval operating and repair base, and shipyards on Ruegen Island located close to Stralsund. The investments in shipyards envisaged in the plan were 50/:

	Thousand DME
Small shipyard	118,755
New construction yard	731,725
Repair yard, estimated	1,038,430

Later sources indicate that this work has been halted. 51/

V. Input Requirements.

A. Raw Materials.

1. Material Consumption.

Material classified as raw material in this section involves all material that has labor expended on it by the shipyard in order to use it on the vessels. A large percentage of the materials received in a shipyard are classed by the producing plant as finished material, such as steel plates and shapes, pipe, lumber, and castings. The value added to these materials by the shipyard is principally in the cost of labor, power, and overhead.

Table 9* gives a summary of the material consumption and allocation of shipyards and related industries. To the quantities of material purchased directly by the shipyard are added the materials required by the component part manufacturers. The tonnages of material required by the shipbuilding industry in this table are

* Table 9 follows on p. 29.

Table 9

Summary of Material Consumption

Item	Unit	Consumption 1952 Shipyards	Consumption 1952 Industry	Percent of National Production	Ratio Unit to GRT	Shipyard Allocation 1953	Anticipated Industry Consumption 1953	Percent of National Production[a]	Ratio Unit to GRT
Fuel									
Raw Brown Coal	Tons	10,595	15,600)	0.02	0.137	19,246	28,300)	0.05	0.136
Soft Coal	Tons	15,854	23,300)		0.201	46,519	68,400)		0.327
Coke	Tons	0	0		0.0	1,500	2,200	0.11	0.008
Gas Coke	Tons	2,121	3,100	0.02	0.024	3,767	5,500	0.03	0.024
Brown Coal Briquettes	Tons	33,674	49,500	0.12	0.434	43,042	63,300	0.13	0.303
Total	Tons	62,244	91,500		0.796	114,074	167,700		0.797
Foundry Iron	Tons	134	200	0.14	0.0014	154	230	0.08	0.0015
Steel	Tons	63,407	93,200	8.08	0.8192	124,357	182,900	12.35	0.8631
Copper and Copper Base Products	Tons	358	530	1.40[b]	0.0031	845	1,240	3.1	0.0055
Lead	Kilograms	1,600	2,400	Negligible	0.0170	10,000	14,700	0.07	0.0500
Zinc	Tons	303	440	Imported	0.0031	710	1,040	Imported	0.0055
Tin	Kilograms	3,754	5,520	1.07	0.0500	3,500	5,150	0.87	0.025
Nickel	Kilograms	N.A.	N.A.			704	1,040	Negligible	0.004
Aluminum	Tons	512	750	5.27	0.0072	1,943	2,860	19.07	0.0135
Solder (30 percent)	Kilograms	4,147	6,100	3.2	0.0500	12,056	17,700	5.90	0.0830
Lumber	Cubic Meters	37,783	55,500	1.85	0.4879	55,250	81,000	2.70	0.3860

a. Most of 1953 figures are based on Five Year Plan Figures.
b. National production; does not include imports.

compared with the national production of East Germany in percentages of national production. The industry required 8.1 percent of the national steel ingot production in 1952 and will require 12.4 percent in 1953 (based on 72 percent ingot production being shipped in finished steel).

2. Material Purchasing and Storing.

The purchasing and storing of materials must conform to the legal regulations of East Germany. Detailed lists covering requirements of materials for the year ahead are prepared. The Main Administration for Ship Construction collects the material demands of all the plants and shipyards under its jurisdiction and passes them on to the Ministry for Transportation and Agricultural Machinery. From there, all material requisitions are forwarded to the State Planning Commission, which establishes the production quotas. Those that cannot be fitted into the East Germany economy are passed on to the Ministry for Home and Foreign Trade to purchase abroad. The actual purchasing of the material is handled by the Main Administration for Ship Construction for the smaller yards. The larger yards purchase directly from the suppliers. 52/

Stocks in excess of those required for 120 days are considered to be excess and must be turned in for redistribution. This causes many difficulties, particularly in those yards that are behind schedule. 53/

3. Material Suppliers.

Materials are supplied by all sectors of the East German economy and by imports from the West and the Soviet Bloc countries. Since steel is by far the largest single material item entering into shipbuilding, this item will be used to show the general conditions which also apply to other materials in varying degrees.

The 1952 plan required the import of 94.9 percent of the steel to be used by the shipyards. Early in the year contracts had been concluded to obtain 25,845 tons from the USSR and 18,610 tons from non-Soviet Bloc countries. By 30 April 1952, only 5,602 tons had been delivered from the USSR while none had been received from non-Soviet Bloc countries. 54/ Resulting changes in the plan required the importing of approximately 11,595 tons from the USSR, all of which was to be used on reparation orders. 55/

For the fourth quarter of 1952, the steel allocations for thick steel plates (thickness of 5 millimeters and over) for heavy machine construction, general machine construction, vehicle construction, ship construction, electrical machine construction, and precision instruments construction amounted to 42,718 tons. Of this amount, 30.4 percent, or 12,969 tons, was allocated to the shipyards. Of this material, 10,899 tons were to be obtained from East German mills and 2,070 tons from imports. All the thin steel plate (thickness of 3 millimeters and under) was to be obtained from the East German mills. The shipyards were to receive 497 tons, or 22 percent of the medium steel plate (thickness of over 3 millimeters and under 5 millimeters) production. 56/

In September 1952, Hungary asked the East Germans to supply a list of commodities which East Germany found difficult to obtain so that the Hungarian representatives could include them in their negotiations for trade agreements with such countries as Argentina, Holland, and Austria. Items included in this list were ship plates, boiler plates, seamless tubes, and deck planking. 57/

Steel materials required for the first quarter of 1953 were covered to the extent of 35 percent by materials in store and impending deliveries. The remaining 65 percent was to come from imports. 58/ From 22 February 1953 through 27 March 1953, 3 Dutch ships unloaded 1,004 tons of shipbuilding plate and 68.8 tons of seamless pipe at Wismar. This material was subsequently transferred to various shipyards. All of this material had been shipped from either Antwerp or Rotterdam. 59/ Steel plate in the amount of 3,123 tons was received from the USSR in July 1953, and 2,581 tons were scheduled to be received from non-Soviet Bloc countries by 15 July 1953. 60/

Steel for the shipyards is produced by the East German rolling mills located in Ilsenberg, Thale im Harz, Riesa, Finow, Hennigsdorf, Aue, Hettstedt, Maxhuette, and Kirchmoeser. 61/ These mills could, if necessary, produce the thin and medium sheet steels required by the industry. The heaviest steel plate (over 12 millimeters) required by the shipyards cannot be supplied in sufficient quantities by these mills, and the industry is dependent on imports.

Other materials such as copper and manganese ores are, to a great extent, imported from the USSR. 62/

4. Quality of Material.

The thin plates received from the USSR and from the rolling mills in Brandenburg and Hettstedt are of poor quality. On 21 March 1953 there were 5 or 6 large piles of thin sheet in the shipyard of the Volkswerft Stralsund which could not be processed because of differences in thickness. For example, 7-millimeter plates measured only 6.6 millimeters in thickness. 63/ This poor quality of plates caused a considerable amount of deterioration and increased maintenance cost. 64/ Vessels built with steel plates produced in East Germany were frequently in drydock. 65/ Castings delivered from the foundries in Torgelow and Riesa show a high percentage of rejections, sometimes running as high as 100 percent. 66/

5. Material Shortages.

Material shortages are the most critical problems facing the industry and require a disproportionate share of supervision by top management. An indifferent attitude is taken by the governmental departments concerning the material situation. In November 1952 the Rosslauer Schiffswerft sent a detailed report to the Department for Reparations covering the material situation. The answer to their request for assistance was that shortages of material is not an adequate excuse for deferring the delivery deadlines. This attitude is recognized by the State Minister for Transportation and Agricultural Machinery. On 14 March 1943, he advised the shipyards that they should apply to the HVS for assistance in all problems that they cannot solve themselves. If this authority did not give assistance because of the "bureaucratic way of working," they should apply to him personally. 67/

The GDS shipyards are in even a worse predicament. They receive only left-over material, which is practically nonexistent. 68/

B. Finished Materials.

The finished materials (component parts) entering into the shipbuilding industry cover a very wide range of items. 69/ Because of the general material, labor, and equipment conditions existing throughout East Germany, component parts are not delivered to the shipyards on the scheduled dates. This is one reason for the generally late deliveries of vessels and this condition at times becomes so acute that the yards have to ask the Ministry to intervene in their behalf with the component plants. 70/

Some of the more critical component parts, especially for the repair of existing vessels that have machinery made in non-Soviet Bloc countries, are obtained from the West. The Neptun Werft has a special account containing West German marks with which it can purchase materials in West Germany needed in the repair program. 71/

Component parts are also supplied by the USSR and other Soviet Bloc countries. During the second half of 1952, the USSR supplied East Germany with materials and equipment, including marine diesel engines. 72/

Some of the shipyards are also component manufacturers for other shipyards. One example of this is the Mathias-Thesen Werft, which makes exhaust gas boilers for other shipyards. 73/

C. Manpower.

The manpower required by the shipyards and ship component industry has grown in direct proportion to the work load. Although the actual employment has lagged behind the planned load, the employment has shown a rapid expansion. The employment in the shipyards and component plants has followed the pattern shown in Table 10.

Table 10

Employment in Shipyards and Ship Component Plants in East Germany
1946-55

Year	Shipyards	Ship Component Plants	Total	Percent of National Labor Gainfully Employed
1946	2,000	300	2,300	N.A.
1947	9,000	1,200	10,200	N.A.
1948	13,000	1,800	14,800	N.A.
1949	27,000	3,700	30,700	0.40
1950	38,000	5,200	43,200	0.56
1951	45,000	6,200	51,200	0.65
1952	51,000	7,000	58,000	0.73

Table 10

Employment in Shipyards and Ship Component Plants in East Germany
1946-55
(Continued)

Year	Shipyards	Ship Component Plants	Total	Percent of National Labor Gainfully Employed
1953	56,000	7,700	63,700	0.80
1955 a/	60,000	8,200	68,200	0.81

a. Estimated.

The employment of women in the industry is common. In 1951, women formed approximately 14.7 percent of the labor force. The percentage of underage workers employed by the Volkswerft Stralsund in 1952 was 16.8 percent, and this figure can be assumed to be a fair average for the entire industry. The apprenticeship system is used in all shipyards, with the apprentices making up about 12 percent of the labor force. 74/

The employment figures for the component plants are based on man-hours and do not mean that the number given is continuously employed on components. The actual number of employees making component parts will vary above and below these figures at one given time.

D. Electric Power.

The total power consumption used by the shipbuilding industry is given in Table 11.* The electric power consumption in kilowatt-hours (kwh) is based on a consumption by the shipyards of 250 kwh per GRT of new construction produced. The electric power consumption in kwh used by the ship component industries is based on 1,100 kwh per ton of steel for machinery,** which gives a power consumption of 320 kwh per GRT for components. The kwh figure for repairs is based

* Table 11 follows on p. 35.
** CIA estimate.

on the consumption for repairs carried on in 1951, and this load has been assumed constant.*

Table 11

Consumption of Electric Power
in Shipyards and Ship Component Plants in East Germany
1951-53

Year	GRT Produced	New Construction (Thousand KWH) Shipyards	Components	Total	Repairs (Thousand KWH)	Total (Thousand KWH)	Percent of National Production
1951	85,857	21,464	26,464	47,928	18,953	66,881	0.31
1952	113,340	28,335	36,269	64,604	18,953	83,557	0.36
1953	202,505	50,626	64,802	115,428	18,953	134,381	0.53

Electric power is supplied to the industry by State plants, municipal plants and by shipyard power stations.

E. Transportation.

The movement of raw and finished materials to the shipyards from the mines, rolling mills, and ship component factories has not appeared to cause a great deal of difficulty in East Germany. There is, however, a shortage of available transportation in East Germany for handling the complete movement of all goods.

The materials for the shipyards are moved via railroad, truck, and water, whichever is the most convenient. Since some shipyards are not located near railroad lines, all materials are transported into the plants by either road or water.

Steel and coal are transported principally from the southern part of the Soviet Zone to the inland yards located in Land Brandenburg and the coastal yards located in Land Mecklenburg. A larger part of the minor or lighter component parts are produced in the Berlin, Leipzig, and Dresden areas. Plants producing heavy components, such as diesel engines, are located in the central and northern parts of East Germany, closer to the consuming plants.

* See Methodology, p. 51.

Allowing approximately 10 percent for scrap, 200,000 tons of material would have to have been transported. If all of this material had been produced in East Germany, it would represent approximately 30 million ton-miles. For the assigned production in 1953, this would have increased to 50 million ton-miles of transportation.

F. Financial Inputs.

1. Capital Investments.

The Five Year Plan 75/ listed 84,865,000 DME as the total shipyard capital investments. A revised estimate prepared by the HVS listed a plan total of 278,300,000 DME for the same 5-year period. 76/ The actual investments in plants started in 1946 and have continued ever since but not entirely according to an over-all plan. Certain shipyards were planned and expansion programs laid out during the period of 1946-49.

On the basis of the revised figures prepared by the HVS at the end of 1952, the increase in ship construction from 1951 through 1955 would amount to 273,315,000 DME, and the capital investments for the same period would amount to 278,300,000 DME. This is equal to 0.98 DME of ship construction for each DME of invested capital during the same period. Using this ratio and the capabilities as given for 1953 and 1955 of 600,730,000 DME and 788 million DME, 77/ respectively, plus the investments in the Peenewerft of 24,526,000 DME 78/ and an assumed value of 10 million DME for all other yards, the capital investments for the shipyards for new construction would be 647 million DME in 1953 and 840 million DME in 1955.*

Using the 1953 total, a relationship between capital investment and production in GRT can be obtained. With 202,505 GRT scheduled for 1953, the ratio of capital investment in plants and equipment to GRT is 3,200 DME per GRT. This figure would apply to the entire group of shipyards, inland and coastal. For only the inland yards and industry study, a ratio of 680 DME of invested capital to GRT is obtained.

* See Methodology, Appendix B, for complete details.

2. Ship Values.

The cost ratio of DME to GRT of vessels being built varies from 1,350 DME for a coastal motor freight vessel to 14,400 DME for a motor cruiser (yacht). A straight average of the vessel types gives 3,260 DME per GRT.

Since the value of a vessel depends on many factors, such as size, method of construction, and outfitting, the ratios obtained cannot be plotted as a graph to show a consistent tendency. The general pattern of costs per GRT is that the smaller vessels cost more than the larger vessels.

VI. Limitations and Vulnerabilities.

A. Limitations.

The limitations of the East German shipbuilding industry are many and varied.

The material used in the industry is not all produced in East Germany for two reasons: (1) there are no sources of raw material and (2) the manufacturing requirements of the industry require more material than is produced in the Soviet Zone. This lack of materials, both raw and manufactured, has retarded the growth of the industry, has limited its productive ability in the past, and will continue to limit the future capacity.

The lack of technical personnel hampered the initial growth of the industry and still retards its advancement even though technical schools have been established for training shipbuilders and marine engineers. This shortage is definitely reflected in the quality of work turned out by the industry. The relatively few qualified engineers cannot check all the designs and plans developed. Even with the technical schools beginning to turn out graduate engineers, it will be some time before these new graduates are in a position to accept responsibility.

Since East Germany had only a very small shipbuilding industry before and during World War II, there was never a reasonable nucleus of skilled personnel on which to build the industry. To alleviate this condition, a speeded-up apprentice system was installed in all the shipyards and manufacturing plants. Even after seven years, this

training system has not turned out enough qualified personnel to keep pace with the expansion.

The USSR had the shipyards expanded along with the basic component plants to support their own activities and interests. While the improved facilities are very good for the use intended, in some cases, these facilities would be uneconomical to operate on a normal schedule of varied work.

The greatest facility limitation in the Soviet Zone is the lack of adequate drydocking facilities. Other than the old floating drydocks at the Neptun Werft, there are no means of drydocking vessels of over 1,500 GRT. The graving docks at Wismar and Warnemuende have been abandoned in their initial construction period and the construction of large floating docks has been cut down to the immediate Soviet needs.

The financial strain placed on the East Germans by the large reparations orders and the large investment programs has reduced the financial status of the country to the point that projects are left half finished for lack of funds. The system is such that the shipyards are continually working on borrowed money and each year finds them operating at a deficit.

The controls exercised by the government are either so rigid that the shipbuilding industry cannot operate smoothly or are so poorly thought out that they are inefficient. The complex planning and distribution system has adverse effects on the industry, since the industry is very dependent on close coordination among all producers.

B. Vulnerabilities.

The shipbuilding industry is dependent, to some extent, upon imports of steel and component parts from the West. Both production and repair would be delayed by a cut in these imports.

Other weaknesses are: (1) the two floating drydocks at the Neptun Werft are the only ones capable of drydocking medium-sized vessels; (2) the production of forged propeller shafts is carried on principally by the Schwermaschinenbau Heinrich Rau in Wildau, and the annealing of these shafts is done by the steel works in Hennigsdorf; (3) delivery of major components manufactured in the Berlin area

would be delayed by any disruption of rail service and highways leading north; and (4) delays in the production of propulsion machinery at the Diesel Motor Works in Rostock would affect the entire industry.

Any further lowering of the workers' morale can cause further slow-downs and in some cases the disruption of the program. Dissatisfaction of the labor force with working conditions has already expressed itself in sabotage of ship components and production facilities. Cable delivered to the Warnow Werft from the Kabelwerk Oberspree was cleverly made with hidden defects. The ship Sovietsky Soyuz developed a 12-degree list to starboard on 18 November 1953, when workers flooded the engine room. 79/ A week later in Stralsund a submarine, being repaired on the marine railway, broke loose and caused more than one million marks damage to the railway. 80/

APPENDIX A

GENERAL DESCRIPTION OF THE SHIPBUILDING INDUSTRY

I. Scope of the Shipbuilding Industry.

The shipbuilding industry includes the construction and repair of all waterborne vehicles and the production of components. The study of the industry also involves an examination of the local plant administration, the national political control, the research and development involved in shipbuilding, and the economic factors that influence the operation of the industry.

A. Design.

The determining factors in the formulation of the general design characteristics of a planned vessel are the services required of the vessel, the size and speed needed to perform those services, the propulsion machinery available, and the type of waters in which the vessel will operate.

To successfully design a vessel with the required characteristics, the naval architect has a large volume of data gleaned from past experience by every branch of the shipbuilding and shipping industries. He also uses the facilities and technical experience of private and governmental research and experimental stations equipped to make model tests of the hull and any or all of the individual parts entering into the vessel. From these data, naval architects and marine engineers develop the final design.

B. Shipbuilding and Repair.

A ship is the largest piece of mobile machinery built. Therefore, unlike most commodities, the production of a ship requires the skills and knowledge of many engineering fields.

The actual building or repair of a vessel takes place in a shipyard having facilities to build or repair the specified type of vessel. The modern large shipyard is a combination of a steel fabrication plant, a mechanical assembly plant, an electrical installation firm, and many other industrial enterprises. The shipyard is not

a manufacturing plant in the true definition of the word but performs a "value added" type of operation usually of the job shop variety. It is at this stage that shipbuilding calls upon the nation's industrial production to fill the many orders for raw, semifinished, and finished material that goes into the building of a vessel. Steel is obtained in the form of plates and shapes which will be cut, formed, and assembled into the required shape for the vessel's hull. Machinery, electrical apparatus, furniture, and many other components are obtained in varying stages of assembly for installation in the vessel's hull.

C. Component Production.

The production of components for the industry is carried on by the normal manufacturers of civilian goods and by special plants producing principally for the shipbuilding industry. This production is vital to the satisfactory completion of a vessel.

D. Inspection and Classification.

During construction of a merchant vessel, inspection and classification is usually accomplished by an independent organization for the purpose of insuring compliance with governmental regulations and insurance standards. The independent classification organizations have set standards for hull and machinery. These classification organizations came into being because of the demands of marine insurance companies and ship operators for standards regulating the design and measurement of vessels. They may be governmental agencies or privately owned firms.

The inspection of naval vessels is accomplished by navy engineers.

E. National Policy.

The dependence on foreign trade to sustain the national economy dictates, in a large measure, the national policy regarding the ownership, operation, construction, and maintenance for the merchant fleet. Capital investment of private or public funds and subsidization of the industry are largely determined by the national policy.

The vulnerability of the nation's military defense through water approaches, the protection of the merchant fleet, and national aspirations dictate the national policy regarding the construction and maintenance of a naval fleet.

II. Shipyards.

A. Definition of Ship Construction and Repair.

Merchant vessel construction and repair involves the construction or repair of all sizes of vessels employed in the movement of cargo and/or passengers. This work includes such vessels as passenger ships, tankers, dry cargo vessels, fishing vessels, tug boats, dredges, and barges.

Naval vessel construction and repair involves the construction or repair of all sizes of warships, naval auxiliary vessels, troop support craft (either for naval or army units), hydrographic vessels, and the like.

B. Classification of Shipyards.

Shipyards generally are divided into two classes.

1. Coastal shipyards build and/or repair vessels for ocean navigation. These yards may be located many miles from the open sea, such location being dependent upon a sufficient depth and width of channel to permit ready access to the sea.

2. Inland shipyards build and/or repair vessels for operation upon inland waterways.

C. Ship Construction Procedures.

The basic shipyard is purely a steel erection and assembly plant where steel plates, shapes, and bars are cut and shaped, and assembled into the required hull form. The outfitting (installation of machinery, deck equipment, furniture, and the like) may be carried on at this basic yard or at some other installation.

The method of constructing a vessel varies from one yard to another, but general descriptions can be given as follows:

1. Standard construction procedure involves the building of a vessel from the keel up by erecting individual items or small subassemblies in proper sequence. A great part of the hull may be in place before any one section is completed.

2. The prefabrication procedure involves the building of a vessel by the erection of subassemblies which have been prefabricated at some point other than on the shipbuilding ways. This procedure is generally divided into two separate and distinct practices. The first and most common practice is the erection on or near the shipbuilding ways of subassemblies, none of which, however, form a completed transverse section of the hull. These subassemblies usually are lifted into place on the building ways. The second practice, common in some yards building small vessels, is the so-called sectional method. This method involves the joining together on the building ways of completed transverse hull sections. These completed sections usually are not lifted into place but are moved on mobile cradles or skids to the ways where the several sections are joined together.

3. Serial construction (production line method) involves the construction of a number of vessels of the same type by use of the prefabrication procedure with operations repeated at scheduled intervals.

D. Description of Shipyards by Types.

1. Naval Shipyards.

Naval yards are operated by the governmental department concerned with the construction, repair, and operation of naval vessels. These yards generally have more facilities than a commercial yard because of the type of work handled on repairs and for operational purposes of the fleet. Leaving out these special purpose facilities, the naval shipyard is similar to the large commercial shipyards.

The naval yard generally constructs vessels by the standard or prefabrication procedure employing the subassembly method. Generally the vessels are completely outfitted and made ready for sea service within the yard.

2. Coastal Shipyards.

Coastal shipyards construct vessels for ocean transportation, coastal vessels, fishing vessels, and tugs. Depending upon the extent of the facilities, the yards generally specialize in certain sizes and types of vessels. The larger yards are complex plants covering a wide range of trades.

The method of constructing vessels is generally by the standard construction procedure or prefabrication procedure. Some of the smaller yards use the serial production method when the quantity of similar vessels to be built warrants the setting up of such facilities.

Only when these yards are emergency or temporary shipyards are the facilities at a bare minimum to perform the construction of certain vessels.

Repair work is carried on simultaneously with construction at some of these yards. The larger yards have floating drydocks and/or graving docks while the smaller installations have marine railways and/or floating drydocks for repair work.

3. Inland Shipyards.

Inland shipyards can be of the simplest form of a shipyard, even to the extent that there are no permanent building ways. Here, again, the type of work handled determines the extent and magnitude of facilities. Such yards construct barges, river towboats, tug boats, miscellaneous commercial craft for special operations, and the like.

The smaller inland yards usually construct vessels by the standard construction procedure. As the volume of work increases, the construction procedure changes into the prefabricated subassembly and the sectional method. Inland craft is ideally suited for the sectional method of construction, especially in case of serial production. Very often vessels are constructed on marine railways or adjacent to the marine railway and launched by such means.

Most of the inland shipyards handle repair work to varying degrees. The yards that have drydocking facilities such as marine railways or floating docks handle the complete repairs and others without such facilities do topside and machinery repairs.

4. Ship Repair Yards.

Certain shipyards specialize only in vessel repairs. The facilities of such yards are selected and laid out primarily to accommodate vessels to be repaired. Drydocking facilities consist of marine railways and floating and graving drydocks. Equipment for handling steel fabrication is limited, but the machine shops are well equipped. This type of yard, while being strictly a repair yard, will also fall within one of the types listed above.

E. Shipyard Facilities.

1. Shops.

The principal shops located in a shipyard vary over a wide range depending upon the size and type of vessels built or repaired and the need for a self-supporting facility. Depending upon the size of the shipyard, the shops will include the following special installations, either in separate buildings or combined in one or more buildings:

a. Mold loft, where plants are laid down full size by the loftsman from the blueprints for purposes of making templates (patterns) for use of the steel trades.

b. Plate shop, where steel plates are cut, beveled, punched, and shaped by layer-out and shipfitter. This shop is sometimes referred to as a boiler shop.

c. Angle shop, where steel shapes are formed into the curvature of the hull by anglesmiths. This involves heating the steel shape and bending it to the determined shape on bending slabs.

d. Fabrication shop or structural shop, where steel plates and shapes are joined together to form subassemblies of varying sizes, depending on the crane facilities and method of construction.

e. Rigging loft, where ships' rigging is made by riggers.

The titles of other shops are self-explanatory, such as carpenter shop, machine shop, foundry, forge, pipe shop, and paint shop.

2. Special Facilities.

Certain other facilities are entirely peculiar to a shipyard and will not be found elsewhere. These facilities are the actual building ways and drydocking facilities, with installations as follows:

a. The building ways, longitudinal, refers to the space where a vessel is constructed and includes the ground or stationary ways and the sliding ways. They slope gently down toward the water with sufficient slope to cause the vessel to move under the impulse of gravity when disengaged from the holding appliance. The ways are built perpendicular or at an angle to the shore line and the vessel is launched stern first into the water.

b. The building ways, transverse, are similar to the longitudinal building ways but lie parallel or at an angle to the shore line from which the vessel is launched sideways into the water.

c. The building basin is an excavation in the shore in which vessels are built. In construction and lay-out, it is similar to the graving dock, being provided with dock gates and a pumping plant and differs principally from a graving dock in that the rate of pumping out of the water is much slower.

d. The graving dock is an excavation in the shore, enclosed by walls and a floor which usually are of concrete or stone construction. Ships in need of cleaning or repair are floated in and then the water pumped out, leaving the vessel resting on blocks. The entrance is closed by some form of gates, either floating, swinging, or sliding. This type of dock may be used for the construction of vessels.

e. The marine railway includes a track, cradle, and winch used to draw a ship out of the water and onto the bank for inspection and repair. The track extends far enough into the water for the cradle to pass beneath the ship. The ship is brought to rest over the cradle, which is then drawn onto the bank. A marine railway may be either for hauling a vessel end ways (longitudinal way) or side ways (transverse way), from the water. The difference is that the transverse railway has more tracks and cradles and generally shorter tracks than the longitudinal railway. They are sometimes utilized for building of vessels.

f. The floating drydock is a U-shaped floating structure of either wood, steel, or concrete, which is fitted with watertight compartments. It is submerged by flooding these compartments and ships enter it while it is submerged. The compartments are then pumped dry, and the dock rises until the ship is completely out of water. These docks are open at either one or both ends, usually the latter.

g. The fitting cut pier (dock or quay) is a pier at which the vessel is moored after launching for the final installation of components and testing. This amount of work may vary over a wide range, depending upon the procedures followed by the individual shipyard. These facilities are also utilized for "above water" or "topside" repairs and machinery repairs.

F. Personnel.

The modern large shipyard requires the services of many people trained and experienced in the fields of business, law, engineering, and numerous industrial trades. Total employees may number from a dozen or so in a small yard to over 15,000 in a large yard. A typical list of the trades involved is:

Anglesmith	Driller	Painter
Blacksmith	Electrician	Passer
Boilermaker	Erector	Pipe coverer
Bolter and reamer	Fitter	Pipe fitter
Brazer	Furnaceman	Press operator
Burner	Grinder	Puncher
Caulker and chipper	Insulator	Rigger
Designer	Joiner	Riveter
Draftsman	Layer-out	Sheetmetal worker
Carpenter	Loftsman	Shearman
Coppersmith	Machinist-outside	Shipfitter
		Welder

Also employed on production are laborers, helpers, apprentices, and the like. The nonproductive trades include maintenance men, storekeepers, truck drivers, crane operators, and the like.

III. Ship Component Production.

A. Scope of Work.

A standard merchant vessel requires approximately 7,000 different items, including such standard items as curtains, medical supplies, and kitchen equipment, and such specialized items as marine engines, anchors, booms, and compasses.

B. Commercial Components.

The standard goods flowing into a shipyard are about as varied as the equipment needed to supply any small community but represent only a small percentage of this type of goods produced by a manufacturer.

C. Marine Components.

Components that are classed as specialized marine items for ships fall into two categories, that is, standard marine parts and items specially designed for the operation required on the vessel on which they are to be used. Such design work is started as soon as the naval architect has reached the stage in the hull design and calculations where he can supply the marine engineers with the necessary specifications.

D. Component Producers.

Components generally are produced by a nation's own industrial plants. Some of the larger shipyards have auxiliary shops capable of building specially designed marine parts. In small countries, however, it may be necessary to import many vital components without which vessels could not be completed.

APPENDIX B

METHODOLOGY

The general methods employed in this report are based upon standard shipbuilding practices whenever such calculations were required. If possible, the methods set forth in documentary reports and East German periodicals were employed wherever they could be applied. This latter method carries with it a certain amount of the optimistic planning by the German engineers.

Two items, cast iron and kilowatt-hours, appear to be low in quantity but are based upon the best information available.

Individual methodologies are explained below, referring to their proper sections:

V. Input Requirements.

A. Raw Materials.

The summary of internal consumption given in Table 9 is the combining of all items made of steel, copper and copper base products, aluminum, and the like, under single headings. Since this material covered only that purchased by the shipyard, however, a method had to be devised to compute the material entering into the components. An individual listing of such components with their respective material would be a very tedious undertaking and the results very uncertain as to accuracy. Therefore, a relationship between the steel purchased by the shipyard (by far the largest raw material in both the hull and components) and the weights of other material and the completed vessel was determined as a fair basis of evaluation. The relationships of certain East German vessels are known, and from these were derived the figures given in Table 12.*

To determine whether the factors were standard, the following vessels with known inputs 81/ were listed and factors determined as shown in Table 13.**

* Table 12 follows on p. 52.
** Table 13 follows on p. 52.

Table 12

Estimated Ratios of Weight of Steel to Weight of Completed Vessel by Types 82/

Type	1 GRT	2 Weight of Completed Vessel (Tons)	3 Steel (Tons)	3/1	2/1	3/2	2-3/2
Trawler	650	610	352	0.54	0.94	0.58	0.42
Logger	400	300	224	0.56	0.75	0.75	0.25
Cutter - Steel	52	45	22	0.43	0.87	0.49	0.51
Cutter - Wood	55	45	9.4	0.17	0.87	0.21	0.79
Freighter, Type I	1,100	800	465	0.42	0.73	0.58	0.42
Freighter, Type II	2,080	1,775	1,140	0.55	0.85	0.64	0.36
Freighter, Type III	4,050	3,190	2,180	0.54	0.79	0.68	0.32
Freighter, Type IV	6,800	5,750	4,100	0.60	0.85	0.71	0.29
Seiner	200	150	127.7	0.64	0.75	0.85	0.14
Totals and Averages	15,387	12,665	8,620.1	0.56	0.82	0.68	0.32

Table 13

Known Ratios of Weight of Steel to Weight of Completed Vessel by Types

Type	1 Weight of Completed Vessel (Tons)	2 Weight of Invoiced Steel (Tons)	3 Weight of Wood and Machinery (Tons)	Ratio 2/1	Ratio 3/1
90-Foot Tug	143	58	91	0.35	0.54
152-Foot Steamer	398	230	194	0.58	0.48
253-Foot Lake Steamer	1,097	812	340	0.74	0.30
205-Foot Tanker	830	550	317	0.66	0.38
168-Foot Self-Propelled Barge	532	344	208	0.65	0.39
190-Foot Pump Barge	500	404	114	0.81	0.23
Ice Breaker - 140-Foot	710	443	313	0.62	0.44
Total and Averages	4,210	2,841 a/	1,577	0.67	0.37

a. Includes scrap.

These figures showed that the ratios between East German ships and other ships were approximately the same. Therefore, the factors of 0.68 and 0.32 shown in columns 7 and 8 have been used to determine the inputs into components and the inputs into the shipyard proper. That is:

1. $\frac{\text{weight of completed vessel - shipyard steel weight}}{\text{weight of completed vessel}} = 0.32$

2. weight of completed vessel x 0.32 = component weight

3. $\frac{\text{individual shipyard item weight}}{0.68} = \text{total weight of individual item}$

There are errors in this method that would appear very great in the United States but are not so great in East Germany. Since copper is very scarce, galvanized steel is used wherever possible as a substitute. Propellers are made of steel castings instead of bronze castings as in this country. Substituting of steel for copper is applied to other raw materials as well.

C. Manpower.

The manpower figures are those reported by the various shipyards for their end of the operation or by the ministry covering the shipyards. To determine the manpower required by the components industry, the Department of Commerce, Census of Manufactures, Volume II, for 1947 was employed. The salary and wages paid in selected industries were averaged, and a percentage obtained of this value against the total value of production shipped. This percentage was 31.6 percent. The industries chosen as most nearly representing the component industry were plumbing, heating and cooking, sheet metal, boiler shop production, structural parts, barrels and drums, steam engines and turbines, internal combustion engines, and metalworking machinery.

To determine the mark value of the components, the 1953 costs were used as follows 83/:

	Thousand DME
Sale Value	231,200
Shipyard Costs	- 90,400
Difference	140,800
10 Percent Profit	- 23,120
Value of Components	117,680

This value times 31.6 percent gave a value of labor of 37,186,900 DME for 1953. The average wage of the shipyard trades for May 1953 84/ was 404 DME per worker. This value times 12 gives a yearly wage of 4,848 DME. Dividing 37,186,900 by this wage gives a total number of employees of 7,670 for the components in 1953. The ratio of this labor to the shipyard labor (0.138) was applied to the shipyard labor for each of the other years to obtain labor in the component industry for those years.

D. Electric Power.

The electric power consumption for the shipyards was determined from meagre information. The power consumption for a few months in 1950 and 1951 is given for a few yards and for 1953. 85/ These values were extended to cover a full year. The sum of these figures divided by the production by these same shipyards for the same years shows the following relationships:

1950 $\frac{1,513,200 \text{ kwh}}{6,000 \text{ GRT}} = 252$ kwh per GRT

1951 $\frac{26,529,632 \text{ kwh}}{53,627 \text{ GRT}} = 495$ kwh per GRT

1953 $\frac{42,300,000 \text{ kwh}}{163,977} = 258$ kwh per GRT

Reports for 1951 included the Mathias Thesen Werft, Warnow Werft, and Neptun Werft. These first two yards were engaged 100 percent in repair work and part of the third's production were repairs. Therefore the

full kilowatt-hours of the first two yards and one-fourth of the kilowatt-hours for the third were deducted. With these deductions, the result was 242 kwh per GRT for 1951. The average of these figures was 250 kwh per GRT, which figure has been used. This amount times the GRT compiled from the production of the shipyards gives the shipyard electric power consumption for new construction.

The value deducted for repairs in 1951 was 13,537,536 kwh. This value was increased by 40 percent to allow for work on components, overhauling of machinery, foreign docking, and the like, all of which was carried on outside the shipyard. This gave a rate of 18,952,000 kwh for repairs per year.

The above method of computing the kilowatt-hours for the shipyards checks very well with a very complete report received after the above calculations were made. 86/ This report, covering the 19 VEB plants, gives the kilowatt-hours between 1 January 1953 and 31 July 1953 as 28,357,000 kwh. The values shown above for the year are:

Repair Work	13,537,000 kwh
New Construction	50,626,000 kwh
Total	64,163,000 kwh

Eighty-two percent of this figure (according to the scheduled reduction of the original program) gives a yearly consumption of 52,614,000 kwh. This value prorated for the seven months is 30,691,000 kwh. Since this latter figure covers all the shipyards, it leaves 2,334,000 kwh for the minor shipyards and for being behind schedule in production, as indicated in the subject report.

The component kilowatt-hours were based on the difference in steel weight for 1953 from Table 9.

Shipyard Steel	124,357 Tons
Component Steel	58,543 Tons
Total	182,900 Tons

$$\frac{58{,}543 \times 1{,}100 \text{ kwh}}{202{,}000 \text{ GRT}} = 320 \text{ kwh per GRT}$$

F. Financial Inputs.

The compilation of capital investments for the period from 1951 through 1955 is shown in Table 14.

Table 14

Summary of Capital Investments in the Shipbuilding Industry 1951-55

Thousand DME

Year	Five Year Plan 87/	Revised Estimate 88/	Summation of Plant Studies
1951	12,877	68,300	70,500
1952	13,707	82,000	76,816
1953	18,864	76,000	113,737
1954	18,825	36,000	30,200
1955	20,592	16,000	12,000
Total	84,865	278,300	303,253

On the basis of the revised figures prepared by the HVS at the end of 1952, the increase in ship construction from 1951 through 1955 would be 273,315,000 DME, and the investments for the same period would be 278,300,000 DME. This is equal to 0.98 DME of ship construction for each DME of invested capital. The Five Year Plan on the same basis shows a ratio of 4.35 DME of ship construction per DME of capital investment (369,096,000 DME of production and 84,865,000 DME of investments. 89/) However, the Five Year Plan was developed under overly optimistic planning and a different production schedule, that is, fewer types of vessels and more mass production.

The Engineers' Collective made a study of the industry in 1951 for the basis on which to do planning. 90/ This study gives the figures shown in Table 15.*

* Table 15 follows on p. 57.

Table 15

Engineers' Collective Study of Sales and Invested Capital
1951

Shipyard	Invested Capital (Thousand DME)	Turnover (Thousand DME)	Ratio of Turnover to Invested Capital
Mathias Thesen Werft	108,636	21,400	0.197
Warnow Werft	115,540	31,400	0.272
Volkswerft Stralsund	26,300	67,500	2.570
Elbewerft	5,700	30,800	5.400
Volkswerft "Ernst Thaelmann"	4,800	23,600	4.920
Staatswerft Rothensee	2,550	14,300	5.610
Rosslauer Schiffswerft	5,800	34,800	6.000
Schiffswerft Uebigau	2,200	9,000	4.090
Total	271,526	232,800	0.857

This ratio of turnover to invested capital compares favorably with the figure of 0.98 arrived at above, when it is considered that in 1951 all facilities in a plant were not used to their utmost.

On the basis of production capabilities for the 14 major shipyards for 1953 of 600,730,000 DME and 788 million DME for 1955 91/ and the factor 0.98, a capital investment for new construction of 613 million DME and 804 million DME for 1953 and 1955, respectively, is obtained for these 14 shipyards. The only major shipyard not included in this list is the Peenewerft, for which a total investment of 24,526,000 DME is planned. 92/ Assuming a capitalization of 10 million DME for all other yards, a total of 647 million DME for 1953 and of 840 million DME for 1955 is derived as capital investment.

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