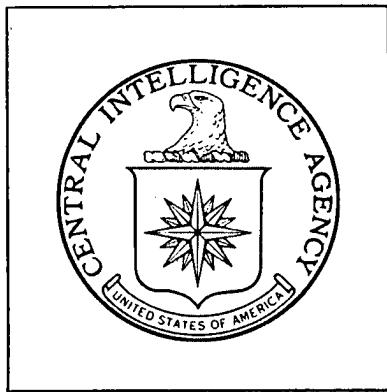


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**DIRECTORATE OF
INTELLIGENCE**

**Industrial Facilities
(Non-Military)**

Basic Imagery Interpretation Report

Polotsk Petroleum Refinery

Polotsk, USSR



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DATE FEBRUARY 1969

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
Imagery Analysis Service

RCS-13/0097/69

INSTALLATION OR ACTIVITY NAME		COUNTRY	
Polotsk Petroleum Refinery		UR	
UTM COORDINATES	GEOGRAPHIC COORDINATES	COMIREX NO.	WAC-PIC NO.
35UNB983536	55-30-43N 028-32-53E	None	0168-57H
MAP REFERENCE 8th RTS. USATC 200, Sheet 0168-5HL, 4th edition, January 1968, Scale 1:200,000 (Secret)			
LATEST IMAGERY USED		NEGATION DATE (If required)	
		Not Required	

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ABSTRACT

The Polotsk Petroleum Refinery is one of the newer refineries built in the Soviet Union using the standardized design for processing units. Based on the standard design capacity for a primary distillation unit, the annual charge capacity of this refinery is estimated to be at least 12 million metric tons. The first interpretable photo coverage of the refinery was taken early in 1962, at which time the first primary distillation and probable cracking units were nearly completed. The refinery was at least partially in production by July 1963. New construction has been noted on all imagery covering the complex up through April 1968. Facilities presently in operation or under construction indicate that the products of this refinery will include straight-run and blended gasolines, various grades and blends of fuel oil, lubricants, waxes, asphaltic materials, and charge stock for petrochemical processes.

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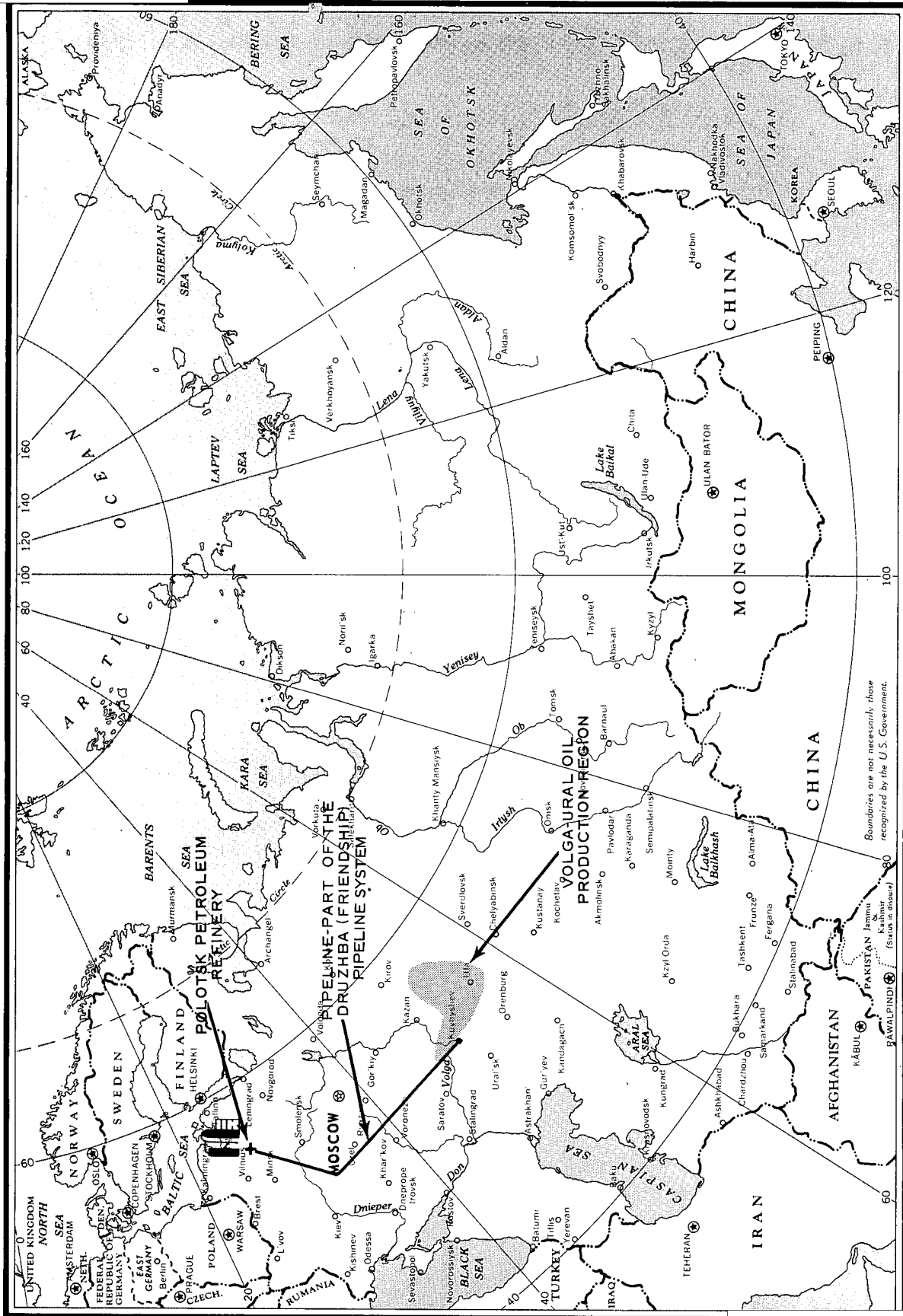


FIGURE 1. LOCATION MAP

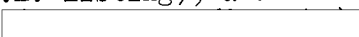
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INTRODUCTION

The Polotsk Petroleum Refinery is located in northern Belorussian S.S.R. on the south bank of the Zapadnaya Dvina River, approximately 9.0 nautical miles (nm) northwest of the center of Polotsk city complex. The location for this refinery was apparently selected to be near the products market, as has been the trend in locating the newer Soviet refineries.^{4/} Products from this refinery will supply consumers in the Belorussian and Baltic areas, and surpluses will be shipped to the northern European countries.^{1/} Crude oil for processing at Polotsk is produced in the Volga-Ural Region in the Tartar and Baskir oilfields. The crude oil is gathered from the fields at Kuybyshev, and from there it is moved via the Druzhba (Friendship) Pipeline System to the refinery (Figure 1).^{1/}

This refinery is the major plant in an industrial complex which also includes water treatment facilities (no B.E. listing), construction support facilities and concrete products plant (no B.E. listing), and the Polotsk Heat and Thermal Power Plant TETS 2 Refinery  A possible synthetics/plastics plant under construction (no B.E. listing) lies immediately southeast of the refinery. Feedstock for the latter plant will probably be obtained from the waste gases and secondary products of the refinery. Rail service into the industrial complex is provided by rail spurs from the main line between Polotsk and Molodechno. The areal extent of the refinery, including the areas presently under construction, measures approximately 8,500 by 5,100 feet and covers about 900 acres.

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BASIC DESCRIPTION

Status and Activity

The following is a generalized construction history of the refinery. No detailed chronological accounting of the construction of the various items of equipment or facilities is presented in this report; however, specific items are noted to illustrate significant points of development. Interpretability and small scale of the best photo coverage of the refinery seriously limited the readout of facilities and activity. None of the large-scale missions over the refinery area provided good quality, complete, cloud-free coverage of the facilities.

February 1962 - One of the multistage primary distillation units and one of the probable catalytic cracking units appeared to be nearly complete. Construction in the products storage area was proceeding at a moderate rate and several of the storage tanks were completed. Also, the heat and thermal power plant was nearing completion.

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August 1963 - Construction on the first multistage primary distillation and probable cracking units appeared complete, and enough of the associated facilities were in place so that at least partial production could be started. The rail transfer facilities and part of the crude oil and products storage areas were also completed. Construction of the probable alkylation plant, the lube oil plant, the second multistage distillation unit, and the second probable cracking unit had been started and was progressing at a rapid rate. However, these facilities were only in the early stages of construction. Work in the storage areas, particularly on the semiburied crude oil storage tanks, was also being carried on at an accelerated rate. The heat and thermal power plant appeared to be in operation.

October 1964 - The second primary distillation and probable cracking units were completed. Three sections of the lube oil plant, including the probable clay treatment, the possible solvent extraction/dewaxing, and the blending and canning sections, appeared complete. The tank farms continued to be expanded. A second phase of construction was started. It included expansion of the refinery area to the northwest and southeast, and the construction of several secondary processing units, one of which has been tentatively identified as a possible thermal reform unit. This second phase of construction was in the very early stages. Work had also just begun on the possible synthetics/plastics plant adjacent to the refinery.

August 1965 - Work throughout the refinery continued at a relatively high rate. All sections of the lube oil plant and the probable alkylation plant appeared complete. A third possible primary distillation unit of somewhat different design than the other two was in the early stages of construction. The products storage tanks and facilities were 60-70 percent complete and the crude oil storage tankage was about 80 percent in place.

May 1966 - The possible thermal reform unit and most of the secondary processing unit within the original refinery area appeared to be completed. Tankage in the crude oil storage area was approximately 90 percent complete. Products storage facilities continued to be expanded northward. The waste gas flare tower had been moved farther to the northwest, and ground scarring between this tower and the refinery proper indicated a possible third phase of construction and expansion of the refinery complex to its present extent.

September 1967 - The construction status of the refinery at this time was essentially the same as shown on Figure 3. Several new processing areas in the refinery expansion to the northwest had been delineated by ditching. The amount and patterns of the ground scarring indicated a rapid rate of construction and a wide variety of facilities being built. Most of the new areas will probably contain facilities for secondary and petrochemical processes. However, the construction was in such early stages that functional analysis of these new areas was impossible.

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April 1968 - No significant changes were noted; however, the coverage was incomplete and of very poor quality. Construction activity appeared to be continuing at a high rate.

Operational Functions

Based on the facilities in place or under construction, it appears that the products of this refinery will include fuel oils, diesel oil, all grades of gasolines, blended fuels, a wide range of lubricants, waxes, asphaltic materials, and charge stock for petrochemical processes. Based on a comparison of this refinery with those at Kirishi and Kremenchug and information from open-source literature, the annual charge capacity of the Polotsk refinery is estimated to be at least 12 million metric tons. If the possible primary distillation unit presently under construction is in fact a new design of distillation unit, the input capacity of this refinery would probably be significantly increased. However, not enough information is available at present to estimate the unit's capacity or to firmly identify its function.

The first indications that the refinery was in production were observed on photography of July 1963. At that time, a primary distillation unit and a probable cracking unit appeared to be operational. This would restrict the products for the most part to low grade gasolines and fuel oil. By October 1964, part of the lube oil plant was completed which would probably add certain types of lubricants and waxes to the list of products. On photography of August 1965, the second primary distillation unit, the second probable cracking unit, all sections of the lube oil plant, and the probable alkylation plant appeared to be complete and probably in operation. Completion of these facilities probably doubled the capacity of the refinery and widened the range of products to include a full line of lubricants and alkylate to be used in the blending of high-grade motor fuels. Some of the secondary processing units which have been completed since August 1965 probably produce petrochemicals and feedstock for petrochemical plants. The possible synthetics/plastics plant being constructed adjacent to the refinery will undoubtedly obtain raw materials from the refinery in the form of refinery waste materials or intermediate products.

On all missions subsequent to July 1963, there have been indications that the refinery was in production.

Physical Features

The following table lists the functional areas and facilities within the refinery complex. Precise identification of the refinery equipment in most cases was not possible because of the small scale and poor quality of the imagery covering the complex. The tentative identifications of equipment are

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based on the overall aspect of the refinery, the relative positions and sizes of units, comparison of equipment with similar facilities found at other refineries, and published listings of standardized units found in the newer-type Russian refineries.3/

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TABLE I

Equipment and Facilities at the
Polotsk Petroleum Refinery
(Items are keyed to Figure 3)

<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
A	Shipping and Storage	1 office building 13 storage buildings
B	U/I Processing U/C	1 bank of U/I equipment 3 processing buildings 12 support buildings 2 buildings u/c 12 cylindrical tanks, diameter 40 feet (12m) 19 cylindrical tanks, diameter 30 feet (9m) 3 cylindrical tanks, diameter 20 feet (6m) 4 cylindrical tanks, diameter 10 feet (3m) 4 cylindrical tanks u/c, diameter 40 feet (12m) 3 cylindrical tanks u/c, diameter 20 feet (6m)
C	Products Treatment, Shipping and Storage	2 processing buildings 34 support/storage and shipping buildings 1 cylindrical tank, diameter 80 feet (24m) 9 cylindrical tanks, diameter 60 feet (18m) 16 cylindrical tanks, diameter 50 feet (15m) 35 cylindrical tanks, diameter 40 feet (12m) 30 cylindrical tanks, diameter 30 feet (9m) 12 cylindrical tanks, diameter 25 feet (7.5m) 62 cylindrical tanks, diameter 20 feet (6m)

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<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
		2 cylindrical tanks, diameter 15 feet (4.5m)
		5 cylindrical tanks u/c, diameter 60 feet (18m)
		4 horizontal treating and storage tanks, length 70 feet (21m)
		23 horizontal treating and storage tanks, length 50 feet (15m)
		65 horizontal treating and storage tanks, length 40 feet (12m)
		3 support buildings
D	Crude Oil Storage	24 cylindrical tanks, diameter 100 feet (30m)
E	Administration	12 administration and support buildings 1 water tower
F	Support	2 engineering/shop-type buildings 8 storage/support buildings
G	Lube Oil Plant (with 5 processing sections)	Blending and Canning Section: 3 processing buildings 3 support buildings 10 tall, small-diameter tanks/ columns 2 small cylindrical tanks (not measured) U/I Processing Section: 2 processing buildings/banks of equipment 6 small items of u/i equipment 2 probable groups of columns/ absorbers, covered 2 small furnaces 5 support buildings U/I Processing Section: 1 processing building 2 small clusters of columns 4 support buildings

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<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
		Possible Solvent Extraction/ Dewaxing Section: 1 processing building with associated heat exchangers and accumulators 2 groups of covered columns 5 support buildings 12 cylindrical tanks, diameter 15 feet (4.5m) Probable Clay Treatment Section: 1 processing building with high section 1 item of u/i equipment 3 support buildings 6 cylindrical tanks, diameter 25 feet (7.5m) 9 cylindrical tanks, diameter 15 feet (4.5m) 3 cooling towers each with 3 units 3 cooling coil racks/spray ponds 3 support buildings
H	Transfer Facilities	Undetermined number of rail tracks with probable loading racks 1 support building
I	Primary Distillation	2 multistage distillation units, each containing: 4 fractionating columns/groups of columns (vacuum, atmospheric and topping stills and possibly light- ends extractors), heights 110- 135 feet 1 bank of heat exchangers/cooling coils 2 processing buildings/banks of equipment 2 pipe furnaces 4 support buildings

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<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
		<ul style="list-style-type: none"> 2 cylindrical tanks, diameter 60 feet (18m) 4 cylindrical tanks, diameter 20 feet (6m) 1 possible spherical tank, diameter 15 feet (4.5) 8 horizontal tanks/desalinization or chemical treatment drum, length 30 feet (9m) 1 item of u/i equipment 2 support buildings 2 natural-draft cooling towers 2 cooling coil racks 2 cylindrical tanks, diameter 45 feet (13.5m)
J	Possible Thermal Reform	<ul style="list-style-type: none"> 1 bank of columns/reactors (number and dimensions not determined) 1 bank of probable heat exchangers 2 large furnaces 2 probable small furnaces 4 support buildings 4 cylindrical tanks, diameter 30 feet (9m) 9 cylindrical tanks, diameter 20 feet (6m)
K	Probable Catalytic Cracking (2 separate units)	<ul style="list-style-type: none"> 1 row of columns/processing units (3) (possible reactor, regenerator and/or fractionators), heights 135-160 feet. 1 bank of equipment/processing building 1 processing/control building 2 large furnaces 3 support buildings 1 small cylindrical tank (not measured) 1 large item of equipment/cluster of columns (possible reactor-regenerator), height 180 feet 1 bank of u/i equipment

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<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
		<ul style="list-style-type: none"> 1 bank of u/i equipment 1 large furnace 1 possible large furnace 5 support buildings 4 cylindrical tanks, diameter 20 feet (6m)
L	Possible Chemical Treatment	<ul style="list-style-type: none"> 1 item of possible processing equipment 1 processing building 6 support/storage buildings 1 small cylindrical tank (not measured) 4 horizontal storage/treatment drums, length 20 feet (6m) 1 water tower
M	U/I Secondary Processing	<ul style="list-style-type: none"> 3 items/clusters of u/i processing equipment 3 small furnaces 9 control and support buildings 3 cooling towers with 6 units each 1 cooling tower with 3 units 3 spray ponds/cooling coil racks 4 cylindrical tanks, diameter 45 feet (13.5m)
N	Probable Alkylation Plant	<ul style="list-style-type: none"> 1 bank of equipment (probable scrubbers and absorbers) 1 cluster of equipment (probable reactors and washing drums) 2 processing/support buildings 2 spherical tanks, diameter 25 feet (7.5m) 2 horizontal tanks, length 70 feet (21m) 2 cylindrical tanks, diameter 40 feet (12m) 3 cylindrical tanks, diameter 30 feet (9m) 2 cylindrical tanks, diameter 25 feet (7.5m) 2 small probable acid storage tanks (not measured)

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<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
O	Possible Light-Ends Processing	<ul style="list-style-type: none"> 2 groups of possible extractors/fractionating columns 2 items of u/i equipment 1 bank heat exchangers/accumulators 1 processing/control building 5 support buildings 4 cylindrical tanks, diameter 25 feet (7.5m)
P	Crude Oil and Products Storage	<ul style="list-style-type: none"> 3 control/support buildings 20 semiburied tanks, diameter 130 feet (39m) 2 cylindrical tanks, diameter 60 feet (18m) 6 cylindrical tanks, diameter 30 feet (9m) 1 possible cylindrical tank, diameter 30 feet (9m) 3 semiburied tanks u/c, diameter 130 feet (39m)
Q	Possible Primary Distillation/Reforming Facilities	<ul style="list-style-type: none"> 1 row of moderately large diameter distillation/extractor/reactor columns (at least 5), height 120 feet 1 bank cooling coils/heat exchangers accumulators 1 processing and control building/bank of heat exchangers and accumulators 1 large furnace building with 2 furnaces 4 support buildings 4 cylindrical tanks, diameter 60 feet (18m) 2 cylindrical tanks, diameter 40 feet (12m) 8 horizontal storage/settling/treatment drums, length 40 feet (12m)
R	U/I Secondary Processing	<ul style="list-style-type: none"> 1 cluster/item of u/i processing equipment 2 processing buildings/banks of equipment

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<u>Area</u>	<u>Functional Designation</u>	<u>Equipment and Facilities*</u>
		<ul style="list-style-type: none"> 2 small furnaces 5 support buildings 6 cylindrical tanks, diameter 40 feet (12m) 2 cylindrical tanks, diameter 20 feet (6m)
S	U/I Secondary Processing	<ul style="list-style-type: none"> 1 row probable extractors/absorbers (3-4 tall, slender columns) 1 group of columns/large diameter column, moderate height 2 probable processing buildings/equipment 6 support buildings 3 cooling towers with 3 units each 3 spray ponds/cooling racks 2 small cylindrical tanks (not measured)
T	U/I Processing Facilities U/C	<ul style="list-style-type: none"> 4 items of processing equipment 14 miscellaneous buildings 3 buildings u/c 12 cylindrical tanks, diameter 40 feet (12m) 2 cylindrical tanks, diameter 20 feet (6m) 6 cylindrical tanks u/c (not measured) Heavy ground scarring throughout area
--	Water Treatment Facilities (adjacent to refinery)	<ul style="list-style-type: none"> 10 buildings 3 large storage ponds 19 storage and treatment basins 4 mounded/buried reservoirs 12 small chemical storage tanks

*NOTE: All measurements are only approximate because of small scale and poorly defined outlines of equipment and storage tanks on the available photography. Storage tanks were measured in meters and then rounded off to the nearest five foot dimensions.

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FIGURE 2. POLOTSK PETROLEUM REFINERY

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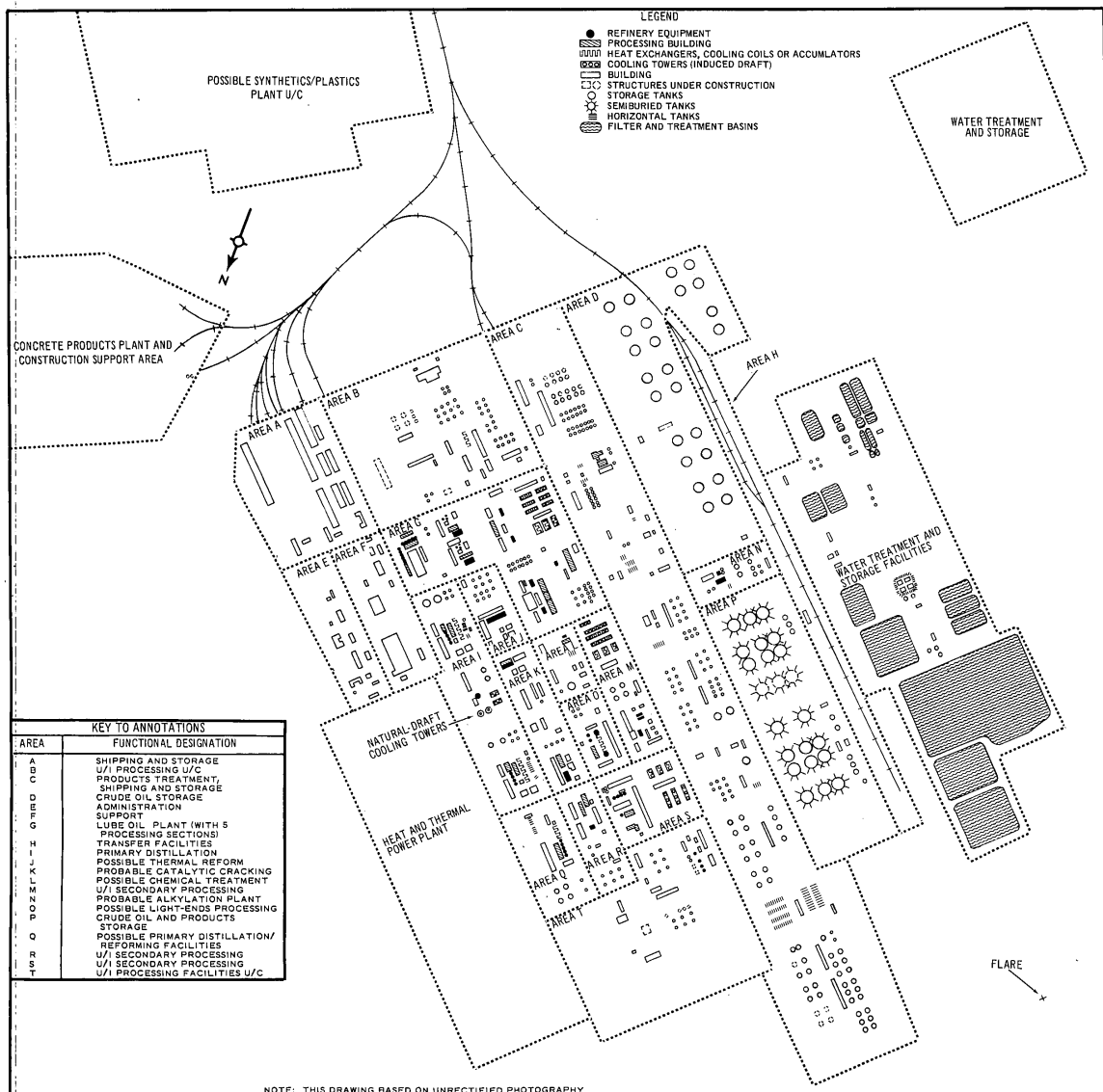


FIGURE 3. POLOTSK PETROLEUM REFINERY

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REFERENCES

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Maps

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3. Ebel, R. E., The Petroleum Industry of the Soviet Union, American Petroleum Institute, 1961 (UNCLASSIFIED)
4. U.S. Department of Commerce. JPRS: 44,605, Studies of Oil Refining and Petrochemistry, USSR, "Report on Polotsk Oil Refinery in Belorussia," pp. 63-64, March 1968 (UNCLASSIFIED)

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