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# Poland

**December 1973**

NATIONAL INTELLIGENCE SURVEY

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[redacted]

# Poland

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# Military Geography

## A. General (U/OU)

Located on the North European Plain between Western Europe and the U.S.S.R., Poland has the painful distinction of being a historical area of armed conflict. The country has been ravaged for centuries by superior military forces and laid waste by armies that have taken advantage of its easy terrain to reach objectives elsewhere.

All of Poland's land boundaries are shared with comember Warsaw Pact countries—East Germany to the west, Czechoslovakia to the south, and the U.S.S.R. to the east (Figure 25). In the north there is a 305-mile[1] coast exposed to the Baltic Sea. The country's southern borders are marked by a chain of mountains and hills that effectively interrupt the movement of ground forces except through a river gap known as the Moravian Gate.

Together with East Germany, Poland functions as a Soviet buffer zone against attack from the west. Conversely, this position provides a choice stage to muster offensive forces against the NATO line of defense in the west; most NATO-affiliated European capitals are less than 1,200 nautical miles away (Figure 1).

Since World War II, Poland has been transformed from a predominantly rural and agricultural society into a society that is predominantly urban and industrial. Postwar government policies of ubanization and industrialization have caused a general movement of population from the countryside into existing and newly created urban centers. Calling to mind the fierce but futile Warsaw Uprising during World War II, these centers may play a fortress role in future conflicts.

A roughly square-shaped country approximately 400 miles on a side, Poland has an area of 120,600 square miles and is slightly larger than Ohio, Indiana, and Kentucky combined (Figure 1). The estimated population is about 33.2 million. The country would be hard to defend, except in the mountainous south,

[1]Distances are in statute miles unless nautical miles are specifically stated.

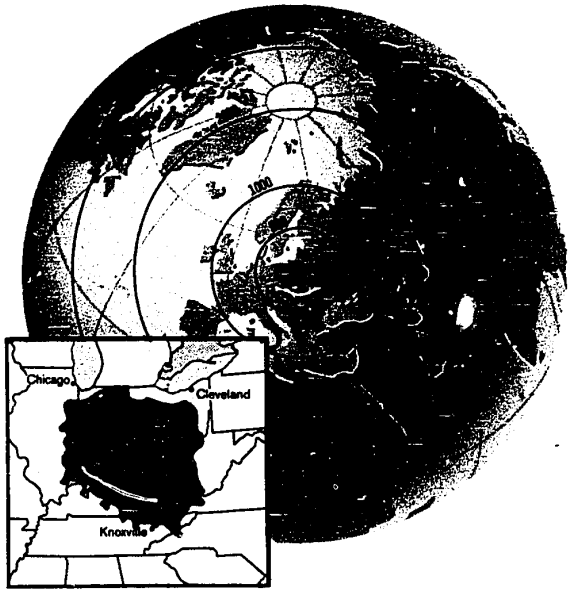



FIGURE 1. Location and comparative area (U/OU)

because of a lack of natural barriers. Rivers are the only hindrance to the free movement of military ground forces in most of the country (Figure 25), and even the largest streams form only limited obstacles.

## B. Topography (U/OU)

Approximately 90% of Poland is a densely populated, mostly cultivated, rolling plain crossed by generally north-flowing, meandering streams. The remainder of the country, the extreme south and southwest, consists of the rounded, forested, sparsely populated Sudeten Mountains and the more rugged, forested, sparsely populated Carpathian Mountains.

## C. Climate (U/OU)

The climate is predominantly maritime but is modified at times by continental influences. During winter (December through February) the intense

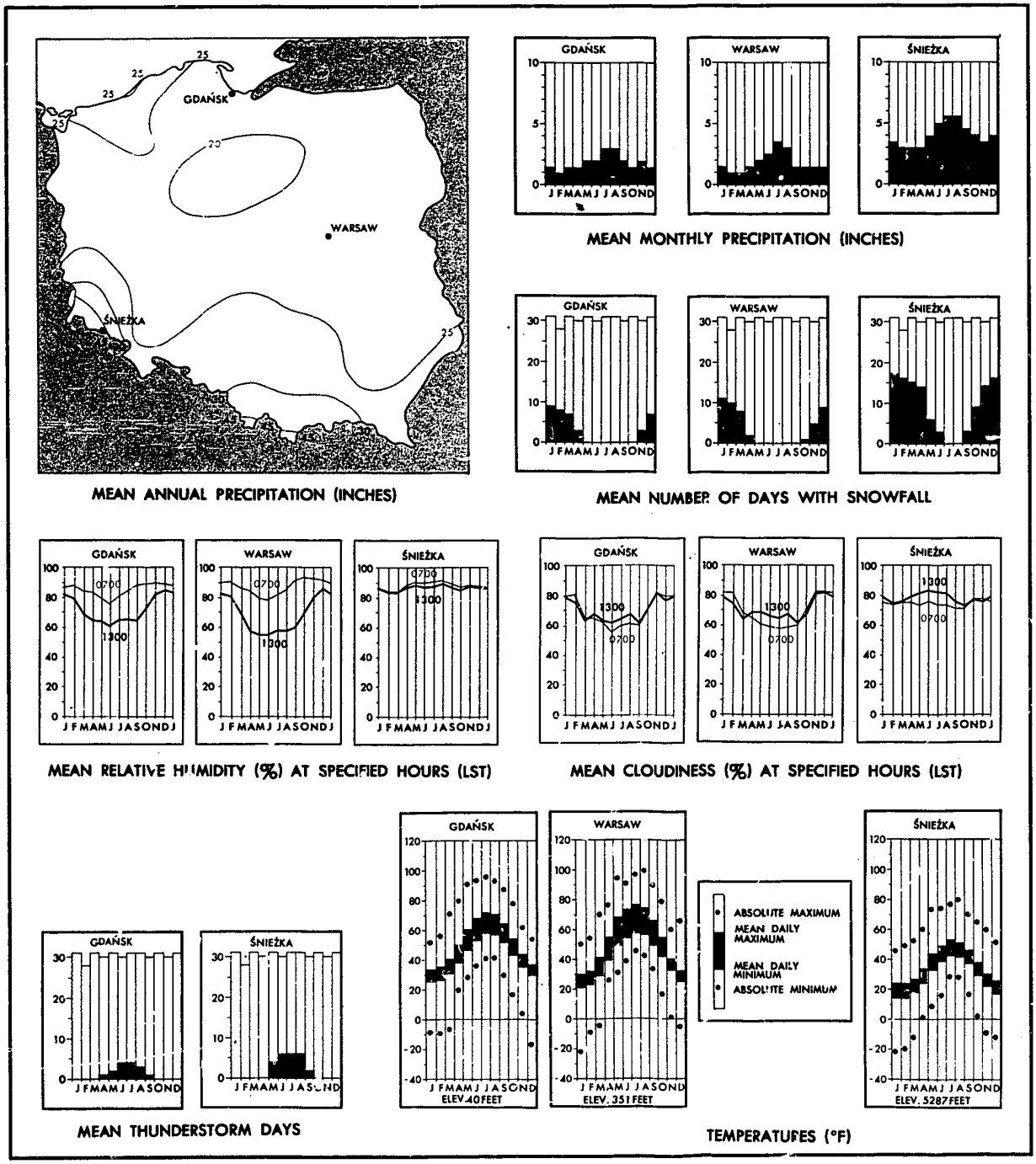



FIGURE 2. Precipitation, snowfall days, relative humidity, cloudiness, thunderstorm days, and temperatures (U/OU)

Icelandic low and the equally intense Siberian high direct a flow of cold, moist Atlantic air from the west or southwest over Poland. Imbedded in this flow is a moderate incidence of cyclonic activity. These storms and their associated fronts cause long periods of inclement weather, characterized by overcast skies, frequent precipitation, poor visibility, and a raw, damp condition. This regime is interrupted occasionally when invasions of polar continental air from the Siberian high bring very cold, dry, sunny weather for brief periods. During summer (June through August) the extension of the Azores high over Europe directs a flow of warm, less moist Atlantic air from the west or northwest over Poland. Although showers and thunderstorms are frequent, the weather is very much improved in this season, with mainly partly cloudy skies, better afternoon visibility, lower relative humidity, and a generally mild pleasant condition. On occasions during summer, hot dry winds from the south or southeast cause abnormally high temperatures. Spring (March through May) and autumn (September through November) are transitional seasons.

Winter temperatures are quite low. Mean daily maximum temperatures generally rise only to freezing or slightly above (Figure 2), whereas mean daily minimums are in the 20's (°F.) and teens. The lowest temperatures, resulting from outbreaks of cold air from the east, often fall below zero and occasionally reach −20°F. and −30°F. Maximum cloudiness occurs in winter, averaging over 70% throughout the season. Low-hanging stratocumulus cloud decks are widespread, and there are only occasional breaks in the overcast. Winter precipitation is frequent and mostly in the form of snow. However, accumulations are small, and mean monthly amounts are generally less than 2 inches over most of the country. The winter snows and low temperatures result in a snow cover that is persistent in the south but becomes intermittent in the north. The poorest visibility conditions are encountered during this season. Fogs are common in the morning and occasionally last throughout the day. The frequent overcast skies and restricted visibilities result in long periods of dull, gloomy weather. Relative humidity remains high throughout winter, in the 80's (%) and 90's, and creates a penetrating dampness which is alleviated only during the invasions of drier air from the east. Surface winds are light to moderate and predominantly southwesterly in this season over most of the country. Strong winds, 30 knots or greater, range from occasional to frequent in the southern mountains.

Summer temperatures are pleasantly mild or warm. Mean daily temperatures range between maximums in the upper 60's (°F.) or low 70's to minimums in the low or middle 50's. Mean temperatures are 10 to 20 degrees cooler in the southern mountains. During the infrequent spells of hot, dry winds from the south or southeast, temperatures rise abruptly to the 90°F. to 100°F. range. Mean monthly cloudiness is at a minimum in this season, generally averaging between 55% and 60% throughout the country. Cloud cover is greatest during the afternoon, when convective activity expands the cumulus puffs into large cloud masses. The frequency of precipitation remains high in summer. The showery type of rainfall results in increased mean monthly amounts, generally ranging between 2 and 6 inches. The heaviest rain falls during thunderstorms, most of which occur in May through August on 3 to 7 days per month. Light fogs in the early morning also remain fairly frequent but quickly dissipate by late morning. Afternoon visibility in this season is much improved and offers the best conditions of the year. Relative humidity is more tolerable in summer, especially when afternoon average values are mostly in the 55% to 65% range. Weak westerly winds prevail, but strong winds of short duration may occur during thunderstorms.

## D. Military geographic regions (C)

Poland is divided into three military geographic regions on the basis of environmental conditions that would affect operations: the Polish Plains, the Sudeten Mountains and Hills, and the Carpathian Mountains and Hills (Figure 25). The principal geographic factors that make each region distinct are shown in Figure 3.

### 1. Polish Plains

This region, which covers approximately 90% of Poland, is suited for most military ground operations. It is predominantly a cultivated, gently rolling plain (Figure 4); there are mixed forests on sandy soils in lowlands, scattered marshes, and swamps along the middle and lower reaches of streams. A few scattered areas of low, forested hills and stream-dissected uplands rise above the surrounding plain in the southeast. The region is drained principally by the extensive Oder and Vistula systems, which are characterized by wide, meandering rivers having marshy flood plains. The road and rail networks are well-developed and serve both the numerous large cities and populous rural areas; the networks are extensive and especially dense west of the Vistula.

FIGURE 3. Distinctive geographic factors (U/OU)

| | REGION | | |
|---|---|---|---|
| | Polish Plains | Sudeten Mountains and Hills | Carpathian Mountains and Hills |
| Elevation above sea level (in feet). | 700 or less | 1,000 to slightly over 5,000 | 1,000 to slightly over 8,000. |
| Local relief (in feet) | 500 or less | 2,000 or more | 2,000 or more. |
| Slope (in percent) | *10* or less | *30* or less | *45* or less. |
| Watercourses: | | | |
| High water | Late February through early May, locally November to February. | Late February through early May, locally in July. | Late March and early April, locally late June through July. |
| Low water | May and August through November. | August through November | September through November. |
| Banks: | | | |
| Upper course | Steep; rock | Steep; rock | Steep; rocky bluffs and gorges. |
| Lower course | Low; sand, silt, or clay | Low; sand, silt, or clay | Steep; rock. |
| Bottoms: | | | |
| Upper course | Rock or gravel | Rock or gravel | Cobbles, pebbles, and gravel. |
| Lower course | Sand or mud | Gravel, sand, or mud | *Do.* |

Inland waterways connect most major population, industrial, and foreign trade centers but are not used to full capacity.

The principal road network is mostly bituminous surfaced and suited for sustained military movements year round. Secondary roads are numerous but in many places are not suited for military traffic. Extensive areas are moderately to well suited for the construction of new roads.

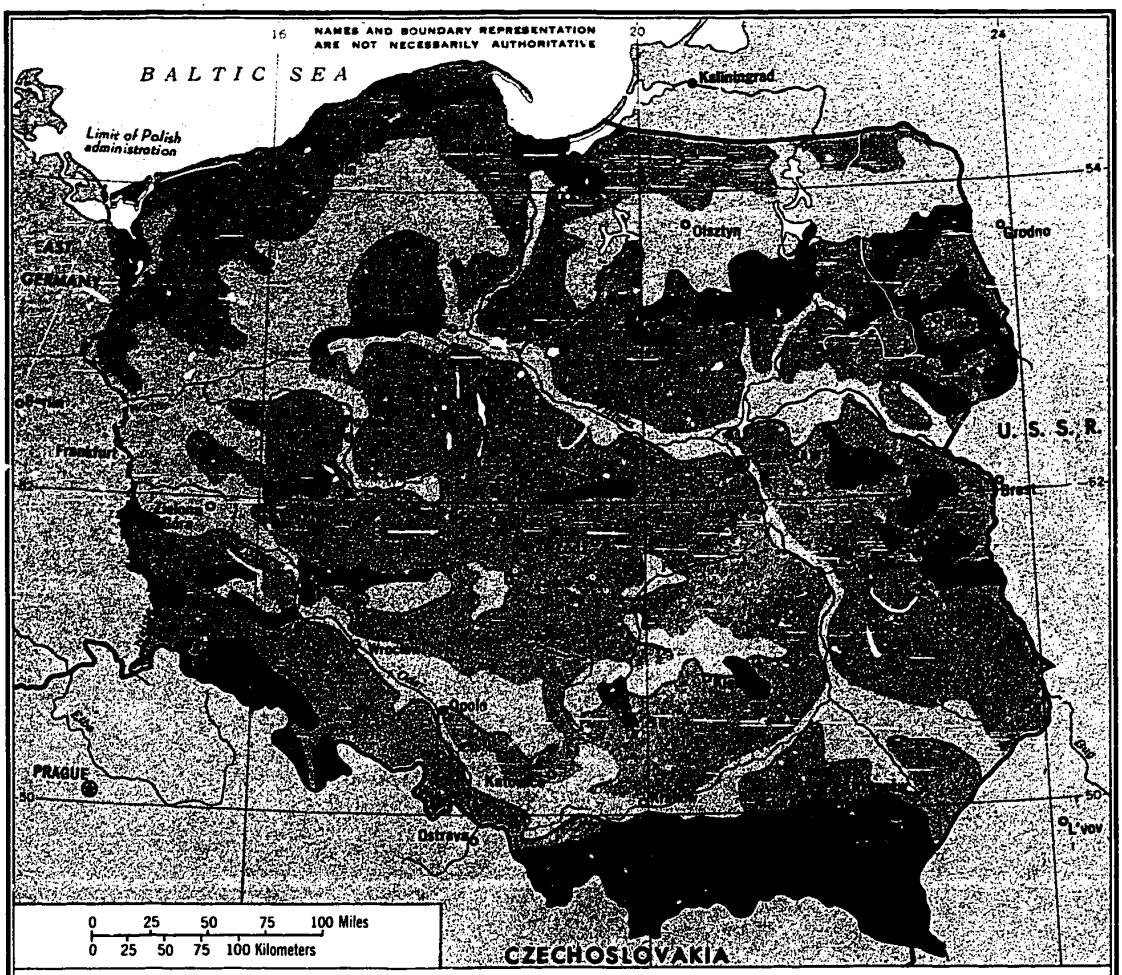
Vehicular offroad dispersal and cross-country movement (Figure 5) would be generally unimpeded over the central plains section when the soils are dry (May to October) and frozen or snow-covered (late December to March). The only major terrain obstacles are extensive marshes and swamps in the east and northeast and large rivers that in many places flow through marshy valleys. Soils are soft and large areas untrafficable during the spring thaw, beginning in late March or early April and lasting 2 to 6 weeks, and following autumn rain-producing frontal systems, usually in October.

There are few opportunities for concealment from air and ground observation, and troops operating in this region would be handicapped by the lack of natural cover from flat-trajectory fire. In much of the region the only cover and concealment available would be in built-up areas.

Conditions are generally suited for the construction of bunker-type installations except in hill areas in the southeast and along major river valleys. The deep soils and low relief make conditions generally unsuited for the construction of tunnel-type installations.

Most of the region is well suited for airmobile and airborne operations. Many places are suitable for use as drop zones, helicopter landing zones, or for landings of assault-type aircraft on unprepared surfaces. Moreover, once on the ground, troops could move quickly to their objectives, either on the numerous

FIGURE 4. The Polish Plains are cultivated for rye, wheat, sugar beets, and potatoes. This field near Poznan is being harvested for rye, Poland's most important grain crop. (U/OU)




| TERRAIN | TRACKED VEHICLES | WHEELED VEHICLES | FOOT TROOPS |
|---|---|---|---|
| Plains and low hills, few large streams and many small streams. | Fair to good*; unsuited during late autumn rains, in periods of winter thaws, and during spring runoff. | Fair; unsuited during late autum rains, in periods of winter thaws, and during spring runoff. | Fair to good. |
| Plains with many lakes, forested plains, and plains along major streams. | Poor; severely restricted in direction by lakes, forests, and compartmented by streams. Unsuited during late autumn rains, in periods of winter thaws, and during spring runoff. | Same as for tracked vehicles. | Poor to good. |
| Perennially wet plains; some areas with dense networks of canals and ditches. | Unsuited. | Unsuited. | Poor; fair when frozen. |
| Partly forested hills and steep mountains. | Unsuited. | Unsuited. | Poor. |

*The conditions shown are for May to October, the optimum season for conducting ground operations.

FIGURE 5. Cross-country movement of conventional forces (C)

roads or cross country. Climatic conditions for airborne operations are most favorable in summer, when there is a minimum of cloud cover and fog. There are many airfields, mainly in the northwest and south, and numerous sites are suitable for the construction of new airfields. Runway alignments would seldom be restricted, and little grading and clearing would be required.

The coast is mostly unsuitable for large-scale amphibious landings because of partly obstructed approaches, stretches of bluffs at the coastline, and numerous obstructions to movement inland from the coast. Of the stretches of coast that are suitable for large-scale landings, all but a few are along the western part of the coast and the best of these is in the vicinity of Kolobrzeg (Figures 6 and 25). Along the eastern part of the coast the best stretch is between Gdansk and Gdynia (Figure 7).

Irregular warfare operations would be severely restricted by the open, nearly level terrain and moderately dense population. Movement would be easy except following rains and the spring thaw when the ground is soft and muddy. In small, scattered areas of forests, swamps, bogs, and marshes, movement is restricted year round. The value of forested areas for purposes of concealment is diminished by the presence of relatively open surrounding terrain, moderately dense population, and easy accessibility by numerous roads. The population is concentrated mainly in industrial and commercial centers in the western part of the region. There is at least one large city in almost every province, and numerous small villages dot the countryside (Figure 8). Food and water would be available mostly in the central and southern sections

**FIGURE 7. This beach at Sopot, midway between the cities of Gdansk and Gdynia, is well suited for large-scale amphibious landings from the Baltic Sea. The beach is 5¾ miles long and has a maximum width of 135 yards. Exits from the beach are good to all parts of the Gdansk–Gdynia strategic area. (C)**

of the region, but many water supplies are contaminated and would require treatment. Shelter and natural fuel would be most plentiful in the forests. Large supplies of food, clothing, medical supplies, small arms, and ammunition would be available only at scattered storage depots, mainly in the large cities. Supply by air would be relatively easy in the nearly flat to rolling terrain.

### 2 Sudeten Mountains and Hills

This sparsely populated region is mostly unsuited for military ground operations. It consists of generally parallel mountain ranges oriented in a northwest-

FIGURE 6. Amphibious landing areas (C)

| CHARACTERISTICS | KOLOBRZEG | BETWEEN GDYNIA AND GDANSK |
|---|---|---|
| Number of beaches | 4 major, 1 minor | 1 major. |
| Beach lengths | 3 to 9.2 miles | 5.7 miles. |
| Total usable length | 30.5 miles | *Do.* |
| Beach widths: | | |
| Low water | 10 to 110 yards | 20 to 135 yards. |
| High water | *do* | *Do.* |
| Beach material | Sand, some gravel | Sand. |
| Wet | Firm | Firm. |
| Dry | Soft | Moderately firm. |
| Tidal range | Negligible | Negligible. |
| Surf: | | |
| Height | 4 feet or more | 4 feet or more. |
| Occurrence (maximum) | 19% July thru September | 10% January thru March. |
| Nearshore bottoms: | | |
| Slopes | Mild to gentle | Mild. |
| Materials | Sand; some gravel, rock, mud | Sand. |

FIGURE 8. The countryside near Lowicz, west of Warsaw, is almost wholly pastoral. The rural villages and scattered farmsteads are connected by tree-lined roads. (U/OU)

southeast direction, rolling to steep hills, dissected slopes, and scattered, rounded mountain summits (Figure 9). Scattered basin areas are commonly found between the ridges. The region is drained principally by the swift headwaters of streams flowing northward to the Oder River. Both the rail and road networks are sparse. Except for main roads, which are bituminous surfaced and in fair to good condition, most roads are gravel or unimproved earth and are sometimes impassable during rainy periods. The rail lines are largely double track.

Nearly all vehicular movement would be limited to the roads, most of which lead through basins and narrow, steep-sided valleys. Sharp curves and steep grades would slow movement, and in winter snow and ice impede traffic. Landslides occasionally block roads during the spring. Even under favorable conditions only a few principal roads could sustain year-round military traffic. Terrain favorable for the construction of new roads is found only on the valley and basin floors and in the rolling hills near the Polish Plains region.

Conditions for vehicular offroad dispersal and cross-country movement are mostly unsuited because of steep slopes, dense forests, and rough terrain. Vehicular movement off the roads would be practicable only in large basins and in areas near the Polish Plains.

Evergreen forests on the middle and upper slopes of the mountains provide year-round concealment from ground and air observation (Figure 10). Deciduous forests on the lower mountain slopes and in hilly areas provide good seasonal concealment. Numerous surface irregularities afford cover from flat-trajectory fire.

Large areas are suited for the construction of underground installations. Shallow soils, exposed bedrock, and steep slopes severely restrict construction of bunker-type installations. Areas of loess in the northern part of the hills area are well-suited for bunker-type installations. Locally, fractured and faulted rock poses problems in the construction of tunnel-type installations.

Most of the region is unsuited for airmobile and airborne operations because of steep, rugged slopes and dense forests. Sites suited for drop zones or for helicopter landing zones are limited to the scattered, larger basins. On the ground, troops would be confined to the roads, where their movement could be blocked easily. Climatic conditions for airborne and airmobile operations are most favorable in summer, when there are mild temperatures, low wind speeds, and minimal cloudiness and fog. There are few existing airfields and few sites suitable for the construction of new airfields. Only in the scattered,

FIGURE 9. Upper slopes of the Sudeten mountains south of Jelenia Gora are steep, rocky, and support only sparse vegetation. Maximum elevations are nearly 5,000 feet. (U/OU)

FIGURE 10. Nearly all forest lands in Poland are under state control. The random spread and growth of these trees in the Sudeten mountains south of Jelenia Gora indicates a a lack of planned forestry management. (U/OU)

larger basins and valleys are sites available that would require little grading and clearing. In most of these sites, however, the runway alignments and approaches would be restricted.

Irregular warfare operations would be confined by the rugged terrain, for the most part, to troops trained in mountain operations. Within basins, movement is restricted by bogs, lakes, and miry soils during the spring thaw and after heavy rains. The sparse population is concentrated mainly in villages and towns in the basins and valleys. Food is available mostly in the cultivated parts of the hills and basins. Potable water is available only from swift mountain streams; elsewhere, it is contaminated and must be treated before using. Shelter and natural fuel would be most plentiful in the forests. Large supplies of food, clothing, medical supplies, small arms, and ammunition would not be readily available. Supply by air would be limited to isolated basins and valleys, most of which have restricted approaches.

### 3. Carpathian Mountains and Hills

Unsuited for most military ground operations, this region consists of mountains oriented in a east-west direction, extensive hilly areas, and scattered basins. The mountains are more extensive and the foothills are more rugged than those in the Sudeten Mountains and Hills Region. In Poland, the Carpathian Mountains range from broad, discontinuous, heavily forested ridges in the west to sharp, barren ridges and jagged summits in the central section (Figure 11). The hills are rugged and largely forested near the mountainous sections, but in many scattered areas, especially adjacent to the Polish Plains, the hills are more rounded and are partially cleared for pasture and cultivation. Most of the region is drained by the headwaters of streams which flow swiftly northward to the Vistula River. The rail and road networks are sparse and less developed than the networks in other parts of the country. Most of the roads are unimproved

FIGURE 11. The Carpathian Mountains have the highest elevations in Poland. The jagged, barren crests of these mountains near Zakopane form the boundary with Czechoslovakia. (U/OU)

and passable only in dry weather. The few bitumimous-surfaced roads are generally oriented north–south, and single-track railroads extend through the large river valleys, basins, and major passes at elevations of 1,600 to 2,000 feet. Most inhabitants of this sparsely populated region live in the basins and valleys (Figure 12) near the major lines of transportation.

Some areas are suitable only for troops specially trained and equipped for mountain operations. Steep, forested slopes restrict vehicular movement to the roads, and unimproved roads become untrafficable after heavy summer rains and during the spring thaw. Even on the few principal roads which extend through the large basins and valleys, steep grades and sharp curves hinder vehicular movement. Heavy snows, sometimes several feet deep, halt vehicular movement for extended periods nearly every year. In spring, landslides occasionally block roads. The terrain is unfavorable for the construction of new roads, mostly because of rugged relief, and considerable grading and clearing would be necessary in most areas. Only on the floors of large basins and valleys and in scattered areas along the northern fringe of the rolling hills would construction be practicable. River valleys would be the only source of sand and gravel, although much bedrock is available for crushing.

Both offroad dispersal and cross-country movement would be hindered severely by the rugged relief and dense forests. Vehicular movement off the roads would be possible only in large basins and in scattered areas among the rolling hills. Year-round concealment from air and ground observation would be afforded by dense evergreen forests on the upper slopes; large deciduous stands provide seasonal concealment on the lower slopes and in the hilly areas. Surface irregularities afford cover from flat-trajectory fire.

Conditions are largely favorable for the construction of underground installations. Only narrow areas of loess on the outer edges of the hills are well suited for bunker-type installations; locally, fractured and faulted rock poses problems in constructing tunnel-type installations.

Most of the region is unsuited for airmobile and airborne operations because of the rugged relief and dense forests. Sites suitable as drop zones or for helicopter landing zones are limited to the large basins. There are few airfields that could be used to support airborne operations. Only in the large basins are there sites which would require a minimum of grading and clearing for the construction of new airfields, and at most of these sites alignments of runways and approaches would be restricted.

Irregular warfare operations would be confined by the rugged terrain, for the most part, to troops trained in mountain operations. Within the basins, movement is restricted by bogs, by lakes, and by miry soils during the spring thaw and after heavy rains. The sparse population is concentrated mainly in the villages and towns in basins, although isolated farms outside of settlements are common. Food is available mostly in the cultivated parts of the hills and basins. Potable water is available only from swift mountain streams; elsewhere, it is contaminated and must be treated before using. Shelter and natural fuel are most plentiful in the forests. Large supplies of food, clothing, medical supplies, small arms, and ammunition would not be readily available. Supply by air would be limited to isolated larger basins, most of which have restricted approaches.

## E. Strategic areas (C)

Four areas designated as strategically significant are: Warsaw–Lodz,[2] Upper Silesia in the south, Szczecin, and Gdansk–Gdynia (Figure 25).

[2]For diacritics on place names see the list of names on the apron of the Military Geographic Factors map, the map itself, and maps in the text.

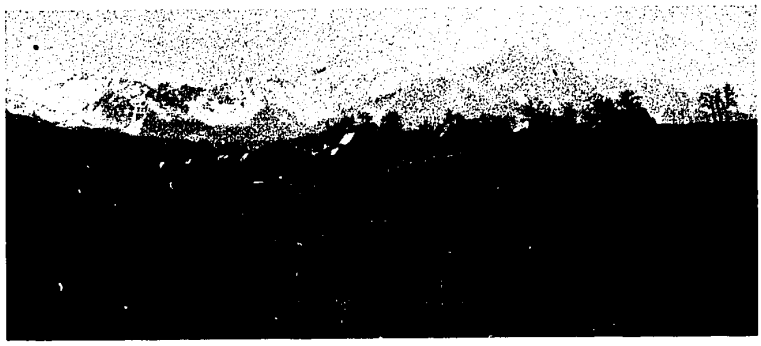


FIGURE 12. The village of Murzasichle is overshadowed by the stark, commanding heights of the Carpathians (U/OU)

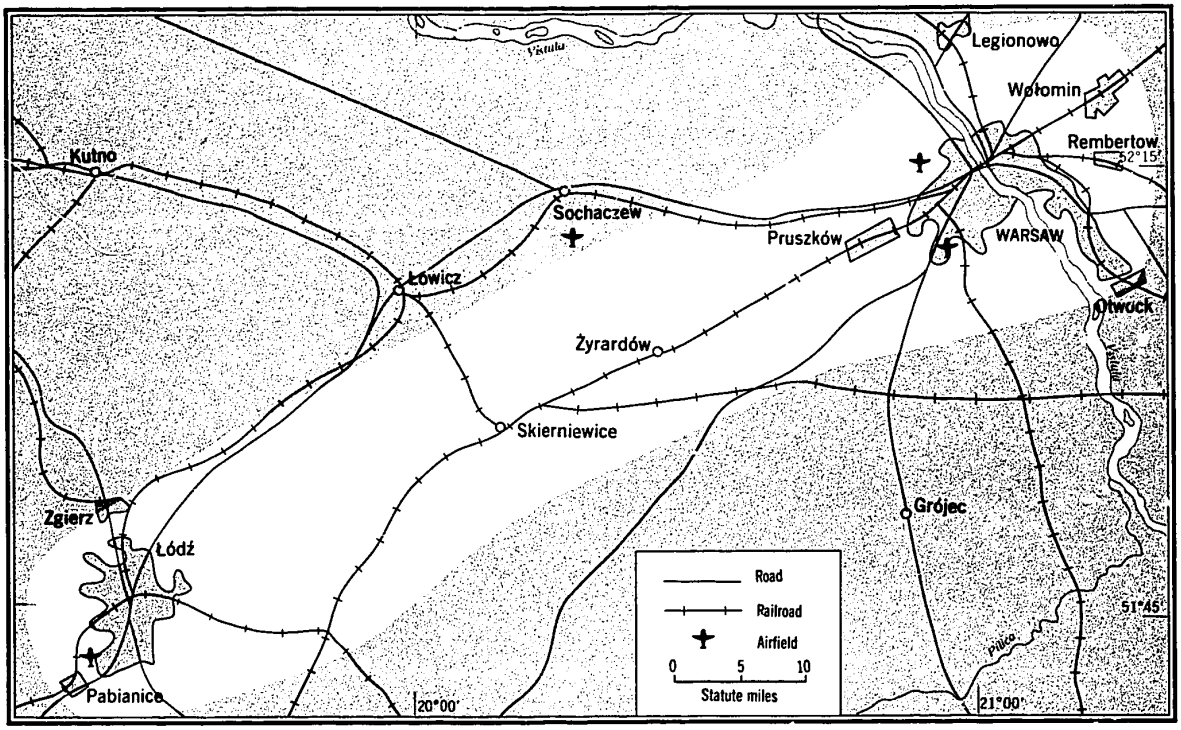



FIGURE 13. Warsaw–Lodz strategic area (C)

FIGURE 14. Extensive reconstruction since the end of World War II has turned Warsaw into a showcase of Polish achievement. Among the new developments are blocks of high-rise apartments, government offices, and commercial enterprises. (U/OU)

FIGURE 15. Warsaw, the national capital and largest urban center, dominates all phases of Polish life. The skyscraper of the Palace of Culture in the background is the tallest building in Poland. (U/OU)

The Warsaw–Lodz and Upper Silesia areas are the country's most important urban centers of industry, government, and culture. These urban-industrial centers also contain numerous military facilities and command the country's most important transportation routes. With their dense concentrations of buildings, these strategic areas offer a prime footing for organized resistance in modern warfare. Szczecin and Gdansk–Gdynia are the principal port areas, containing large shipyards and the country's most important naval facilities.

### 1. Warsaw–Lodz

This strategic area (Figure 13) is in the east-central part of Poland. Warsaw, the country's capital and largest urban center (January 1973 population 1,623,000, including nearby suburbs) is a modern metropolis (Figures 14 and 15), the focal point of railroad, highway, and air transportation networks, and the largest inland port on the Vistula River. A large, modern airfield near the southwest edge of Warsaw is the principal Polish civil airfield, and an airfield a short distance northwest of the city ranks among the best military fields in Poland. Warsaw is the headquarters of the Ministry of Defense and the national command center of all Polish armed forces. It is also the site of the country's principal military academies and has billeting facilities for about 35,000 troops, several supply and ammunition depots, and other large storage facilities. The city is a major industrial center and the prime telecommunications center of the country. It produces about one-fourth of the country's output of electrical, telecommunications, and electronic equipment. It is also a large producer of alloy steel and metals, industrial machinery, and transportation equipment, including motor vehicles, tractors, gasoline and diesel engines, optical and photographic equipment, precision instruments, pharmaceuticals, and various items of equipment for the armed forces. Lodz, the second largest city in Poland (916,000 population, including nearby suburbs, in January 1973), is also a large industrial center. It produces about 40% of the country's textiles. Also of significance is the output of electrical and telecommunications equipment, machine tools, textile machinery, dyes, pharmaceuticals, small arms, and military supplies. It is the site of several large air force depots and has barracks for about 10,000 troops, extensive storage facilities, and an airfield near the southwest edge of the city. The total storage capacity for refined petroleum products in the strategic area, excluding that available at airfields, is 700,000 barrels.

### 2. Upper Silesia

Called the Ruhr of Poland, this strategic area (Figure 16) in the south has the largest concentration of mines and industries in the country and is one of the leading industrial districts in Europe. The area's central core has an urban population of almost 2.5 million people largely concentrated in about half a dozen cities of at least 150,000 inhabitants each. The outlying cities of Krakow and Czestochowa had populations of 605,000 and 189,000, respectively, in January 1973. This strategic area is at the junction of east-west road and rail routes that link southern Poland with the U.S.S.R. and East Germany and north-south road and rail routes that join the Baltic port areas with southern Poland and Czechoslovakia. A closely knit web of roads and railroads serves the numerous industrial and mining installations within the strategic area. The principal telecommunications facilities are at Krakow and Katowice. Military barracks, large ammunition depots, and extensive storage areas are available near the major mining and manufacturing centers. Nearly all of the country's zinc, lead, coal, and most of the domestically produced coke come from Upper Silesia (Figure 17). More than 90% of the national capacity for iron and steel production is in this strategic area, close to the best domestic deposits of coking coal and iron ore. Most of the iron and steel plants are in the vicinity of Katowice, but the largest and most modern steel plant is near Krakow. Numerous industries produce synthetic rubber, plastics, and industrial and agricultural chemicals. The strategic area is also a

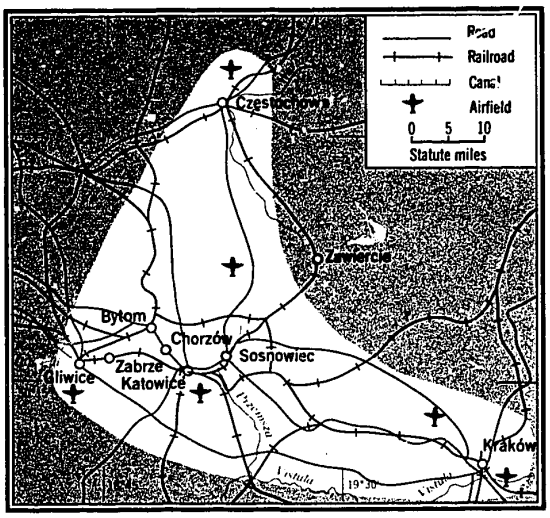



FIGURE 16. Upper Silesia strategic area (C)

FIGURE 17. The Wawel Coke Plant at Katowice is one of several plants that process coal for industries in the Upper Silesia strategic area. Smoke, steam, and polluted air mark this area as the heartland of the Polish iron and steel industry. (U/OU)

principal producer of armaments, tanks, tracked artillery prime movers, engineer and telecommunications equipment, and other military materiel. Several military and civilian airfields serve the area. The storage capacity for refined petroleum products, excluding that available at the airfields, is estimated at 2 million barrels.

### 3. Gdansk–Gdynia

This strategic area (Figure 18) on the Baltic coast is one of the two most important port areas in Poland. Gdansk (January 1973 population 440,000, including its northern suburb of Sopot) is significant for its bulk-cargo handling facilities (primarily coal, iron ore, and grain), the nation's largest shipbuilding and ship repair yards, and a coast guard establishment. The port exports Polish coal and imports Swedish iron ore. Industries produce a significant quantity of telecommunications and electrical equipment for maritime uses. Gdynia (January 1973 population 229,000, including the northern suburb of Rumia) is the best equipped Polish port and the country's principal naval base. It has the nation's third largest shipyard, important ship repair facilities, and industries which manufacture marine radio equipment. There are two military airfields, one north of Gdynia and another south of Gdansk. Large grain elevators, extensive vegetable-oil processing facilities, and several fish canneries are in both cities. Excluding the storage capacity available at the airfields, facilities are available for an estimated 1.2 million barrels of refined petroleum products. There are several military barracks and depots in the strategic area. Naval ships are berthed mainly at Oksywie and Hel.

### 4. Szczecin (Stettin)

Situated in northwest Poland near the mouth of the Oder River, this strategic area (Figure 19) functions as Poland's major port, serving both seagoing and inland waterway traffic. Szczecin (Figure 20) (January 1973 population 346,000) is the country's principal center for handling coal exports and Swedish iron ore imports. Most of the products manufactured in the Upper Silesia strategic area are shipped through this port. It has the country's second largest shipyard and a repair yard for large oceangoing vessels. In addition, the city is Poland's largest manufacturer of

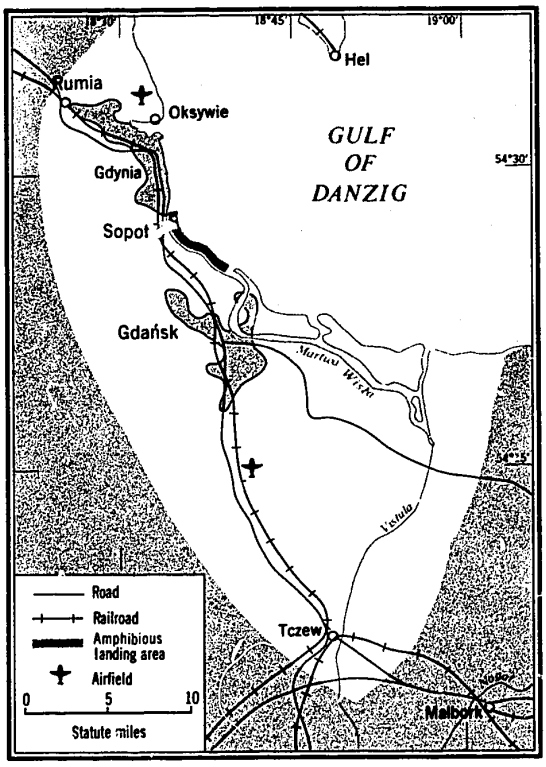



FIGURE 18. Gdansk–Gdynia strategic area (C)

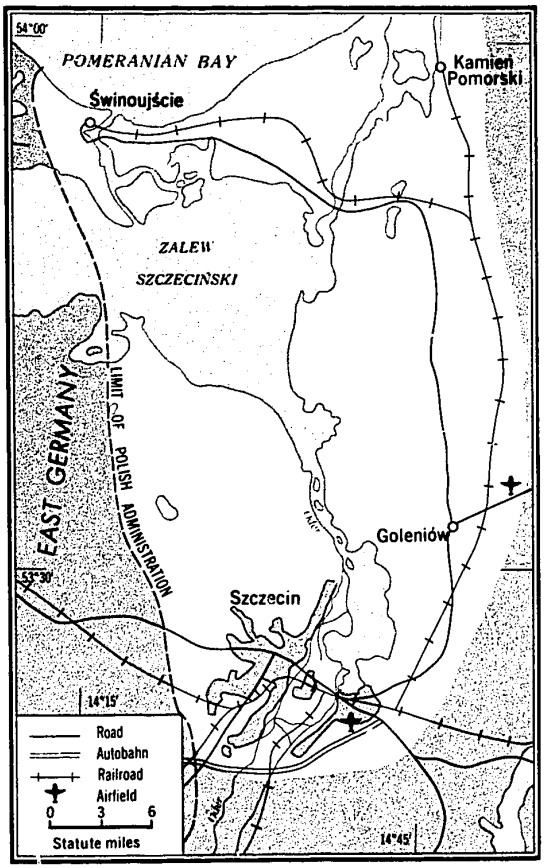



FIGURE 19. Szczecin strategic area (C)

construction cranes. Major chemical plants produce sulfuric acid and superphosphate fertilizers. Other industries include meat and fish canneries, and large grain elevators. The city also has several large barracks and military storage areas. There are two airfields, one of which is military. At Swinoujscie, about 35 miles north, are two naval bases (one Polish and one Soviet) with munitions depots and barracks. The estimated storage capacity for refined petroleum products, excluding that available at the airfields, is 825,000 barrels.

### 5. Other important areas

In addition to the strategic areas, there are four areas of growing significance: Wroclaw (Breslau), Bydgoszcz–Torun, Poznan, and Radom–Kielce. Each is an industrial area, having installations manufacturing a wide variety of military and civilian products, and functions as a military center with extensive billeting and storage facilities and at least one military airfield. As transportation centers, all of the areas dominate regional transport networks, and two of them—Poznan and Wroclaw—occupy strategic positions astride internal routes leading to East Germany and Western Europe. Figure 21 provides a more detailed description of these areas.

## F. Internal routes (C)

The selected internal routes (Figure 25) are the easiest avenues of movement between the major land approaches and the strategic areas, from the amphibious landing area near Kolobrzeg, and between the strategic areas. Detailed information on the selected routes is presented in Figure 22. The offroad dispersal and vehicular cross-country movement data presented in Figure 22 describes the

FIGURE 20. The city of Szczecin at the mouth of the Oder river near the border of East Germany controls the flow of both oceangoing and river traffic into the central part of Eastern Europe (U/OU)

FIGURE 21. Other important areas (C)

| NAME AND ESTIMATED POPULATION (JAN. 1973) | REMARKS |
|---|---|
| Wroclaw..... 536,000 | Fourth largest city. Major rail center of southwest Poland; major inland port on Oder River, serving vessels of up to 5.3-foot draft; ship and railroad repair facilities. Storage for an estimated 307,000 barrels of refined petroleum products (excluding that stored at airfields). Several powerplants and a combined capacity of 234,300 kilowatts. Headquarters of military district and air defense zone, ammunition storage, billeting facilities for 15,000 troops, one military and one civilian airfield, telecommunications center. Industries produce electric locomotives, railroad passenger cars, seagoing and river vessels, trucks, buses, trailers, military vehicles, recoilless guns and antitank missile launchers, ammunition for aircraft cannon and small arms, fuses for shells and bombs. Also manufactures machine tools, road construction machinery, electronic and electrical equipment, chemicals, and synthetic fibers. |
| Bydgoszcz–Torun area: | |
| Bydgoszcz..... 290,000 | Significant port on a major canal linking Vistula and Oder rivers, serving vessels up to 5.3-foot draft; ship repair facilities; important road and rail junction and major railroad repair shops. Headquarters of military district and air defense zone, a major air force base, military depots, ammunition storage, and large billeting facilities. One of country's largest producers of propellants and explosives; a major loader of artillery shells, handgrenades, and mines; producer of detonators, fuses, ammunition, and handgrenade casings. A major producer of electrical and telecommunications equipment, road construction machinery, and consumer goods. |
| Torun..... 134,000 | Port of Vistula River, regional road and rail junction. Large warehouses, and storage facilities for ammunition and refined petroleum products; extensive billeting facilities. A major producer of electrical, electronic, and telecommunications equipment. Manufactures hoisting, shipboard, and earthmoving machinery, chemicals, fertilizers, textiles, and synthetics; producer of processed food. |
| Poznan..... 478,000 | Fifth largest city. Most important road and rail junction in western Poland; major railroad repair shops. Center of rich agricultural area and commercial, telecommunications, and industrial center. Billeting for 13,000 troops; two major military airfields. The principal manufacturer of marine main diesel engines, electric locomotives, air compressors, specialized railroad cars, tires, tubes, chemicals, and consumer goods. Industrial output also includes agricultural machinery, machine tools, ball bearings, and machineguns. Storage facilities for 315,000 barrels of refined petroleum products (excluding that available at airfields). |
| Radom–Kielce area, includes: | |
| Kielce..... 135,000 | A major producer of ball bearings, spark plugs, ignition coils, detonators and other ammunition components. Metalworks assembles dump truck and tanker bodies, hoisting mechanisms, and special-purpose vehicle bodies; major alumina works. |
| Ostrowiec Swietokrzyski..... 52,000 | A major iron and steel plant producing pig iron and crude and rolled steel |
| Pionki..... 15,000 | A major chemical works producing propellants and explosives. |
| Radom..... 161,000 | Telephone equipment plant supplies about 40% of country's total output, partly for military use; small arms plant; major military airfield. |
| Skarzysko Kamienna..... 41,000 | Largest ammunition manufacturing and loading plant, producing most of Poland's small arms ammunition; also loads mines, aerial bombs, mortar and artillery shells. |
| Starachowice..... 45,000 | Largest truck plant, producing about one-third of national truck output; also manufactures diesel truck engines; large iron smelting plant. |

terrain adjacent to the route selected; data for cross-country movement away from these routes is given in Figure 5.

## G. Approaches

The perimeter of Poland consists of 305 miles of coastline and 1,922 miles of land boundaries (Figure 23). Poland claims territorial waters for 3 nautical miles and fishing rights to 12 nautical miles. (U/OU)

### 1. Land (C)

Developed transportation facilities in the land approaches are good. Roads are mostly two- or four-lane bituminous or four-lane divided concrete; railroads are 4'8½" gage and single or double track in East Germany and Czechoslovakia. Railroads in the U.S.S.R. are 5'0" gage, but transloading facilities to 4'8½" gage are generally available at the border. Offroad dispersal is generally unrestricted. Cross-

FIGURE 22. Internal routes (C)

| ROUTE AND TERRAIN | ROAD | RAILROAD | OFFROAD DISPERSAL AND VEHICULAR CROSS-COUNTRY MOVEMENT (CCM) |
|---|---|---|---|
| East Germany border near Kostrzyn to Gdansk–Gdynia strategic area. Generally flat to rolling plain, numerous streams, lakes, and marshes. Mainly evergreen forest, some cultivation. | Two to three lanes, intermediate (1.5 to 3.0 inches thick) bituminous, some cobblestone and cement concrete stretches. | Double track, 4′8½″ gage, to Pila; single track, 4′8½″ gage, from Pila to strategic area. | Fair to difficult. Offroad dispersal difficult in west and some areas in east. CCM partially restricted by forests, lakes, marshes, and seasonally wet areas. |
| East Germany border near Slubice to Warsaw–Lodz strategic area. Rolling plain to west of Poznan; more gentle terrain with low hills, streams, and marshes to east. | Two to three lanes, bituminous, good condition. Cobblestones in towns and villages. | Double track, 4′8½″ gage, electrified from Poznan to strategic area. | Good to poor. Offroad dispersal generally easy. CCM partially restricted, particularly in west, because of rivers, peat bogs, and seasonally wet areas. |
| East Germany border near Zary to Upper Silesia strategic area. Nearly flat to rolling plains, some forests in west and east, terrain mostly cultivated. | Two lanes, concrete and bituminous, in fair to good condition from East Germany border to north of Boleslawiec and from point southeast of Wroclaw to Upper Silesia strategic area; four-lane divided highway from north of Boleslawiec to point southeast of Wroclaw. | Double track, 4′8½″ gage, electrified east of Wroclaw to strategic area. | Offroad dispersal and CCM difficult because of rivers, locally steep slopes and gullies, and seasonally wet ground. |
| Czechoslovakia border at Cieszyn to Upper Silesia strategic area. Route through low hills and plains in crop, and forests. | Two lanes, bituminous and cobblestone stretches, fair to good condition. | Double track, 4′8½″ gage, generally east of route. Electrified from Zebrzydowice to strategic area. | Offroad dispersal easy. CCM mostly unrestricted, except for local areas of forests, streams, and seasonally wet ground. |
| U.S.S.R. border in southeast to Upper Silesia strategic area. Rolling terrain along edge of foothills, forests in east, remainder cultivated. | Two lanes, bituminous, fair to good condition. Short sections of stone block, Soviet border to strategic area. | Mostly 4′8½″ gage, double track, electrified. Dual gage (4′8½″ and 5′0″) and transloading facilities near border. | Offroad dispersal and CCM difficult because of forests, seasonally wet areas, and locally steep slopes, particularly in east. |
| U.S.S.R. border near Hrebenne to Warsaw–Lodz strategic area. Flat to rolling plains and a few large and many small streams and ditches; mostly in crops or grass, forests predominant in extreme north and in vicinity of Pulawy. | Two lanes, cobblestone with brick and bituminous concrete stretches; good condition. | 4′8½″ gage. Border to Rejowiec single track; Rejowiec to Pilawa double track; Pilawa to strategic area single track. Lublin to strategic area electrified. | Offroad dispersal and CCM generally fair. CCM locally restricted by forests and streams and seasonally restricted by soft soils. |
| U.S.S.R. border near Terespol to Warsaw–Lodz strategic area. Nearly flat to gently rolling plains, some low hills and marshes; mostly cultivated. | Two lanes, concrete, some cobblestone sections. Fair to good condition. | Double track, dual gage (4′8½″ and 5′0″) from border to point short distance west of Terespol; double track, 4′8½″ gage, from latter point to strategic area. Electrified Minsk Mazowiecki to strategic area. | Offroad dispersal fair to unsuited. CCM restricted by rivers and seasonally wet areas with miry soils along river valleys. |
| U.S.S.R. border near Geniusze to Warsaw–Lodz strategic area. Nearly flat to gently rolling plain with dissected and marshy areas. Mostly cultivated. | Two lanes, mostly concrete and bituminous, some cobblestone sections; fair to good condition. | Double track, dual gage (4′8½″ and 5′0″) from border to Geniusze; single track, 4′8½″ gage Geniusze to Bialystok; double track Bialystok to Lapy; single track Lapy to Lochow, second track under construction; Lochow to strategic area electrified. | Offroad dispersal generally easy, CCM restricted by rivers and seasonally wet areas with miry soils in low areas. |

FIGURE 22. Internal routes (C) *(Continued)*

| ROUTE AND TERRAIN | ROAD | RAILROAD | OFFROAD DISPERSAL AND VEHICULAR CROSS-COUNTRY MOVEMENT (CCM) |
|---|---|---|---|
| U.S.S.R. border near Braniewo to Gdansk–Gdynia strategic area. Rolling to hilly plain with lakes; mostly cultivated but some forested areas. | Two lanes, bituminous, good condition.... | Double track, dual gage (4′8½″ and 5′0″) border to Elblag; double track, 4′8½″ gage, Elblag to strategic area. | Offroad dispersal easy. CCM restricted by rivers, wet, low areas, and numerous lakes. |
| Gdansk–Gdynia strategic area to Szczecin strategic area. Gently rolling, low-lying coastal plain; cultivated except in marshy areas along rivers and in scattered forested areas. | Two lanes, cement and bituminous concrete, good condition. | 4′8½″ gage; single track to Runowo, remainder double track. | Offroad dispersal easy. CCM restricted by forests, rivers, marshes, and seasonally wet areas. |
| Amphibious landing area near Kolobrzeg to Gdansk–Szczecin internal route. Marshy coastal plain, | Tracks and trails from beach to nearby gravel-surfaced road which leads to two-lane bituminous-surfaced roads, eventually connecting with Gdansk–Szczecin internal route. | Single track, 4′8½″ gage, leading inland 15 miles to single track, 4′8½″ gage. | Offroad dispersal fair to poor. CCM restricted by forests, dunes, marshy areas. |
| Szczecin strategic area to Upper Silesia strategic area. Nearly flat to rolling plains; many forested areas, but mostly cultivated. | Two lanes, mostly concrete and bituminous, good condition; some cobblestone sections. | Double track, 4′8½″ gage. Generally parallel to, but not within, internal route from strategic area to Poznan. | Offroad dispersal fair to poor, locally unsuited. CCM restricted by forests, lakes, and seasonally wet areas; locally hindered in south by steep slopes and gullies. |
| Upper Silesia strategic area to Warsaw–Lodz strategic area. Flat to rolling plains, chiefly in crops or grass with scattered patches of forest; forested area in south. | Two lanes, bituminous, good condition.... | Double track, 4′8½″ gage, electrified..... | Fair. CCM restricted locally by streams and forests and by seasonally wet areas with soft ground. |
| From Upper Silesia–Warsaw–Lodz internal route at Piotrkow Trybunalski to Warsaw–Lodz strategic area. Flat to rolling plains in crops or grass and scattered patches of forest; forested area in south. | *....do.....* | None..... | *Do.* |
| From Warsaw–Lodz strategic area to Gdansk–Gdynia strategic area. Nearly flat to gently rolling plain; cultivated. | Mostly two lanes and bituminous, good condition. Some cobblestone stretches south of Torun; some gravel with potholes south of Wloclawek. | 4′8½″ gage, electrified, generally parallel to, but not within, this internal route. Single track to Kutno, double track to Gdansk–Gdynia strategic area. | In south, offroad dispersal easy; CCM restricted except along rivers. In north, offroad dispersal fair to poor; CCM severely restricted by rivers, canals, and seasonally wet areas. |
| From Warsaw–Lodz strategic area to Braniewo–Gdansk internal route near Elblag. Nearly flat plain, cultivated. | Two to three lanes, mostly bituminous, good condition. | 4′8½″ gage, double track, generally parallel to but not within this internal route. | In south, easy offroad dispersal; CCM partially restricted by rivers and seasonally wet areas. In north, offroad dispersal fair to poor, CCM restricted by rivers, lakes, and seasonally wet areas. |

FIGURE 23. Boundary data (C)

| BOUNDARY | LENGTH | STATUS | TERRAIN |
|---|---|---|---|
| | *Miles* | | |
| Baltic coastline..... | 305 | Claimed limit of territorial waters 3 nautical miles; fishing rights to 12 nautical miles. Undisputed. Heavy fortifications around Swinoujscie, on Mierzeja Helska, and along western shore of Gulf of Danzig. | Narrow beaches backed by sand dunes, stretches of bluffs, small lakes, and marshes. |
| Czechoslovakia..... | 864 | Demarcated, undisputed. Recognized by United States as legal international boundary. No fortifications of significance on either side. | Most of border along Sudeten and Carpathian Mountains; gap in mountains along Oder River. Steep slopes in mountains; gentle slopes on plain along Oder. |
| East Germany..... | 283 | Demarcated, undisputed. Not recognized by United States as legal international boundary; called Limit of Polish Administration. No major permanent fortifications. Polish side of border, only a few minor defenses guarding bridges. East German side of border heavily guarded. | Most of border delimited by Oder and Neisse rivers across nearly flat to gently rolling, forested or cultivated plains. Bogs and marshy areas common. Medium to dense networks of streams. |
| U.S.S.R.. ..... | 775 | Demarcated, undisputed. Recognized by United States as legal international boundary. No fortifications of significance on either side. | Nearly flat to rolling plains with hills and mountains in south. Bug River delimits portion of border in south. |

country movement is restricted in many places by lakes, drainage ditches, forested areas, and soft ground in the spring and autumn rainy season. Detailed information on approaches is contained in Figure 24.

### 2. Sea (C)

The sea approaches to the coast of Poland are from the North Sea via the Skaggerak and Kattegat straits and the Baltic Sea. Offshore approaches are clear except for a few shoals, banks, and scattered wrecks. Nearshore approaches are partly obstructed by longshore bars, wrecks, shoals, rocks, and groins. In addition, shoals are present off the larger river mouths. Nearshore bottoms are mostly sand. The tidal range is negligible, and surf 4 feet or higher may be expected a maximum of 24% of the time from January through March, 18% April through June, 23% July through September, and 21% October through December.

The best amphibious landing areas are along a 52½-mile stretch of coast centered slightly west of Kolobrzeg, and a 5¾-mile section between Gdynia and Gdansk. These landing areas provide access to a strategic area or to an internal route leading to strategic areas (Figure 25). Exits are primarily by tracks and trails to bituminous-surfaced coastal roads. Predominantly sandy shores are backed by grass- and brush-covered dunes. Closely spaced groins interrupt some stretches of sandy shore. The coastal zone, backed by a nearly level to rolling plain extending more than 20 miles inland, is covered principally with low field crops, scattered small lakes and lagoons in the west, and patches of forest; a range of low hills extends about 16 to 35 miles inland from the western coast of the Gulf of Danzig. Characteristics of the landing areas are summarized in Figure 6.

### 3. Air (U/OU)

Air approaches[3] from the northeast and east are over the western U.S.S.R.; from the south over northern Romania, Czechoslovakia, northern Hungary, northern Austria, and the southeastern part of West Germany; from the west over East Germany and the northeastern part of West Germany; and from the northwest and north over southeastern Denmark, southern Sweden, and the southern part of the Baltic Sea. Weather conditions in all approaches are best in summer (June through August) and least favorable in winter (December through February). Spring and autumn are transitional periods.

During the summer, cloudiness is at or near the minimum (40% to 75%) and predominantly of a cumuliform type in all approaches. Thunderstorm activity, however, is at a maximum in summer and thunderstorms occur on an average of 2 to 8 days per month. The greatest hazard to flying during this season is severe turbulence associated with thunderstorms and convective cloudiness. Severe icing conditions are present in large convective clouds and

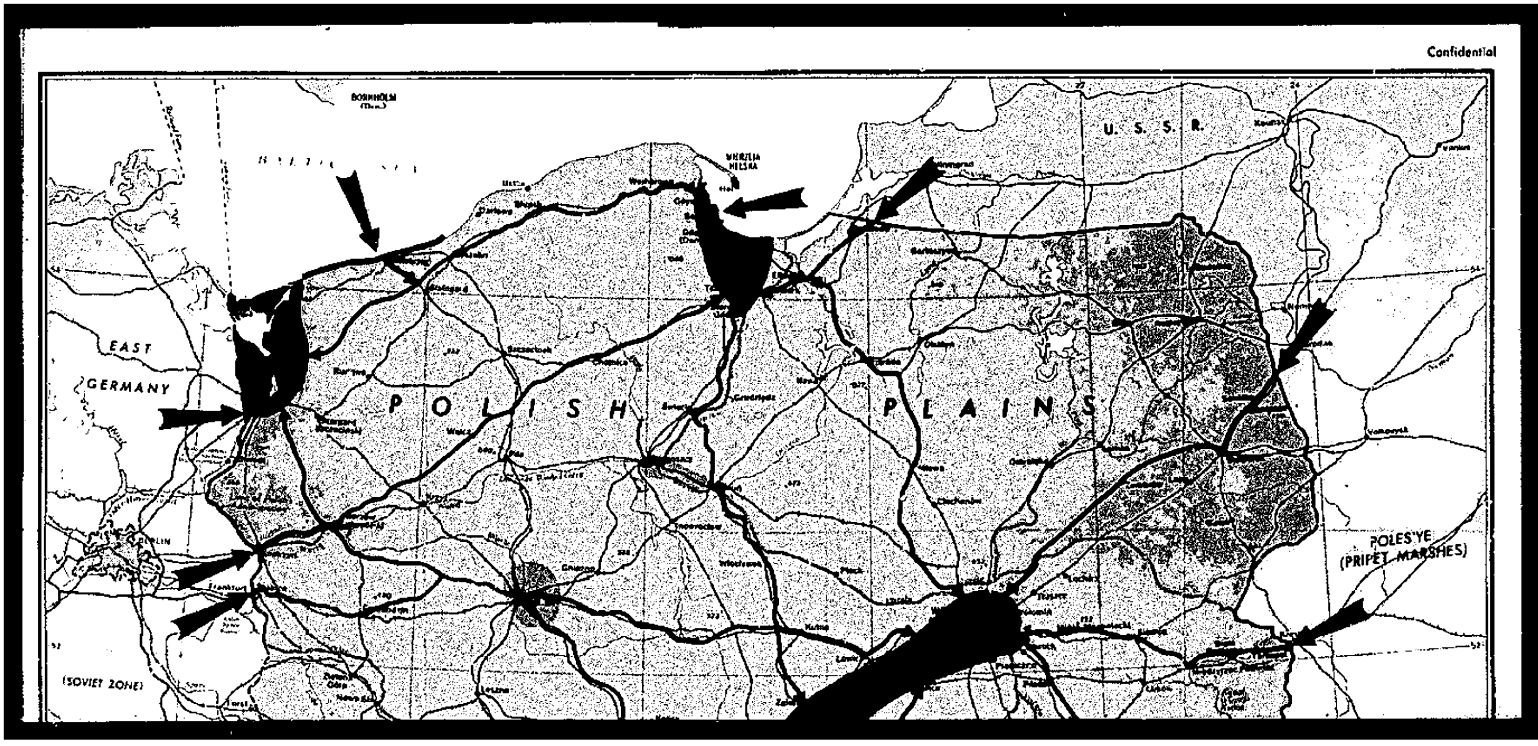
[3]The discussion zone for air approaches extends approximately 200 nautical miles beyond the borders of Poland.

FIGURE 24. Land approaches (C)

| APPROACH | ROAD | RAILROAD | OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT (CCM) |
|---|---|---|---|
| To Szczecin strategic area from East Berlin. Nearly flat to gently rolling plain; mostly cultivated. | Four lanes, divided, limited access, concrete, good condition. | Single track, 4′8½″ gage..... | Offroad dispersal easy. CCM restricted by areas of soft ground, lakes, ditches, and forest. |
| To Kostrzyn, Poland from East Berlin. Nearly flat to gently rolling plain; mostly cultivated. | Two lanes, intermediate bituminous, good condition. | ....*do*..... | Offroad dispersal easy. CCM generally easy, but some local areas of soft soil, perennial wet places, ditches, and forest. |
| To border at Frankfurt, East Germany from East Berlin. Nearly flat to gently rolling plain; mostly cultivated. | Four lanes, divided, limited access, concrete, good condition. Terminates near southwest section of Frankfurt. | Double track, 4′8½″ gage..... | Offroad dispersal easy. CCM restricted in places by lakes, bogs, and forests. |
| To border south of Forst, East Germany from East Berlin. Nearly flat to gently rolling plain with extensive areas of marshes, bogs, lakes, and some forests; some brush, grass, and cultivated crops. | Four lanes, divided, limited access, concrete, good condition to road junction about 50 miles south of East Berlin, two lanes from junction to point near border where road terminates. | Single track, 4′8½″ gage..... | Offroad dispersal easy. CCM severely restricted in large areas of bogs, marshes, lakes, and forests. |
| To border at Cieszyn, from Zilina, Czechoslovakia. Mostly cultivated hills and plains in north and south, some forested hills and mountains in central part. | Bituminous, two to three lanes, fair to good condition. | Double track, 4′8½″ gage, electrified. | Offroad dispersal easy. CCM generally unrestricted on plains except when soils become soft and miry or when snow covered from mid-November to early April. CCM generally restricted in steeper hills and mountains. |
| Southern approach to border from L'vov, U.S.S.R. Rolling and dissected plains and scattered, forested hills. | Two lanes, bituminous, fair condition..... | Double track, 5′0″ gage, from L'vov 48 miles westward; dual gage (4′8½″ and 5′0″) remainder of route. Transloading facilities. | Offroad dispersal easy. CCM restricted on dissected plains. |
| Northern approach from L'vov, U.S.S.R., to border at Hrebenne. Rolling and dissected plains with scattered, forested hills. | Two lanes, mostly bituminous, some crushed stone and improved earth, fair to good condition. | Single track, 5′0″ gage. Transloading facilities near border. | Offroad dispersal easy. CCM restricted in dissected plains and forest areas. |
| To border from Brest, U.S.S.R. Gently rolling plain, numerous scattered, wet, and forested areas; mostly cultivated. | Two lanes, bituminous and concrete, fair to good condition. | Dual gage (4′8½″ and 5′0″) to border; transloading facilities. | Offroad dispersal fair to poor. CCM restricted by numerous forests and marshy areas. |
| To border from Grodno, U.S.S.R. Nearly flat to gently rolling plain, mostly forested with large areas wet most of the year. | One to two lanes, bituminous in most of route, some crushed stone near border; fair to good condition. | Double track, 5′0″ gage; dual gage (4′8½″ and 5′0″) near border; transloading facilities. | Offroad dispersal easy. CCM restricted in areas of soft soil and wet areas. |
| To border from Kaliningrad, U.S.S.R. Nearly flat to rolling plain; mostly cultivated with scattered forested and seasonally wet areas. | Two lanes, bituminous, good condition.... | Dual gage (4′8½″ and 5′0″) to border; transloading facilities. | Offroad dispersal easy. CCM partially restricted in forested and seasonally wet areas. |

thunderstorms extending above the freezing level, which is usually near 10,000 feet. Visibility is usually good except during showers. The prevailing winds aloft to at least 55,000 feet are westerly, and their mean speeds do not exceed 50 knots.

In winter, intense migratory lows and associated fronts cause extensive, multilayered stratiform cloudiness (50% to 85%), low ceilings, poor visibility, and moderate to severe icing conditions. The freezing level is frequently at or near the surface during this season but occasionally may be near 7,000 feet in the south. Thunderstorms are rare even in frontal zones, and turbulence is seldom severe. Cold, dry, easterly winds from the interior of Asia occasionally produce clear skies for several days in the northeastern and eastern approaches. Fog, snow, and haze are the primary restrictions to visibility. The predominantly westerly winds aloft reach maximum mean speeds of about 50 knots near 30,000 feet in the southern and western approaches.



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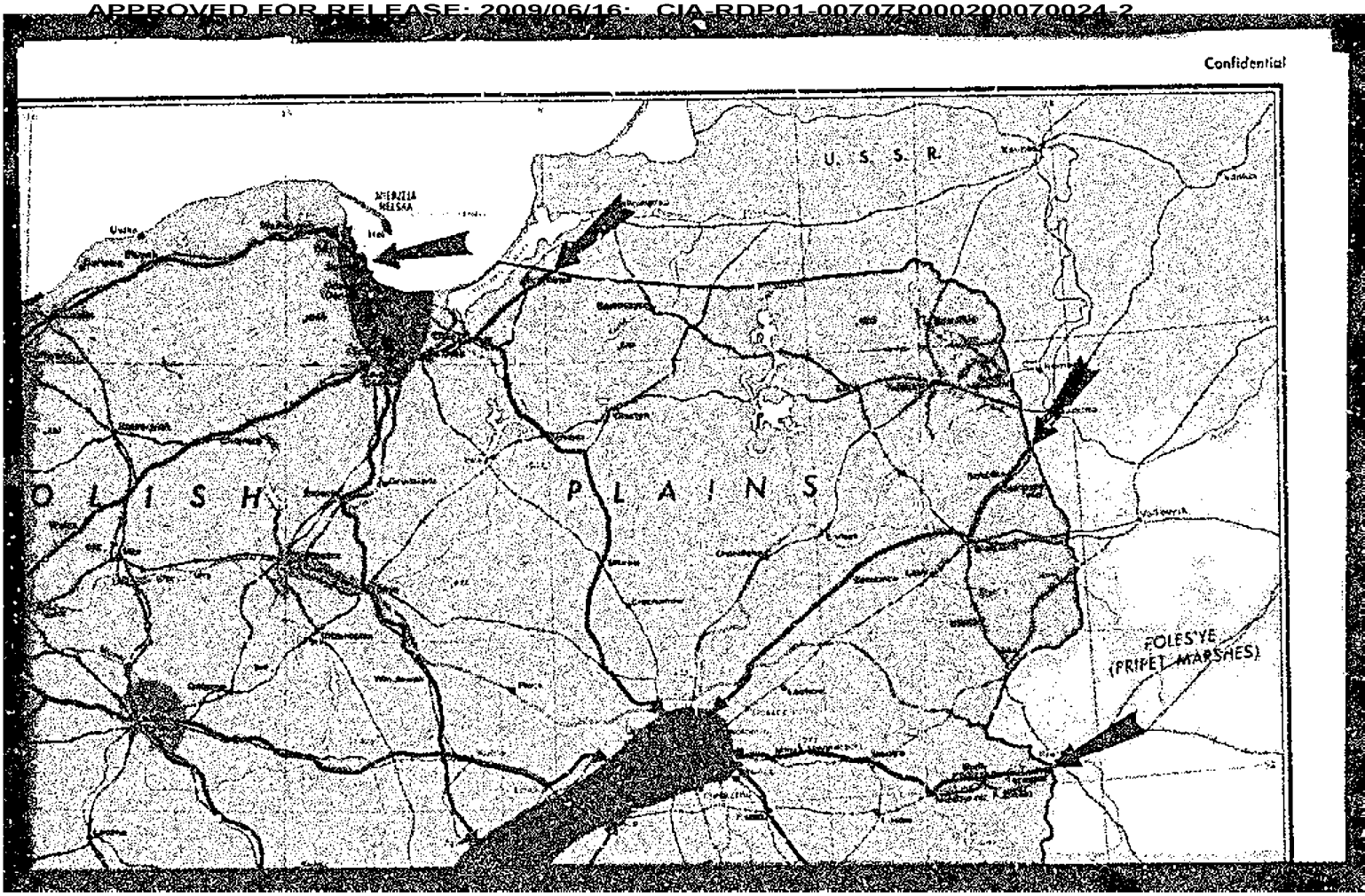

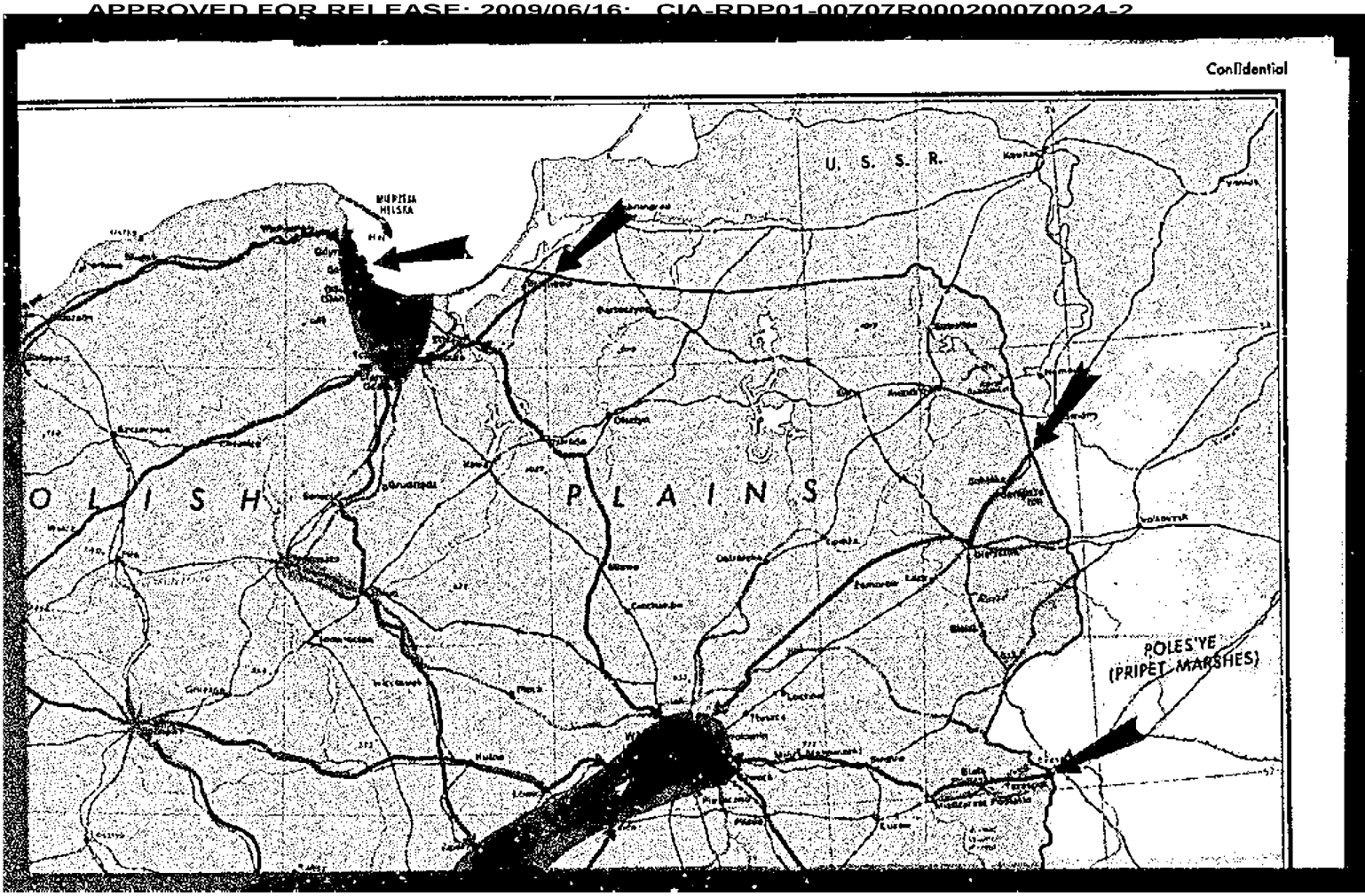

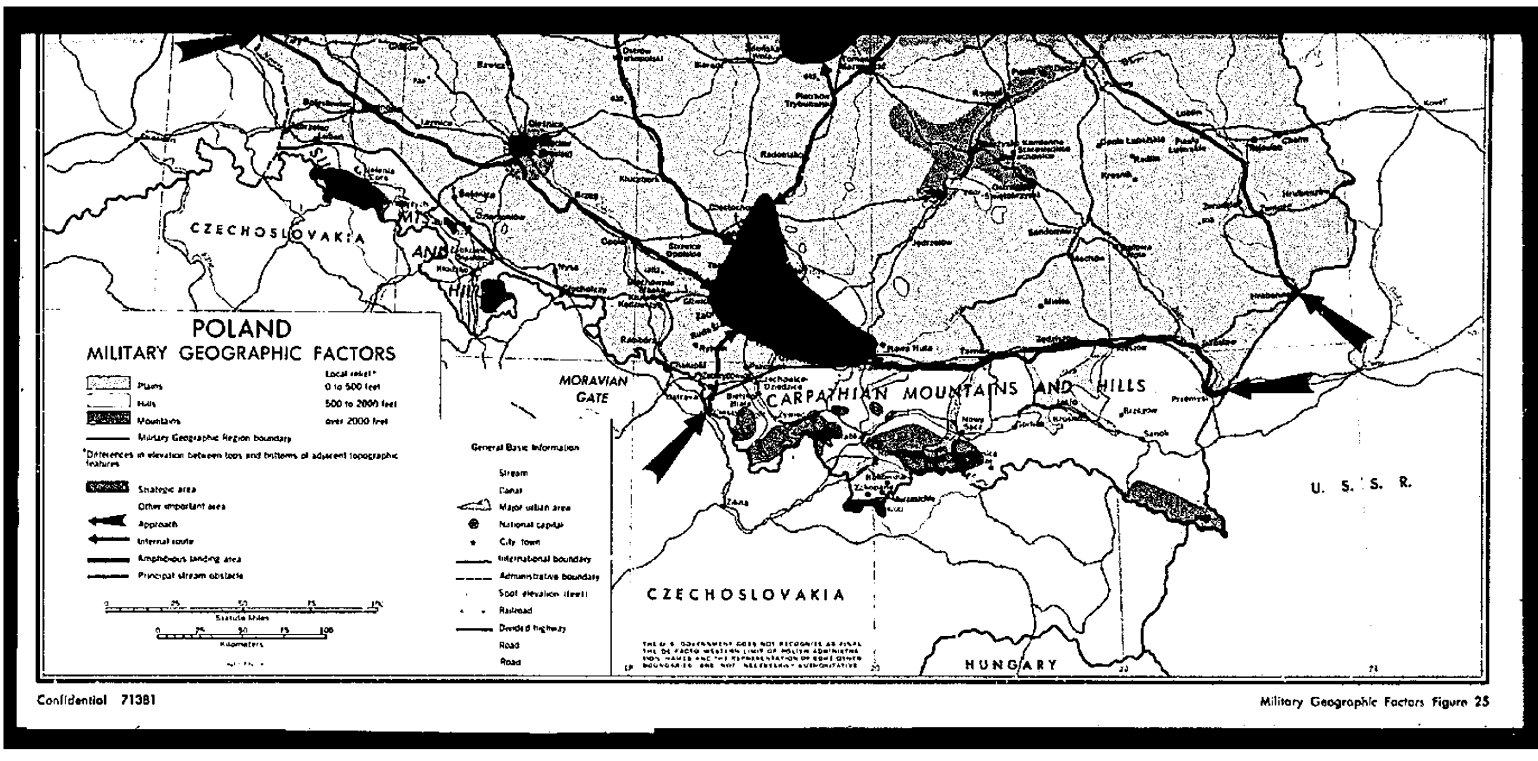


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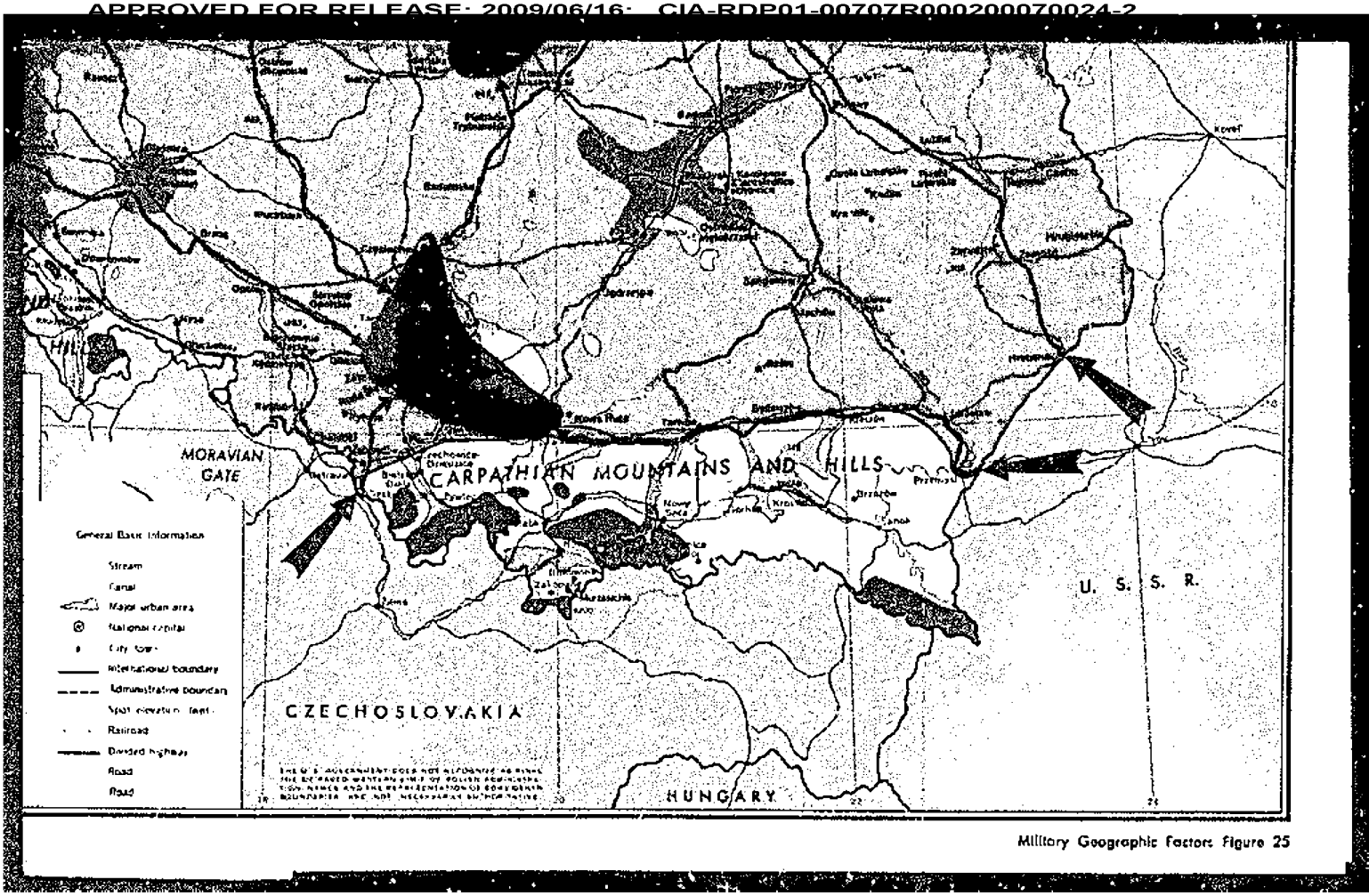
Military Geographic Factors Figure 25




Military Geographic Factors Figure 25

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