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NATIONAL INTELLIGENCE SURVEY

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NATIONAL INTELLIGENCE SURVEY PUBLICATIONS

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U.S.S.R.

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This chapter supersedes the geographic coverage in the General Survey dated March 1971.

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FIGURES

Military Geography

A. General (U/OU)

The U.S.S.R., the largest country in the world, extends across much of Europe and all of northern Asia (Military Geographic Factors Map, Figure 46). It is bordered mostly by the broad North European Plain in the west and by an almost continuous mountain bulwark in the south; the Pacific and Arctic Oceans are to the east and north. The western border of the U.S.S.R. is within 1,000 nautical miles of all the important manufacturing centers in Western Europe, the southern border is within 750 nautical miles of the extensive oilfields in the Middle East, and the easternmost extremity is within 750 nautical miles of the principal United States bases in Alaska. Moreover, within 4,000 nautical miles of the northern coast, across the Arctic Ocean, are the major industrial regions of North America—all within range of Soviet jet bombers and missiles. The country is unfavorably located in relation to the major sea lanes of the world and, except for its Black Sea ports, there are only a few widely scattered ports open throughout the year.

One geographic factor overshadows all others in characterizing the Soviet Union: its enormous size. The U.S.S.R. is approximately 300,000 square miles larger in area than the combined land areas of the United States, Canada, and Greenland. Its 8.6 million square miles occupy almost one-sixth of the land surface of the earth. This vast area spans 170° of longitude across the northern part of the Eurasian continent, from the Baltic Sea in the west to the Bering Strait in the east. Continental North America, by comparison, spans only 111° of longitude. This great longitudinal extent of the U.S.S.R. landmass measures about 5,550 miles[1] by air from Kaliningrad to the Bering Strait via Moscow, Tomsk, and Yakutsk. It is predominantly a land of far northern character; about 80% of the country is north of 50°N., the latitude of Winnipeg, Canada.

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

About 248 million people, roughly one-fifth more than the population of the United States, live in this land. Slightly more than two-thirds of this population is concentrated west of the Ural Mountains in European U.S.S.R., where most of the great urban centers and the best developed transportation networks are located. Because of the expansion of industry and agriculture, the population of Siberia and the Arctic is increasing.

B. Topography (U/OU)

The surface of the U.S.S.R. is dominated by interior plains and plateaus drained by great rivers, the largest of which flow south in the European U.S.S.R. and north in Siberia. The area is rimmed on the south and east by a succession of mountain systems. Plains, broken at wide intervals by hills and low mountains, predominate in the western half of the country. These plains comprise four major zones from north to south: tundra, forested swampy plains, cultivated plains, and grass- and scrub-covered plains and deserts.

The first, along the shores of the Arctic Ocean, is a zone of desolate tundra characterized by arctic vegetation and permanently frozen subsoil (permafrost). Along its southern margin, where the tundra supports some tree growth, it merges with a second zone, a broad belt of densely forested swampy plains (taiga). These forested plains extend from near the Arctic Circle southward to about 55°N. Movement is extremely difficult through these immense forested swamps, which is an important reason for the sparsity of urban centers in the zone. Natural openings and clearings prevalent near the southern boundary of the forest zone are outliers of the third zone—well-drained cultivated plains and widely scattered forests of mixed evergreen and deciduous trees. These plains extend westward beyond the borders of the U.S.S.R. along the Baltic and North Sea coasts to France and have been the obvious and traditional avenue for military movement during the last thousand years. Most of the

Soviet population, the most productive industries and agricultural areas, and the best developed transportation net are concentrated in these plains. South of the cultivated plains is the fourth zone—grass- and scrub-covered plains and deserts that occupy an area more than half as large as the United States. Most of this zone is east of the Caspian Sea and south of about 50°N. Centers of population in these plains and deserts are widely scattered and linked by a sparse network of railroads, poor roads, and a fragmented but expanding inland waterway system.

A plateau area cut by deeply incised river valleys is between the Yenisey and the Lena rivers. The surface of the plateau, although higher than the swampy plains in the west, resembles them in the relatively uninterrupted expanses of dense, swampy coniferous forest. Movement in this area is severely restricted. Surface transportation routes north of the Trans-Siberian railroad are very sparse except for trails and inland waterways. This part of Siberia has one of the lowest population densities in the U.S.S.R.

C. Climate (U/OU)

1. General

All of the principal types of climate in the world except tropical are encountered in the U.S.S.R. These range from tundra in the Arctic north, through the temperate forest and steppe zones in the large central regions, to the desert, mountain, and subtropical regions in the southern parts of the country. Nevertheless, these climatic divisions become secondary when considering the single overpowering influence on the climate, the vast Eurasian landmass. Because of its great size, large portions of Eurasia, and therefore of the U.S.S.R., are far removed from the moderating influences of the Atlantic and Pacific Oceans. In addition, the greater part of the Arctic Ocean is locked under a cover of polar ice and, because maritime characteristics are almost totally absent much of the year, may be considered an extension of the Eurasian landmass. A supplementary effect is the efficient blocking by the Himalayas and adjacent mountain chains of any moist, tropical air flows from the Indian Ocean. The net result is a very pronounced continental climate over most of the country. Only in relatively small, peripheral sections are the continental characteristics tempered by maritime influences. A feature of the continental climate common to all regions is the distinct contrast between the winter and summer seasons.

The long winters in the U.S.S.R. are some of the most rigorous that man must endure. Severe winter cold is the dominant characteristic as an intense semipermanent high-pressure system, centered over Central Siberia and Mongolia, produces a flow of bitterly cold air to all sections of the country. Over most of the Siberian interior east of the Yenisey river, typical winter conditions are frequent sunny skies, very little snowfall, exceptionally dry air, and extremely low temperatures. The clear, still weather near the center of the high promotes the coldest Northern Hemisphere temperatures on record, near or below −90°F., and the vapor of human breath freezes and crackles in the air. Cloudy and inclement weather is more frequent on the Siberian coasts, where penetration of migratory cyclones or fronts breaks the monotony of the bright, bitter cold, especially in the east. West of the Yenisey river and, in particular, in European Russia the bitter cold is moderated by frequent invasions of maritime air which accompany migratory lows from the Atlantic Ocean or Mediterranean Sea. The lows either force their way through or ride over the cold dome of air and bring overcast skies and increased humidity; these features linger after the storms pass and create a sense of persistent, gloomy, raw, damp weather. The frequent light snowfalls of winter occasionally become raging blizzards which, in the Arctic, are so severe at times that inhabitants do not venture outdoors for 2 or 3 days. The winter temperatures in these western regions are not as cold as those in the east but, when combined with the high frequency of strong winds, create a windchill that is often equivalent to or even surpasses the frigidity of Siberia. Protective measures are necessary to prevent frostbite during severe windchill conditions.

The relatively short summers are a welcome relief in some sections of the country, but in the other sections summer weather presents additional trying conditions. As in winter, most of the country is dominated by a semipermanent pressure system. The interior regions undergo intense heating of the land surfaces, creating a thermal low centered just south of Soviet Central Asia. The effects of the Asian heat low are best reflected in the deserts of Soviet Central Asia, where an extremely hot, dry, dusty, almost suffocating atmosphere prevails. The cloudless skies allow intense solar heating of the desert sands, sending air temperatures soaring above 100°F. almost daily and baking the sands to the point where superficial burns may result from touching the ground. In contrast,

much of the rest of the interior has more pleasant conditions; mornings are bright and cool and afternoons are warm, but somewhat humid. During the daytime, puffs of clouds often develop into thunderstorms or shower activity before clearing and cooling takes place through the evening hours. On the Arctic and Far East coasts, however, summer ushers in foggy, cloudy, moist conditions which, because of lower temperature resulting from cold water along the coasts, are unpleasantly raw in the Arctic and oppressively muggy on the southern shores of the Far East. In Vladivostok the humidity is so great that perspiration does not evaporate, rust and mold are widespread, and the fog is so persistent that the sun remains hidden for weeks on end.

A feature of the climate common to the entire U.S.S.R. is the regularity of seasonal conditions. Despite this, a delineation of the seasons commonly applicable to all regions of the country is impractical. For example, the term "summer" is not truly descriptive of some sections of the Arctic coast, where freezing temperatures and snow occur even in the warmest month. More importantly, the polar to subtropical latitudinal extent dictates that winters in the polar regions last much longer than those in the subtropical sections. Therefore, the most feasible approach is to adopt the standard Northern Hemisphere 3-month seasonal breakdown as follows: winter (December through February), spring (March through May), summer (June through August), and autumn (September through November). It is emphasized, however, that the use of winter–summer terms serves mainly as a convenience to identify the coldest and warmest periods of the year and not necessarily to define the length of these periods.

2. Climatic controls

The climate of the U.S.S.R. is controlled mainly by the immense size of the Eurasian landmass, by the position of the country in high latitudes, and by seasonally alternating semipermanent pressure systems. Other climatic influences are the migratory lows and the oceans and seas over which they traverse, and the mountainous terrain, especially along the southern border.

More than three-fourths of the country is north of the 50th parallel, and much of this is within the Arctic Circle. Frequent autumnal invasions of polar air stagnate in these high latitudes, particularly in Siberia. Strong radiational cooling intensifies the already cold, dense air and it accumulates at the surface. This results in the development of an intense high-pressure system which, during winter, generally is centered west of Lake Baikal near the Mongolia–Central Siberia border. The high cell extends westward along 50°N. as a ridge of high pressure. Air pours out of the high clockwise toward lower pressure in the surrounding oceans and seas. On the eastern flank of the high, outpourings with a northerly component become the winter monsoon and blanket the Soviet Far East with bitterly cold, dry air. Similar outbreaks from the southern flanks send easterly cold waves across Soviet Central Asia and southern European Russia. The chain of high mountains along the southern border easily contains the cold air and keeps these regions under the grip of the Siberian cold. Periodically, however, the cold spells are broken by the movement of cyclones into these regions from the Mediterranean, accompanied by relatively mild, cloudy, wet weather. The Crimea and Caucasus sections benefit most and experience a milder winter than the more continental interior. Out of the western and northern flanks of the high the westerly component airflows are not as cold, relative to the outbreaks in the east and south. Embedded in the westerly airflows is a moderate incidence of cyclonic activity. These lows originate in the Atlantic Ocean and enter the country primarily from central or northern Europe. The storms bring considerable cloudiness, moisture, and warmer air and give the western and northwestern sections of the country a more varied winter than occurs elsewhere. Beyond the Urals the maritime air rapidly loses its characteristics and the storms, penetrating eastward into the cold dome, gradually weaken and eventually dissipate or become intermeshed with the cold pool of air in the Arctic north. On the whole, most sections of the country are under the complete dominance of the intensely cold Siberian high and winters become more severe from west to east.

Increasing insolation during the short spring transition thaws the icy grip of winter and turns much of the country into muddy quagmires and flooded plains. Continued rapid warming of the land establishes lower pressure over the Asian continent by summer. Simultaneously, higher pressure is established over the oceans. This results in a complete reversal in the general flow pattern as air gradually moves from the cooler oceans to the hot continental interior. The influx of air affects the outlying regions in different

ways. In the Far East the southerly component winds become the summer monsoon and bring warm, very humid, foggy weather to the Pacific shores but do not penetrate very far inland. The chain of high mountains in southern Asia successfully prevents invasions of hot, muggy air from the Indian Ocean, but warm, less humid air from the Atlantic Ocean arrives in the southern part of European Russia as a west to northwest flow. In the northern part of European Russia cyclonic activity in the westerly airstreams from the northern Atlantic alternate with northerly invasions of Arctic air and bring a variety of weather conditions. Finally, along the Arctic coasts of Siberia easterly to northeasterly winds bring cool, rather moist, foggy weather. The remaining vast interior, especially Soviet Central Asia, is subjected to rather stagnant air within the perimeter of the continental heat low. This culminates in daily conditions of dry, hazy heat in most sections, broken only by occasional thunderstorm or shower activity. In the desert regions the heat is almost unbearable and seldom alleviated. Relief occurs briefly during the short autumnal transition before the country is once again under the icy grip of the winter anticyclone. The overall annual cycle, therefore, is a pendulum-like swing through periods of intense cold and moderate to intense heat.

3. Weather elements and climatic conditions

a. Temperature

The continentality of the climate is best expressed by the temperature regimes. Although the contrast between summer and winter, their duration, and even their character may differ from one region to another, pronounced warm and cold periods everywhere are clearly defined, and large annual ranges of temperature are common countrywide. In fact, much of Siberia experiences the greatest annual range of temperature in the world, in excess of 100 Fahrenheit degrees (Figure 29). These large annual temperature ranges are mainly due to the severe winters.

The coldest winter temperatures are experienced in the cold pole region of Siberia east of the Yenisey river, where mean daily maximum temperatures in January are mostly below −20°F. and mean daily minimums are in the −40°F. to −60°F. range. The official Northern Hemisphere record of −94°F. was recorded here, and unofficial readings to −108°F. have been cited. Away from the cold pole average temperatures increase rapidly toward the Pacific shores but much more gradually toward the Black and Caspian Seas. Midwinter temperatures on the eastern coasts are mostly above zero during the day but nighttime readings dip to between −15°F. and −20°F. at places on the Okhotsk coast. West of the cold pole mean daily maximums in midwinter vary from below zero in parts of West Siberia to the comparatively warm 30's and 40's in some coastal sections on the Black and Caspian Seas (Figure 30). Mean daily minimums display a similar increase southwestward, from −10°F. to −25°F. in West Siberia to 15°F. to 35°F. in the Caucasus region. This represents a temperature change of as much as 50 Fahrenheit degrees across the western half of the country.

The duration and intensity of the cold period is borne out by the average number of days that maximum temperatures are at or below freezing and minimum temperatures are at or below zero (Figures 31 and 32). The frequency of both is greatest on the Arctic coast and in the Siberian interior east of the Yenisey river, where 150 to 300 days with maximums below freezing and 100 to 200 days with minimums below zero justify this region as the cold pole. These low temperatures approach a similar high incidence in the northern sections of European Russia but, in the southern sections, are reduced in frequency to 50 to 100 days of below freezing maximums and 5 to 30 days of below zero minimums. Freezing temperatures are least frequent in the Caucasus region, where minimums rarely drop below zero. Probably the best measure of the severity of Soviet winters is seen in the tables on windchill in Figure 33. Windchill takes into account the effects of temperature and wind speed and relates them to human comfort. For example, a person would feel just as chilled at a temperature of 15°F. and a wind speed of 20 knots as he would at a temperature of −32°F. and a calm wind. The effects of windchill are graduated in degrees of severity up to condition V, during which exposed flesh freezes almost immediately. Even though temperatures are colder in the interior of Siberia, the many calms and light winds cause severe windchill to be less frequent here than on the Arctic coast. The coastal sections of Siberia have a high incidence of strong winds and experience condition V as much as 50% to 80% of the time. Severe windchill conditions decrease in incidence toward the southwest where the warmer temperatures occur. In all sections it is essential to wear the proper protective clothing to guard against chill during outdoor activities.

The rapid spring warming culminates in a summer temperature regime varying from cool or mild in the northern sections to warm or hot in the southernmost sections, an obvious influence of latitude. Average daily maximums in July, the warmest month, range from the 40's (°F.) and 50's at many Arctic coast stations to the 60's and 70's in all but the southernmost sections, where average values are in the 80's and 90's. The hottest temperatures are recorded in the deserts of Soviet Central Asia. Here, daily maximums average in the 95°F. to 105°F. range, and occasionally the temperatures soar to near 120°F. The afternoon heat is as unbearable in the deserts as the winter cold is on the Arctic coasts of Siberia. Temporary relief from the intense heat occurs at night, when the clear skies allow the desert floor to cool rapidly through nocturnal radiation. The result is a great diurnal temperature range of 30 to 35 Fahrenheit degrees at many desert locations. Nighttime temperatures elsewhere in July range from cool in the central regions to near freezing in many parts of the Arctic north.

The main concern of temperatures in the layers of the atmosphere above the ground surface is the average height of the freezing level. In the northern regions the freezing level is at or near the ground surface during the 7 to 10 coldest months of the year and lifts to between 5,000 and 10,000 feet in the remaining warmer months. In the southern regions the freezing level varies between the surface and 5,000 feet in winter and between 12,000 and 17,000 feet in summer. Considerable amounts of icing may be deposited on aircraft flying in clouds above the freezing level. The most hazardous icing potentials occur during the transit of the many, often intense, migratory lows in autumn through spring and during thunderstorm activity in summer. The summer thunderstorms are normally isolated and, except over high, rugged terrain, can be circumnavigated in most cases, but the migratory storms are accompanied by widespread, thick cloudiness which is difficult to avoid. The least danger of aircraft icing occurs near the virtually cloud free centers of the Siberian high in winter and Asian heat low in summer.

b. Humidity

Relative humidity, uniformly high throughout the year near the coasts, undergoes a very gradual decrease toward the interior in winter and a very pronounced decrease inland in summer. The winter humidities are commonly in the 70's (%) and 80's throughout most of the day in almost all sections of the country. The high relative humidity in the interior and Arctic coast sections of Siberia, however, may be misleading insofar as the moisture content of the air. Very cold air is incapable of holding much moisture and consequently the absolute humidity, or actual water vapor content, is very small. This is essentially why the amounts of precipitation received during winter are meager compared to summer amounts, even though precipitation occurs more often in winter. The most prominent exception to a winter regime of high relative humidity is in the Far East, where the dry monsoon out of Siberia lowers values to the 50's and 60's. The summer regime of relative humidity features marked decreases in afternoon values away from the coasts. The contrast is starkly evident when comparing the conditions in two widely separated areas, the Far East coasts and Soviet Central Asia. In the Far East the summer monsoon from the Pacific Ocean pumps warm, moist air onshore, sending afternoon humidities into the 70's and 80's and producing a very oppressive condition. Conversely, in the desert regions of Soviet Central Asia intense afternoon heat reduces humidities to the 20's and 30's and, in some instances, to as low as 5%. These low humidities increase the rate of evaporation of body sweat and cause a cooling sensation, thereby allowing the individual to more readily withstand the intense heat.

c. Precipitation

The continentality of the climate is further evidenced by the light to moderate average annual precipitation received over the major portion of the country. A wide central belt of moderate annual precipitation, 15 to 30 inches, extends from the Yenisey river westward to the western extremities of European Russia. Except in the Far East and southern mountains, annual precipitation becomes lighter beyond this central belt, with the smallest amounts averaging less than 10 inches on the Arctic coast of Siberia and less than 5 inches over much of the deserts of Soviet Central Asia. Isolated sections in the Far East and southern mountains receive 25 to 50 inches annually but the greatest annual falls, 60 to 100 inches, occur on the southwest flank of the Caucasus Mountains. Except in the Caucasus, the precipitation regime in most of the country shows a pronounced winter minimum and summer maximum.

During the winter period average monthly precipitation almost everywhere is less than 2 inches, with many places averaging less than 1 inch. The greater amounts occur in the regions affected by the

migratory storms from the Atlantic Ocean and Mediterranean and Black Seas and by the storms off the Kamchatka Peninsula. The most notorious wet spot is on the Black Sea coast near the southwest flank of the Caucasus Mountains where, in some months, 5 to 10 inches are normal. The penetration of moisture deep into the interior is prevented in a large part by the strong circulation of the Siberian high. As a result, much of Siberia receives the lesser amounts. Most of the winter precipitation is in the form of snow but, despite the high frequency, the snowfalls are rather light in intensity. Nevertheless, because of the low temperatures snowmelt is minimal and accumulations build to substantial depths in regions of calm or light winds. Annual snow depths greater than 2 or 3 feet are concentrated in two major areas, in the west from the Ural Mountains through the West Siberian Plain to the northern mountains of Central Siberia and in the east along the Pacific sides of Kamchatka Peninsula and Sakhalin island. The Atlantic storms drop considerable snow on the northwest sections of European Russia, but the strong winds accompanying the snowstorms sweep much of the snow into deep drifts and leave comparatively thin snow depths over exposed areas. The more intense storms produce blizzard conditions. The worst blizzards occur in the Arctic coast environs, where subzero temperatures and winds at times in excess of 50 knots create conditions so severe that local inhabitants do not venture outdoors for 2 or 3 days at a time.

The winter snows and low temperatures produce a snow cover in almost all of the U.S.S.R. The period of snow cover is longest on the eastern two-thirds of the Arctic coast. Here, the ground is covered in excess of 250 days annually, generally from early September to late May. The periods of snow cover decrease gradually southward in Siberia to 100 to 150 days near the Chinese border. The southward decrease is more rapid in the remaining sections, especially in European Russia south of 50°N. where less than 20 days with snow cover occur in wide sections of the Black and Caspian Sea coasts and in the southern deserts.

Summer precipitation shows a marked increase throughout Siberia but only slight increases in European Russia. Average monthly precipitation is greatest in the southern sections of the Far East and in the southern mountains of Siberia, where exposed sections normally receive 5 to 6 inches. The unstable nature of the air causes rainfall to be the showery type. The heavy showers and thunderstorms produce a large runoff in the southern mountains which, because of the presence of permafrost and ice-covered rivers in the north, causes frequent summer flooding throughout Siberia. The flooding is especially severe when the heavy rains start early, sometimes in late spring, and the runoff swells the upper courses to floodstage. These waters then overflow the still frozen lower courses in the north, inundating the entire river basin and frequently reaching catastrophic levels. The summer precipitation maximum in European Russia is characteristically continental. The predominance of convective showers and thunderstorms produces monthly normals of 2 to 4 inches, despite a lesser frequency of activity than in winter. The summer falls are carried to extremes on the southwest flank of the Caucasus range, where uplift has triggered maximum 24-hour falls of 6 to 9 inches; this is more than most places in the deserts of Soviet Central Asia receive all year. In the deserts, complete summers have passed without a drop of rain and absolute droughts have extended for much longer periods. This stark contrast between two regions on different sides of a chain of mountains illustrates well the effectiveness of topography in windward and leeward exposures.

d. Cloudiness

As with precipitation, the flow of moist air from marine sources to the separate regions of the country results in a variety of cloud patterns; there are marked seasonal extremes over some areas and a uniformity of cloud conditions in other areas. The greatest seasonal contrasts are in the vicinity of the Siberian high and Asian heat low centers. Winter–summer differences in cloudiness are as much as 30% to 50% near the centers. Conversely, cloudiness is uniformly high all year on the Kola Peninsula in the northwest.

Winter cloudiness reflects a general increase eastward and westward from an area of minimum cloud cover near the center of the Siberian high, where midwinter amounts average as low as 25% to 35%. The eastward increase culminates in maximum cloud amounts in the Kurils, on the eastern coast of Kamchatka Peninsula, and on the Bering Sea coasts, where January cloudiness in the 60's (%) and 70's are in sharp contrast with the generally clear skies near the Siberian high. The westward increase in cloud cover terminates in a large area of maximum cloudiness over European Russia. Invasions by Atlantic and Mediterranean storms maintain monthly cloudiness in the 70's and 80's throughout the latitudinal extent of this part of the country. Overcast decks of low stratus or stratocumulus are so frequent and diurnal variations are so small that the winter skies take on a continuous dull, gray appearance.

Summer cloudiness, on the other hand, reflects a uniform increase from south to north over most of the country. A preponderance of clear skies occurs over the southern deserts of Soviet Central Asia near the Asian heat low. This results in the lowest monthly cloud amounts anywhere in any season in the Soviet Union, generally less than 20% in most desert sections and as little as 5% at some locations. Fanning outward from this area, average cloud amounts increase northward to maximums in the 70's (%) and 80's along almost the full extent of the Arctic coast and northeastward to similar amounts on the Far East coasts. Continental heating and convective activity produce abundant cumuliform cloudiness in the interior regions of the country. Small puffs of cumulus often build to towering cumulus or cumulonimbus, from which the showery rains of summer are derived. On the immediate coasts, however, comparatively warm air overlying the colder coastal waters causes frequent and persistent sea fog and low stratus.

The majority of cloud ceilings (5/8 or more cloud cover) have bases between 1,000 and 3,300 feet. Ceilings at these levels are most frequent in areas affected by moist airflows, namely in the coastal sections and in European Russia. These ceiling heights reach maximum frequency, normally between 30% and 70%, in summer and early autumn on the Arctic coast, in autumn and winter along the Baltic coast, and throughout winter in European Russia (Figure 34). Comparable frequencies of ceilings in this height category persist much of the year on many Far East coasts. Lower ceilings, less than 1,000 feet, are of interest to air operations because of the hazard they present during landings and takeoffs. These lower ceilings are in abundance in summer along most of the Arctic coast and at many locations from Vladivostok through the Kurils to southern Kamchatka, occurring on as much as 60% of the observations at some places. Low ceilings are also frequent along the autumn–winter storm track in European Russia, especially in November and December. Figure 35 is presented as a broad information base of pertinent ceiling and visibility conditions at representative stations.

e. Visibility

Because of the variety of factors generating restricted visibilities, the best and worst conditions occur at different times of the year over the country. During the winter months the clear, cold, dry conditions in the region of the Siberian high produce excellent visibilities for long periods; ice fogs and snow are the major inhibitors. Elsewhere during this time of year fog (Figure 36), snow, blowing snow, and industrial pollutants are the chief restrictions to visibility. High frequencies of reduced visibility are especially prevalent in European Russia and on the Arctic coast. Fogs are quite common during early morning hours, while snow and industrial haze may be prominent at any time of day. The poorest visibilities occur during the intense winter blizzards when forward vision is often reduced to near zero distances by the blinding snow.

During the summer months visibility is seldom greatly reduced over the interior sections of the country. The chief restrictions in the inner regions are the brief early morning fogs and afternoon showers. A lingering dust haze veils much of the interior as the hot, dry winds lift the dust from the sun-baked soils, carry it over great distances, and leave it suspended at great heights for long periods. Visibility is poorest in the coastal regions during this season. Early morning fogs are frequent along the Baltic Sea coast and occasionally along the Black Sea coast, but these burn off soon after sunrise. On the Arctic coast sea fogs are frequently advected onshore and sometimes remain for long periods. The sea fogs, more dense than the early morning fogs on the Baltic, occasionally reduce visibility to less than 5/8 mile. The worst fog conditions occur in the Far East, especially in the Vladivostok–Sakhalin–Kuril–Kamchatka areas. Here, warm, moist air from the Pacific Ocean passes over the cold coastal waters and condenses into dense sea fogs, which penetrate the shores and completely obscure the sun for weeks at a time. This condition is renowned in Vladivostok, where the dampness of the air and the warm temperatures combine to produce an extremely oppressive condition.

f. Winds

The surface winds normally conform to the circulation about the Siberian high in winter and the Asian heat low in summer. Interruptions to these normal flow patterns are caused by local effects and by migratory pressure systems. Overall, winds are strongest during the winter months and weakest in summer throughout the country.

Variations in the winds in the winter half year are most pronounced during the passage of migratory cyclones, which affect large areas. The winter storms also account for most of the frequent gale-force winds (greater than 27 knots) along the storm tracks in the west and northwest. These strong winds are especially prominent on the Arctic coast, where the more intense storms generate wind speeds often in excess of 50 knots and sometimes exceeding 75 knots. Winds are characteristically weak during the summer months

and result in more localized variations. On the coasts differential heating and cooling of the land and water surfaces cause pronounced land and sea breezes; the afternoon sea breezes are usually stronger than the nighttime land breezes. In the mountainous regions a similar differential heating and cooling process leads to valley breezes up the slope during the daytime and mountain breezes down the slope at night. Other local winds occur at various times of the year but the most notable are the *foehn* and the *bora;* both are winds descending mountain slopes. The foehn arrives at lower elevations as a warm, dry wind but the bora is so cold initially that it remains relatively cold even after descent. The bora is the stronger of the two and one such event is on record on Novaya Zemlya as having lasted for 5 days, with a mean speed of 72 knots and a peak gust of 117 knots.

Prevailing upper air winds are distinctly westerly over the entire country throughout the year at all levels to at least 55,000 feet. The westerlies do not vary significantly in strength from winter to summer in the latitudes north of about 50°N. and maximum mean speeds in the upper levels are generally less than 50 knots. South of this latitude in the west the westerlies are stronger in summer than in winter; average wind speeds are 60 to 70 knots in the summer jet streams near 40,000 feet. In the southern latitudes in the east, however, the westerlies are slightly stronger in winter than in summer, with maximum mean speeds in January reaching about 70 knots in the jet stream between 35,000 and 45,000 feet.

g. Thunderstorms and turbulence

Thunderstorm activity is confined almost exclusively to the summer half year over all of the U.S.S.R. (Figure 37). During peak activity in the middle of this period, thunderstorms increase in frequency southward from 1 or 2 per month in the cool Arctic regions, to 5 to 10 per month in the large central regions, to maximums of 10 to 15 monthly in the mountains along the southern border. These thunderstorms are mostly the air mass type and usually occur on hot afternoons when convective activity is most pronounced; some of those in the mountains result from orographic lift of warm, moist air. During the transitional months in spring and autumn, thunderstorms are most likely associated with frontal activity. These are normally more severe and widespread than the isolated air mass type. Squalls and heavy cloudbursts are frequently associated with thunderstorms and some may cause great destruction or flash floods.

Moderate to severe turbulence extending to great heights can always be expected in the vicinity of thunderstorms and strong fronts. These violent situations should be avoided, if possible, when flying. Light to moderate turbulence may be expected over mountainous terrain and in the lower levels over the deserts during the daytime heating of these surfaces in summer. At the higher levels clear-air turbulence may be expected in the vicinity of the jet streams and may at times be severe when winds are exceptionally strong.

D. Military geographic regions (C)

The U.S.S.R. contains such a wide range of environmental conditions that broad generalizations have been used in defining military geographic regions for the country. Significant factors used to distinguish the various military geographic regions are relief, drainage, vegetation, climate, and culture features.

Differences in these factors in the Soviet Union are sufficiently marked to provide a basis for dividing the country into seven military geographic regions: the Central Plains, the Caucasus Mountains, the Caspian–Central Asian Lowlands, the Southern and Eastern Mountains, the Subarctic Swamp and Forest, the Arctic Barrens, and the Insular and Peninsular Far East. These regions are shown on Figure 1, and Figure 38 identifies the most important characteristics of each region. The most important region, both economically and strategically, and the most favorable for sustained large-scale military operations is the Central Plains region.

1. Central Plains

This region, which contains most of the population, industry, and transportation network of the U.S.S.R., extends from the western borders of the Soviet Union eastward for about 2,700 miles into Siberia. The region is composed mostly of sparsely forested plains that are dissected by major north- or south-flowing rivers. The plains are interrupted in their central section by the narrow, relatively low Ural Mountains (Figure 46). Small areas of low mountains are also located in the southwest near the border with Romania and near the Black Sea port of Sevastopol.[2]

Because of its physical characteristics and its industrial and cultural development, this region is the part of the Soviet Union most generally suited for large-scale conventional ground operations. Cross-

[2]For diacritics on place names see the list of names on the apron of the Military Geographic Factors map.

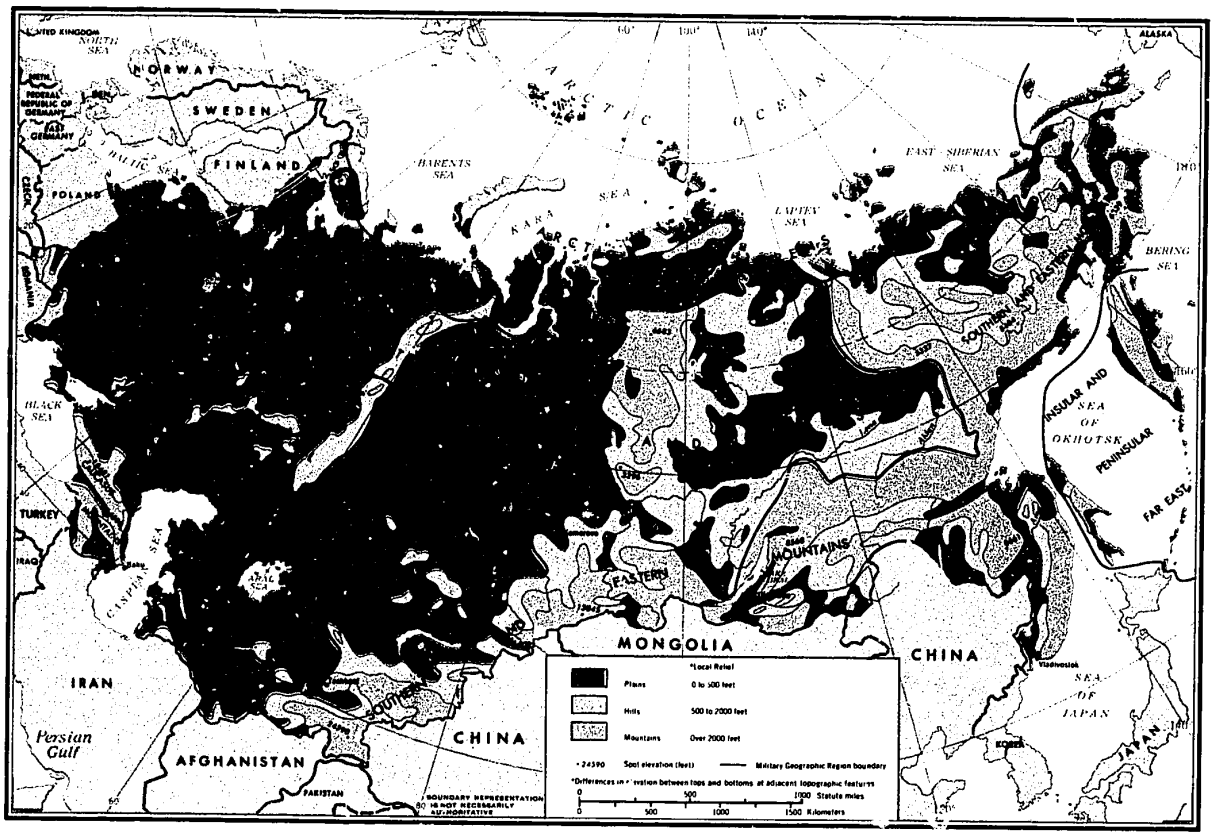


FIGURE 1. Generalized military geographic regions and terrain (U/OU)

country movement is difficult in marshy and forested parts of the west and northwest and in the small mountainous areas. In these difficult areas vehicles would be confined to existing lines of transportation. Movement in the remaining parts of the Central Plains is fair to good but is greatly influenced by several seasonal factors.

Heavy rains and melting snow from as early as late February in the south and lasting until mid-May in the north cause the ground to become deep mud, making cross-country movement very difficult. Severe cold and snowfall from late October to mid-April impose great hardships on troops. Mean daily minimum temperatures of −25°F. and snow as deep as 3 feet have been recorded in this region. Although winter could force a marked slowdown in military operations, it would facilitate movement in one important respect: rivers generally freeze to sufficient depths that light vehicles and, in some places, tanks could be supported.

Military operations would be facilitated by the best developed highway and railroad network in the Soviet Union, supplemented by a good system of navigable rivers and canals. Construction of new roads would encounter major problems in much of the region.

Concealment and some cover would be available in the fairly extensive forested areas in the northern part of the region and on the forested slopes of mountainous areas. Elsewhere, natural cover and concealment for large numbers of mechanized forces are sparse (Figure 2), though small villages throughout the region could provide cover and concealment for small numbers of troops. Extremely dry periods during summer months make vegetation and grasses readily combustible. The region is moderately well suited for bunker-type construction except in large, poorly drained areas in parts of the west and northwest and in western Siberia.

The Central Plains region is well suited for airmobile and airborne operations during the months of June through September. Numerous sites are available for parachute, helicopter, and assault-type aircraft landings, and little or no site preparation would be required. Construction of airfields would be

FIGURE 2. Carefully tended shelterbelts of trees and shrubs help protect the grasses and low crops in the wind-swept Central Plains region (U/OU)

relatively easy on the plains except in parts of the west and northwest, where sites are limited in size, number, and alignments by numerous marshes, swamps, and lakes. In many places, little grading would be required and runway lengths and alignments would be unrestricted. Construction materials, except hard rock suitable for crushing, are generally available. Miry ground or extreme cold during much of the rest of the year would adversely affect the performance of men and equipment.

The coast is mostly unsuitable for amphibious operations because of partly obstructed nearshore approaches, rugged coastal terrain, areas of marsh, and poor exits. Although there are numerous landing beaches along the coasts of the Baltic and Black Seas, the most suitable areas for large-scale landings are in the vicinity of Riga on the Baltic Sea and near Odessa, Yevpatoriya, and Feodosiya on the Black Sea. These selected landing areas are shown on Figure 46 and their characteristics are summarized in Figure 39.

The Central Plains region is fair to poor for irregular force operations. The relatively flat, nonforested plains would offer little to no cover or concealment, but the forested mountain slopes would provide cover and concealment for small groups. Bogs and swamps in the west and northwest make movement on foot difficult but do offer some cover and concealment for small groups. Sustenance would be available on the cultivated plains but scarce in mountain regions. The relatively high density of culture features, including transportation systems, would hinder the movement of irregular forces in many parts of the plains.

2. Caucasus Mountains

This region is composed mostly of parallel mountain ranges oriented in a northwest–southeast direction that have peaks over 15,000 feet above sea level. These high, rugged, partially forested, sparsely populated mountains (Figure 3) are drained by north- or south-oriented, deeply incised, rapidly flowing streams and are divided by relatively narrow, densely populated, cultivated valleys.

The Caucasus Mountains region is, for the most part, unsuited for large-scale conventional ground operations. Steep mountain slopes would preclude vehicular cross-country movement except in the valleys between the major mountain ranges. Operations could be conducted best by troops trained in mountain warfare. Cold weather during winter months would be an additional handicap to troops operating in the mountains, where mean daily minimum temperatures as low as 3°F. have been reported in January. Snow cover generally lasts from late October to early April.

The principal roads in the region follow the coasts and extend east–west via the valleys that separate the two major ranges. Several roads, which can be easily blocked (Figure 4), cross the mountains from north to south. Although construction materials are plentiful, the construction of new roads would be extremely difficult in most places because of steep slopes.

Forests, most extensive in the west and on lower slopes, and surface irregularities would afford cover and concealment for troops operating in the

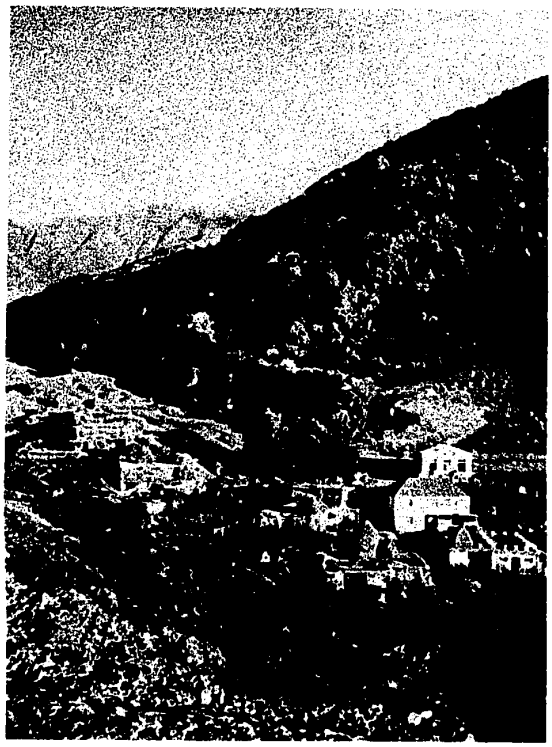


FIGURE 3. Settlements in the more remote parts of the Caucasus Mountains tend to be small, very self-sufficient communities. There is little contact with outsiders because of the poorly developed transportation and telecommunication systems. (U/OU)

FIGURE 4. Local roads in the Caucasus Mountains are narrow, mostly in poor condition, and follow mountain passes that could be easily interdicted. Any attempt to build new roads or to upgrade existing local roads would be difficult. (U/OU)

mountains. However, in the valleys that separate the major ranges, natural cover and concealment are generally poor. Much of the region is well suited for the construction of tunnel-type installations, but access to sites is difficult. Most parts of the valleys are favorable for bunker-type installations.

The region is not suited for airmobile and airborne operations. High, rugged relief would be an obstacle for low-level air approaches to most parachute drop and helicopter landing sites except in the valleys separating the major mountain ranges. Steep slopes also preclude airfield construction in most of the region. However, there are some sites suitable for airfields in valleys separating the mountain ranges, and the airfield approaches and runway orientations would be generally unrestricted.

Rugged terrain along much of the Black Sea coast makes most of that area unsuitable for large-scale amphibious operations. There are, however, amphibious landing areas on the eastern part of the Black Sea coast near Sukhumi and Batumi. These are shown on Figure 45 and their characteristics are summarized in Figure 39.

The Caucasus Mountains region is well suited for irregular force operations. The rugged, higher slopes and lower forested slopes both offer cover and concealment for small groups. Transportation facilities in the mountains are poorly developed, and travel on existing roads is slow and difficult. The foothills, coastal lowlands, and valleys are mostly cultivated (Figure 5) and, being more densely populated, offer food, clothing, and shelter. Natural cover and fuel would be available in the mountains, but low temperatures would hinder irregular force operations in all mountainous areas.

3. Caspian–Central Asian Lowlands

This lowland region is mostly east of the Caspian Sea and extends eastward for a maximum distance of about 1,800 miles. The region consists of arid and semiarid sparsely populated plains. There are only six rivers in this region of over 1 million square miles with

FIGURE 5. The valleys, coastal lowlands, and foothills of the Caucasus Mountains region have a climate that promotes the cultivation of crops foreign to the rest of the Soviet Union. Mechanical equipment is used to harvest tea, the national drink, at this plantation in the Georgian S.S.R. (U/OU)

sufficient supplies of water to sustain their flow throughout the year.

The Caspian–Central Asian Lowlands are unsuited for large-scale conventional ground operations in almost every aspect except cross-country movement. The greatest problem would be overcoming the almost complete absence of an adequate water supply. Only in the southeast, adjacent to the Southern and Eastern Mountains region, is sufficient water available year round. In the extreme north ample supplies are available only from mid-March to mid-June. The paucity of roads and railroads for movement of men and material adds to the problems of military operations. Only five railroads cross the region from north to south, and paved roads are scarce. The insufficiency of both water and construction materials would make construction of transportation facilities difficult. Troops operating in the region would also be handicapped by a scarcity of natural cover and concealment. Other natural conditions, however, favor the construction of bunker-type installations except in sand dune areas in the south and in hilly areas in the northeast. In the hilly areas, natural conditions are moderately well suited for the construction of tunnel-type installations.

Troops operating in the region would experience a wide variation in temperature between summer and winter. Mean daily maximum temperatures in July range from the low 80's to the low 100's. In January, mean daily minimum temperatures range from −10°F. to the lower 30's.

Although the terrain of most of the Caspian–Central Asian Lowlands favors airmobile and airborne operations and contains numerous sites for landing assault-type aircraft, troops dropped in the region would experience the same unfavorable conditions that would be encountered by large-scale ground operations. Construction of airfields throughout most of the region would be seriously handicapped by the lack of water, construction materials, and good natural foundations.

The region is unsuited for large-scale amphibious operations because it has no approaches from the open sea.

The Caspian–Central Asian Lowlands are poorly suited for irregular force operations. The nearly flat, semiarid plains (Figure 6) offer little to no cover or concealment, and the scarcity of water would be a constant problem. There are very few roads and railroads, and natural cover, fuel, and sustenance are scarce. In addition, the terrain is good for cross-country movement by conventional forces.

4. Southern and Eastern Mountains

This region, the largest in the U.S.S.R., extends for 6,000 miles from the Caspian Sea in the southwest to the Bering Strait in the northeast. Sparsely populated, the region consists, for the most part, of dissimilar mountain groups. The mountains along the Iran border in the west are arid and barren, and those along the Afghanistan border are sparsely forested and are drained by numerous rapidly flowing, deeply incised streams. The latter group contains the highest peaks in the U.S.S.R. and has extensive glaciers and snowfields. Farther east, along the Mongolia border west of Lake Baikal, the mountains become more densely forested

FIGURE 6. Problem-ridden "virgin lands" straddle the northern edge of the Caspian–Central Asian Lowlands region. Attempts to expand the nation's agricultural base into dry grazing areas have proved to be a serious gamble with the weather. The paths of mechanical harvesters, and heavy military vehicles, are unobstructed. (U/OU)

and the peaks are lower. The area east of Lake Baikal is less rugged; mountain ranges there present varied patterns of shape, height, and direction and are more commonly separated by broad, nearly level valleys than are the ranges in the west.

This region is mostly unsuited for large-scale conventional ground operations. Steep slopes preclude vehicular cross-country movement (Figure 7). East of Lake Baikal, the region is crossed by the vital Trans-Siberian railroad that connects the Central Plains region to important population centers on the Pacific coast and along which most of the region's population is located. The almost complete absence of roads and other railroads makes the region unattractive for most ground operations. Steep slopes in most of the region make the construction of transportation facilities very difficult. Good cover from small arms fire and concealment from observation is afforded by the forests; irregularities in relief could give good cover from flat-trajectory fire. Most of the region is moderately to well suited for the construction of tunnel-type installations. Many valleys and basins are poorly suited for bunker-type installations because of poor drainage. In addition to rugged relief and the paucity of roads and railroads, troops operating in this area would be subject to extremely cold winter temperatures. Temperatures as low as −94°F. at Verkhoyansk and −80°F. in the mountains west of Lake Baikal have been recorded.

The region is unsuited for airmobile and airborne operations. Steep slopes preclude parachute drops and landing of helicopter and assault-type aircraft in most localities. Marshy terrain is a hindrance in the larger valleys and basins, and the surrounding high relief is an obstacle for low-level approaches. Steep slopes preclude airfield construction in most of the region, and, in many basins and valleys, airfield construction would be hindered by poor drainage.

The rugged relief which extends along most of the Pacific coast is generally not suitable for amphibious operations. There are, however, suitable landing areas that afford access to Vladivostok and Nakhodka (Figures 39 and 46).

The Southern and Eastern Mountains region is well suited for irregular force operations. The rugged, densely forested mountains in the south offer good cover and concealment. Mountains in the east are less rugged but also offer good possibilities for undetected movement and cover. Cultivated and natural foods are very scarce, and supplying irregular forces by sea or air would be difficult.

5. Subarctic Swamp and Forest

This sparsely populated region stretches eastward about 3,500 miles from the border of Finland to the mountains east of the Lena river. It has both heavily forested, poorly drained plains and highlands that have been dissected by large, north-flowing rivers (Figure 8). That part of the region west of the Yenisey river consists almost entirely of plains except for a relatively small area of hills in the northwest and the Ural Mountains, which bisect the region in the vicinity of the 60th meridian. East of the Yenisey river is the hilly Central Siberian Plateau and a large, nearly flat to dissected plain near the Lena river. A large area of mountains is located just east of the Yenisey river.

The Subarctic Swamp and Forest region is poorly suited for large-scale conventional ground operations.

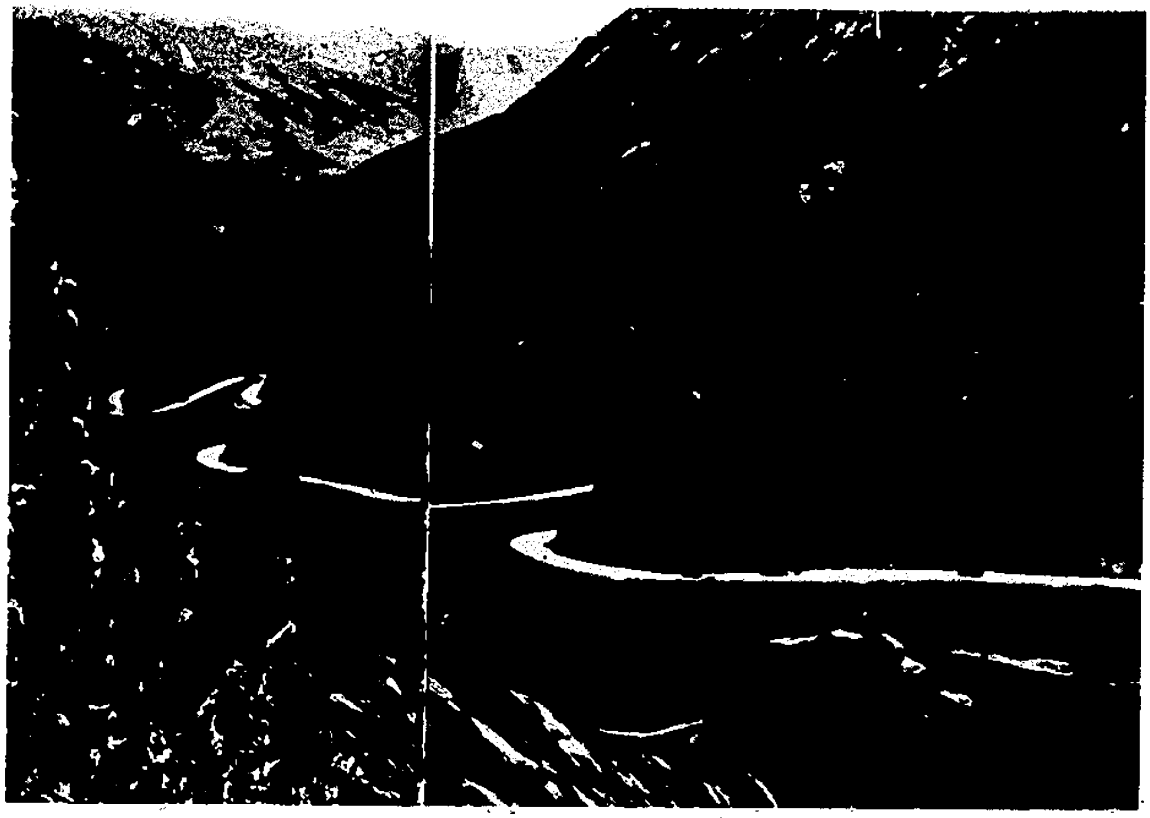


FIGURE 7. The Southern and Eastern Mountains region is poorly suited for military forces encumbered by vehicles and heavy equipment. This road in the Tadzhik S.S.R. could be easily blocked, and the steep slopes minimize the choice of alternate rounting. (U/OU)

Though much of the region is relatively flat, movement of troops and vehicles is either highly restricted and channelized or is practically impossible because of flooded or soft ground, dense forests, marshes, deep streams, and locally rugged terrain. Steep slopes are additional obstacles to cross-country movement in the Ural Mountains and the hilly to mountainous Central Siberian Plateau. From mid-October through April, frozen soils and drainage features would aid movement. Snow cover greater than 1½ feet deep occurs occasionally.

Another deterrent to military operations is the almost complete absence of a road and rail network. Three railroads cross this region from north to south, all west of the Urals. These run from Murmansk, Arkhangel'sk, and Vorkuta southward into the Central Plains region. Two north–south highways also cross this region from Murmansk and Arkhangel'sk into the Central Plains region. Construction of additional transportation facilities would require extensive clearing and drainage, and alignments would be restricted by steep slopes in the Ural Mountains and the Central Siberian Plateau. The poor drainage also makes much of this region unsuited for the construction of underground installations.

Good cover from small arms fire and concealment from observation is afforded by the dense forests; steep slopes and rugged terrain in the hilly and mountainous areas provide good cover from flat-trajectory fire.

The severe subarctic climate compounds the handicaps imposed by the swampy, forested terrain. The extremely low temperatures would severely reduce the efficiency of troops. Yakutsk on the Lena river has a January mean daily minimum temperature of −53°F. West of the Yenisey river, temperatures, although less extreme, are near or below 0°F. for long periods.

This region, for the most part, is unsuited for airmobile and airborne operations. Although air approaches are generally unrestricted, except from the

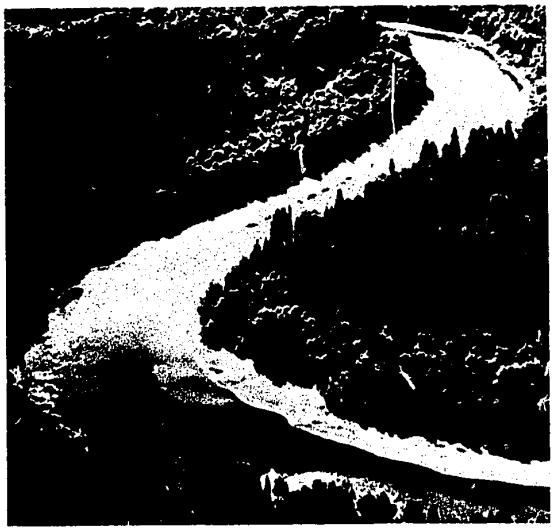


FIGURE 8. The Siberian portion of the Subarctic Swamp and Forest region is a virtually unbroken expanse of dense forest. There are very few transportation or telecommunication facilities. Rivers are the natural arteries for movement even when they are frozen and serve as winter roads. (U/OU)

east, the dense forests and extensive swamps would be extremely hazardous for troops dropped into the area, and there are few sites suitable for helicopter landings. Construction of airfields would be difficult and would require extensive clearing and drainage.

The region borders the White Sea for a short distance in the northwest, but conditions there do not favor large-scale amphibious operations. The shores are normally blocked by ice between mid-November and mid-May.

The Subarctic Swamp and Forest region affords good to fair conditions for irregular force operations. Dense forests throughout this region afford good concealment and cover from small arms fire; the more rugged terrain in the Ural Mountains and the Central Siberian Plateau affords good concealment and very good cover from flat-trajectory fire for small groups. Sustenance, such as cultivated or natural foods, shelter, and clothing would be very scarce. The severe subarctic climate would be a hindrance to irregular force operations.

6. Arctic Barrens

This region, mostly north of the Arctic Circle, extends about 3,500 miles along the coast of the Arctic Ocean from the borders of Finland and Norway in the west to the Kolyma river in the east. Most of the Soviet islands in the Arctic Ocean are included in this region. The mainland part of the region is a sparsely populated plain drained by large, north-flowing rivers and is covered for the most part by tundra vegetation (Figure 9). However, the plains are interrupted in the west by the Ural Mountains and by scattered hilly and mountainous areas. Many of the islands in the Arctic Ocean are also hilly, and glaciers and snowfields cover about half their areas.

This region is poorly suited for large-scale conventional ground operations. Troops would be subjected to the climatic extremes characteristic of high latitudes. Conditions are especially severe during the long, extremely cold winters, which last from early October through March. Frequent storms make visibility extremely poor. Winter temperatures usually remain below 0°F., and temperatures as low as −75°F. have been recorded in the east. In summer, when mean daily minimum temperatures in July and August range mostly between 30° and 50°F., the ground thaws and makes vehicular movement extremely difficult. Another handicap to ground operations is the almost complete absence of improved roads or railroads to facilitate the movement of troops and supplies. Although relief presents few problems to road or railroad construction, the presence of permafrost in most of the region and the poor drainage during the summer makes construction of these facilities very difficult. The low-growing vegetation affords no cover and little concealment. The presence of permafrost would be a handicap in the construction of bunker and tunnel-type installations.

Although the relief and vegetation of the region favor airmobile and airborne operations, such operations would encounter the same severe arctic climate factors that adversely affect ground operations. Similarly, airfield construction would be hindered by the same problems encountered in railroad and road construction, principally permafrost and poor summer drainage.

The region is not suited for amphibious operations. Except along the coast of the Kola Peninsula on the Barents Sea, which is generally ice-free throughout the year, shores are ice-free only from August through September or mid-October. There is one landing area northeast of Murmansk suitable for large-scale amphibious operations (Figures 39 and 46).

The Arctic Barrens offer fair conditions for irregular force operations. The nearly flat, sparsely vegetated plains offer little or no cover or concealment. Long, dark winters, deep snow, and extreme cold would present difficulties to irregular forces. Miry conditions in the summer months would practically preclude the movement of conventional forces on the ground. This barren land offers little or no sustenance, but the nearly flat plains would allow supplies to be brought in by air.

FIGURE 9. The northern edge of the Soviet mainland, comprising the Arctic Barrens region, is a bleak land largely devoid of human development. This view near Murmansk illustrates the prevailing open, rocky tundra landscape. (U/OU)

7. Insular and Peninsular Far East

This region consists of the Kamchatka Peninsula, Sakhalin Island, and the Kuril Islands. The Kamchatka Peninsula (Figure 10) and Sakhalin each have two generally parallel forested mountain ranges drained by short, rapidly flowing, incised streams. These mountain ranges are separated by marshy or swampy plains. Marshy plains are also common along the coasts and on northern Sakhalin. Most of the Kuril Islands are mountainous.

The rugged relief that comprises most of this region is unsuited for large-scale conventional ground operations. Steep slopes preclude vehicular cross-country movement in most of the region. In the plains, marshes and swamps are the principal deterrents to vehicular movement. Military operations could be conducted best by troops trained in mountain warfare. The paucity of roads and railroads would add to the difficulties of troops operating in the region. Hard-surfaced roads are few and there are only two major railroad lines (3'6" gage) in Sakhalin. Construction of additional transportation facilities would be extremely difficult on steep mountain slopes and on the poorly drained areas that cover most of the plains. The forests and irregularities of relief afford cover and concealment in mountainous areas; natural cover and concealment is generally lacking on the plains. The mountains of the region are well suited for the construction of tunnel-type installations; most of the plains are unsuited for bunker-type installations because of poor drainage. An additional factor that would handicap ground operations is severe winter weather. Temperatures remain below freezing from late October through March, and minimums slightly below −50°F. have been recorded on the Kamchatka Peninsula and Sakhalin. Minimums near −20°F. have been recorded in the Kuril Islands. Depth of snow

FIGURE 10. The Kamchatka Peninsula is essentially a double line of volcanic peaks, many of which are active (U/OU)

cover ranges from 1 to 6 feet throughout the winter and is greatest in the southern parts of the Kamchatka Peninsula and on the higher parts of Sakhalin.

The region is unsuited for airmobile and airborne operations. High relief precludes the landing of troops in most of the area and is an obstacle to low-level air approaches. The steep, rugged relief also precludes airfield construction in most of the area. Poor drainage presents major construction problems in the plains.

The coastline of this region is unsuited for amphibious operations, and the numerous beaches do not afford access to selected internal routes or strategic areas.

The Insular and Peninsular Far East region is well suited for irregular force operations. The densely forested, rugged mountains offer good cover and concealment for small groups. Natural cover and concealment are generally lacking in the plains. Snow and severe cold would be problems to irregular forces in winter. Natural sustenance would be scarce in this region, and it would be difficult to supply troops by sea or air because of poor flying conditions and sea ice

during most of the year. Poor surface visibility and sea fog are additional hazards.

E. Strategic areas (S)

Nine strategic areas (Moscow, Donets, Volga–Ural, Leningrad, Baku, Tashkent, Kuznetsk, Baykal, and Far Eastern) are of primary importance to the military potential of the Soviet Union. These areas vary considerably in size and in the reasons for their importance. Four important areas located west of 50°E. are centered on the cities of Moscow, Leningrad, and Baku and on the industrial heart of the Donets Basin. Moscow is the political and military center of the Soviet Union as well as a major industrial and communication center. Leningrad is an industrial city and port, and Baku is one of the most important petroleum centers in the nation. The Donets Basin is the most important mining and industrial district of the country. Another important area is the roughly triangular-shaped petroleum-producing, mining, and industrial district which extends from the Volga river, in the vicinity of Kuybyshev and Kazan, eastward to include the central and southern Ural Mountains. In south-central U.S.S.R., Tashkent is an important but relatively isolated industrial center. East of the Ural Mountains are three widely separated areas of major strategic significance. Located on the Trans-Siberian railroad, they include the mining, manufacturing, and communication complexes of the Kuznetsk and Baykal strategic areas. The Far Eastern strategic area is the rail terminus of the Trans-Siberian railroad and, perhaps of even more importance, it is the center of Soviet military and political influence in that area.

Much of the Soviet Arctic is of strategic importance, primarily because of its location in relation to transpolar air routes. It affords advanced sites for defensive installations such as early warning systems and interceptor bases and for offensive bases for launching Soviet air power and missiles. The western Soviet Arctic acquires additional importance because nowhere in the Soviet Union is there a concentration of submarine bases of similar size. There are six operating bases within an area of 50 miles. There are four advantages why the majority of the Soviet submarine fleet is located here: 1) its obscure location, 2) numerous deep fiords affording excellent protection, 3) a relatively mild climate due to the warming influence of the North Cape current, a remnant of the Gulf Stream, and 4) unrestricted access to the open waters of the Atlantic. The only major Soviet commercial port north of the Black Sea that is ice-free and that has year-round access to the Atlantic is Murmansk.

1. Moscow

Moscow is both the political and military capital of the country. It dominates all aspects of the country's internal affairs and is the control point for international affairs. The country's primary governing organs and its highest military and defense organizations (Figure 11) have headquarters in Moscow. Also located at Moscow are the headquarters of the Warsaw Pact military forces and the Soviet-dominated Council for Economic Mutual Assistance. As the site of several universities, the Soviet Academy of Sciences, and a number of leading military

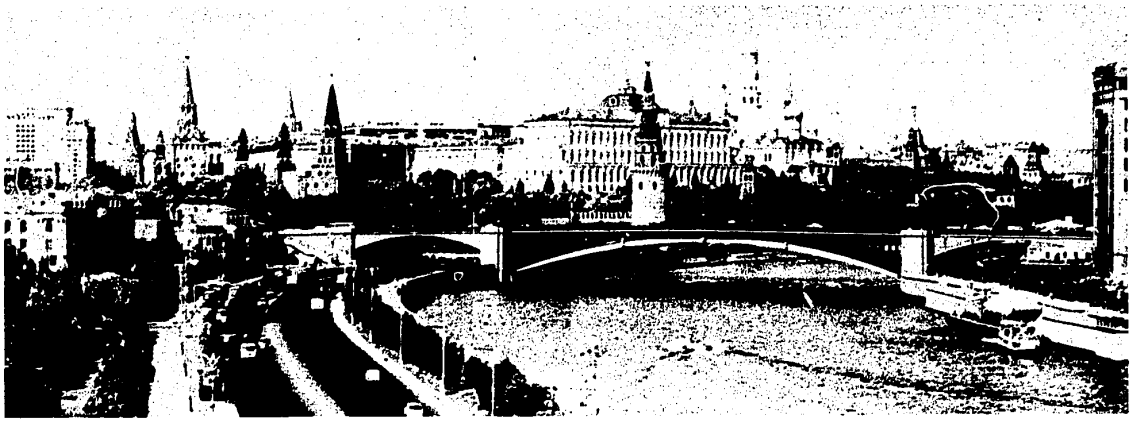


FIGURE 11. The Kremlin in Moscow, the seat of Soviet internal and international power (U/OU)

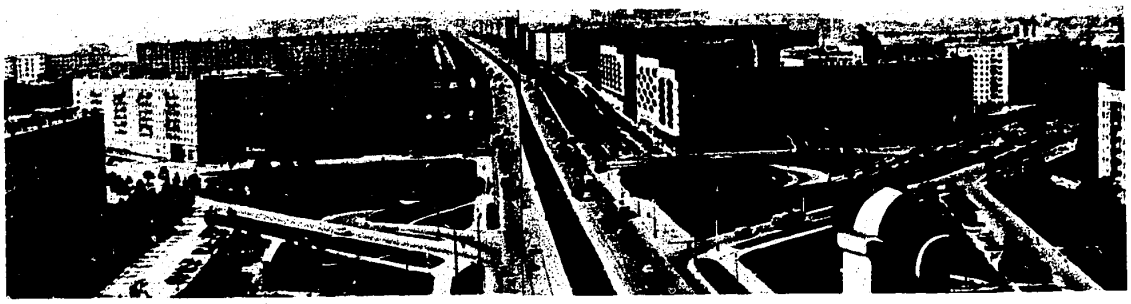


FIGURE 12. Modern Moscow is extolled as the showcase of Soviet achievement (U/OU)

academies, the strategic area is a principal center of training and research.

Located on a nearly flat plain about 500 miles from the closest East European border, this strategic area (Figure 40) constitutes the largest interrelated cluster of populated places in the Soviet Union. In addition to Moscow (estimated population 7.3 million in 1973), the area contains an additional 2 million people in nearly 80 towns and settlements within 75 miles of the Kremlin. Because many inhabitants of the suburbs are commuters, Moscow City (Figure 12) has a daytime population about 1 million greater than at night.

An intricate system of SAM sites defends the Moscow area. The strategic area is the country's largest concentration of manufacturing and contributes close to 10% of the total national output. The products of its highly diversified machine-building plants (automobiles, aviation, machine tools, ball bearings, electrical engineering, measuring instruments, precision tools, automatic equipment, semiconductor instruments, computers) are used in every part of the U.S.S.R. Particularly noteworthy is the production of guided missiles, aircraft, and their components, and the large number of outstanding research and development installations in the fields of nuclear energy, aircraft, guided missile systems, and electronics. Also of importance are the area's growing chemical industries and large textile and food processing plants.

The Moscow strategic area is the country's largest transportation center and the junction of numerous connecting railroad, highway, air, and waterway routes. Eleven major rail lines, 13 major highways, and extensive domestic and international flights (to 63 countries) leave the Moscow area. The deep canalized Moscow river extends 80 miles to the Volga, connecting deepwater seaports to the north and the south. Three major airports and several secondary fields are located around the city.

Among the more important urban industrial centers in the Moscow strategic area (Figure 40) and their significance are:

Elektrostal (estimated population 129,000 in 1973) functions as a nationally important metallurgical (steel and uranium metal) and heavy machine-building center. It is the Soviet's largest producer of pipe and tube mills.

Khimki (estimated population 95,000 in 1973) has a missile and space research and development center, missile and aircraft plants, and the largest port facilities in the strategic area. There also are a number of chemical and power engineering research establishments.

Lyubertsy (estimated population 150,000 in 1973) is known for its significant space, aerodynamics, aircraft engine, and industrial research facilities. Products originating here include agricultural machinery, steel structures, optical instruments, plastics, textiles, refined petroleum items, and construction materials.

Mytishchi (estimated population 124,000 in 1973) is the strategic area's most important center of electronics research, missile and space development, and missile production. Other products include motor vehicles, chemicals, and machinery. All rolling stock for the Moscow, Leningrad, and Kiev subways is made here.

Podol'sk (estimated population 180,000 in 1973) manufactures electronic equipment, missile guidance systems, heavy machinery, cable, batteries, and cement.

Zagorsk (estimated population 97,000 in 1973) produces optical equipment, chemicals, propellants, and textiles.

2. Donets

The Donets strategic area (Figure 13) is the most important mining and basic metallurgical district in the U.S.S.R. Nowhere else in the country is such an abundance of coking coal, iron ore, manganese, and limestone found in such close proximity. Its location about 400 miles south of Moscow and 50 miles north of the Black Sea places the strategic area within easy reach of most industrial consumers in European U.S.S.R. Besides these advantages, the numerous centers of heavy industries are served by well-developed electric power facilities (Figure 14) and a

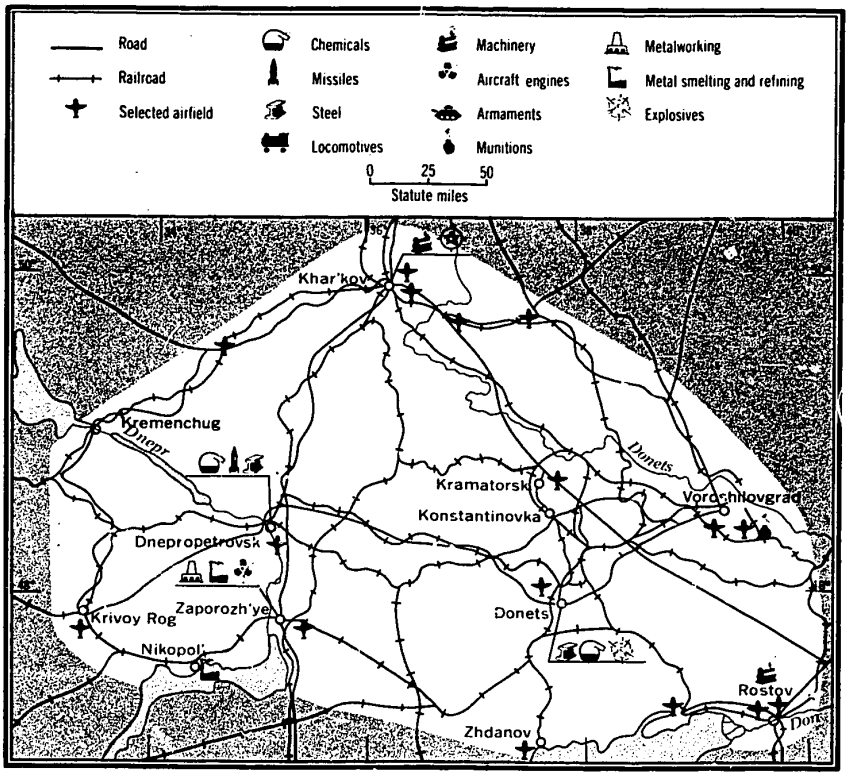


FIGURE 13. Donets strategic area (S)

FIGURE 14. Pridneprovsk GRES near Dnepropetrovsk is one of the largest thermal powerplants in the U.S.S.R. (U/OU)

dense railroad network. The area's coalfields, concentrated between Donetsk and Voroshilovgrad, produce 35% of all Soviet coal and 50% of all its coking coal. Near Krivoy Rog, 200 miles to the west, iron mines provide 50% of the country's iron ore. About 175 miles west, near Nikopol, are the world's richest manganese deposits; they furnish 60% of the Soviet Union's output of this essential industrial material. The proximity of these deposits and adequate limestone has made the Donets strategic area the major producer of pig iron and ingot steel in the Soviet Union (50% and 40%, respectively). A large natural gas producing area is centered just south of Khar'kov, and important gas pipelines extend from that region to many thousands of consumers. The iron ore fields near Krivoy Rog are important because they are also the center of a significant part of the country's uranium ore production. The estimated 1973 population of the strategic area is 20 million.

Important urban industrial centers within the strategic area include:

Khar'kov (estimated population 1,311,000 in 1973) is a leading producer of heavy industrial machinery and equipment. Significant products include turbojet transport and jet fighter aircraft, locomotives, tractors, turbines, heavy electrical equipment, diesel marine engines, agricultural and mining machinery, and ball bearings. Other products of importance include optical and navigational equipment, radios, precision equipment, coke and chemical byproducts, reinforced concrete, textiles, and diversified industrial equipment. The city functions as a major junction of principal rail lines, highways, and air routes. Extensive military facilities and installations are situated in the environs.

Donetsk (estimated population 914,000 in 1973) and its satellite towns serve as the major center of iron and steel production, coal mining, coke industry, and chemical manufacturing. This urban complex is a major producer of explosives, ammunition and propellants, mining and agricultural machinery, and pipe for water distribution systems and oil and chemical industries.

Dnepropetrovsk (estimated population 926,000 in 1973) is known as the leading producer of surface-to-surface guided missiles and a nationally significant producer of ingot steel and finished steel products. Important coke plants, chemical complexes, and rubber tire factories are in or near the city. The urban area has other industries which are major producers of tractors and diversified industrial equipment. It is a principal rail center and port on the Dnepr river and has extensive transshipment facilities.

Rostov (estimated population 842,000 in 1973) is a leading producer of agricultural machinery, especially combines and cultivators. It also manufactures helicopters, diversified industrial machinery, construction materials, communications equipment, and chemicals. Headquarters of the North Caucasus Military District are located here. A major transportation center, it serves as the southern terminus for the Baltic Sea–Black Sea inland waterway and has numerous rail-water transshipment services. The urban area is also a primary telecommunications switching center in the national network.

Zaporozh'ye (estimated population 719,000 in 1973) is a principal metalworking center of the U.S.S.R. and an outstanding producer of high quality steel for missile tubing, jet engine turbine blades, and high speed tools. It is a nationally significant producer of titanium (60% of national output), magnesium, aluminum, synthetic abrasives, and refractory materials. Also manufactured here are transformers, high voltage switches, aircraft engines, motor vehicles, electrical cranes, diesel engines, and synthetic polymers. Large rail classification yards and repair facilities characterize this industrial center.

Voroshilovgrad (estimated population 414,000 in 1973) functions as the country's largest producer of locomotives with 60% of national output. Located in the largest coal producing region of the U.S.S.R., it is also known as a nationally significant producer of small arms, ammunition, and shell casings. Other products include heavy machinery, freight cars, machine tools, pipe and rolled tube equipment, footwear, and coke-chemical products.

A dense transportation network and power transmission grid serve the strategic area. Most transportation is by rail; highways are used only for short hauls. Important transportation centers are Rostov, Khar'kov, and Zaporozh'ye. Rostov, near the mouth of the Don river, is a transshipment point between railroads and an inland water route that leads to the Volga river. Khar'kov is the main rail junction of lines leading from the Donets Basin directly to Moscow. The Dnepr river is a northwest–southeast traffic route, and completion of the Kanev Dam near Kiev will enhance the use of it as a waterway in international traffic throughout the Mediterranean area.

3. Volga–Ural

The Volga–Ural strategic area (Figure 15) is the Soviet Union's most important oil producing and refining area and its second ranking mining and metallurgical district. Large reserves of metallic ores and crude petroleum have provided the base for rapid industrial development. This strategic area extends from east of the Ural Mountains to west of the Volga river, a distance of approximately 570 miles, and from Kuybyshev and Magnitogorsk northward about 500 miles to Serov. The estimated 1973 population of the strategic area is 22.5 million.

The chief assets of the Volga–Ural strategic area are its large reserves of petroleum and natural gas and its abundance and variety of both ferrous and nonferrous mineral resources. In 1969 about 65% of the country's

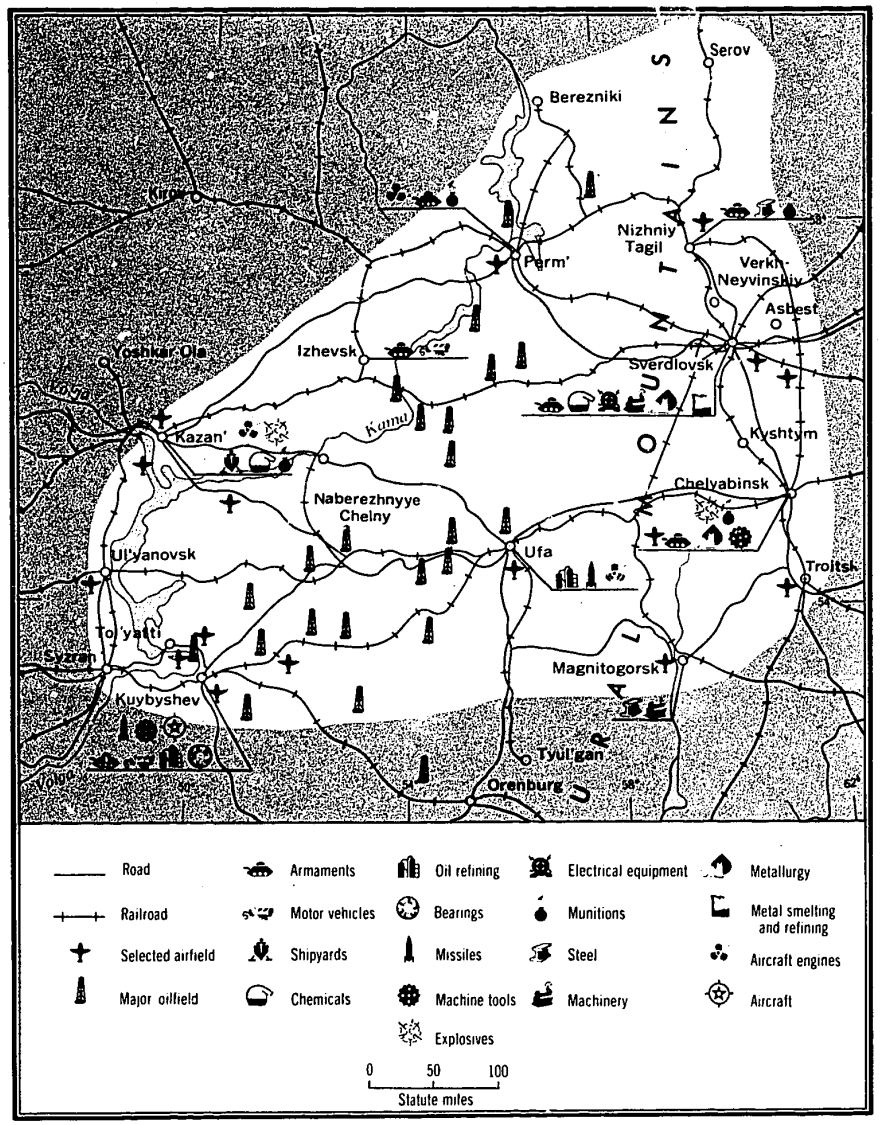


FIGURE 15. Volga–Ural strategic area (S)

total crude oil production came from this region. There are numerous refineries and petrochemical plants in the strategic area, and well-developed systems of oil and refined products pipelines connect these plants to both local and distant consumers. Iron ore, the principal metallic resource, is mined north of Magnitogorsk. The bauxite deposits near Serov are the richest in the Soviet Union and the combined alumina production of that area is the largest in the country. The largest asbestos deposit in the world, at the city of Asbest, supplies 75% of the total Soviet production. The strategic area is also the country's most important producer of vanadium and was the most significant producer of copper in the U.S.S.R. in 1969. The local supply of good quality iron ore, alloy minerals, and coking coal brought in from Karaganda has made the

Volga–Ural strategic area especially important in the production of high grade steel.

There are 10 cities in the strategic area with a population exceeding 250,000, and each performs a variety of strategic industrial and economic functions.

Kuybyshev (estimated population 1,121,000 in 1973) is the Soviet's leading producer of refined petroleum products. It is also the nation's integrated center of the aircraft industry, and guided-missile production and space vehicles; extensive research facilities are available for the development of rocket engines. The city is a hub of highway and rail networks as well as a major port on the Volga river. Kuybyshev is a primary telecommunications center in the national network and the headquarters of the Volga Military District. Its most important industries produce explosives, automatic weapons, passenger cars, synthetic rubber, chemicals, machine tools, and construction machinery. Kuybyshev is second only to Moscow as a source of roller and ball bearings.

Sverdlovsk (estimated population 1,098,000 in 1973) is another of the Soviet Union's leading industrial, transportation, and telecommunication centers. Situated in a natural gateway through the Ural Mountains, it is a focal point for rail and highway traffic between European U.S.S.R. and Siberia. The city is a principal producer of refined copper (25% of U.S.S.R. output), alloy and carbon steel, and steel pipe. Sverdlovsk also is a major producer of metallurgical and oilfield equipment, heavy machinery, field guns and surface-to-air missiles, electrical equipment, communications equipment, and chemicals. The Ural Military District Headquarters is situated here.

Chelyabinsk (estimated population 917,000 in 1973) is a major producer of explosives, armament components, propellants, and heavy machinery for metallurgical and mining industries. Other significant products include steel, zinc, cadmium, and steel pipe, bulldozers, road scrapers, and industrial chemicals. Extensive coal mines are nearby. Chelyabinsk is served by several railroads and is a major railroad center.

Kazan (estimated population 922,000 in 1973) is a nationally significant producer of war materiel, including aircraft components, helicopters, high explosives, ammunition, propellants, radar, and communication and navigation equipment. It is a significant producer of polyethylene, other synthetic chemicals and pharmaceuticals, and is an important storage center for military ammunition and chemical warfare agents. The city is a transshipment point on the Volga river and is located near one of the largest shipyards in the U.S.S.R. Other important industries are paper manufacturing, motion picture and photographic film, optical equipment, and industrial chemicals.

Perm (estimated population 902,000 in 1973) also functions as a nationally significant producer of war materiel. It has a large armament industry and one of the country's largest ammunition-loading and propellant plants. War materiel production includes aircraft and rocket engines, guided-missile propulsion systems and equipment. Other important products are refined petroleum, industrial machinery, heavy electrical and telecommunications equipment, sulfuric acid, metallic sulfates, phosphates, and paper products. Perm is a major inland port. There are large ICBM launch complex and support facilities south of the city.

Ufa (estimated population 844,000 in 1973) is mainly a petroleum refining center but also has a significant production of turbojet engines and guided-missile systems. Other products are pharmaceuticals, telecommunications and electronic equipment, and chemicals.

Izhevsk (estimated population 473,000 in 1973) is outstanding as the leading producer of small arms and automatic weapons in the U.S.S.R. Motor vehicles, machinery, and construction equipment also originate here.

Nizhniy Tagil (estimated population 382,000 in 1973) is the major producer of freight cars and medium tanks in the U.S.S.R. Other significant products are alloy and carbon steel, self-propelled gun mounts, and ammunition.

Magnitogorsk (estimated population 380,000 in 1973) is the site of the largest integrated steel mill in the U.S.S.R. The city produces a significant part of the country's carbon and alloy steel and is a major producer of coke and coke byproducts, mining equipment, and various metal products (Figure 16). Numerous iron mines are located near the city.

Tol'yatti (estimated population 374,000 in 1973), 40 miles northwest of Kuybyshev, is the fastest growing new industrial town in the Soviet Union. It has a passenger automobile plant that is designed to be the Soviet's largest; the present output is about 1,400 vehicles daily. A similar project has been designed at Naberezhnyye Chelny (population now about 100,000, projected 350,000 by 1975) which will become the largest truck plant in the country with a projected output of 150,000 vehicles yearly.

Throughout the strategic area there are smaller industrial towns engaged in the manufacture of products connected with the iron, steel, and petroleum industries. A large chemical plant is at Berezniki, plus

FIGURE 16. The Volga–Ural strategic area ranks as the Soviets second most important mining and metallurgical district, after Donetsk. The plant shown here is a metallurgical combine at Magnitogorsk. (C)

a magnesium refinery that utilizes local potash deposits. This chemical plant and another at Krasnotur'insk (outside the strategic area at 59°46'N., 60°12'E.) are producing heavy water for the atomic energy program. A plutonium production plant and a uranium isotope separation plant are at Kyshtym and Verkh-Neyvinskiy, respectively. Electric powerplants in the strategic area utilize coal, oil, and gas from local fields and coal from northeastern Kazakh S.S.R. Some powerplants also use gas from Central Asian and west Siberian gasfields. There are large hydroelectric stations on the Kama and Volga rivers.

Most of the transportation lines that link European U.S.S.R. with Siberia pass through the Volga–Ural strategic area. Although railroads are the most important means of transportation within the strategic area, waterway traffic in the Volga–Kama basin represents almost one-half of the total inland waterway traffic in the U.S.S.R.

4. Leningrad

The Leningrad strategic area (estimated population 3,663,000 in January 1973), second in size and importance among Soviet urban areas, is the focus of almost all political, industrial, military, commercial, and educational activity in the Soviet northwest. Other cities and settlements in the northwest are important locally but cannot approach Leningrad's overall dominance. An influx of rural people to Leningrad has increased the population of the city and its suburbs, although the government has made attempts to curb urban growth. The strategic area (Figure 17) is located at the head of the Gulf of Finland, about 75 miles southeast of the U.S.S.R.–Finland border.

Because of its position of influence, Leningrad has acquired an increasingly independent voice in the development of the northwest region, frequently challenging bureaucratic control from Moscow's ministries. It is one of the most cosmopolitan of Soviet cities, having an exceptionally vibrant outlook toward the Western world.

Leningrad exerts a strong bearing on the industrial and economic affairs of the country. Despite preemption of some of its former industrial rank, it has the oldest and largest turbine plant in the country and retains its position as the country's prime producer of generators, high voltage equipment, and gas turbines. Moreover, it is the nation's second largest producer of cable and wire. The Soviet's most important military

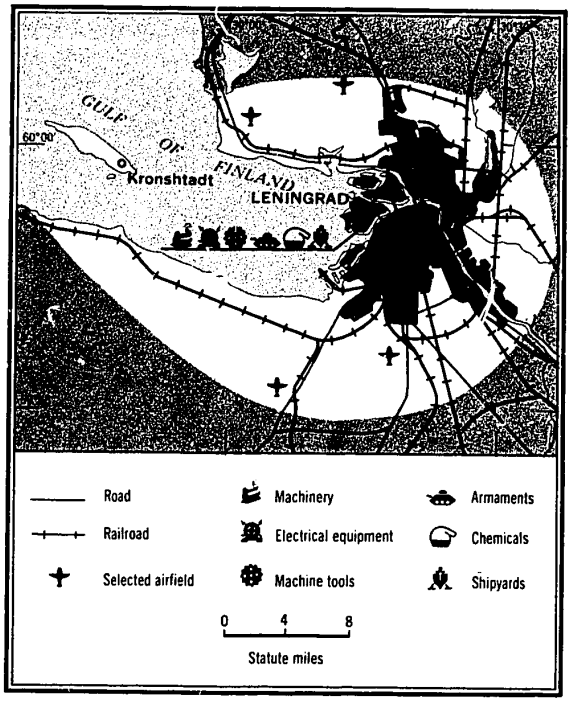


FIGURE 17. Leningrad strategic area (C)

and civilian shipbuilding complex is Leningrad. There are nine major combines that produce submarines, destroyers, minesweepers, tankers, freighters, and research and space-associated vessels. Its maritime orientation stems largely from its strategic position on the Gulf of Finland, combined with facilities that make it the country's second largest maritime port (18 million metric tons cargo yearly). Much of the industrial production that originates in Leningrad is destined for distant national and international markets. Most of these products are high value items and include precision instruments, optics, telecommunication and chemical equipment, chemicals and chemical products, agricultural equipment, and railroad cars.

Leningrad has many prominent scientific, technical, and educational institutions that play a leading role among Soviet scholars. There are also various military academies, particularly some that are associated with the navy. Although Leningrad is the headquarters of the Leningrad Military District, it is definitely navy oriented. Many naval personnel are based in the city and on the 6-square-mile island fortress of Kronshtadt (about 15 miles west of the city in the Gulf of Finland), which effectively blocks any sea approach to the strategic area. Leningrad serves as an operational base for the Soviet Baltic Fleet, and its extensive storage, ship repair, and drydock facilities make it a vital link in maintaining Soviet seapower.

Leningrad has several railroad and highway connections with other cities in the Baltic Sea area and with Moscow. It is, however, relatively isolated and the three larger airfields in its vicinity are the major transportation connection with the rest of the country and the world.

5. Baku

This area (Figure 18) has long been a prominent center of petroleum refining, petrochemical, and specialized oilfield equipment industries. Located on the west coast of the Caspian Sea, it occupies a small, oil-rich peninsula at the eastern end of the rugged Caucasus Mountains. The Iran border is 100 miles to the south.

Baku (estimated population 900,000 in 1973) is the largest city in the strategic area and the capital of Azerbaijan S.S.R. The oilfields which nearly encircle the city and those at offshore locations in the Caspian together account for about 8% of the total Soviet crude oil production. In refining capacity, the assemblage of refineries in the city and its environs ranks third in the country. Increasing quantities of petroleum have been shipped from other Soviet oilfields to Baku refineries in recent years. Storage facilities for crude oil and refined products are among the largest in the country. The area's chemical plants, closely associated with the petroleum industry, produce sulfuric acid, oxygen, acetylene, caustic soda, iodine, and various pharmaceutical items. The city is the leading Soviet producer of all types of oilfield equipment and tools, and many of these items are exported. Baku is the principal port on the Caspian Sea and has the most complete shipbuilding and repair facilities on the Caspian Sea coast. Railroads and highways lead from the strategic area westward to the Black Sea, south to the Iran border, and northwest to the Donets strategic area. Baku has four military airfields and is the headquarters of the Fourth Army and the Caspian Sea Flotilla.

Sumgait (estimated population 145,000 in 1973) is an important satellite city of Baku. The large reserves of chemical raw materials available in the strategic area provide a strong base for large-scale chemical industries (Figure 19). A wide variety of polymer materials are produced, in addition to pesticides, detergents, fluorocarbon plastics, chlorine, hydrochloric acid, and other chemicals.

Recent exploration has unearthed large deposits of petroleum, natural gas, coal, phosphate, and other

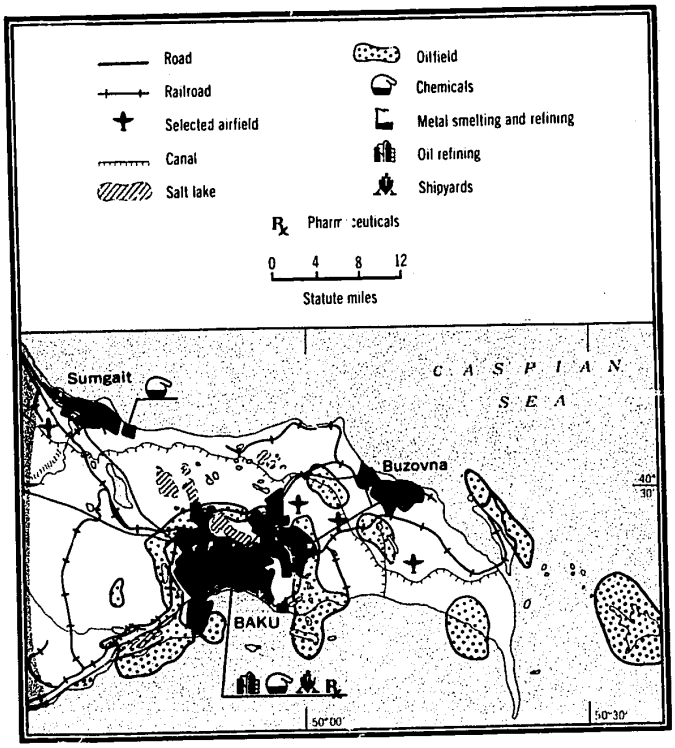


FIGURE 18. Baku strategic area (C)

natural resources at various places along the east coast of the Caspian Sea. Among the problems which will be encountered in the development, processing, and marketing of these resources is their isolated geographic location. As the closest industrial center, Baku has a vital interest in these tasks and will likely play a major role in the future development of the area.

6. Tashkent

The Tashkent strategic area (Figure 20) is an important industrial, mining, and petroleum producing area in south-central U.S.S.R. Only 70 miles from the border of the People's Republic of China, this strategic area is isolated from other parts of the U.S.S.R. by large deserts to the west and north. It is bounded on the east and south by the rugged Tien Shan. The estimated 1973 population of the strategic area is almost 9 million.

Tashkent (estimated population 1,505,000 in 1973) is the largest city in the strategic area and the main industrial center and military headquarters in Soviet Central Asia. It is the capital of Uzbek S.S.R., a leading producer of textiles, and one of the country's main suppliers of machinery for use in agricultural, textile, electrochemical, and transportation fields. Other significant industries include an aircraft assembly plant, an electron tube plant, and a storage battery plant. Headquarters of the Turkestan Military District are located at Tashkent. Numerous scientific institutes including a nuclear research center and nationally prominent university are also at Tashkent.

The city is an important transportation center on strategic railroad, highway, and air routes. The major railroad in the area connects Krasnovodsk, on the Caspian Sea, and Tashkent with the Kuznetsk strategic area. A rail connection from central European U.S.S.R., extending through Kuybyshev, joins this line at Tashkent.

Chimkent (estimated population 275,000 in 1973) is the largest lead smelting and refining center in the U.S.S.R. and one of the most important industrial and commercial centers in the Kazakh S.S.R. It produces machine tools, construction materials, textiles, processed agricultural goods, pharmaceuticals, and chemicals. It is also an important junction of national

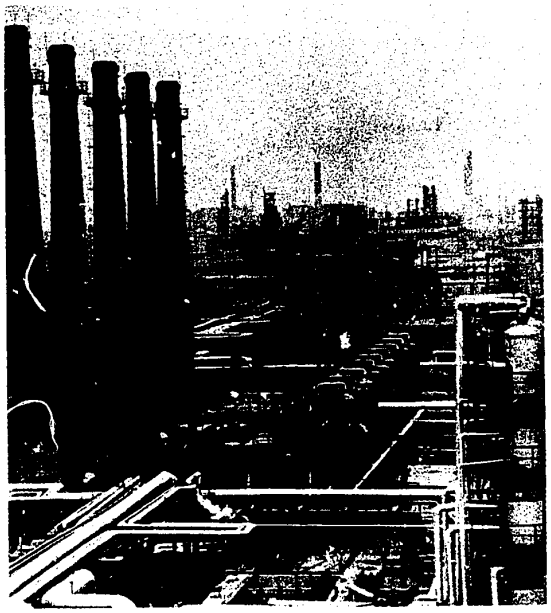


FIGURE 19. The Sumgait Chemical Plant exemplifies the petrochemical industrial nature of the Baku strategic area (U/OU)

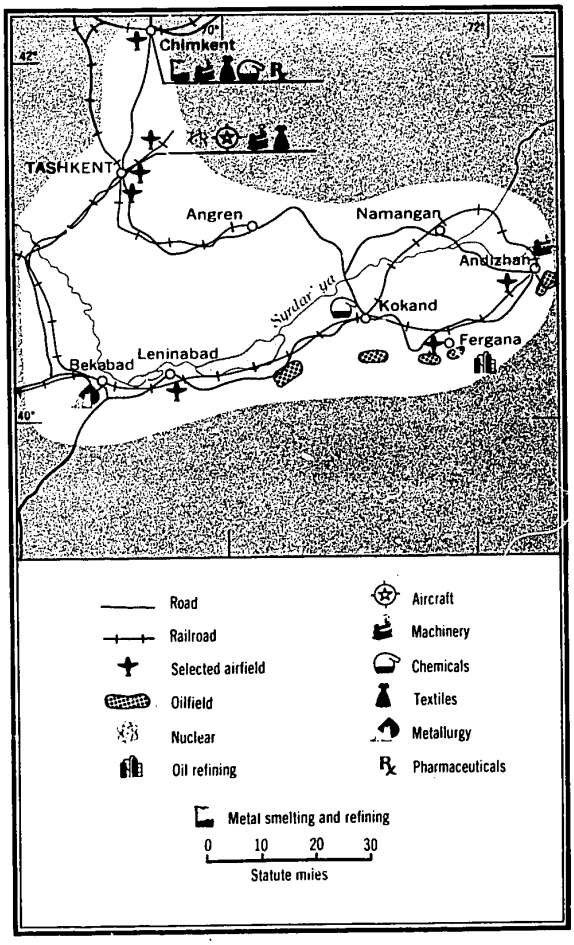


FIGURE 20. Tashkent strategic area (C)

transportation lines and is the site of a key military airfield. The city has several colleges and is the center of local administrative and cultural activities.

Other significant industries in the strategic area include a metallurgical plant in Bekabad, construction machinery plants at Andizhan, a superphosphate plant at Kokand, and petroleum refineries at Fergana.

Natural resources found within the strategic area include petroleum near Fergana, petroleum and natural gas near Andizhan, and brown coal near Angren. Mercury and uranium ores are mined south of Fergana. Other mineral deposits exploited include sulfur, zinc, copper, tungsten, and molybdenum.

7. Kuznetsk

The Kuznetsk strategic area (Figure 21) is the most important mining and manufacturing center east of the Volga–Ural strategic area. Its industrial development is primarily based on coal deposits at Kemerovo and Novokuznetsk which supply the country with 15% of its coal and 30% of its coking coal. The strategic area includes the adjacent Novosibirsk–Barnaul manufacturing belt and the city of Tomsk. The most important industry in the strategic area is iron and steel manufacturing, but nonferrous metallurgical industries such as zinc, tin, and aluminum are also significant. Iron is being mined near Tashtagol and this resource will further contribute to the strategic importance of the Kuznetsk area. The coke produced from coalfields centered around Prokop'yevsk, Anzhero-Sudzhensk, and Kiselevsk is the basis of gas, chemical, explosives, and fertilizer production in the area. The estimated 1973 population of the strategic area is 5.5 million.

There are six cities in the stragegic area with populations exceeding 250,000 and each has a certain prominence of its own.

Novosibirsk (estimated population 1,219,000 in 1973) is the largest city in Siberia and one of the country's leading industrial, scientific, and transportation centers. It is the site of the Soviet Union's largest tin smelter and produces 50% of the national output of uranium metal. It is also a major producer of heavy

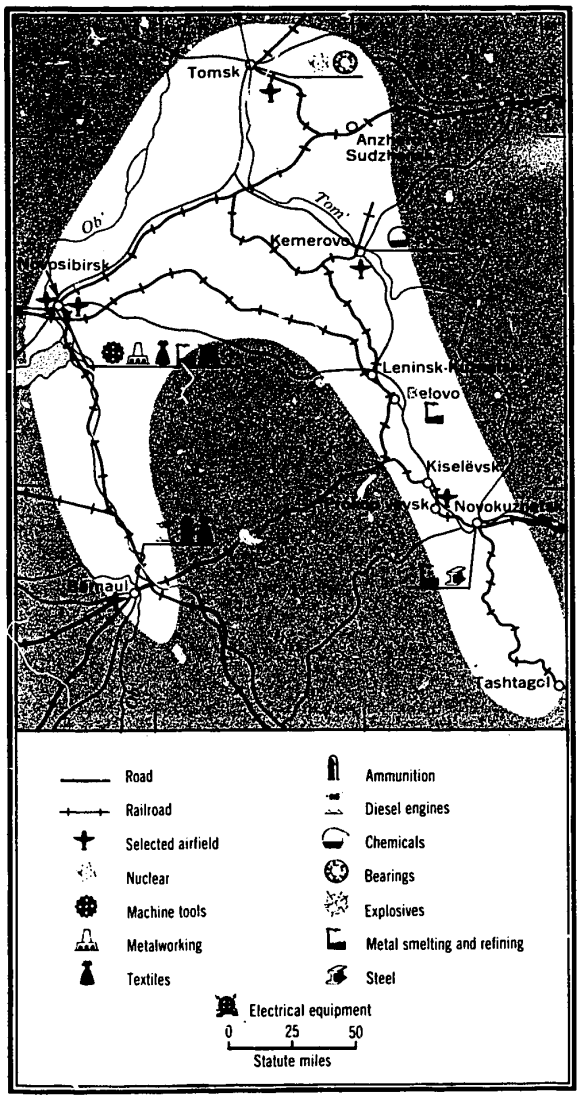


FIGURE 21. Kuznetsk strategic area (C)

machine tools and hydraulic presses, generators, and electrical equipment. The city is a significant producer of jet aircraft and aircraft components, small arms and cartridges, and casings for naval and artillery ammunition. It is also known as a major producer of electron tubes, radiocommunication equipment, optics, chlorine, chemical products, and construction equipment. The city serves as a major telecommunications center and is the headquarters of the Siberian Military District and the Trans-Siberian Air Defense Sector. Novosibirsk is the most important port on the Ob river and the junction of a railroad from the Tashkent strategic area and the Trans-Siberian railroad. Textile mills, extensive stockyards, slaughterhouses, and flour mills also are situated in the city. Akademgorodok (Figure 22), just south of Novosibirsk, is the only large scientific center in Siberia.

Barnaul (estimated population 469,000 in 1973) is a major producer of diesel engines, freight cars, high-pressure boilers and drilling tools. The city also is an important producer of small arms, ammunition, textiles of synthetic and cotton fabrics, rubber, and asbestos products. It functions as a port on the Ob river and is a major rail hub between the Volga–Ural, Kuznetsk, and Tashkent strategic areas.

Novokuznetsk (estimated population 514,000 in 1973) is located in a region of extensive coking coal deposits and iron ore reserves. These resources form the basis of the city's growth and importance as a major producer of iron, steel, coke and chemical byproducts, cement, and reinforced concrete products. Moreover, the city is located in one of the main concentrations of electrical power in Siberia. With large quantities of power available, it has become the second largest Soviet producer of aluminum (20% of national output).

Kemerovo (estimated population 413,000 in 1973) is situated in a rich coal producing region which supplies raw materials for the city's nationally important coke chemical industries. Other significant items produced are ammunition, explosives, propellants for weapons systems, synthetic ammonia, chlorine, and nitric acid.

Tomsk (estimated population 370,000 in 1973) ranks as a nationally significant atomic energy center and a significant producer of plutonium and uranium for nuclear weapons. It has two nuclear powerplants. In addition, the city is a significant producer of ball bearings, electrical equipment, and cables for electric power and communication uses.

Prokop'yevsk (estimated population 276,000 in 1973) is a major coal mining center that produces coke and chemical byproducts and metal products. A large zinc smelter is situated northwest at Belovo.

8. Baykal

The Baykal strategic area (Figure 23) is a Siberian center of military and industrial significance that in places is less than 40 miles from the Mongolia border. Rich in hydroelectric power (Figure 24), the area produces more than 25% of the Soviet aluminum output and furnishes power as far as Novosibirsk in the Kuznetsk strategic area. The Trans-Siberian railroad, the transportation lifeline in central Siberia, serves all important parts of this 650-mile-long strategic area.

FIGURE 22. The Kuznetsk strategic area is the center of science and technology in central Siberia. The Institute of Nuclear Physics, shown here, is in the science city of Akademgorodok at Novosibirsk. (C)

The estimated 1973 population of the strategic area is about 3 million. Seven centers—Bratsk, Cheremkhovo, Usol'ye-Sibirskoye, Angarsk, Irkutsk, Ulan-Ude, and Petrovsk-Zabaykal'skiy—are significant in this strategic area.

Irkutsk (estimated population 486,000 in 1973) is a major railroad classification and repair center, a hub of domestic and international air routes, and the leading port on the Angara river. It is also an important industrial center, whose products include aircraft, machine tools, metallurgical and mining equipment, mica, and radio equipment. A large aluminum refinery is located nearby (Figure 25). The city is the site of important administrative, research, and educational installations, as well as the site of an Air Defense Zone Headquarters, two major airfields, barracks, and military supply depots.

Ulan-Ude (estimated population 276,000 in 1973) is also a major transportation and industrial center. It is located at a strategic junction of the Trans-Siberian railroad and an important railroad and highway which extend southward to the Mongolia border. The city is also the site of many barracks, storage areas, and other governmental facilities, a major locomotive and railroad car repair plant, an airframe plant, and several large industries that produce consumer goods.

Angarsk (estimated population 218,000 in 1973) is the site of a uranium isotope separation plant, a large petroleum refinery, the country's only coal tar distillation synthetic fuels plant, petrochemical plants, a nitrogenous fertilizer plant, and several important construction materials industries.

Bratsk (estimated population 175,000 in 1973) is the site of the world's second largest hydroelectric powerplant, the largest aluminum plant in the U.S.S.R., and an important timber, pulp, and paper industry.

Other significant centers of activity include the following: Cheremkhovo is the site of a large battery plant. Petrovsk-Zabaykal'skiy is the site of the largest steel plant in central Siberia. Chemical and salt plants producing large quantities of chlorine and caustic soda are located at Usol'ye-Sibirskoye. The Ust-Ilimsk hydroelectric powerplant, located about 100 miles north of Bratsk, will be one of the largest powerplants in the Soviet Union and will further increase the electric power supply in this strategic area.

Effective mining of the coal mines between Cheremkhovo and Irkutsk is dependent on uninterrupted operation of the Trans-Siberian railroad. This dependence is equally applicable to the tungsten and molybdenum mines near Ulan-Ude and uranium mines north of Petrovsk-Zabaykal'skiy. There are several railroad tunnels near the southern end of Lake Baykal that constitute critical bottlenecks.

9. Far Eastern

The Far Eastern strategic area (Figure 26), mostly parallel to the border of the People's Republic of China, opens onto the Sea of Japan in the south and extends about 600 miles from Vladivostok in the south to Komsomol'sk in the north. Militarily it is significant because of its proximity to the People's Republic of China, its many important commands, its storage facilities, and the concentration of airfields. The strategic area has a strong maritime orientation, building about 11% and repairing about 20% of all Soviet naval vessels and repairing about 25% of all

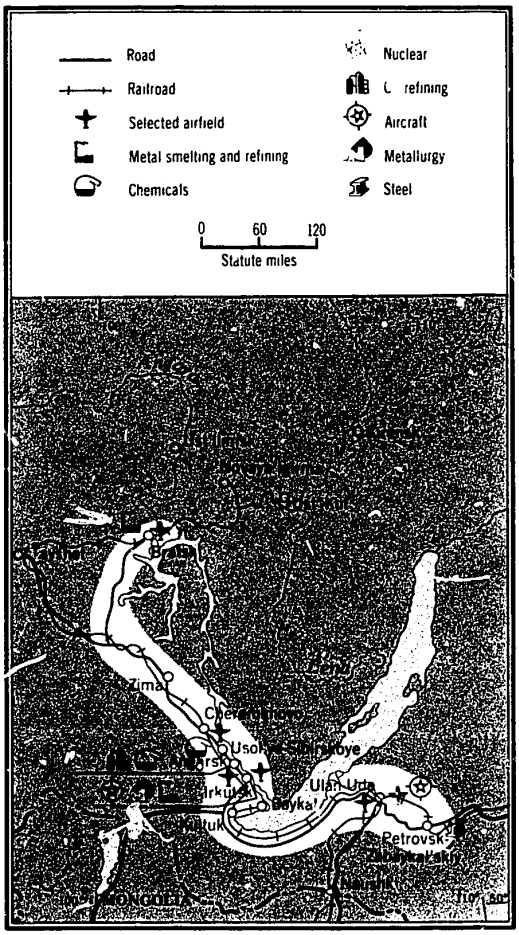


FIGURE 23. Baykal strategic area (C)

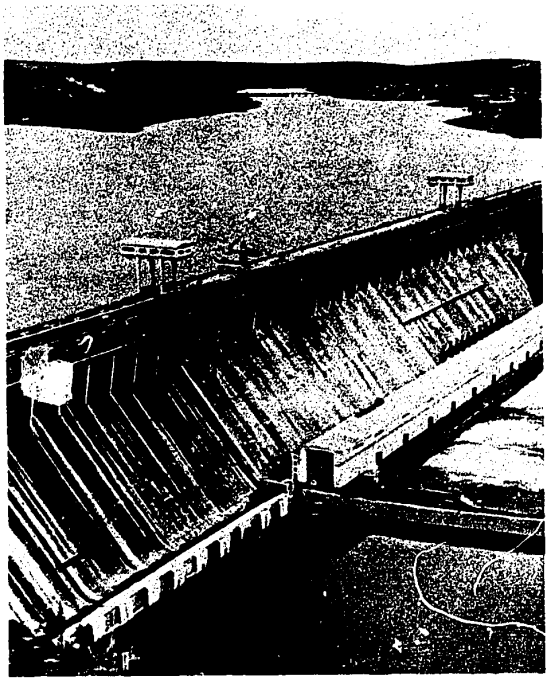


FIGURE 24. Rivers in the Baykal strategic area furnish vast amounts of hydroelectric power. Shown here are the Bratsk dam, powerplant, and reservoir on the Angara River. (U/OU)

Soviet merchant shipping. There are significant storage facilities for about 12.2 million barrels of refined petroleum products. Tin deposits in the area are a very significant national asset. The estimated 1973 population of the strategic area is nearly 2.7 million.

Vladivostok (estimated population 490,000 in 1973) is the most important naval base, the largest ship repair center, and the second largest commercial port in the Soviet Far East. The excellently equipped port, kept open in winter by icebreakers, is the eastern terminus of the Trans-Siberian railroad. The city contains the Headquarters of the Pacific Fleet, the Submarine and Naval Aviation Headquarters of the Pacific Fleet, and an Air Defense Zone Headquarters. The area has a large concentration of airfields and storage facilities, including a significant quantity used for refined petroleum products. Major industries include shipbuilding and ship repairs, fishing and associated enterprises, and electrical and telecommunications equipment. In addition, the city is a governmental, educational, and research center.

Nakhodka (estimated population 116,000 in 1973) is the largest commercial port on the Pacific coast of the U.S.S.R. It has extensive wharfage and mechanized cargo handling facilities (Figure 27). Its military port capacity is 36,000 long tons of general cargo per day. In 1972 it handled 11.5 million metric tons of cargo. It is also a naval base for patrol craft. The city has extensive storage facilities, including important refined petroleum products storage. Major industries include shipbuilding and ship repairs, and fishing and fish processing. Nakhodka has recently become a major crude oil exporting terminal.

Khabarovsk (estimated population 475,000 in 1973) is a major transportation center on the Trans-Siberian railroad, a major concentration point of airfields, and the principal industrial, oil distribution, military, telecommunication, and commercial center in the Soviet Far East; its port facilities are the largest on the Amur river. The city is the headquarters of the Far

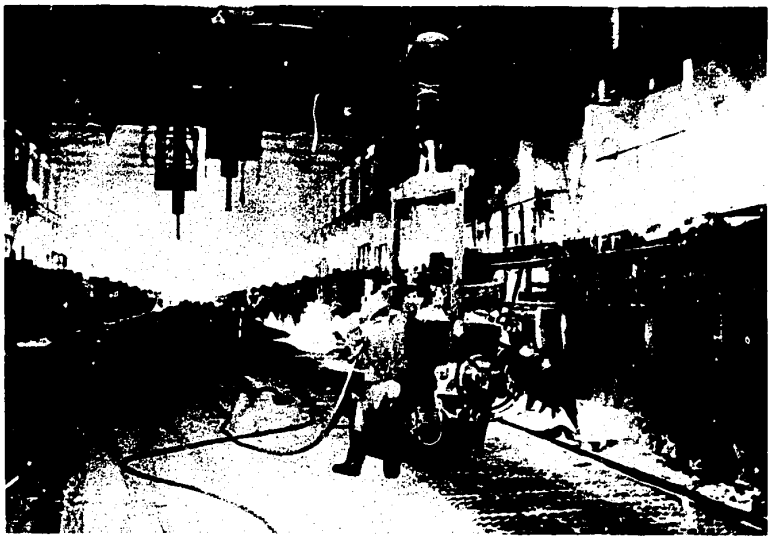


FIGURE 25. Abundant supplies of hydroelectric power have attracted power-hungry industries to the Baykal strategic area. This modern aluminum plant near Irkutsk is dependent upon ample supplies of electricity. (U/OU)

East Military District, the Far East Air Defense District, and Far East Tactical Aviation. It has a naval base and extensive, important billeting and storage facilities. Industries of significance include shipbuilding and ship repairs, diesel engines, agricultural machinery, machine tools, oxygen production, petroleum refining, electric wire and cable, power machinery, and heating equipment. The city is also a government center.

Komsomol'sk (estimated population 231,000 in 1973), situated on the Amur river, is also a port and has the largest shipyard in the Soviet Far East. Other significant installations include an important plant that makes submarine batteries, a nationally important airframe plant, the only steel plant in the strategic area, and one of the two petroleum refineries in the Soviet Far East. The city also produces sulfuric acid and foundry equipment. It is the site of an Air Defense Zone Headquarters and has significant storage facilities including those used for refined petroleum products.

Among the other important towns is Ussuriysk (estimated population 138,000 in 197) an important center on the Trans-Siberian railroad. It is a major military center with headquarters of both the air force and army, airfields, and extensive storage facilities and barracks. Leather footwear is one of the city's most important products. Coal is mined in areas near Partizansk (Suchan) and Artem.

The Far Eastern strategic area is a scene of tension that stems from occasional Chinese–Soviet border disputes. Some conflicts have involved the military forces of each country. In recent months Soviet authorities have made a concerted effort to erase Chinese territorial claims by Russianizing the names of many towns and a multitude of rivers and other physical features in this area.

10. Other important areas

In addition to the strategic areas, there are 30 areas of growing significance. A characteristic common to each of these areas is their industrial nature, with installations manufacturing a variety of military and civilian products. In addition, most of the areas function as a military center with billeting and/or storage facilities and at least one military airfield. As transportation centers, all of the areas dominate regional transport networks, and many of them occupy strategic positions astride internal routes leading to seaports or border crossing points. Figure 41 provides a more detailed description of these areas.

F. Internal routes (C)

The selected internal routes (Figure 46) are the easiest avenues of movement between strategic areas, from land and sea approaches to strategic areas, and between internal routes. Most of the routes have improved roads and there are railroads over most of their lengths. Roads and railroads are greatly influenced by seasonal conditions.

Offroad dispersal and cross-country movement are also greatly influenced by seasonal factors such as snow during the winter months and flooding during

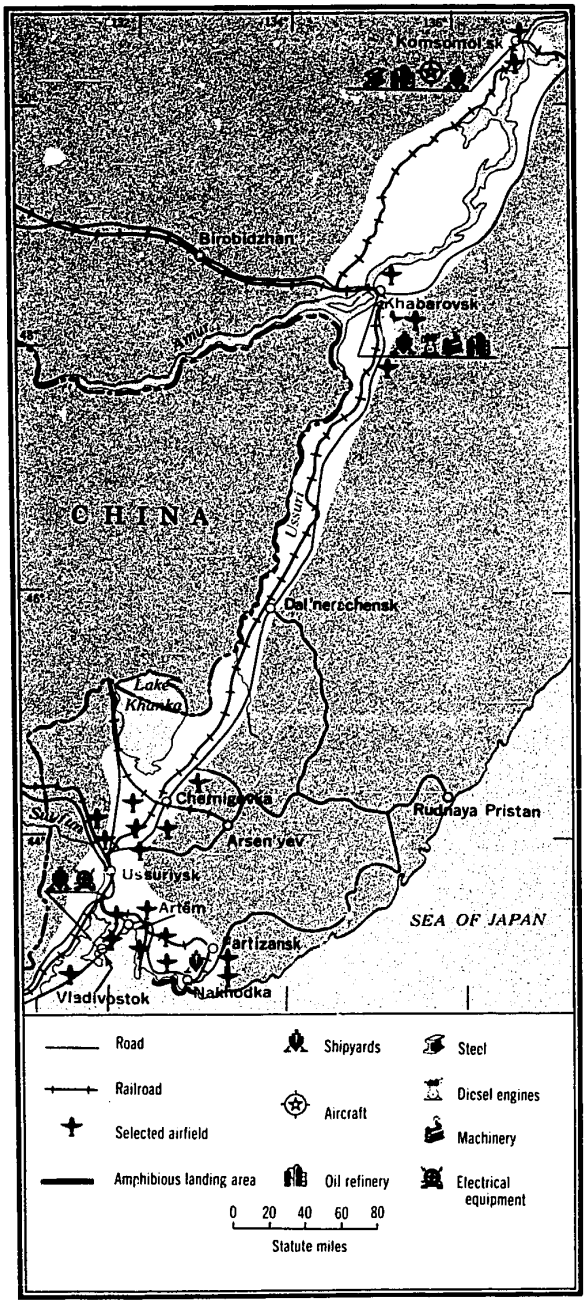


FIGURE 26. Far East strategic area (C)

spring thaw. Conditions range from good to fair in the plains regions to poor in the mountain and hill regions which are heavily forested and extremely rugged in places. Detailed information on internal routes is given in Figure 42.

G. Approaches (C)

The perimeter of the U.S.S.R. consists of about 12,000 miles of land boundaries and approximately 29,000 miles of coastline, including the island of Sakhalin. The Soviet Union claims jurisdiction to 12 nautical miles from its coasts and claims sovereignty, under the sector doctrine, over all the ocean area which extends from the U.S.S.R. mainland to the North Pole between 35°E. and 170°W. The Soviet Union also claims control over the Caspian Sea north of a line connecting the two segments of the land boundary between the U.S.S.R. and Iran. The United States does not recognize any of these Soviet maritime claims. Figure 43 presents detailed information on land boundaries.

1. Land

Although many points along the border of the U.S.S.R. are passable for ground movement into or out of the country, only 19 approaches, those having the best access to strategic areas within the U.S.S.R., have been selected. Detailed information on these approaches is presented in Figure 44.

2. Sea

The coast of the U.S.S.R. is generally unsuitable for large-scale amphibious landings because of stretches of rugged coast, ice-clogged approaches, and lack of suitable exits inland. The most suitable amphibious areas are as follows: on the Black Sea near Odessa, on the Crimean Peninsula, and along the southeastern coast of the Black Sea; on the Baltic Sea in the vicinity of Riga; on the Arctic coast, the only suitable area is a stretch along the north coast of the Kola Peninsula east of Polyarnyy; along the Pacific coast, the suitable areas are those that afford access to Vladivostok and Nakhodka. Figure 39 presents detailed information on the amphibious landing areas shown on the Military Geographic Factors Map (Figure 46).

3. Air

Air approaches[3] to the U.S.S.R. are divided into four sectors (Figure 28). The northern air approach is over the vast expanses of the Arctic Ocean except in the extreme east. Terrain obstacles to low-level flight are widely scattered islands in the Arctic Ocean, which have a maximum elevation of almost 3,600 feet above sea level within 125 nautical miles of the U.S.S.R.

[3]The discussion zone for air approaches extends approximately 300 nautical miles beyond the boundaries of the U.S.S.R.

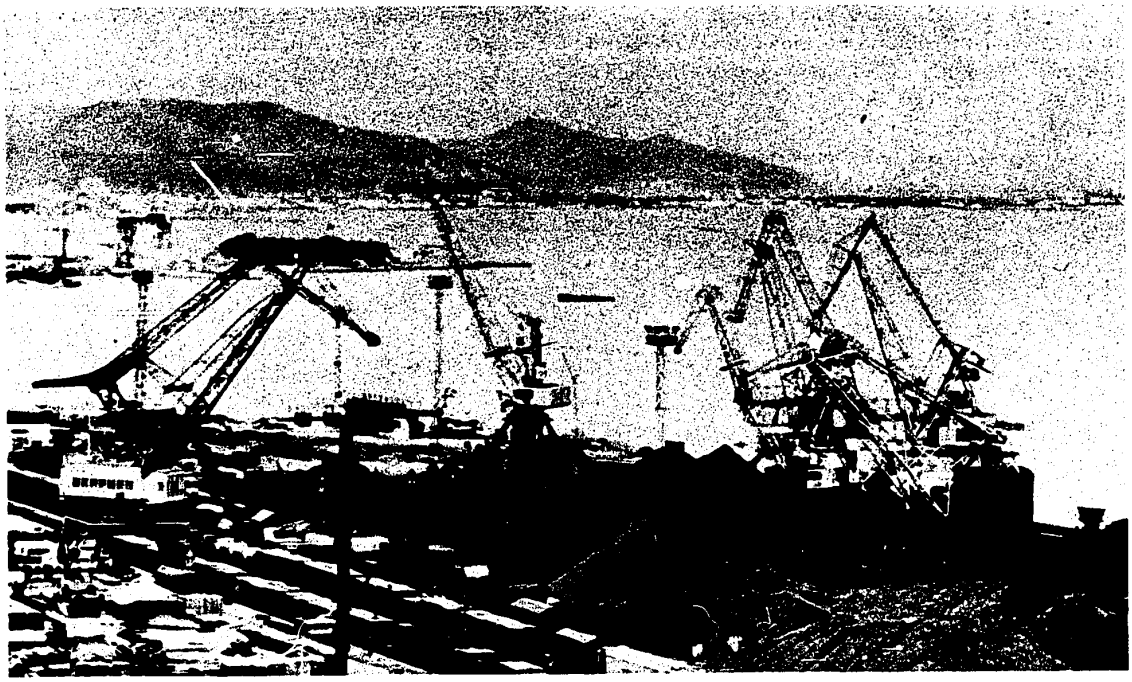


FIGURE 27. Nakhodka, just east of Vladivostok, is the leading commercial port in the Soviet Far East (U/OU)

mainland. In the extreme east, air approaches are across the rugged Alaska ranges, which reach maximum elevations of 5,000 feet within 300 nautical miles of the U.S.S.R. mainland and decrease to about 3,000 feet about 75 nautical miles from the U.S.S.R. The eastern air approach is across the Pacific Ocean and associated seas. The chief obstacle is mountainous northern Japan, which has a maximum elevation of about 7,500 feet above sea level. The southern air approach to the U.S.S.R., for the most part, is across extremely rugged mountainous terrain, which in many places extends into the U.S.S.R. In North Korea, mountains attain maximum elevations of about 9,000 feet above sea level less than 120 nautical miles from the Soviet border. In the northeast part of the People's Republic of China, maximum elevations of about 4,600 feet are common less than 50 nautical miles from the U.S.S.R. border. However, a relatively narrow northeast–southwest trending lowland bisects this area and offers low-level access (generally less than 1,000 feet above sea level) to the U.S.S.R. border in the vicinity of Khabarovsk. In eastern Mongolia, maximum elevations of more than 4,000 feet above sea level are within 20 nautical miles of the border. From eastern Mongolia to the Afghanistan border, mountain ranges with elevations of about 10,000 feet and occasional peaks and crests over 15,000 feet straddle the international boundary. From Afghanistan through Turkey, mountains attain elevations of more than 5,000 feet above sea level, with individual peaks and crests often exceeding 12,000 feet above sea level less than 100 nautical miles from the U.S.S.R. border. However, the Black Sea, north of central and western Turkey, and the Caspian Sea, north of central Iran, permit low-level access to the U.S.S.R. The western air approach to the U.S.S.R. crosses the complex mountain masses of southern Europe in the south, the flat to gently rolling plain of northern Europe and the Baltic Sea in the center, and the mountainous backbone of the Scandinavian Peninsula in the north. Elevations over 5,000 feet above sea level are common throughout the southern half of the approach, and in places peaks rise over 8,000 feet above sea level within 125 nautical miles of the U.S.S.R. border. On the Scandinavian Peninsula, maximum elevations are between 5,000 and 7,000 feet above sea level within 300 nautical miles of the U.S.S.R.

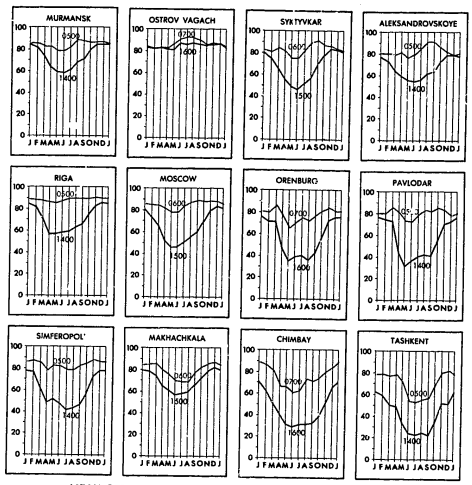
Weather conditions are most favorable for flight during summer (principally June through August) except in the northern sector and in the eastern half of the southern sector, where they are best in winter (principally December through February). Migratory lows and associated fronts are primarily responsible for less favorable conditions during the remainder of the year. These lows present the most hazardous weather conditions in the eastern sector, particularly during winter when they are most intense. They are least frequent over much of the eastern half of the southern sector, where they occur mostly in spring through autumn. Typhoons occasionally enter the Sea of Japan in summer and early autumn but usually degenerate by the time they reach northern Japan. Figure 45 summarizes the important weather factors for flight in each sector.

FIGURE 28. Air approaches orientation (U/OU)

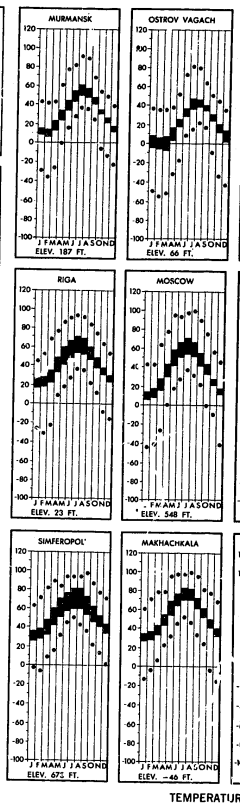
LIST OF STATIONS

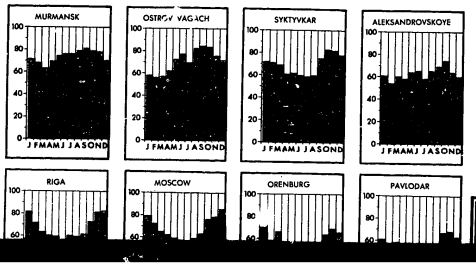
STATION	LATITUDE*	LONGITUDE*	ELEV. (FT.)
AK-BAYTAL	43°09'N	64°20'E	764
AKTYUBINSK	50°17'N	57°09'E	745
ALEKANDROVSKOYE	60°26'N	77°52'E	159
ALMA-ATA	43°14'N	76°56'E	2,779
CHIMBAY	42°57'N	59°49'E	217
MAKHACHKALA	43°01'N	47°26'E	−46
MOSCOW	55°45'N	37°34'E	548
MURMANSK	68°58'N	33°03'E	187
ORENBURG	51°45'N	55°06'E	358
OSTROV VAGACH	70°27'N	58°40'E	66
PAVLODAR	52°17'N	76°57'E	479
RIGA	56°58'N	24°04'E	23
SIMFEROPOL'	45°01'N	33°59'E	673
SYKTYVKAR	61°40'N	50°51'E	312
TASHKENT	41°16'N	69°16'E	1,404
TROITSKO-PECHORSK	62°42'N	56°12'E	420

*COORDINATES GIVE LOCATION OF WEATHER STATIONS AND DO NOT NECESSARILY CORRESPOND TO THOSE FOR POPULATED PLACES.

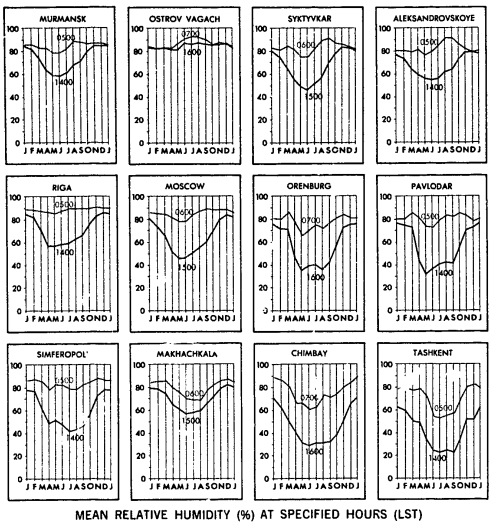


MEAN RELATIVE HUMIDITY (%) AT SPECIFIED HOURS (LST)

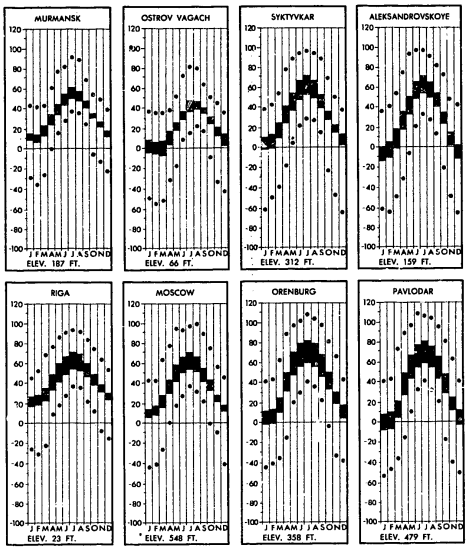




TEMPERATUR

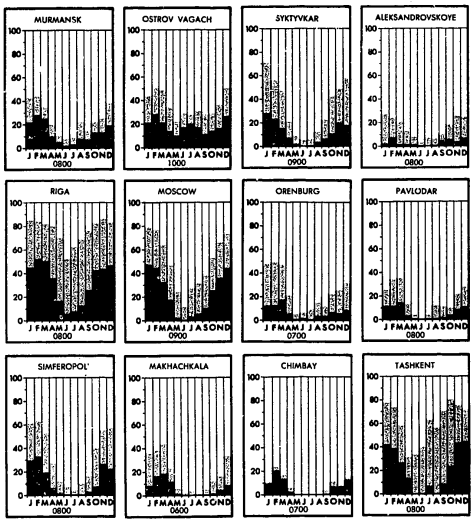


MEAN RELATIVE HUMIDITY (%) AT SPECIFIED HOURS (LST)



TEMPERATURES (°F.)

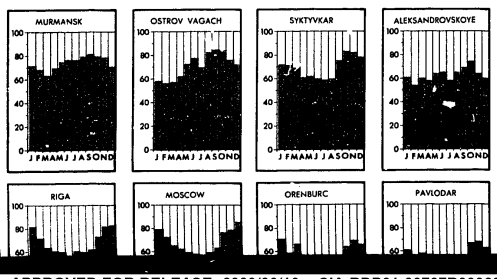
ABSOLUTE MAXIMUM
MEAN DAILY MAXIMUM
MEAN DAILY MINIMUM
ABSOLUTE MINIMUM

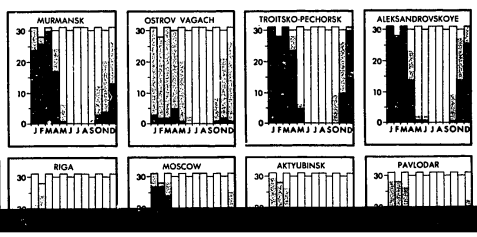


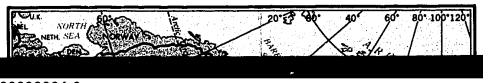
PERCENTAGE FREQUENCY OF SPECIFIED VISIBILITIES IN MORNING

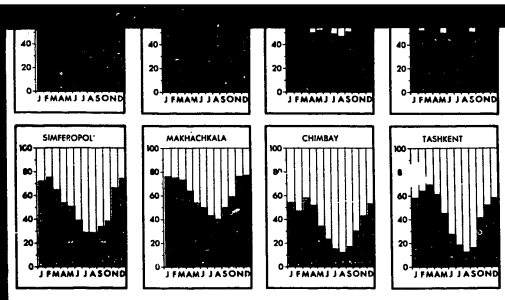
TIMES SHOWN LST

6 MILES
2½ MILES

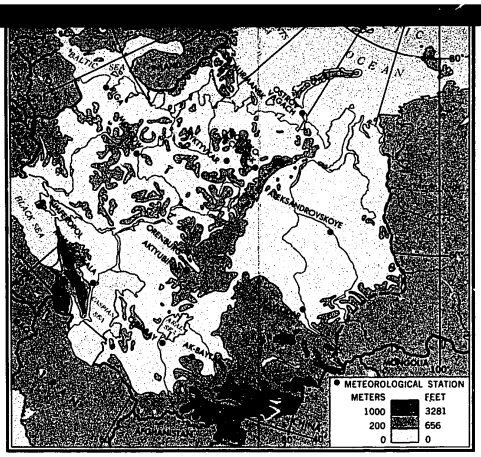




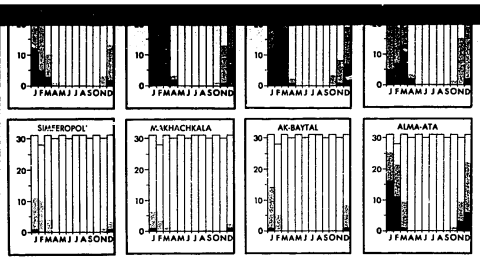




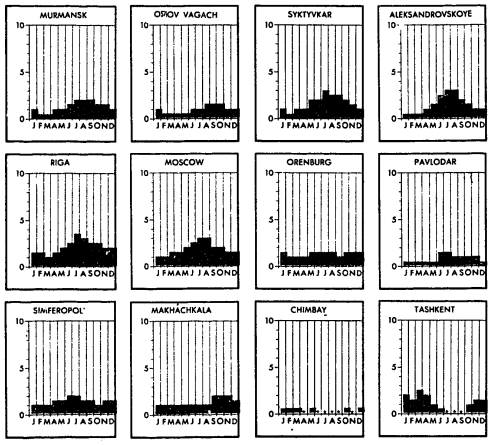
MEAN CLOUDINESS (%)



STATION LOCATIONS

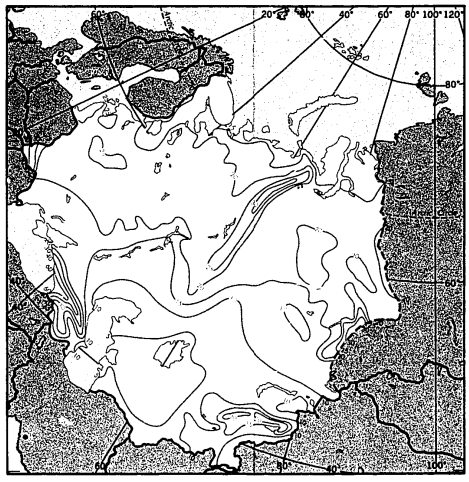


MEAN NUMBER OF DAYS WITH SPECIFIED SNOW DEPTHS

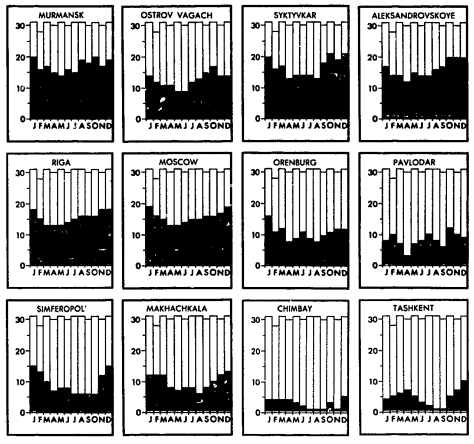


MEAN MONTHLY PRECIPITATION (INCHES)

* < 0.25 INCH



MEAN ANNUAL PRECIPITATION (INCHES)



MEAN NUMBER OF DAYS WITH MEASURABLE PRECIPITATION

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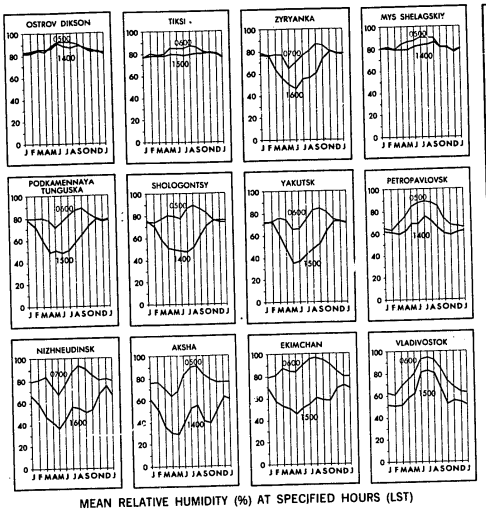
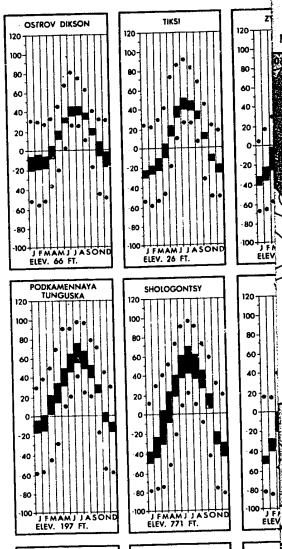
Variations of climatic elements, U.S.S.R., West Figure 29



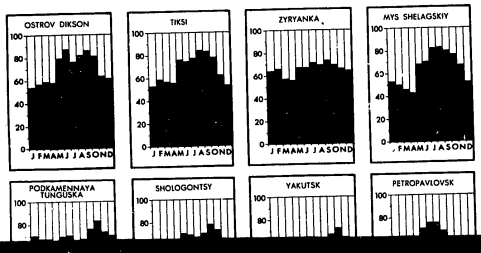
MEAN RELATIVE HUMIDITY (%) AT SPECIFIED HOURS (LST)



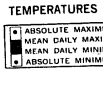
LIST OF STATIONS

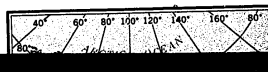
STATION	LATITUDE*	LONGITUDE*	ELEV. (FT.)
AKSHA	50°17'N	113°17'E	2,408
EKIMCHAN	53°04'N	132°56'E	1,782
KAMEN'-RYBOLOV	44°43'N	132°04'E	246
MYS SHELAGSKIY	70°06'N	170°30'E	20
NIZHNEUDINSK	54°53'N	99°02'E	1,352
OSTROV DIKSON	73°30'N	80°14'E	66
PETROPAVLOVSK	53°01'N	158°44'E	490
PODKAMENNAYA TUNGUSKA	61°36'N	90°00'E	197
RODCHEVO	66°04'N	151°04'E	197
SHOLOGONTSY	66°15'N	114°17'E	771
TIKSI	77°35'N	128°55'E	26
UAKIT	55°28'N	113°38'E	3,599
VLADIVOSTOK	43°07'N	131°54'E	453
YAKUTSK	62°05'N	129°45'E	338
ZYRYANKA	65°44'N	150°54'E	141

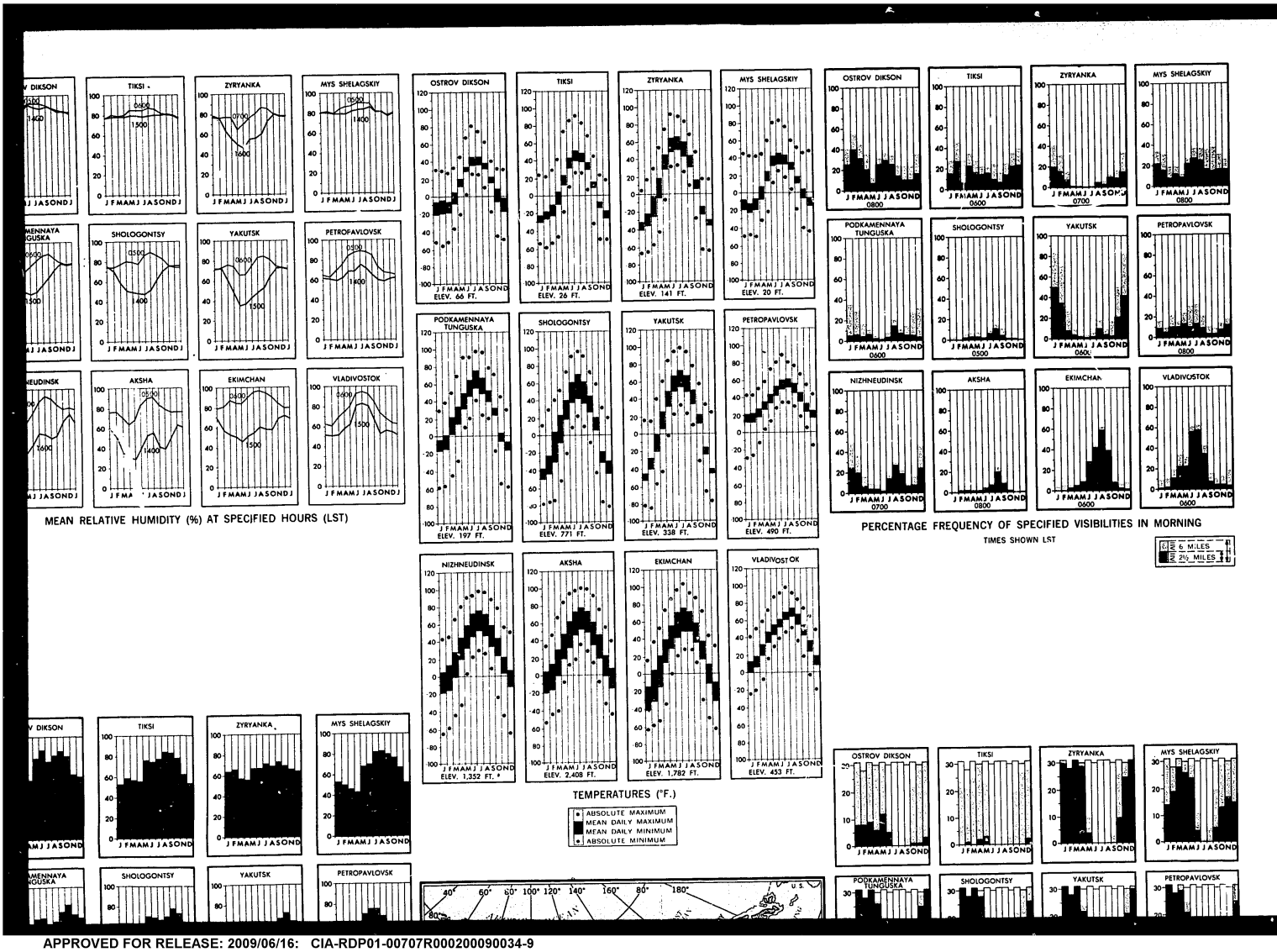
*COORDINATES GIVE LOCATION OF WEATHER STATIONS AND DO NOT NECESSARILY CORRESPOND TO THOSE FOR POPULATED PLACES.

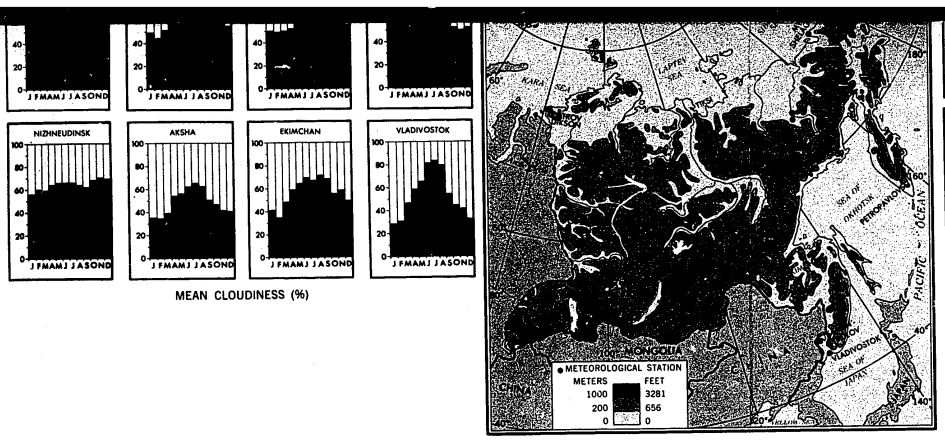


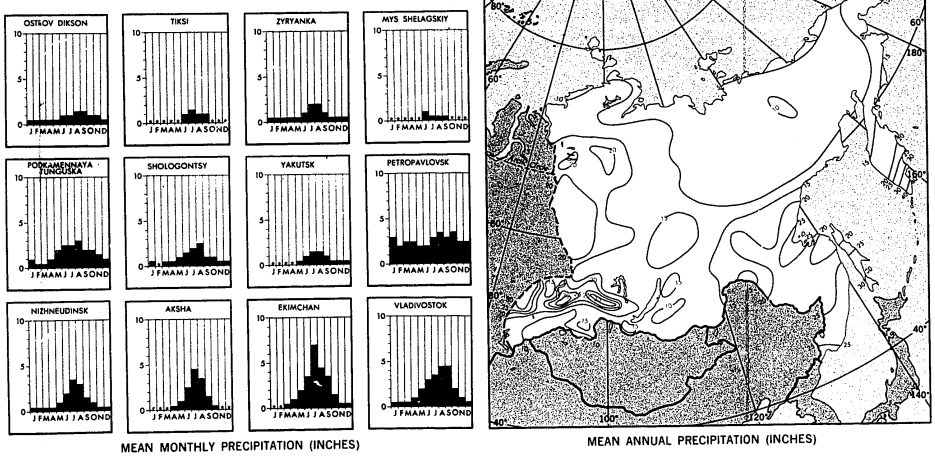
TEMPERATURES











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Variations of climatic elements, U.S.S.R., East Figure 30

FIGURE 31. Mean number of days with maximum temperature 32°F. or lower (U/OU)

REGION AND STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., West:														
Murmansk	28	26	25	12	3	*	0	0	*	11	19	28	152	8–9
Ostrov Vaygach	31	28	31	28	25	7	*	0	1	18	27	31	227	6–7
Syktyvkar	31	28	20	7	*	0	0	0	0	10	22	29	147	8–9
Aleksandrovoskoye	31	27	23	12	2	*	0	0	0	14	28	31	168	9
Riga	21	20	11	*	0	0	0	0	0	*	7	17	76	8–9
Moscow	28	25	15	1	0	0	0	0	0	3	14	24	110	8–9
Orenburg	30	27	18	1	0	0	0	0	0	3	16	28	124	8–9
Pavlodar	31	27	21	4	0	0	0	0	0	4	22	29	138	5–7
Simferopol	11	10	3	*	0	0	0	0	0	0	1	6	32	8–9
Makhachkala	6	6	3	0	0	0	0	0	0	0	1	4	20	7
Chimbay	14	12	1	0	0	0	0	0	0	0	2	15	43	3–5
Tashkent	5	3	1	0	0	0	0	0	0	0	1	5	15	3–5
U.S.S.R., East:														
Ostrov Dikson	31	28	31	30	30	12	*	1	8	29	30	31	260	7–8
Tiksi	31	28	31	29	23	4	0	0	7	29	30	31	243	8–9
Zyryanka	31	28	31	25	5	0	0	0	4	29	30	31	213	8–9
Mys Shelagskiy	31	28	31	29	20	4	*	5	16	29	29	31	251	6–7
Podkamennaya Tunguska	31	28	23	13	1	*	0	0	1	14	29	31	170	6–8
Shologontsy	31	28	30	20	7	*	0	0	3	25	30	31	205	7–9
Yakutsk	31	28	31	16	1	0	0	0	1	21	30	31	190	9–10
Petropavlovsk	26	24	20	7	*	0	0	0	0	*	16	25	118	8–10
Nizhneudinsk	31	26	16	6	*	0	0	0	*	6	25	31	141	8–9
Aksha	31	26	14	3	0	0	0	0	0	4	25	31	134	9–10
Ekimchan	31	28	26	10	*	0	0	0	0	10	29	31	166	9
Vladivostok	31	26	11	1	0	0	0	0	0	*	13	27	107	9–10

*<0.5 day.

FIGURE 32. Mean number of days with minimum temperature 0°F. or lower (U/OU)

REGION AND STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., West:														
Murmansk	9	8	5	*	0	0	0	0	0	*	1	6	30	8–9
Ostrov Vaygach	22	21	19	15	3	0	0	0	0	*	7	11	98	6–8
Syktyvkar	18	11	7	1	0	0	0	0	0	*	4	12	54	8–9
Aleksandrovskoye	22	19	10	5	0	0	0	0	0	2	14	21	93	6–8
Riga	3	3	1	0	0	0	0	0	0	0	0	1	8	8–9
Moscow	10	5	2	0	0	0	0	0	0	0	*	5	21	8–9
Orenburg	12	14	5	*	0	0	0	0	0	*	2	10	44	8–9
Pavlodar	21	19	8	0	0	0	0	0	0	*	7	16	71	5–7
Simferopol	1	*	0	0	0	0	0	0	0	0	0	0	1	8–9
Makhachkala	0	0	0	0	0	0	0	0	0	0	0	0	0	6–7
Chimbay	5	3	0	0	0	0	0	0	0	0	0	3	11	3–4
Tashkent	0	0	0	0	0	0	0	0	0	0	0	0	0	3–4
U.S.S.R., East:														
Ostrov Dikson	30	26	25	22	6	0	0	0	0	6	22	25	162	7–9
Tiksi	31	27	28	23	5	0	0	0	0	8	28	31	181	8–9
Zyryanka	31	28	30	18	*	0	0	0	0	12	28	31	179	8–9
Mys Shelagskiy	29	28	28	27	4	0	0	0	0	7	21	28	172	5–7
Podkamennaya Tunguska	25	22	13	7	0	0	0	0	0	1	19	25	112	6–8
Shologontsy	31	28	28	20	4	0	0	0	*	12	28	31	183	8–9
Yakutsk	31	28	28	11	0	0	0	0	0	6	28	31	163	9–10
Petropavlovsk	4	3	1	0	0	0	0	0	0	0	0	1	8	8–9
Nizhneudinsk	26	20	11	1	0	0	0	0	0	1	13	24	96	9
Aksha	29	25	12	1	0	0	0	0	0	1	18	27	113	9–10
Ekimchan	31	27	22	6	0	0	0	0	0	2	22	31	140	9–10
Vladivostok	14	7	*	0	0	0	0	0	0	0	0	7	28	9–10

*<0.5 day.

FIGURE 33. Percentage frequency of selected windchill conditions (U/OU)

REGION AND STATION	CONDITION*	OCT	NOV	DEC	JAN	FEB	MAR	APR	YRS REC
U.S.S.R., West:									
Murmansk	I	77	51	25	17	12	33	67	9–10
	II	18	27	28	22	25	30	24	9–10
	III	5	17	26	26	31	23	8	9–10
	IV	0	4	14	21	21	11	1	9–10
	V	0	1	7	14	11	3	0	9–10
Ostrov Vaygach	I	43	14	7	4	4	6	10	6–7
	II	33	27	15	12	7	15	18	6–7
	III	19	31	30	18	30	24	30	6–7
	IV	4	17	19	21	25	20	22	6–7
	V	1	11	29	45	34	35	20	6–7
Syktyvkar	I	80	51	26	13	16	48	83	9
	II	14	28	28	28	29	26	12	9
	III	5	14	25	28	32	18	4	9
	IV	1	5	13	18	14	5	1	9
	V	0	2	8	13	9	3	0	9
Aleksandrovskoye	I	76	37	15	11	15	43	74	7–8
	II	15	25	21	21	24	24	13	7–8
	III	7	14	27	29	29	19	8	7–8
	IV	2	14	19	22	16	9	3	7–8
	V	0	10	18	17	16	5	2	7–8
Riga	I	99	83	59	49	48	71	96	9
	II	1	14	28	26	30	22	4	9
	III	0	3	10	18	16	6	0	9
	IV	0	0	3	6	5	1	0	9
	V	0	0	0	1	1	0	0	9
Moscow	I	97	76	53	36	44	72	97	8–9
	II	3	18	24	28	33	19	3	8–9
	III	0	6	17	26	17	7	0	8–9
	IV	0	0	5	8	4	2	0	8–9
	V	0	0	1	2	2	0	0	8–9
Orenburg	I	94	67	35	22	22	59	95	8–9
	II	5	20	29	27	31	20	5	8–9
	III	1	9	20	31	22	15	0	8–9
	IV	0	3	10	14	18	4	0	8–9
	V	0	1	6	6	7	2	0	8–9
Pavlodar	I	77	32	10	11	9	38	83	8–9
	II	19	28	21	16	17	27	11	8–9
	III	4	25	27	27	30	20	4	8–9
	IV	0	11	22	28	26	11	1	8–9
	V	0	4	20	18	18	4	1	8–9
Chimbay	I	99	94	81	74	79	93	99	5
	II	1	4	11	16	15	4	1	5
	III	0	2	5	8	5	2	0	5
	IV	0	0	2	2	1	1	0	5
	V	0	0	1	0	0	0	0	5
U.S.S.R., East:									
Ostrov Dikson	I	14	6	2	1	0	1	5	6–7
	II	27	9	9	4	3	7	7	6–7
	III	28	19	12	6	7	11	17	6–7
	IV	17	24	16	10	9	18	22	6–7
	V	12	42	61	79	81	63	49	6–7
Tiksi	I	22	6	0	0	1	3	13	8–9
	II	25	14	11	5	7	17	20	8–9
	III	25	14	12	21	19	18	26	8–9
	IV	17	19	15	14	17	22	22	8–9
	V	11	47	62	60	56	40	19	8–9

Footnote at end of table.

FIGURE 33. Percentage frequency of selected windchill conditions (U/OU) (*Continued*)

REGION AND STATION	CONDITION*	OCT	NOV	DEC	JAN	FEB	MAR	APR	YRS REC
Zyryanka	I	44	5	1	0	1	10	38	7–8
	II	25	23	9	7	15	24	23	7–8
	III	22	30	37	34	31	27	23	7–8
	IV	5	24	24	20	24	21	11	7–8
	V	4	18	29	39	29	18	5	7–8
Mys Shelagskiy	I	36	17	9	6	5	10	22	5–6
	II	24	16	15	17	23	20	18	5–6
	III	22	24	14	17	18	14	15	5–6
	IV	12	15	11	11	9	13	16	5–6
	V	6	28	51	49	45	43	29	5–6
Podkamennaya Tunguska	I	78	22	13	11	17	49	75	7–8
	II	16	24	21	22	29	25	15	7–8
	III	5	28	32	28	31	17	7	7–8
	IV	1	17	19	21	14	6	2	7–8
	V	0	9	15	18	9	3	1	7–8
Yakutsk	I	60	3	0	0	1	13	59	9–10
	II	24	15	5	4	8	19	21	9–10
	III	11	29	24	22	22	30	12	9–10
	IV	4	33	28	27	30	23	5	9–10
	V	1	20	43	47	39	15	3	9–10
Petropavlovsk	I	91	53	28	22	28	40	68	8–9
	II	9	36	37	26	29	33	25	8–9
	III	0	11	30	33	24	19	7	8–9
	IV	0	0	5	17	13	7	0	8–9
	V	0	0	0	2	6	1	0	8–9
Nizhneudinsk	I	92	53	42	35	47	72	86	8–9
	II	6	24	27	30	30	17	10	8–9
	III	2	16	21	21	15	9	4	8–9
	IV	0	5	7	10	5	2	0	8–9
	V	0	2	3	4	3	0	0	8–9
Ekimchan	I	93	47	14	11	27	64	87	9–10
	II	5	33	40	37	41	22	9	9–10
	III	2	13	35	36	20	10	3	9–10
	IV	0	5	7	11	8	3	1	9–10
	V	0	2	4	5	4	1	0	9–10

*Condition:

I—Comfortable with normal precautions.

II—Very cold. Travel becomes uncomfortable on overcast days.

III—Bitterly cold. Travel becomes uncomfortable even on clear, sunny days.

IV—Freezing begins. Travel and life in temporary shelter becomes disagreeable.

V—Survival efforts are required. Exposed flesh will freeze in less than 1 minute.

FIGURE 34. Percentage frequency of ceiling <3,300 feet in morning and afternoon (U/OU)
(Ceiling defined as 5/8 or more cloud cover)

REGION AND STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., West:															
Murmansk	0800	36	36	36	27	38	44	48	52	52	54	51	46	43	9–10
Ostrov Vaygach	1000	44	30	29	36	54	59	46	65	72	74	69	55	53	8–9
Syktyvkar	0900	44	36	36	30	29	22	22	32	57	65	67	57	41	9–10
Aleksandrovskoye	0800	20	14	15	18	21	36	21	29	36	37	35	25	26	4–6
Riga	0800	62	59	44	35	31	22	27	32	34	52	65	70	45	8–9
Moscow	0900	64	61	52	31	21	21	20	26	37	59	66	78	45	9–10
Orenburg	1000	48	25	32	18	10	13	7	7	15	33	44	44	25	9–10
Pavlodar	0800	20	19	22	16	10	9	14	18	17	28	38	27	20	5–7
Simferopol	0800	44	46	38	17	17	12	5	5	11	17	40	44	25	9–10
Makhachkala	0900	57	59	56	34	13	7	9	10	20	32	57	59	34	7–8
Chimbay	1000	38	37	28	14	5	4	2	1	2	11	23	37	17	7–8
Tashkent	1100	19	20	16	7	2	*	*	0	0	2	14	22	9	7–9
U.S.S.R., East:															
Ostrov Dikson	0800	15	25	18	21	51	77	51	63	77	64	38	30	44	2–4
Tiksi	0900	6	8	6	12	49	58	57	66	59	31	14	10	31	8–10
Zyryanka	1000	6	6	2	3	16	23	33	32	37	20	11	10	16	8–9
Mys Shelagskiy	0800	9	13	5	10	43	50	58	71	70	44	25	7	34	2–4
Podkamennaya Tunguska	0900	19	13	18	23	34	26	18	30	48	52	22	20	27	4–5
Shologontsy	0800	0	0	1	8	20	24	27	32	39	24	*	*	15	8–10
Yakutsk	0900	6	4	1	6	8	8	10	17	22	24	9	4	10	9–10
Petropavlovsk	0800	32	27	21	29	43	58	48	41	30	24	25	29	34	6–8
Nizhneudinsk	1000	4	3	7	13	14	13	14	17	21	16	14	6	12	7–9
Aksha	0800	1	1	3	5	7	14	20	28	20	7	2	1	9	9–10
Ekimchan	0900	*	*	1	9	14	15	25	41	46	20	11	1	15	9–10
Vladivostok	0900	7	8	19	31	34	67	71	66	40	27	21	14	34	9–10
U.S.S.R., West:															
Murmansk	1400	43	29	22	29	40	47	43	51	55	55	57	40	43	10
Ostrov Vaygach	1600	34	23	25	39	57	63	45	65	75	79	69	54	52	9
Syktyvkar	1500	36	36	38	27	20	14	19	24	45	66	61	51	36	10
Aleksandrovskoye	1400	13	5	13	17	30	35	25	30	34	46	29	18	25	6–8
Riga	1400	58	51	40	29	23	16	16	27	31	49	61	65	39	10
Moscow	1500	50	51	43	28	22	16	21	24	35	50	65	70	40	10
Orenburg	1600	37	23	29	15	10	10	8	5	11	30	44	37	21	9–10
Pavlodar	1400	16	6	21	13	9	9	19	13	12	34	29	20	17	6–8
Simferopol	1400	40	49	36	19	17	9	3	4	10	14	30	40	23	9–10
Makhachkala	1500	53	49	50	24	13	8	9	7	23	38	52	63	33	8–9
Chimbay	1600	32	30	27	16	5	7	2	1	4	12	19	30	15	9–10
Tashkent	1700	16	20	14	7	1	0	0	0	0	5	14	21	8	9–10

Footnote at end of table.

FIGURE 34. Percentage frequency of ceiling <3,300 feet in morning and afternoon (U/OU) *(Continued)*

REGION AND STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., East:															
Ostrov Dikson	1400	24	20	14	22	58	80	53	71	67	63	37	33	45	3–5
Tiksi	1500	5	6	4	9	47	54	56	62	58	30	17	12	30	8–10
Zyryanka	1600	5	3	*	2	12	12	23	22	25	15	11	5	11	8–10
Mys Shelagskiy	1400	16	8	5	6	41	54	58	59	64	47	25	10	33	4–6
Podkamennaya Tunguska	1500	19	9	27	25	36	32	22	35	46	53	31	16	29	6
Shologontsy	1400	0	*	4	16	45	43	37	51	49	28	1	1	23	8–10
Yakutsk	1500	5	1	1	4	7	3	7	13	17	18	5	5	7	9–10
Petropavlovsk	1400	25	23	22	26	36	37	38	37	33	25	20	23	29	7–8
Nizhneudinsk	1600	1	3	4	9	7	9	9	8	11	16	13	6	8	7–9
Aksha	1400	1	1	3	5	6	9	14	12	10	9	3	1	6	9–10
Ekimchan	1500	1	*	2	6	9	7	8	11	15	11	5	1	6	9–10
Vladivostok	1500	7	7	17	25	28	51	52	46	32	22	21	11	27	9–10

*<0.5%.

FIGURE 35. Percentage frequency of specified ceiling and visibility combinations at specified hours (U/OU)
(Ceiling defined as 5/8 or more cloud cover)

REGION AND STATION	HOUR (LST)	COMBINATION*	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., West:																
Murmansk	0800	A	76	68	72	88	92	90	87	74	83	74	80	76	80	9–10
		B	12	15	13	5	5	3	7	13	8	15	10	12	10	
Ostrov Vaygach	000	A	77	70	77	83	87	76	74	71	78	81	80	70	77	8–9
		B	11	15	11	7	5	16	22	21	14	6	6	8	12	
Syktyvkar	0900	A	60	68	79	86	90	95	92	82	71	67	70	66	76	9–10
		B	12	11	6	7	6	2	4	7	17	18	13	14	10	
Aleksandrovskoye	0800	A	89	89	92	90	94	92	90	92	84	82	78	86	88	4–6
		B	5	7	4	7	3	4	4	5	11	12	11	8	7	
Riga	0800	A	44	41	44	59	73	89	84	78	68	48	48	48	60	8–9
		B	24	33	27	18	9	3	5	11	16	25	25	23	18	
Moscow	0900	A	41	47	61	79	73	94	93	86	78	65	52	42	69	9–10
		B	24	17	18	7	2	2	2	5	7	17	26	24	13	
Orenburg	1000	A	61	66	73	92	98	100	99	99	96	83	71	63	83	9–10
		B	20	16	12	3	1	0	**	0	1	9	17	20	8	
Pavlodar	0800	A	84	85	81	95	96	98	97	94	90	89	84	81	89	5–7
		B	10	12	14	4	1	0	1	4	3	6	7	14	6	
Simferopol	0800	A	63	60	70	86	89	96	99	97	94	87	65	68	81	9–10
		B	25	27	20	9	7	2	**	1	4	7	25	21	12	
Makhachkala	0900	A	80	68	72	87	98	100	99	99	99	98	87	74	88	7–8
		B	9	20	12	8	**	0	**	1	**	1	6	12	6	
Chimbay	1000	A	73	77	91	96	98	99	99	100	99	98	95	75	92	7–8
		B	18	14	6	1	1	**	**	0	**	**	5	20	6	
Tashkent	1100	A	62	69	89	96	100	100	100	100	99	93	73	52	86	7–9
		B	19	13	4	1	0	0	0	0	0	1	14	24	6	
U.S.S.R., East:																
Ostrov Dikson	0800	A	74	59	68	74	81	40	54	47	69	78	85	68	66	2–4
		B	21	32	23	14	13	45	36	35	24	15	8	19	24	
Tiksi	0900	A	82	72	84	86	80	66	70	72	82	80	77	79	77	8–10
		B	12	24	12	8	11	25	20	18	9	11	16	18	15	
Zyryanka	1000	A	71	78	93	100	97	95	89	88	86	91	85	75	87	8–9
		B	19	14	2	0	1	1	5	4	8	5	9	14	7	
Mys Shelagskiy	0800	A	78	83	92	86	76	60	55	55	70	80	83	83	75	2–4
		B	10	5	6	5	12	33	32	34	18	8	9	10	15	
Pedkamennaya Tunguska	0900	A	91	93	95	91	93	99	97	88	84	84	88	88	91	4–5
		B	1	3	0	3	4	0	1	8	8	7	1	4	3	
Shologontsy	0800	A	99	100	98	97	95	98	94	90	94	96	98	100	97	8–10
		B	**	0	0	1	2	1	3	8	4	2	0	0	2	

Footnotes at end of table.

FIGURE 35. Percentage frequency of specified ceiling and visibility combinations at specified hours (U/OU) (*Continued*)

REGION AND STATION	HOUR (LST)	COMBINATION*	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., East (*Continued*):																
Yakutsk	0900	A	38	44	79	94	96	98	96	86	88	81	69	43	76	9–10
		B	46	46	11	2	2	1	1	8	8	11	19	48	17	
Petropavlovsk	0800	A	91	95	90	88	75	65	69	81	91	93	91	88	85	6–8
		B	6	2	6	7	13	14	18	7	4	2	4	5	7	
Nizhneudinsk	1000	A	71	73	89	98	98	99	98	97	96	94	88	67	89	7–9
		B	19	15	5	1	1	**	1	2	2	3	9	23	7	
Aksha	0800	A	100	98	97	98	98	96	92	80	90	98	99	100	96	9–10
		B	0	**	1	1	1	3	7	17	9	2	1	0	4	
Ekimchan	0900	A	99	97	97	94	96	97	90	72	73	90	93	100	91	9–10
		B	0	**	2	2	2	1	6	22	23	7	2	0	6	
Vladivostok	0900	A	96	94	85	75	71	39	38	49	74	86	88	90	74	9–10
		B	3	3	13	23	27	59	59	47	21	13	10	8	24	
U.S.S.R., West:																
Murmansk	1400	A	62	75	90	91	96	96	94	89	93	82	80	72	85	10
		B	20	14	2	3	2	1	1	5	2	9	11	15	7	
Ostrov Vaygach	1600	A	77	74	84	86	90	76	77	72	77	80	78	69	78	9
		B	13	12	6	6	5	19	19	22	13	8	10	10	12	
Syktyvkar	1500	A	74	80	90	91	95	99	96	95	88	77	68	71	85	10
		B	6	3	2	6	3	**	**	1	6	10	10	8	5	
Aleksandrovskoye	1400	A	94	96	96	95	94	95	97	97	96	82	84	87	93	6–8
		B	3	2	2	3	2	3	2	1	1	6	8	5	3	
Riga	1400	A	50	58	70	92	94	97	98	96	92	78	62	48	78	10
		B	23	19	12	4	3	**	1	1	2	8	24	27	10	
Moscow	1500	A	57	71	85	93	98	98	97	96	95	83	63	54	83	10
		B	11	7	6	1	**	1	1	**	1	5	17	22	6	
Orenburg	1600	A	79	83	84	98	99	100	99	100	98	92	77	75	90	9–10
		B	9	10	7	**	0	0	1	0	1	3	13	12	5	
Pavlodar	1400	A	87	91	91	97	95	98	98	100	99	92	87	85	93	6–8
		B	8	5	4	1	4	1	0	0	1	3	5	6	3	
Simferopol	1400	A	77	71	88	98	97	98	100	99	97	97	84	76	90	9–10
		B	17	20	10	3	2	1	0	1	2	1	10	16	7	
Makhachkala	1500	A	82	80	85	92	99	100	100	99	98	97	86	78	91	8–9
		B	8	8	7	3	0	0	0	1	**	1	3	8	3	
Chimkent	1600	A	82	88	93	94	99	97	98	98	98	98	95	86	94	9–10
		B	14	7	3	4	1	1	1	1	1	1	2	8	4	
Tashkent	1700	A	75	86	92	99	100	99	99	100	100	98	88	58	91	9–10
		B	9	6	4	**	0	1	1	0	0	**	7	16	4	

U.S.S.R., East:																
Ostrov Dikson	1400	A	56	60	67	75	82	52	55	55	70	69	73	64	65	3–5
		B	29	28	22	21	11	31	40	35	22	20	16	22	25	
Tiksi	1500	A	75	68	83	89	85	76	76	80	84	85	76	75	79	8–10
		B	18	25	12	7	8	16	14	10	5	8	18	17	13	
Zyryanka	1600	A	78	99	98	99	96	99	96	96	95	94	89	76	93	8–10
		B	13	1	1	**	1	0	1	2	3	2	6	11	3	
Mys Shelagskiy	1400	A	85	85	91	89	79	59	60	57	68	86	78	85	77	4–6
		B	9	8	4	4	11	30	33	32	22	7	13	10	15	
Podkamennaya Tunguska	1500	A	93	95	96	97	96	99	99	96	96	92	91	94	95	6
		B	2	1	1	2	2	1	1	2	1	4	2	1	1	
Shologontsy	1400	A	100	99	99	97	97	98	98	95	96	96	98	98	98	8–10
		B	0	0	**	1	2	2	1	3	**	1	**	**	1	
Yakutsk	1500	A	40	70	99	97	100	100	99	94	96	91	81	39	84	9–10
		B	43	17	**	**	0	0	0	5	2	3	12	47	11	
Petropavlovsk	1400	A	88	89	91	89	86	87	85	88	93	95	93	90	90	7–8
		B	6	8	4	4	4	4	4	3	2	1	1	6	4	
Nizhneudinsk	1600	A	81	93	97	99	98	100	98	99	100	97	93	75	94	7–9
		B	9	3	1	**	1	0	1	1	0	2	1	14	3	
Aksha	1400	A	99	99	98	98	99	99	99	98	99	99	99	98	99	9–10
		B	**	**	1	2	0	1	0	**	1	1	1	1	1	
Ekimchan	1500	A	99	99	98	95	99	99	98	97	99	95	96	98	98	9–10
		B	0	**	1	2	**	0	**	2	0	2	1	1	1	
Vladivostok	1500	A	94	96	91	80	83	56	57	69	85	92	88	94	82	9–10
		B	3	3	8	19	15	39	40	28	12	5	11	4	16	

*Combination:
A—Ceiling 1,000 feet or greater and visibility $2^1/_2$ miles or greater.
B—Ceiling <650 feet and/or visibility $<1^1/_4$ miles.
**<0.5%.

FIGURE 36. Mean number of days with fog (U/OU)

REGION AND STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., West:														
Murmansk	10	8	6	3	2	2	4	9	4	5	7	9	67	10
Ostrov Vaygach	5	5	5	6	10	16	18	17	11	4	4	2	103	7–9
Syktyvkar	10	8	8	6	5	4	6	8	9	7	7	6	84	10
Aleksandrovskoye	2	3	2	1	2	1	4	5	4	2	1	4	30	9–10
Riga	26	23	25	22	24	24	25	26	25	28	27	26	301	10
Moscow	23	19	18	15	9	5	10	12	14	1ι	20	21	181	10
Orenburg	10	13	14	7	1	2	2	1	4	7	11	13	87	10
Pavlodar	5	6	8	3	1	*	2	3	2	3	4	5	42	9–10
Simferopol	24	20	20	13	16	12	8	8	11	18	22	24	196	10
Makhachkala	14	13	16	10	5	2	1	1	2	3	9	15	89	9–10
Chimbay	9	6	4	1	1	*	0	*	1	3	4	8	36	7–8
Tashkert	15	12	8	4	1	*	*	*	0	6	12	17	75	7–8
U.S.S.R., East:														
Ostrov Dikson	5	7	7	7	7	15	19	16	11	5	5	3	107	11
Tiksi	1	1	1	2	7	11	10	5	2	1	1	1	43	25
Zyryanka	13	9	4	*	0	*	1	2	2	3	5	12	51	25
Mys Shelagskiy	2	1	2	2	7	14	20	17	8	1	3	1	77	6–7
Podkamennaya Tunguska	3	2	1	*	1	1	3	7	5	2	1	3	28	9–10
Shologontsy	*	*	*	*	*	1	2	4	2	*	*	1	10	25
Yakutsk	17	10	2	1	*	*	1	1	1	2	5	16	56	30
Petropavlovsk	*	*	1	4	11	15	17	13	7	2	1	*	71	15
Nizhneudinsk	6	4	2	1	3	7	16	18	12	4	4	6	83	10
Aksha	*	*	*	1	2	5	11	15	8	1	*	*	42	10
Ekimchan	1	*	0	1	4	14	21	25	19	5	1	1	90	10
Vladivostok	1	2	9	16	17	25	25	20	9	7	6	5	142	10

*<0.5 day.

FIGURE 37. Mean number of days with thunderstorms (U/OU)

REGION AND STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
U.S.S.R., West:														
Murmansk	*	*	*	0	*	2	2	1	*	0	0	*	5	28
Ostrov Vaygach	0	0	0	0	0	*	1	1	*	0	0	0	2	23
Syktyvkar	0	0	*	*	2	6	7	4	1	0	0	0	20	30
Aleksandrovskoye	0	0	0	*	2	6	8	5	1	*	0	0	23	28
Riga	*	0	*	1	3	5	6	4	2	*	*	*	22	21
Moscow	0	0	0	*	2	4	4	3	1	*	0	0	14	16
Orenburg	0	0	*	1	4	7	8	5	1	*	0	0	26	30
Pavlodar	0	0	0	*	2	6	6	4	1	0	0	0	19	29
Simferopol	*	0	0	*	3	6	5	4	2	1	*	0	22	10
Makhachkala	0	0	0	*	1	4	4	4	1	*	*	0	14	29
Chimbay	*	0	0	1	1	2	*	*	*	*	0	0	4	7–8
Tashkent	0	*	0	1	3	1	*	*	*	*	*	0	7	7–8
U.S.S.R., East:														
Ostrov Dikson	0	0	0	0	0	*	1	1	0	0	0	0	2	23
Tiksi	0	0	0	0	0	*	1	1	0	0	0	0	2	25
Zyryanka	0	0	0	0	*	2	2	1	0	0	0	0	5	30
Mys Shelagskiy	0	0	0	0	0	*	*	0	*	0	0	0	1	6–7
Podkamennaya Tunguska	0	0	0	0	1	5	8	4	1	0	0	0	19	30
Shologontsy	0	0	0	0	*	4	5	1	*	0	0	0	10	25
Yakutsk	0	0	0	0	1	4	5	2	*	0	0	0	12	30
Petropavlovsk	0	*	0	0	*	0	0	*	*	*	0	0	1	9
Nizhneudinsk	0	*	*	*	1	6	12	8	2	0	0	0	29	10
Aksha	0	0	*	1	1	6	10	6	1	0	0	0	26	10
Ekimchan	0	0	0	*	2	8	9	7	3	*	*	0	29	10
Vladivostok	0	0	0	0	1	2	1	1	3	1	*	0	9	10

*<0.5 day.

FIGURE 38. Distinctive geographic factors (U/OU)

GEOGRAPHIC REGION	SURFACE CONFIGURATION	DRAINAGE
Central plains	Rolling or dissected plains bisected by rounded hills and mountains of the Ural Range (Figure 1). Local relief in rolling plains 50 to 300 feet, slopes generally less than 5%; 50 to 500 feet in dissected plains, slopes 10% to 45%. Scattered hills along Romanian border, in Volga Uplands, and in far southeast. Relief in Urals 500 to 2,500 feet, slopes 20% to 30%. Rugged Carpathian Mountains in southwest have relief of 2,000 to 3,000 feet and slopes 30% to 45%.	Drained by several major river systems. East of Urals by northward-flowing Ob and its tributaries. Interstream areas are interior drainage basins with many salt lakes. Network of major streams west of Urals; direction of flow generally southward. Northwest part of region predominantly marshes, swamps, and lakes.
Caucasus Mountains	Parallel, sharp-crested mountains with snowfields, glaciers, and other alpine characteristics. Relief up to 6,000 feet; slopes exceed 45%. Ranges separated by nearly flat to gently rolling lowland corridors and flanked on north by plateau-like uplands cut by terraces and ravines.	Swift-flowing, narrow streams in mountains. Rivers on corridor lowlands have braided, meandering channels, low velocities.
Caspian-Central Asian lowlands	Nearly flat to rolling plains. Some dissected hills and plains in northeast. Numerous depressions along east coast of Caspian Sea, isolated hills in south and east. Slopes generally less than 5% except in dissected hills and depressions. Relief mostly less than 300 feet.	Drainage generally interior to lakes and marshes, a few perennial streams flow into Caspian and Aral Seas. Streamflow dependent upon snowmelt in mountains and thunderstorms. Many slat lakes.
Southern and Eastern Mountains	Alpine-type mountain chains flanked by dissected hills and separated by nearly flat to rolling broad river valleys. Slopes in mountains generally exceed 45%, in the hills 10% to 45%, and in river valleys less than 5%. Relief commonly exceeds 6,000 feet in mountains, 1,000 to 2,000 feet in hills, and 200 to 500 feet in lowlands.	Generally torrential mountain streams and meandering, braided valley streams in Southern Mountains. Drainage in Eastern Mountains by swift-flowing mountain streams and by sluggish, major streams with large discharge volumes in lowlands.
Subarctic swamp and forest	Eastern half predominantly rolling hills and rounded mountains. Relief 2,000 to 3,000 feet in mountains, 500 to 1,000 feet in hills. Slopes generally 10% to 30%. Dissected plains in Lena river basin. Most of western half nearly flat to rolling plains with relief less than 300 feet. Slopes generally less than 10%. Ural Mountains bisect area north-to-south; relief of 2,000 to 3,000 feet, slopes of 30%.	Drainage predominantly by major north-flowing rivers and their tributaries. Vast expanses of marshes, swamps, and bogs. Many lakes and peat bogs west of Urals.
Arctic barrens	Nearly flat to rolling lowlands with isolated hills and a mountain range near center of the region. Relief generally less than 350 feet. Slopes less than 5% except in isolated hills and mountain range.	Drainage predominantly by large, sluggish, ice-jammed rivers flowing into Arctic Ocean. Vast areas of bogs and marshes in interstream areas.
Insular and peninsular far east	Volcanic mountain ranges flanked by narrow coastal plains and small areas of hills. Many mountain peaks 8,000 feet above valley floors. Slopes in mountains exceed 45%; 15% to 30% in hills, coastal plains less than 10%.	Drainage by torrential mountain streams and meandering, braided streams on plains.

VEGETATION	CLIMATE	CULTURE FEATURES
Predominantly extensive croplands and grasslands with scattered patches of forests on highlands and dissected terrain. Northwest area dairyland, forests, and swamps.	Cold winters, mild summers. Growing seasons comparable to North American wheat lands.	Most densely populated section of Soviet Union with much of country's industrial and agricultural production facilities. Dense railroad network west of Urals; moderately dense road system. East of Urals railroad network connects industrial and agricultural centers; road system is sparse.
Complex pattern of deciduous and evergreen forests and grasslands among snowfields and barren rock in mountainous areas. Croplands and grasslands in lowland corridors. Desert vegetation in extreme southern sections.	Alpine in mountainous areas. Subtropical along Black Sea coast and in lowland corridors.	Moderate population density in lowland corridors and along coasts of Black and Caspian Seas. Transportation networks limited to lowland corridors and coastal areas.
Predominantly desert. Grasslands and croplands along major stream channels and northern boundary of region.	Semiarid to desert climate.....	Population density sparse except in irrigated areas, along cultivated stream valleys, and in scattered industrial areas based on mineral wealth. Transportation network limited to stream valleys and between industrial areas.
Predominantly dense evergreen forests to treeline in Eastern Mountains with marshes, bogs, grasslands in lowlands and river valleys. Mixed patches of forest and grassland in Southern Mountains with deserts or barren areas in southern border areas. Croplands and grasslands in stream valleys.	Alpine in Eastern Mountains with very short, cool summers. Also alpine in higher mountains in south. Semiarid conditions in hills and at lower elevations. Summers warm to hot in lowlands.	Very sparsely populated except along Trans-Siberian railroad, in mining areas, and cultivated stream valleys. Transportation network limited to railroad system and a few navigable waterways.
Predominantly dense evergreen forests interspersed with patches of deciduous forests, peat bogs, marshes, swamps, and grasslands.	Very cold winters; short, hot summers.	Sparsely to very sparsely populated. Forestry and mining activities in a few areas. Sparse networks of railroads and roads connect scattered settlements in areas west of Urals.
Predominantly bogs and tundra of short grass.	Long, very cold winters; short, warm summers.	Very sparsely populated. Some populated places in areas of rich mineral deposits in northwest, Kola Peninsula, and in Noril'sk area. Only good transportation network on Kola Peninsula.
Wide range of vegetation from snowfields and barren alpine heights to deciduous forests, grasslands, and bamboo thickets.	Severe winters with deep snows; mild, short summers.	Very sparsely populated except for fishing villages and seaports. Transportation network very poorly developed.

FIGURE 39. Selected amphibious landing areas (C)

MAP REF. NO.*	LOCATION	APPROACH	BEACH	TERRAIN BEHIND BEACH AND EXIT
1	On coast of Barents Sea in vicinity of Teriberka (50 miles east of Polyarnyy).	Offshore approach clear but flanked on east side by tombolo and by submerged rocks. Nearshore approach partly obstructed by sandbars up to 100 yards off low water line. Nearshore bottom mud; nearshore bottom gradient ranges from 1 on 30 to 1 on 120. Average winter sea ice rarely forms along this coast. In severe winters sea ice may be present from February to May. Surf 4 feet or higher infrequent during all seasons. Tidal range 10.3 feet, springs.	One beach, 1 mile long; all usable; width 30 to 125 yards at low water, 10 to 25 yards at high water; gradient 1 on 15 to 1 on 30, low water to high water, 1 on 15 in high water zone. Material: sand.	Beach immediately backed by lowland 75 to 1,000 yards wide, narrowing to river valley behind west half; rugged hills back lowland behind east half and extend several miles inland. Exits cross-country or by trails to minor port of Teriberka behind west part of beach.
2	Along coast of Baltic Sea for approximately 40 miles in vicinity of Riga.	Offshore approach clear except for wrecks; nearshore approach partly obstructed by scattered rocks, shifting sandbars, and spoil ground. Nearshore bottom sand; nearshore bottom gradient ranges from 1 on 60 to 1 on 135. Few places suitable for dry-ramp LST landings. Ice generally forms in December and lasts until April; navigation hindered only during January through March. Surf 4 feet or higher ranges from 12% in May to 30% in February and August. Tidal range negligible.	Three beaches ranging in length from 9 to 13 miles; total length 35 miles, all usable; widths range from 30 to 500 yards. Material: sand.	Two beaches backed by brush-covered dunes and ridges and one beach by cliff; all, in turn, backed by level to undulating cultivated plain crossed by rivers and streams; scattered marshy areas, swamp, and villages on plain. Exit by tracks and trails or by streets of towns and villages to surfaced coastal road 100 yards to 3 1/2 miles inland.
3	Along coast of Black Sea for approximately 15 miles in vicinity of Odessa.	Offshore approach partly obstructed by a bank, shoals, rocks, and a few piers and flanked by wrecks; nearshore approach partly obstructed by shoals, rocks, and a few piers; nearshore bottom mud, sand, and shell; nearshore bottom gradients 1 on 60 to 1 on 130. Few places suitable for dry-ramp LST landings. Ice occurs approximately 40 days a year between early January and early March. Surf 4 feet or higher 7% of the time during summer and infrequent during all other seasons. Tidal range negligible.	Three beaches ranging in length from 450 yards to 4 miles; total length 5 1/2 miles, all usable; widths range from 10 to 50 yards; gradient ranges from 1 on 30 to 1 on 60. Material: sand and gravel.	Two beaches backed by sandy strip and one beach by dump area; all, in turn, backed by partly cultivated plain; lake on plain. Exit by tracks and trails or by city street to surfaced coastal road 75 to 1,000 yards inland.

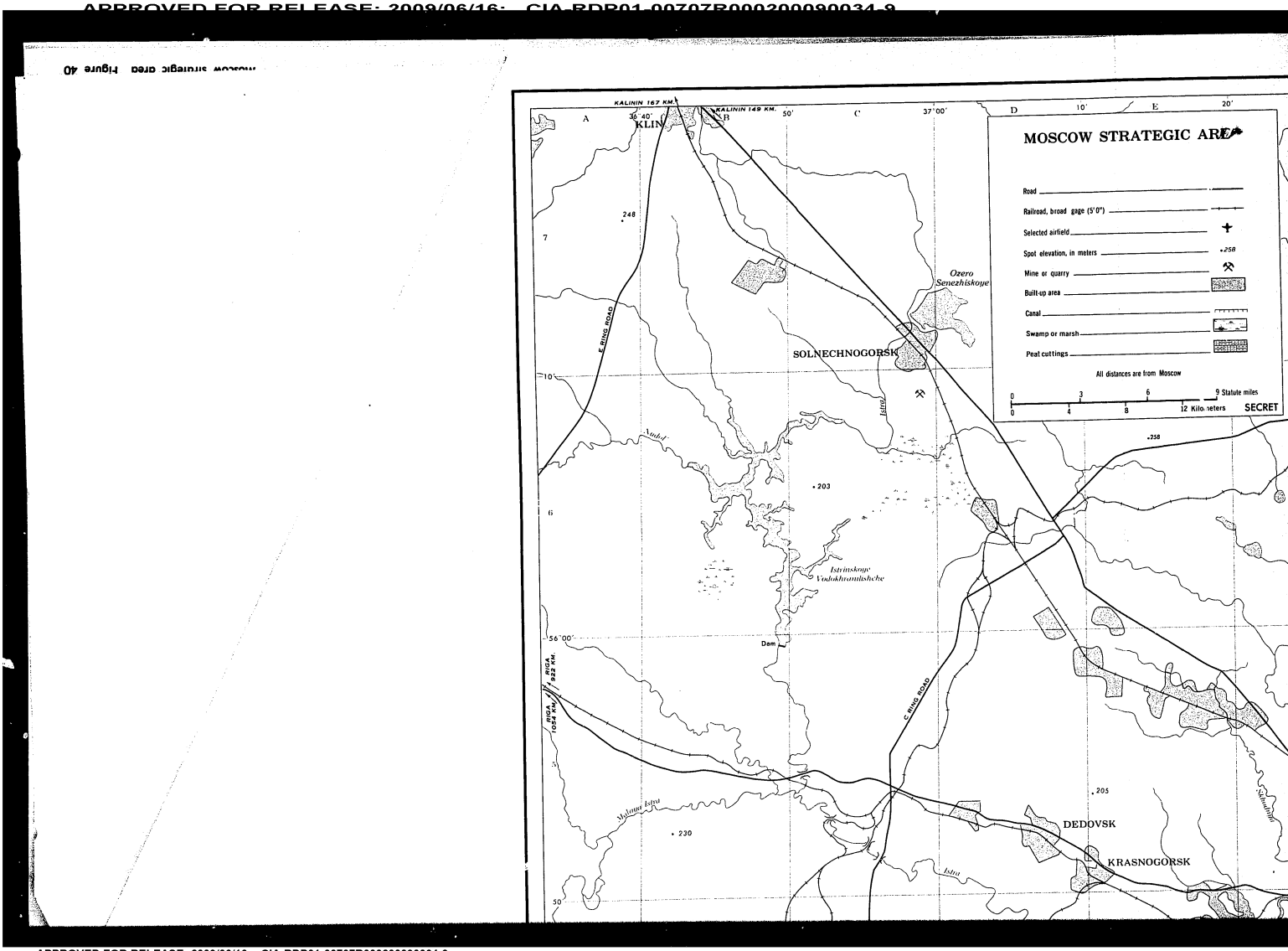
4	Along coast of Black Sea for approximately 19 miles in vicinity of Yevpatoriya.	Offshore approach mostly clear except for shoal; nearshore approach partly obstructed by shifting sandbars and shoal; nearshore bottom sand, mud, gravel, and shell; nearshore bottom gradients 1 on 60 to 1 on 135. Few places suitable for dry-ramp LST landings. Ice less than 10 days in February. Surf 4 feet or higher 12% of the time January to March, 7% April to June, 6% July to September, 8% October to December. Tidal range neglibible.	Five beaches ranging in length from $1^1/_2$ to $7^1/_2$ miles; total length $15^3/_4$ miles, all usable; widths range from 15 to 50 yards; gradient ranges from 1 on 15 to 1 on 30. Material: sand, shell, and gravel.	Beaches backed by partly marshy, sandy area and by minor port; in turn backed by level to undulating partly cultivated plain; numerous villages on plain. Exit by tracks and trails to village streets. Surfaced roads lead inland from Yevpatoriya.
5	Along coast of Black Sea for approximately 7 miles in vicinity of Feodosiya.	Offshore approach clear; nearshore approach clear except for wreck; nearshore bottom mud, sand, and shell; nearshore bottom gradients 1 on 30 to 1 on 120. Few places suitable for dry-ramp LST landings. Ice less than 10 days a year in February. Surf 4 feet or higher expected 5% of the time January to June, 7% October to December, and infrequent in other months. Tidal range negligible.	Two beaches $1^3/_4$ and $3^3/_4$ miles long; all usable; widths range from 10 to 40 yards; gradient ranges from 1 on 15 to 1 on 30. Material: sand, gravel, shell, and cobbles.	Beaches backed by partly cultivated undulating plain; lakes and marshy area on plain. Exit by tracks, trails, and surfaced coastal road.
6	Along coast of Black Sea for approximately 38 miles in vicinity of Sukhumi.	Offshore approach mostly clear except for scattered rocks; nearshore approach partly obstructed by shifting sandbars, rocks, and wrecks; nearshore bottom sand, shell, gravel, and rocks; nearshore bottom gradients 1 on 30 to 1 on 120. Places with nearshore gradients of 1 on 50 or steeper suitable for dry-ramp LST landings. Ice less than 10 days a year in February. Surf 4 feet or higher expected 12% of the time January to March, 10% April to June, 12% July to September, 8% October to December. Tidal range negligible.	Eight beaches ranging in length from $1^1/_2$ to $11^1/_4$ miles; total length $33^3/_4$ miles, all usable; widths range from 5 to 60 yards; gradients 1 on 15. Material: sand, gravel, some cobble and sand.	Four beaches backed by sandy area fronting a cultivated plain; four beaches backed by cultivated plains extending inland to hills; plains covered by brush and woods, some cultivation, scattered villages. Exit by tracks, trails, unsurfaced roads, or streets of town to surfaced coastal road.
7	Along coast of Black Sea for approximately 36 miles between Poti and Batumi.	Offshore approach mostly clear except for shoal; nearshore approach partly obstructed by shifting sandbars, shoal, and rocks; nearshore bottom sand, shell, rocks, and mud; nearshore bottom gradients 1 on 15 to 1 on 180. Places with nearshore gradients of 1 on 50 or steeper suitable for dry-ramp LST landings. Ice less than 10 days a year in February. Surf 4 feet or higher expected 9% of the time January to March, 7% April to June, 5% July to September, 7% October to December. Tidal range negligible.	Thirteen beaches ranging in length from 700 yards to $5^3/_4$ miles; total length $27^1/_2$ miles, all usable; widths range from 10 to 100 yards, gradient ranges from 1 on 15 to 1 on 60. Material: sand, sand and gravel, some cobble.	Eight beaches backed by sandy beach ridges and port. Most of these beaches, as well as other beaches, backed in turn by cultivated and partly marshy plain extending to forested hills; swamps, streams, and villages on plain. Exit by tracks, trails, streets, unsurfaced roads, and surfaced coastal road.

Footnote at end of table.

FIGURE 39. Selected amphibious landing areas (C) (*Continued*)

MAP REF. NO.*	LOCATION	APPROACH	BEACH	TERRAIN BEHIND BEACH AND EXIT
8	From Nakhodka westward along coast of Sea of Japan for approximately 56 miles.	Offshore approaches clear except for a few scattered shoals in the eastern half of the area; nearshore approaches partly obstructed by bars off most beaches, scattered rocks and shoals, and a few piers. Nearshore bottom sand, mud, rock, and gravel; nearshore bottom gradients 1 on 15 to 1 on 105. Places with nearshore gradients of 1 on 50 or steeper suitable for dry-ramp LST landings. Sea ice normally forms in mid-December and lasts until late March. During severe winters sea ice may form in late November and persist until early April. Surf 4 feet or higher ranges from infrequent in summer, winter, and autumn to a maximum of 11% in spring. Tidal range 1 foot, springs.	Total of 18 beaches, ranging in length from 180 yards to 7 1/2 miles; total length 11 1/2 miles, 11 1/4 miles usable; widths range from 10 to 30 yards; gradient ranges from 1 on 5 to 1 on 60. Material: sand and gravel.	Most beaches are backed by sandy strips or by escarpments fronting partly marshy and partly cultivated lowlands or valleys extending inland to nearby wooded hills. Exits by tracks, trails, or unsurfaced roads to nearby towns; routes lead inland to a surfaced coastal road.

*Numbers correspond to those shown on Figure 46.



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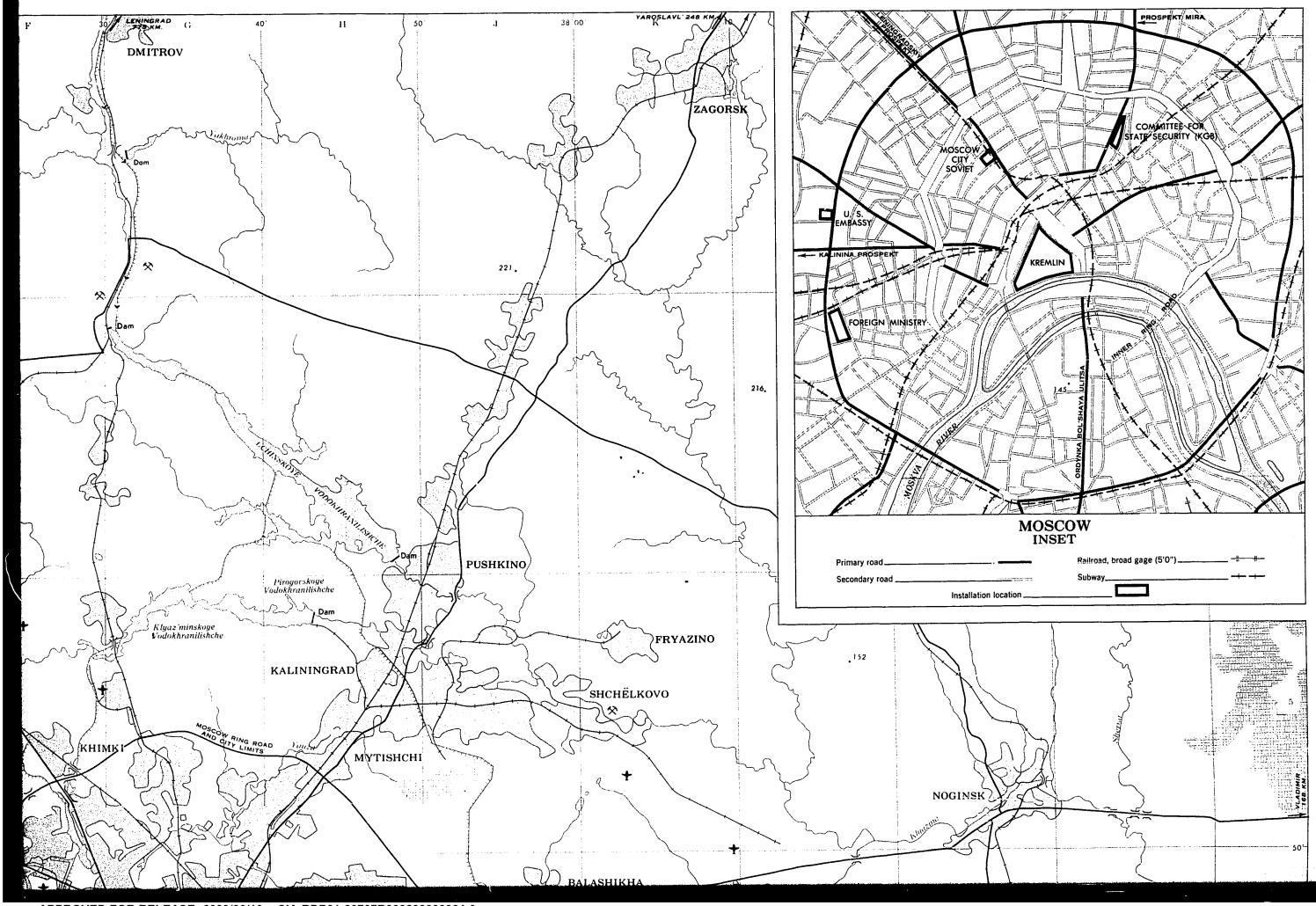
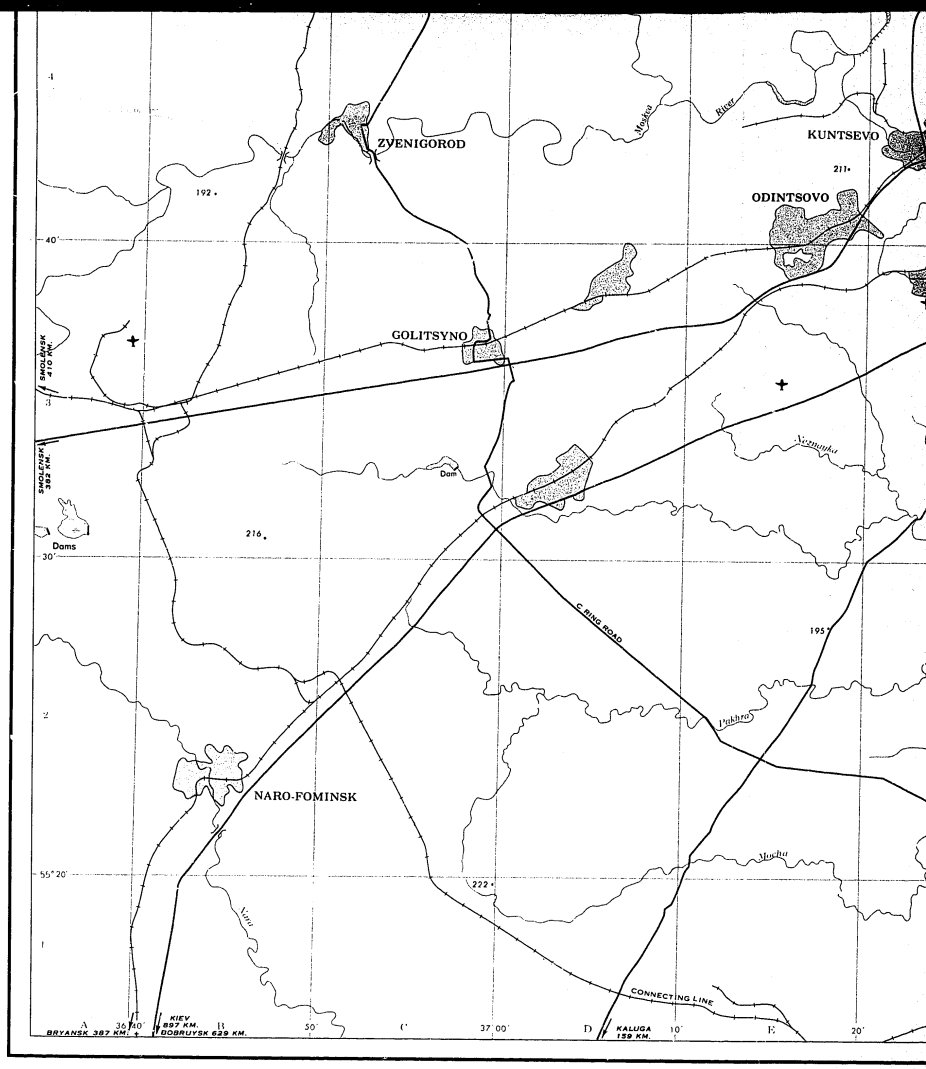




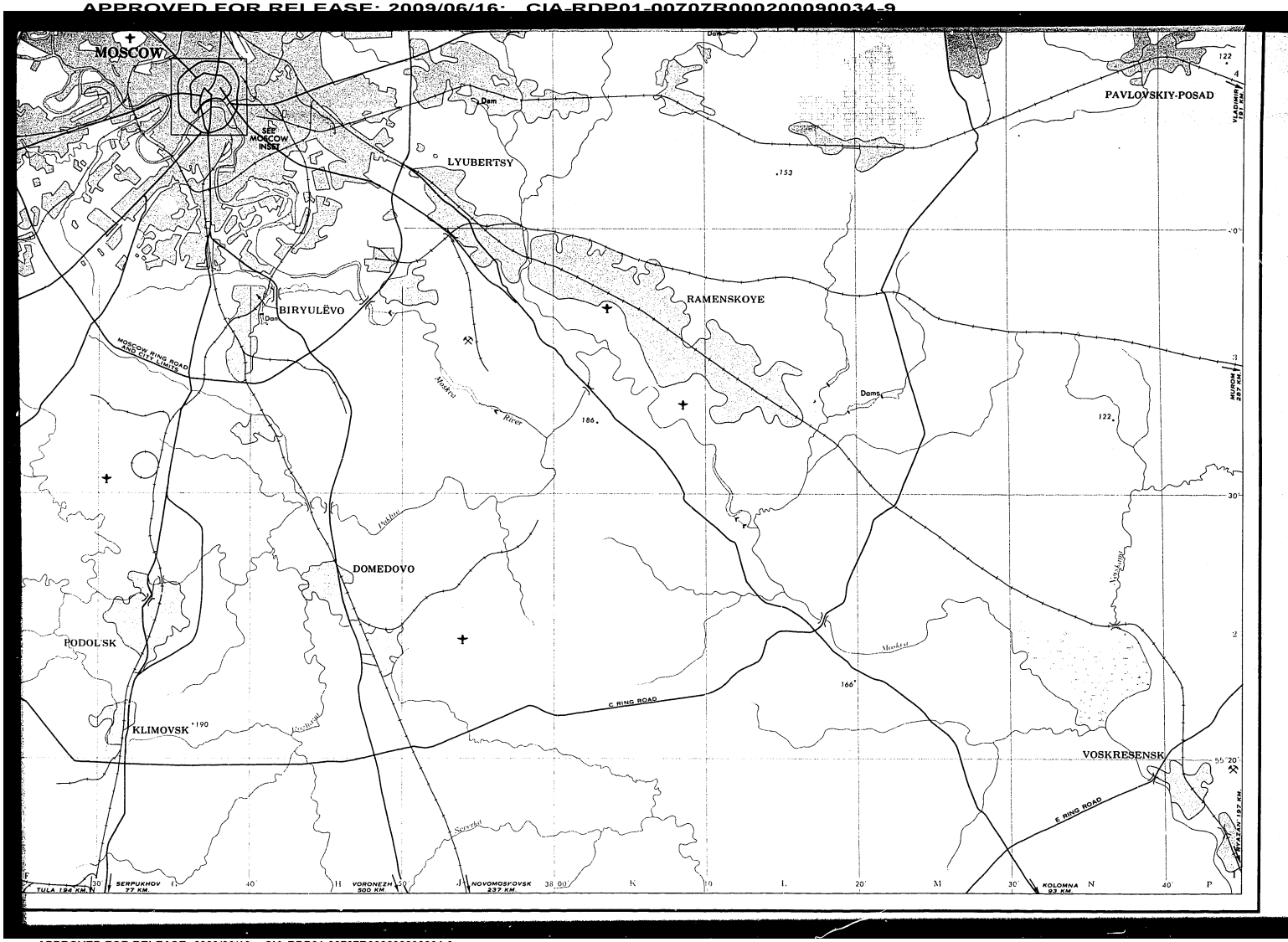


FIGURE 41. Other important areas (S)

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Alma-Ata (Figure 46).....	798,000	43°15′N., 76°57′E.	Second largest city in Soviet Central Asia and capital of Kazakh S.S.R. Nationally significant industrial plants produce heavy machinery and munitions. Production of underwater ammunition, including sea mines (20% of national production) and torpedoes (over 10% of national production). Also makes electrical and telecommunication equipment, machine tools, construction materials, consumer goods. Headquarters of Central Asian Military District and a Tactical Aviation Headquarters. Billeting for about 15,000 troops. Two important military airfields, both long-range bomber-capable bases. Telecommunication and transportation hub. Railroad and highway connections with areas bordering the People's Republic of China. Educational, scientific, and computing center.
Arkhangel'sk.....	362,000	64°33′N., 40°32′E.	Country's leading lumber center and principal commercial port in Soviet Arctic. Main supply base for ports and military posts on Northern Sea Route. Shipbuilding and ship repair activities in city and in satellite town of Severodvinsk (estimated population in 1973, 160,000) include largest Soviet naval shipyard and only European U.S.S.R. shipyard constructing ballistic-missile-armed nuclear submarines (capacity 30% to 40% of national total). Naval base supports naval forces and various weapons systems. Important airfields include two arctic staging bases and a medium bomber base. Nuclear weapons storage. Major transshipment point between railroad and coastal or inland waterway traffic; facilities include largest railroad terminal on White Sea.
Ashkhabad.....	272,000	37°57′N., 58°23′E.	Capital of Turkmen S.S.R. in Soviet Central Asia. Largest and most important city in Soviet Central Asia near border of Iran (20 miles to south). Military center with billeting capacity for more than 10,000 troops. Civil airfield can serve as long-range bomber-capable base; fighter aircraft base northwest of city. Headquarters for rifle corps. Hub of transportation routes including highway to Iran and navigable canal to Amu Darya River; extension of canal in progress westward to Caspian Sea. Variety of industrial plants including textiles, construction materials, glass, and metalworking. Manufactures oilfield drilling equipment. Cultural, educational, and computer center.
Chita.....	264,000	52°03′N., 113°30′E.	Largest military center in central Siberia. City strategically located near borders of Mongolia and the Peoples's Republic of China, about 190 and 250 miles distant, respectively. Headquarters of Transbaykal Military District, Tactical Aviation and Rocket Forces, controlling about 60 ICBM sites in area. Billeting facilities for about 17,000 troops. Numerous military storage depots, tank repair, and maintenance facilities. Long-range bomber-capable base in southwest. Transportation hub on Trans-Siberian railroad has extensive railroad repair and maintenance facilities; junction of a rail line and hard surface roads leading to Monogolia and China.

FIGURE 41. Other important areas (S) (*Continued*)

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Dushanbe	409,000	38°33′N., 68°48′E.	Capital of Tadzhik S.S.R. in Soviet Central Asia. City strategically located about 100 miles north of Afghanistan border. Numerous billeting and military storage facilities in and near city. Two important airfields: a civil airfield that can serve as long-range bomber-capable base and a fighter aircraft base. Hub of transportation routes with railroads and highway leading to Afghanistan. Major industrial center, engaged primarily in processing cotton and construction resources; also produces machinery, cable and electrical equipment, construction materials, consumer goods of regional importance. Telecommunication, educational, scientific center. City will soon be linked to multi-purpose Nurek dam and hydroelectric project, about 45 miles southwest; dam will be one of highest in world, with very large reservoir for irrigation purposes, 2.7-million kilowatt powerplant.
Frunze	464,000	42°52′N., 74°35′E.	Capital of Kirgiz S.S.R. in Soviet Central Asia. Several nationally significant industries. Products include metal-cutting lathes, small arms ammunition, agricultural machinery and spare parts. Also electrical equipment, electric motors, dump trucks, textiles, processed meat items. Two important airfields: military field in eastern environs is long-range bomber-capable base; civil airfield capable of sustaining light-bomber operations. Telecommunication and transportation hub. Educational, scientific, and computing center.
Gor'kiy	1,223,000	56°18′N., 43°53′E.	Large manufacturing center (including satellite city of Dzerzhinsk, estimated 1973 population 232,000) about 250 miles east of Moscow, surpassed only by Moscow and Leningrad. Ranks first in production of motor vehicles, rivercraft, metal-cutting machine tools. Largest, most important chemical complex in Soviet Union. Principal center of production for military goods; ranks first in jet fighter aircraft, armored personnel carriers, military electronics (including guidance and control equipment for surface-to-air missile systems). Nationally significant production of submarines, guided-missile propellants, aviation fuels, artillery, ammunition, telecommunication equipment, chemical warfare agents. Total billeting capacity exceeds 12,000 troops. Three important airfields, including fighter base, test and flyaway field serving the aircraft industry, and a civil airfield capable of sustaining light-bomber operations. Major port, rail–water transshipment point, ship repair center, and largest inland shipyard in U.S.S.R. Headquarters of Volga fleet.
Groznyy	362,000	43°19′N., 45°39′E.	Nationally important oil producing, refining, petrochemical center in northern foothills of Caucasus Mountains. Large output of high octane aviation fuels. Extensive petroleum products storage. Manufactures oil refining and mining equipment. Petrochemical products include phenol (13% of national production), acetone, ethyl and synthetic alcohol, polymers, and other chemicals. Country's foremost institute for education and research in petroleum industry. Fighter aircraft base nearby.

FIGURE 41. Other important areas (S) *(Continued)*

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Karaganda	551,000	49°49′N., 73°08′E.	Karaganda (and its satellite town Temirtau about 20 miles northwest, estimated 1973 population 186,000) in Soviet Central Asia form nucleus of large industrial complex covering about 3,100 square miles. Third most important source of bituminous coal (after Donbas and Kuznets Basins) in country. Supplies increasing amounts of excellent coking coal to Central Asian, Volga and Ural regions. Total output of coking coal about 12% of national production. Also nationally important industries based on coal mining activities; includes three mining machinery plants, ferrous metallurgical, and chemical enterprises. All towns in area built within last 40 years.
Kiyev (Kiev)	1,836,000	50°27′N., 30°31′E.	Third largest city in U.S.S.R. and capital of Ukrainian S.S.R. High ranking cultural, educational, scientific center. Military District Headquarters, Air Force and Air Defense District Headquarters. Extensive military facilities; total billeting capacity more than 44,000 troops. Important airfields include an intermediate-range bomber-capable base, two fighter aircraft bases, inactive intermediate-range bomber-capable base currently used by adjacent airframe plant. Machine tool factories; a major producer of precision engineering instruments and heavy machinery. Country's largest excavator plant, accounting for 20% of national production. Key junction of transportation routes and telecommunication systems between European U.S.S.R. and Eastern European countries. Major Dnepr river port; major rail–water transshipment facilities. Academy of Sciences institute with important cybernetics center.
Krasnoyarsk	708,000	56°01′N., 92°56′E.	Military and industrial complex in central Siberia, strategically located at point where Trans-Siberian railroad crosses Yenisey River. ICBM complex with more than 70 launch sites deployed in area of about 2,000 square miles west of Yenisey River and north of Trans-Siberian railroad. National underground stockpile of nuclear weapons and significant atomic energy and missile-related installations about 25 miles northeast of city. Billeting for up to 15,000 troops. Civil airfield capable of sustaining light-bomber operations. Industrial output includes propellants for conventional weapons systems (16% of national output), military radiocommunication equipment, high explosives, ammunition, rocket motors. Other products of national significance are aluminum (14% of national output), steel, cranes, heavy machinery, synthetic rubber and tires, chemicals, cellulose, paper. Site of largest hydroelectric power-plant in world, 24 miles southwest of city (6 million kilowatts). Rail–water transshipment point; extensive port facilities.

FIGURE 41. Other important areas (S) *(Continued)*

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
L'vov	596,000	49°51'N., 24°01'E.	Strategically important junction of railroads and highways between European U.S.S.R. and Eastern European countries. Located about 30 miles east of Poland border, on shortest railroad routes between Soviet ports in Baltic and Black Sea areas. Extensive railroad facilities. Carpathian Military District Headquarters, Tactical Air Army Headquarters, and communications center. Extensive military facilities; total billeting capacity exceeds 18,000 troops. One light-bomber base, one intermediate-range bomber-capable base. Large production of electronic, electrical, telecommunication equipment. Also manufactures industrial, agricultural, transportation, machine building equipment. Output of interurban buses about 60% of national total; production of mobile construction cranes nearly a third of national total. Principal commercial and agricultural center of western Ukraine.
Magadan	101,000	59°34'N., 150°48'E.	Supply base and administrative center in country's richest goldfield region, the vast northeastern part of Soviet Far East. Accounts for about 75% of national gold production. Magadan Oblast, center of gold production, has 32 placer mines, 18 dredges, more than 100 sand-washing rigs. Also mining of tin, mercury, wolfram, molybdenum, coal. City is center of region's vital sea, air, and road communications. Well-protected harbor on Sea of Okhotsk, kept open in moderate winters by icebreakers. Port contains summer operating base for submarines, destroyers, patrol craft of Soviet Pacific Fleet. Kolyma Highway, only road in the region, leads northward about 600 miles and connects most mining areas and settlements. Civil airfield capable of sustaining heavy- or medium-bomber operations. Industrial output includes manufacture and repair of mining equipment, drilling machinery.
Minsk	1,029,000	53°54'N., 27°35'E.	Capital of White Russian (Belorussian) S.S.R. Located about 150 miles east of Poland border, city is key junction of transportation routes between Moscow and Eastern European countries. Belorussian Military District Headquarters, Tactical Air Army Headquarters, Western Air Defense District Headquarters. Extensive military facilities; total billeting capacity exceeds 42,000 troops. Four major airfields: medium-bomber base, fighter aircraft base, two fields with intermediate-range bomber capabilities. Nuclear weapons storage. Important industrial complex, with major production of machine tools, tractors, transportation and communication equipment. Country's largest single manufacturer of tractors, producing approximately 20% of national output. Also produces military communications equipment and radar. Computer production third largest in nation. Cultural, educational, scientific center. Academy of Sciences institute and nuclear research center.

FIGURE 41. Other important areas (S) *(Continued)*

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Murmansk	338,000	68°58′N., 33°04′E.	Most strategic ice-free port complex in Soviet Arctic. Principal Soviet military base closest to eastern United States. Primary operating base for ballistic-missile-armed nuclear submarines. Headquarters of Northern Fleet and Coastal Defense Forces. Extensive naval repair and supply facilities; total billeting capacity exceeds 15,000 troops. Important airfields include two staging bases for heavy and medium bombers, plus two medium-bomber bases. Nuclear weapons storage. Important seaplane station. Largest Soviet fishing center in Arctic; annual catch approximately 25% of national output. Fish processing facilities among country's largest. Shipbuilding and ship repair for trawler fleets. Western terminus of Northern Sea Route. Large rail-water transshipment facilities in satellite town Severomorsk (estimated 1973 population 60,000).
Noril'sk	149,000	69°20′N., 88°11′E.	Major mining and metallurgical center in northern part of central Siberia. Large deposits of metallic ores provide basis for production of nickel (nearly 50% of national putput), cobalt (about 20% of national output), copper (10% to 12% of national output), platinum and platinum metal (about 75% of national output). Rich coal deposits also mined. Other products include coke, chemicals (oxygen, sulfuric acid, benzene, toluene, phenol), construction materials. Military airfield northwest of city is a staging base for heavy and medium bombers. Noril'sk connected by 75-mile railroad with Dudinka (estimated 1973 population 21,000), the most important Arctic port east of Arkhangel'sk; port also serves Yenisey River traffic.
Odessa	969,000	46°29′N., 30°43′E.	Odessa and adjoining town Il'ichevsk (estimated 1973 population 32,000) constitute largest maritime port complex (presently 23 million metric tons of cargo handled yearly) in U.S.S.R. Daily military discharge capacity about 63,000 metric tons. Has strategic location on Black Sea, about 80 miles northeast of Romania border. Extensive ship repair center, including country's largest floating drydock (lifting capacity 60,000 metric tons). Major rail center; significant distribution and rail-water transshipment facilities. Naval base and Odessa Military District Headquarters. Long-range ASW-capable seaplanes. Highly diversified industrial center. Largest producer of tractor plows, accounting for more than half of national output. Major production of heavy cranes. Important shipbuilding and ship repair activities. Soviets plan construction of two new port areas in vicinity, making this area one of world's most significant port complexes.

FIGURE 41. Other important areas (S) *(Continued)*

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Omsk	906,000	55°00′N., 73°19′E.	Significant industrial center in central Siberia on Irtysh River. Ranks, after Ufa, as leading petroleum refining complex east of Urals; has about 7% of country's refining capacity. Integrated petrochemical industry; major producer of synthetic rubber, rubber products, tires, carbon black, chemicals, plastics. Large production of aircraft, tanks (about 10% of national total), antiaircraft guns, and ammunition. Also telecommunication equipment; machinery for agricultural, chemical, food, light industries. Long-range bomber-capable base in west and fighter aircraft base in east. ICBM site and associated support facilities in northeast. Billeting for more than 10,000 troops. Major rail hub on Trans-Siberian railroad and rail–water transshipment point.
Orsk	234,000	51°15′N., 58°34′E.	Orsk and satellite town Novo-Troitsk (estimated 1973 population 88,000) form large industrial complex in western Siberia. Third largest nickel processing facilities in country (about 15% of national output); cobalt produced as byproduct. Considerable output of steel based on rich, local ore deposits, and metallurgical coke; important byproducts include benzene, toluene, phenol. Integrated petrochemical industry. Petroleum refineries produce gasoline, kerosene, fuel oils, lubricating oils, synthetic alcohol. Other products include heavy machinery for metallurgical and mining industries, agricultural machinery, construction machinery, railroad equipment. Military airfield capable of sustaining heavy- or medium-bomber operations; currently used as training facility.
Petropavlovsk-Kamchatskiy	178,000	53°01′N., 158°43′E.	Major military complex and only naval base in Soviet Far East with unrestricted access to Pacific Ocean. Strategically significant location 1,300 nautical miles from Nome, Alaska. Operating base for long-range submarines and [illegible] craft. Headquarters of Kamchatka Flotilla of Soviet Navy. Home port for Pacific missile range instrumentation ships: missile tracking and aircraft direction finding radio stations. Extensive naval storage depots, including facilities for surface-ship and submarine-borne missiles, explosives, nuclear warheads. Coastal defense sites for cruise missiles. Medium-bomber base in northwest environs, local civil airfield capable of sustaining light-bomber operations. Billeting facilities for about 12,000 troops. Extensive ship repair facilities for naval surface vessels, submarines, ships of regional fishing fleet. Port of call during summer for ships traversing Northern Sea Route.

FIGURE 41. Other important areas (S) (*Continued*)

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Riga	767,000	56°59′N., 24°07′E.	Capital of Latvian S.S.R. Important commercial port, rail-water transshipment point handling both domestic and international commerce. Baltic Military District Headquarters. Naval base and shipyard; support center for submarines and surface vessels. Important airfields include light-bomber base, fighter aircraft base, intermediate-range bomber-capable base. Two seaplane stations used for naval patrol. Concentration of military storage depots. Total billeting capacity exceeds 16,000 troops. Nationally important manufacturer of electrical, electronic, and military electronic equipment including radar components, telecommunication equipment, batteries. Also produces motor vehicles, railroad rolling stock, chemicals, textiles. Shipbuilding and extensive repair facilities for merchant and naval vessels, including submarines.
Saratov	804,000	51°33′N., 45°56′E.	Large military and industrial complex. Satellite town Engel's on east bank of Volga River (estimated 1973 population 144,000). Largest ICBM complex in U.S.S.R., consisting of 121 launch sites within 50-mile distance. Heavy-bomber base and intermediate-range bomber-capable base. Long-range aviation division headquarters. Nuclear weapons storage. Produces and assembles guided missiles and component missile systems. Storage battery manufacturing complex, leading producer of submarine storage batteries. Engineering school specializes in rocket technology. On margin of largest gas- and oil-bearing region in U.S.S.R.; has major petroleum refinery. Nationally significant production of machine tools, bearings, trolley buses, synthetic fibers, tractor parts, glass. Major transportation hub; important rail-water transshipment facilities.
Sovetskaya Gavan'	60,000 (includes adjacent town of Vanino)	48°59′N., 140°15′E.	Major naval and air complex for Soviet Pacific Fleet. Submarine and torpedo boat base. Facilities for logistic and operational support to naval vessels. Naval aviation base. Most important airfields, in north, include medium-bomber base and fighter base. Extensive storage depots include facilities for cruise missiles and nuclear weapons. Billeting facilities for about 10,000 troops. Naval and commercial ship repair center. Port of Vanino has large sheltered natural harbor; accommodates ships with unlimited displacement. Northernmost rail-sea transshipment point in Soviet Far East; railroad connection with Trans-Siberian railroad.

FIGURE 41. Other important areas (S) *(Continued)*

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Tallin	385,000	59°25′N., 24°44′E.	Capital of Estonian S.S.R. Strategically located on Gulf of Finland near Sweden and Finland. Naval base and headquarters of Soviet Baltic Fleet. Facilities for building, repairing, fitting, maintenance of naval vessels. Fighter aircraft base and two inactive military airfields capable of sustaining light-bomber operations. Total billeting capacity approximately 12,000 troops. Significant fishing port. Important commercial center, handling both foreign and domestic coastal trade. Center for Baltic Sea passenger services. Extensive rail-water transshipment facilities. Important machine building, electronic, and electrical equipment industries.
Tbilisi	949,000	41°43′N., 44°48′E.	Capital of Georgian S.S.R. Has strategic location about 80 miles northeast of Turkey border. With satellite town Rustavi (estimated 1973 population 112,000) ranks as important industrial complex. One of two producers in country manufacturing electric locomotives; produces approximately one-third of national total. Major production of air-to-surface missiles, aircraft, steel, chemicals. Only known producer of jet trainer aircraft in European U.S.S.R. Transcaucasus Military District and Tactical Air Army Headquarters. Nuclear weapons storage. Extensive military facilities. Important airfields include one fighter and two long-range bomber-capable bases. Total billeting capacity approximately 20,000 troops. A main communications and transportation center, extensive railroad facilities, including major locomotive and railroad car repair facilities.
Tula	487,000	54°13′N., 37°36′E.	In central part of European U.S.S.R., about 100 miles south of Moscow. Nationally important producer of small arms and ammunition; produces entire national output of sniper rifles and twin-barrel antiaircraft cannon. Important manufacturer of diversified agricultural and transportation equipment. Large coal and iron ore deposits support regionally significant metallurgical and mining industries; production of pig iron, alloys, carbon steel. Railroad and highway center linking major manufacturing centers. Satellite town of Shchekino (estimated 1973 population 69,000) has powerplant of more than 1 million kilowatts that supplies Moscow. Nationally significant chemical combine produces ammonia and sulfuric acid. Intermediate-range bomber-capable air base.

FIGURE 41. Other important areas (S) (*Continued*)

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Volgograd	871,000	48°40′N., 44°28′E.	Large military and industrial complex. Important satellite town Volzhskiy (estimated 1973 population 168,000) on east bank of Volga River. Nationally significant producer of armored vehicles, guns, ammunition, explosives. Chemical warfare plant one of three in U.S.S.R. conducting research and production of toxic agents. Kapustin Yar missile complex, about 60 miles east, one of country's three guided-missile test and development centers; only Soviet test range for intermediate- and medium-range ballistic missiles and tactical missile systems, launch site for earth satellite vehicles. One active and one inactive military airfield, both capable of sustaining light-bomber operations. Largest hydroelectric powerplant in Europe (2,563,000 kilowatts). Largest aluminum plant in European U.S.S.R. accounts for 12.2% of national production. Oil refining center with extensive petroleum products storage. Nationally significant production of chemicals, including liquid oxygen, carbon black, caustic soda, chlorine. Also important production of rubber, tires, synthetic fibers, steel and steel products, tractors, bulldozers, excavators, machinery, abrasives, ball bearings. Transportation center, major river–rail transshipment point on Volga River.
Voronezh	713,000	51°40′N., 39°15′E.	Military, industrial, and transportation center in central part of European U.S.S.R. Manufactures jet fighters, electronic and electrotechnical devices. Rocket engine test facility for guided missiles. Two long-range bomber-capable bases. Nationally significant production of airframes, aircraft engines, heavy machinery, excavators, cranes, agricultural machinery, steel bridges, telecommunication equipment. Largest Soviet producer of synthetic rubber, accounting for more than 15% of national output. Center of newly developing metallurgical region. Repair plant for diesel-electric and steam locomotives, about 35 miles south, one of largest in nation. Largest Soviet nuclear powerplant (1.5 million kilowatts).
Yaroslavl'	549,000	57°39′N., 39°53′E.	Industrial center. Nationally important for petroleum refining and petrochemical industries. Largest producer of pneumatic and solid rubber tires, accounting for nearly 25% of national output; second largest producer of synthetic rubber. Also produces diesel engines and textiles. Fighter aircraft base with air-to-air missile support facility. A principal rail center and port on Volga River; major rail–water transshipment point.

FIGURE 41. Other important areas (S) *(Continued)*

NAME	ESTIMATED POPULATION (JANUARY 1973)	COORDINATES	REMARKS
Yerevan.....	845,000	40°11′N., 44°30′E.	Capital of Armenian S.S.R. Military and industrial center. Southernmost major city in European U.S.S.R. located near borders of Turkey and Iran, about 10 and 30 miles south and southeast, respectively. Billeting facilities for nearly 10,000 troops. Primary ground force field headquarters. Inactive air base capable of sustaining heavy- or medium-bomber operations. Important production of missile guidance equipment. Nationally significant production of synthetic rubber, chemicals, electronic, and electrical equipment. Machine tool and machine building industries. Manufactures digital and analogue computers for scientific and nuclear research purposes. Transportation center with international connections to Turkey and Iran.

FIGURE 42. Internal routes (C)

MAP REF. NO.*	ROUTE AND TERRAIN	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
1	Murmansk to Leningrad strategic area. Densely forested mountains, steep hills, and plains. Bogs common in hills and mountains; marshes, swamps, lakes, and streams common in plains.	Two lanes; bituminous and gravel surfaced; fair condition. Some sharp curves and steep grades. Subject to deep snowdrifts from November to April. Portions being reconstructed, completion expected in 1973.	Single track, 5′0″ gage,** from Murmansk to Apatity (115 miles south of Murmansk***) and from Belomorsk to Volkhov. Double track from Apatity to Belomorsk, and from Volkhov to Leningrad. Electrified from Murmansk to Kandalaksha and from Volkhov to Leningrad. Fourteen railroad bridges ranging from 330 to 1,244 feet in length.	Movement unsuited because of rugged terrain near Murmansk and dense forests, marshes, bogs, and deep streams south of Murmansk. Some highly directionalized movement possible when streams frozen (November to mid-April). Snow also hinders movement in winter.
2	Finland border near Vyborg to Leningrad strategic area. Densely forested plains with numerous bogs, lakes, streams, and swamps.	Two lanes; bituminous surfaced; good condition. Moderate gradients and curves.	Single track from Finland border to Ushkovo (35 miles northwest of Leningrad). Double track from Ushkovo to Leningrad. Electrified from Vyborg to Leningrad. Two railroad bridges, 760 and 1,500 feet in length.	Movement unsuited because of wet, soft, and miry ground and dense forests. Some highly directionalized movement possible when streams frozen (December to April).
3	Poland border near Kaliningrad to Leningrad strategic area. Flat to rolling cultivated plains with many forest patches, bogs, and marshes.	Two lanes; bituminous and concrete surfaced; fair to good condition. Bridge over Daugava river at Riga 1,850 feet long. Moderate gradients and curves.	Dual gage, 5′0″ and 4′8½″, from border to Kaliningrad. Double track from Kaliningrad to Chernyakhovsk (56 miles east of Kaliningrad), from Balozi (8 miles south of Riga) to Riga, and from Siverskaya (46 miles south of Leningrad) to Leningrad. Single track from Chernyakhovsk to Balozi, from Riga to Ieriki (46 miles northeast of Riga), and from Pskov to Siverskaya. Electrified from Jelgava (26 miles southwest of Riga), to Riga, and from Luga to Leningrad. Highway only from Ieriki to Pskov. Nine railroad bridges ranging from 550 to 2,500 feet in length.	Movement fair to unsuited. Difficult and highly restricted by forests, streams, bogs, and swamps. Severely restricted by miry ground from early March to early May and mid-October to mid-December.
4	Poland border near Brest to Moscow strategic area. Cultivated and forested plains with numerous marshes, swamps, and streams.	Two to three lanes; bituminous and concrete surfaced; good condition. Gentle grades and moderate curves.	Double track, electrified from Borodino (75 miles west of Moscow) to Moscow. Six railroad bridges ranging from 330 to 550 feet in length.	Movement fair to unsuited. Very difficult and restricted because of forests, marshes, and deep streams. Severely restricted by miry ground from early March to early May and mid-October to mid-December.

Footnotes at end of table.

FIGURE 42. Internal routes (C) (*Continued*)

MAP REF. NO.*	ROUTE AND TERRAIN	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
5	Route connecting internal routes from Poland border (Kaliningrad) to Leningrad strategic area and from Poland border (Brest) to Moscow strategic area. Flat to rolling plains. Streams bordered by swamps and marshes. Large streams deep year round.	Two lanes; bituminous surfaced; fair to good condition. Moderate curves and grades. Road between Kaunas and Vil'nyus is a four-lane divided highway with a concrete surface. Bridge 1,150 feet over Neris river at Kaunas.	Double track. Electrified from Molodechno (48 miles northwest of Minsk) to Minsk. Three railroad bridges ranging from 500 to 1,200 feet, and one tunnel 4,050 feet in length.	Movement poor. Difficult and restricted because of streams, swamps, and soft, miry ground, especially in spring and late autumn.
5A	Poland border near Grodno to route connecting internal routes from Poland border (Kaliningrad) to Leningrad strategic area and from Poland border (Brest) to Moscow strategic area. Flat to rolling plains; forest with swamp and cropland with patches of forest.	From border to Grodno, one to two lanes; mostly bituminous surface, some crushed stone near border; fair to good condition. Remainder two lanes, bituminous surface, good condition.	Double track, 5′0″ gage; dual gage, 4′8½″ and 5′0″, and transloading facilities near border.	Movement generally unsuited in forests and swamps except locally; fair from border to Grodno.
6	Poland border near L'vov to Khar'kov in Donets strategic area. Flat to rolling, grass-covered and sparsely forested plains. Most streams small and steep-banked.	Two lanes; bituminous surfaced; good condition. Moderate curves and grades. Bridge over Dnepr river at Kiyev 5,000 feet long.	Dual gage, 5′0″ and 4′8½″, from Poland border to Mostiska Pervaya (48 miles west of L'vov). Double track from Mostiska Pervaya to Pereyaslavskaya (56 miles southeast of Kiyev). Single track from Pereyaslavskaya to Poltava. Double track from Poltava to Khar'kov. Electrified from Mostiska Pervaya to Baryshevka (40 miles southeast of Kiyev) and from Lyubotin (15 miles west of Khar'kov) to Khar'kov. Eight railroad bridges ranging from 175 to 3,750 feet in length.	Movement good to poor. Easy most of year on grass-covered plains; difficult in spring and late autumn when soils miry.
7	From Brest to route connecting Poland border near L'vov and Donets strategic area. Cultivated, flat to rolling and dissected plains with patches of forest.	Two lanes; bituminous and stone-block surfaced; fair to good condition. Moderate curves and grades.	Single track to Kivertsy (44 miles southeast of Kovel), double track from Kivertsy to Rovno. Three bridges, ranging from 205 to 450 feet in length.	Movement poor to fair. Severely restricted from Brest to Kovel because of dense forests and miry ground. Easier from Kovel to Rovno because of less dense forests and more level terrain, but local flooding and wet ground still pose problems.

8	From amphibious landing area at Odessa to Pskov on route connecting Poland border (near Kaliningrad) to Leningrad strategic area. Flat to moderately dissected plains with small stands of trees and both steep-banked, deep streams and low-banked, shallow streams from Odessa to Kiyev. Flat to rolling plains with numerous bogs, swamps, marshes, and streams from Kiyev to Pskov.	Two lanes; concrete, bituminous, and stone-block surfaced; fair to good condition. Moderate curves and grades. Bridge 1,856 feet long over Desna river at Chernigov.	Highway only from Odessa to Kiyev and from Nevel to Pskov. Double track railroad from Kiyev to Bakhmach (120 miles northeast of Kiyev); single track from Bakhmach to Nevel. Electrified from Kiyev to Bakhmach. Eight railroad bridges ranging from 360 to 3,060 feet in length.	Movement fair to poor. Moderately restricted by steep streambanks and gullies from Odessa to Kiyev. Severely restricted from Kiyev to Pskov by dense forests, marshes, bogs, and swamps. Miry ground and deep streams pose problems.
9	Amphibious landing area near Feodosiya through Donets strategic area to Moscow strategic area. Mostly flat to rolling and dissected grass-covered and cultivated plains with patches of forest. Forested mountains and hills in extreme south.	Two to three lanes; bituminous surfaced with some gravel sections; fair to good condition. Moderate curves and some steep grades.	None in stretch between Feodosiya and Dzhankoy; single track connection between these points is northeast of internal route. Double track, electrified from Dzhankoy to Moscow strategic area. Eleven bridges ranging from 300 to 1,800 feet in length.	Movement unsuited in extreme south because of rugged terrain. Good to fair most of year on grass-covered plains in south. Movement on mostly dissected plains from Khar'kov to Moscow strategic area more difficult, especially during spring and late autumn when soils are soft and miry.
9A	Amphibious landing area near Yevpatoriya to junction with route from Feodosiya to Moscow strategic area. Flat to rolling cultivated plains with fields of grass.	Two lanes; bituminous surfaced; fair to good condition. Moderate curves and some steep grades.	Single track to north of Simferopol; remainder double track and electrified.	Movement good.
10	Iran border near Astara through Baku strategic area to Rostov in Donets strategic area. Mostly grass-covered plains with some low hills. Few large, steep-banked streams, bogs, and marshes.	Two lanes; bituminous and gravel surfaced; fair to poor condition. Some sharp curves, steep grades, and narrow, low-capacity bridges. Sections of road subject to flooding during periods of heavy rains.	Single track from Astara to Alyat (45 miles southwest of Baku), and double track from Alyat to Rostov, includes two single-track lines from Gudermes to Prokhladnyy. Electrified from Alyat to Sumgait (24 miles northwest of Baku) and from Mineral'nyye Vody to Rostov. One railroad and highway bridge 760 feet, and 18 railroad bridges from 350 to 1,900 feet in length.	Movement fair over plains, somewhat restricted by flooding and marshes. Restricted movement on route near Caspian Sea because of marshes and miry ground in spring.

Footnotes at end of table.

FIGURE 42. Internal routes (C) (*Continued*)

MAP REF. NO.*	ROUTE AND TERRAIN	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
11	From route connecting Donets strategic area, near Rostov, and Baku strategic area along east coast of Black Sea, including amphibious landing area, to Baku strategic area. Flat, grass-covered plain from Rostov to Krasnodar. Densely forested mountains and steep hills from Krasnodar to Tbilisi. Mostly flat to rolling plains from Tbilisi to Baku.	Two lanes; bituminous and concrete surfaced; fair to good condition. Numerous steep grades, sharp curves, and narrow bridges. Section of road in mountainous areas subject to landslides and snow blockage.	Single track from Tikhoretsk (85 miles northeast of Krasnodar) to Krymsk (33 miles northeast of Novorossiysk) and double track from Krymsk to Novorossiysk. One railroad bridge 900 feet long. Highway only from Novorossiysk to Tuapse. Single track, electrified from Tuapse to Tbilisi. Double track, electrified from Tbilisi to Rustavi. Single track, electrified from Rustavi to Akstafa (58 miles southeast of Tbilisi). Double track, electrified from Akstafa to Baku. One railroad highway bridge 1,550 feet, 37 railroad bridges ranging from 300 to 1,400 feet, and 9 railroad tunnels ranging from 3,900 to 13,000 feet in length.	Fair to good from Rostov to Krasnodar. Poor and very difficult from Krasnodar to Tbilisi because of steep slopes, some forests, and swift streams. During winter, snow in mountains makes movement very difficult. Fair to good from Tbilisi to Baku on cultivated or grass-covered plains.
11A	Amphibious landing area near Batumi to junction with route that connects Black Sea and Baku strategic area. Hills and mountains; cropland with patches of forest.	Two lanes; bituminous surfaced; good condition. Moderate curves and grades.	Single track, electrified. Six bridges ranging from 275 to 700 feet in length.	Movement unsuited except locally.
12	Turkey border to Tbilisi on internal route that connects Black Sea and Baku strategic area. Forested mountains and steep hills.	One to two lanes; bituminous, crushed stone, and gravel surfaced; good condition. Numerous sharp curves, steep grades, and narrow, low-capacity bridges.	Single track from border to Navtlugi Pervyye (4 miles southeast of Tbilisi). Double track from Navtlugi Pervyye to Tbilisi. Electrified from Leninakan to Tbilisi. Two railroad bridges, 320 and 500 feet, and one tunnel 5,000 feet in length.	Movement poor to unsuited. Difficult and restricted because of rugged terrain, forests, and rock-strewn slopes.
13	Afghanistan border to Tashkent strategic area. Predominantly flat to rolling plains. Few small hills and some steep-sided gullies.	One to four lanes; bituminous, concrete, and crushed stone surfaced; fair to good condition. Moderate curves and grades. Some sections subject to flooding in winter. Ferry across Amu Darya river at Chardzhou. From Syrdar'ya river to Tashkent, road is four lane divided highway with a concrete surface.	Single track from Afghanistan border to Samarkand and from Dzhizak (70 miles east of Samarkand) to Khavast (94 miles south of Tashkent). Double track from Samarkand to Dzhizak and from Khavast to Tashkent. Three railroad bridges, 410, 1,200, and 5,300 feet in length.	Movement fair to good on the plains. Miry soils in spring and drifting, steep-sided sand dunes make movement difficult locally.

14	People's Republic of China border near Kuldja to Sary-Ozek (95 miles northeast of Alma-Ata) on route connecting Tashkent strategic area and Kuznetsk strategic area. Dissected plains and hills, some flat to rolling plains, and some mountains.	Two lanes; bituminous surfaced; fair condition. Numerous sharp curves and steep grades. No seasonal restrictions.	None	Movement poor. Very difficult because of steep slopes and dissected plains. Miry ground and flooding during spring thaw.
15	Mongolia border to Baykal strategic area. Dissected plains flanked by rugged hills.	Two lanes; bituminous surfaced; good condition. No known bottlenecks.	Single track. Four railroad bridges, ranging from 650 to 1,850 feet in length.	Movement poor. Restricted by deep streams and marshes. Miry soils in spring and snowdrifts in winter are additional difficulties.
16	People's Republic of China border near Hailar to Baykal strategic area. Mostly cultivated, flat to rolling and dissected plains.	Two lanes; bituminous, gravel and crushed stone surface; fair to good condition. Sharp curves and steep grades.	Single track. Three railroad bridges, 1,200, 1,300, and 700 feet in length.	Movement on plains fair except when soils miry during spring thaw. Movement in hills unsuited because of steep slopes.
17	People's Republic of China border near Harbin to Far East strategic area. Moderately dissected, cultivated plains and marshland; some hills.	Two lanes; gravel surfaced; fair to good condition. Moderate grades and curves.	Single track. One railroad tunnel 400 feet, one railroad bridge 420 feet in length.	Movement fair. Moderately restricted by dissected slopes and steep-banked streams. Soils miry for a 4-week period starting mid-April. Snow cover may exceed 10 inches in winter.
18	North Korea border to Far East strategic area. Rugged hills, cultivated plains, and marshland.	Two lanes; gravel surfaced; good condition. Moderate grades and curves. Combination highway and railroad bridge, 2,340 feet in length, at Khasan.	Single track. One railroad and highway bridge, 1,770 feet, and 13 railroad bridges ranging from 400 to 1,100 feet in length.	Movement fair. Moderately restricted to difficult because of dissected slopes and steep-banked streams. Soils miry for a 4-week period starting mid-April. Snow cover may exceed 10 inches in winter.
19	Moscow strategic area to Leningrad strategic area. Densely forested plains with numerous bogs, marshes, lakes, and streams.	Two to three lanes; concrete and bituminous surfaced; good condition. Moderate grades and curves.	Double track and electrified. Five railroad bridges ranging from 480 to 1,200 feet in length.	Movement unsuited. Very difficult because of miry ground and dense forests. Some movement on frozen streams possible December to April.
20	Moscow strategic area to Kazan in Volga–Ural strategic area. Densely forested and cultivated plains with many marshes, swamps, lakes, and streams.	Two lanes; bituminous and concrete surfaced; fair to good condition. Moderate curves and grades. Ferry across Volga river at Zelenodol'sk (30 miles west of Kazan). Four-lane divided highway extends eastward from Moscow for 40 miles.	Double track and electrified from Moscow to Gor'kiy. Highway only from Gor'kiy to Zelenodol'sk. Three railroad bridges, 500, 1,060, and 1,100 feet in length.	Movement poor to unsuited. Difficult and directionally restricted because of dense forests, steep-banked streams and gullies. Miry ground, especially during spring thaw, makes movement very difficult.
21	Moscow strategic area to Syzran in Volga–Ural strategic area. Flat to rolling and dissected plains with many steep-banked streams. Contains some areas of forests, bogs, marshes, and swamps.	Two to three lanes; bituminous surfaced; good condition. Moderate curves and grades.	Double track and electrified from Moscow to Zubova Polyana (280 miles southeast of Moscow). Highway only from Zubova Polyana to Penza. Double track, electrified from Penza to Syzran. Five railroad bridges ranging from 492 to 1,700 feet in length.	Movement fair to poor. Restricted in direction by steep streambanks. Miry ground and deep streams during spring thaw add much difficulty. Snow cover may exceed 1 foot in winter.

Footnotes at end of table.

FIGURE 42. Internal routes (C) (*Continued*)

MAP REF. NO.*	ROUTE AND TERRAIN	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
22	Route connecting internal routes from amphibious landing area near Odessa to Leningrad strategic area and from amphibious landing area near Feodosiya to Moscow strategic area. Flat to rolling, cultivated plains with many steep-banked streams. Few bogs and marshes.	Two lanes; concrete surfaced; good condition. Few curves and moderate grades.	Double track; and electrified from Nezhin to Konotop.	Movement generally fair to poor. Deep streams and steep banks restrict movement. Miry ground, late February to early May, severely hinders movement.
23	From Syzran in Volga–Ural strategic area to Rostov in Donets strategic area. Dissected, grass-covered and cultivated plains crossed by steep-banked streams.	Two lanes; bituminous, gravel, and improved earth surfaced; fair to good condition. Moderate curves and grades. Ferry across Don river at Kalach-na-Donu (45 miles west of Volgograd).	Single track from Syzran to Petrov Val (142 miles northeast of Volgograd). Highway only from Petrov Val to Volgograd and from Surovikino (90 miles southwest of Volgograd) to Rostov. Double track from Volgograd to Surovikino. Three railroad bridges ranging from 430 to 2,350 feet in length.	Movement fair to poor. Restricted in direction by deep streams, gullies, and miry ground late February to early May.
24	Tashkent strategic area to Chelyabinsk in Volga–Ural strategic area. Predominantly flat to rolling plains with some poorly drained depressions. Few streams.	One to two lanes; bituminous, gravel, and crushed stone surfaced; fair to good condition. Negligible curves and grades. Sandstorms in summer create difficult driving conditions.	Double track from Tashkent to Arys', single track from Arys' to Dzhusaly (335 miles northwest of Arys'). Highway only from Dzhusaly to Troitsk. Double track, electrified from Troitsk to Chelyabinsk. Four railroad bridges ranging from 500 to 740 feet in length.	Movement on the plains mostly fair except for 1- to 3-week period beginning in early April when soils soft and muddy.
25	Tashkent strategic area to Novosibirsk in Kuznetsk strategic area. Predominantly flat to rolling and dissected plains; few hilly areas. Some sand dunes and cultivated areas.	One to two lanes; bituminous, gravel, and earth surfaced; poor to good condition. Some sharp curves and steep grades. Sandstorms in summer create difficult driving conditions. Twenty-five miles of fourlane divided highway in vicinity of Alma-Ata.	Double track from Tashkent to Chu, Semipalatinsk to Raz No. 14 (37 miles northwest of Barnaul), and from Berdsk (24 miles south of Novosibirsk) to Novosibirsk. Single track from Chu to Semipalatinsk and from Raz No. 14 to Berdsk. Railroad exits area of selected route, generally less than 50 miles, to connect with Chu in the west and Aktogay in the east.	Movement fair to poor. Restricted by gullies and ravines, and, in spring, by miry ground. Snow may exceed 1 foot in winter.
26	Connects Kuznetsk and Volga–Ural strategic areas. Grass-covered and cultivated plains with scattered marshes, lakes, and seasonally soft depressions.	One to two lanes; bituminous, gravel, earth surfaced; fair to poor condition. Moderate grades and curves.	Double track and electrified from Novosibirsk to Petropavlovsk. Highway only from Petropavlovsk to Troitsk. Three railroad bridges, 2,750, 2,300, and 840 feet in length.	Movement fair to good. Restricted by lakes and marshes year round. Soils miry for 1- to 3-week period beginning in April.

27	Connects Kuznetsk and Tashkent strategic areas internal route to Kuznetsk and Volga–Ural strategic areas internal route. Flat to rolling, grass-covered plains; moderately dissected in places.	Two lanes; bituminous, gravel, and earth surfaced; fair to poor condition. Moderate grades and curves.	Single track from Omsk to Irtyshk (103 miles southeast of Omsk). Highway only from Irtyshk to Semipalatinsk. One railroad bridge 2,000 feet in length.	Movement good to fair. Some local hindrances caused by steep-banked streams. Severely restricted in spring because of unfordable streams and muddy ground.
28	Kuznetsk strategic area to Baykal strategic area. Predominantly dissected plains; mostly grass-covered and cultivated in west, forested in east.	Two lanes; bituminous, gravel, and earth surfaced; fair to good condition. Some steep grades and sharp curves.	Double track, electrified. Thirteen railroad bridges ranging from 350 to 3,040 feet in length.	Movement fair on plains but hindered by miry ground and deep streams during April and May.
29	Route connecting internal route between Hailar, China, and Baykal strategic area to Far East strategic area. Mostly forested, flat to rolling and dissected plains and low hills. Few marshes and lakes, numerous streams.	One to two lanes; bituminous, gravel, crushed stone, and earth surfaced; poor to good condition. Ferry across Amur river at Khabarovsk; ferry across the Zeya river at Blagoveshchensk. There is no through highway connection between Sretensk and Svobodnyy.	Double track. Thirty-one railroad bridges ranging from 300 to 8,550 feet, and 5 railroad tunnels ranging from 2,900 to 18,480 feet in length.	Movement poor to unsuited because of dense forests and locally steep slopes.

*Numbers correspond to those shown on Figure 46.

**Unless otherwise specified, all rail lines are 5'0" gage.

***Because of the small scale of the Military Geographic factors map, only the larger cities and towns and the major drainage features are shown. Locations of towns and railroad stations mentioned in the table but not shown on the maps are indicated by statements (in parentheses) of their direction and distance from the nearest large town or city.

FIGURE 43. Land boundaries (C)

BOUNDARY	APPROXIMATE LENGTH	STATUS	TERRAIN
	Miles		
Norway	120	Demarcated and undisputed. No significant fortifications.	Hills and plains, forest or shrub-covered, some stunted birch and small, dense stands of pine in south.
Finland	820	....*do*.....	Steep-sided hills with rounded tops in north, flat to rolling plains in south. Forests on plains and hills. Plains poorly drained. Low ridges common in lowlands.
Poland	775	....*do*.....	Flat to gently rolling plains. Mostly cultivated; some forests and swampy areas. Hills and mountains of Carpathian Mountains in extreme south.
Czechoslovakia	60	....*do*.....	Densely forested hills and mountains in north. Cultivated, flat to gently rolling plains in south.
Hungary	75	....*do*.....	Flat to gently rolling plains. Cultivated crops; some patches of forest and brush.
Romania	840	....*do*.....	Mountains, hills, and plains. Densely forested Carpathian Mountains and foothills in west. Boundary in east formed by Prut river. Mainly dissected plains and steep hills. Boundary along arm of Danube in extreme east swampy, marshy, and poorly drained.
Turkey	385	Demarcated and undisputed. No significant fortifications. Few garrisons.	Forested mountains in western two-thirds. Many deep ravines and gorges. Grassy, partly cultivated, flat to rolling plain in eastern third.
Iran	1,225	Demarcated and undisputed. Some permanent light fortifications.	West of Caspian Sea: rugged, forested mountains separated by semiarid, flat to rolling plains. East of Caspian Sea: mostly grass-covered hills and mountains flanked on east and west by barren, flat to rolling plains.
Afghanistan	1,480	Border surveyed but not demarcated. Undisputed. No permanent fortifications.	Grass-covered or barren, flat to rolling plains flanked on the west by steep, grass-covered hills and on the east by high, rugged, mostly barren mountains.
People's Republic of China.	4,670	Demarcated and delimited for most of its length by international agreements; however, 4 short segments in dispute; most of eastern portion marked by broad, deep rivers. No significant fortifications.	Western portion of border: high, rugged mountains with both rounded and sharp crests. Some permanent snowfields and glaciers at elevations above 10,000 feet. Scattered intermontane basins. Eastern portion of border: predominantly flat to rolling forested plains separated by three hill groups. Scattered cultivated areas.
Mongolia	2,135	Undisputed and mostly demarcated. Some pre-World War II forts on U.S.S.R. side of border.	Rugged forested mountains separated by plains and rolling hills.
North Korea	10	Undisputed and marked by river. No significant fortifications.	Flat, swampy region backed by hills.

FIGURE 44. Land approaches (C)

APPROACH AND TERRAIN	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
From Finland. Chiefly forested plains. Many bogs, marshes, and swamps.	Two to three lanes; improved gravel surface; fair condition; 0- to 3-foot shoulders. Road lined with trees.	Single track, 5′0″ gage	Movement poor. Hindered by dense forests and bogs. Snowfall from late November through late March and flooding in April and May greatly hinder movement.
From northern Poland. Flat to gently rolling, mostly cultivated plains.	Two lanes; bituminous surface; good condition; 3-foot shoulders. Road lined with trees.	Dual gage, 5′0″ and 4′8½″. Several change-of-gage facilities. Crosses one important bridge.	Movement good to fair. Locally restricted by unfordable streams and forest patches. Severely hindered by soft ground during spring thaw.
From northeastern Poland. Flat to gently rolling, mostly cultivated plain.	Two lanes: mostly concrete and bituminous surface; some cobblestone sections; fair to good condition.	Double track; dual gage, 5′0″ and 4′8½″.	Movement fair. Unsuited part of winter and during early spring because of soft ground.
From central Poland. Flat to gently rolling, mostly cultivated plains. Many marshes and swamps.	Two lanes, concrete with some cobblestone surface; fair to good condition. Thirty-ton capacity bridge at border near Terespol.	Dual gage, 5′0″ and 4′8½″. Two bridges cross Bug river, one of each gage. Numerous change-of-gage facilities.	Movement fair to poor. Restricted by marshes, swamps, and unfordable streams.
From southern Poland. Rolling, partially forested plains.	Two lanes; bituminous surface; fair to good condition; 3- to 6-foot shoulders.	Dual gage, 5′0″ and 4′8½″; electrified. Change-of-gage facilities at border. Crosses three large bridges.	Movement fair. Restricted by forests, streams, wet areas, and locally steep slopes. Severely hindered by soft ground during spring thaw.
From Turkey. Flat to rolling plains	Two lanes, crushed-stone and bituminous-treatment surface. Crosses one bridge 130 feet long. Poor to fair condition.	Single track, 4′8½″ gage. Change-of-gage facility on U.S.S.R. side of border.	Movement fair. Locally restricted by steep streambanks. Streams unfordable at times during period early November through April.
From Iran. Flat to rolling coastal plains backed by steep, forested mountains.	Two lanes; gravel and bituminous surface; fair to good condition.	None	Movement fair to poor. Restricted by steep streambanks and locally by rough, bouldery surfaces.
From Afghanistan. Dissected hills and plains, a few ridges and escarpments.	Two lanes; concrete surface; good condition; 4- to 6-foot shoulders.	*do*	Movement fair. Hindered by steep slopes and locally by stones and boulders. Difficult when ground muddy from early December to March.
From Ching-ho, the People's Republic of China. Flat to gently rolling, grass-covered plains with steep-banked streams.	Two lanes; gravel surface; good condition. Sharp curves and steep gradients near border.	*do*	Movement fair to poor. Restricted by steep-banked or unfordable streams.
From Mongolia. Dissected, grass-covered plains.	Two lanes; bituminous surface; fair to good condition.	Single track, 5′0″ gage	Movement poor. Restricted by gullies, rough surfaces, and steep-banked streams. Severely hindered by miry soils during spring thaw and after rains.

FIGURE 44. Land approaches (C) *(Continued)*

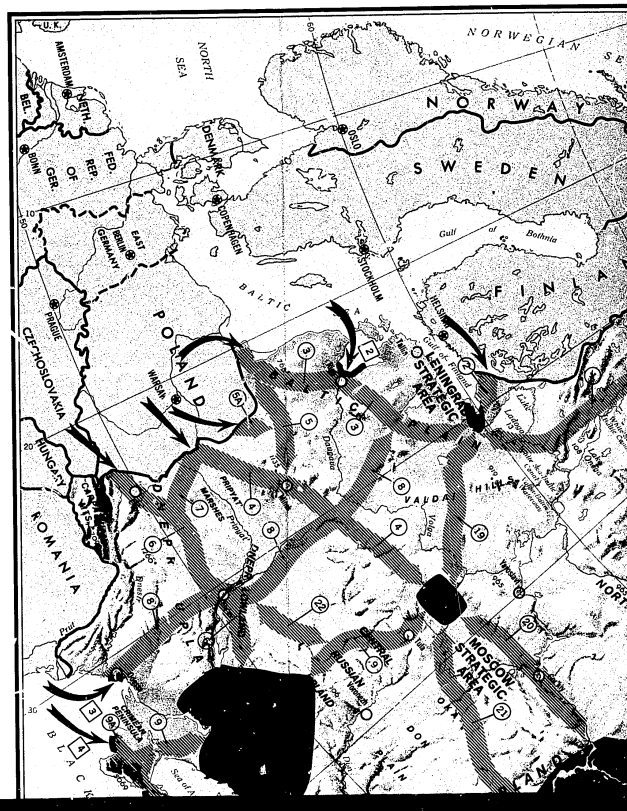
APPROACH AND TERRAIN	ROAD	RAILROAD	OFFROAD DISPERSAL AND CROSS-COUNTRY MOVEMENT
From the People's Republic of China, west of Hailar. Flat to rolling, grass-covered plains.	One to two lanes; earth and gravel surface; fair condition.	Single track, 4′8½″ gage. Change-of-gage facility at border.	Movement good but hindered by snowdrifts in winter.
From the People's Republic of China, east of Harbin. Forested hills and grass-covered plains.	One to two lanes; gravel surface; poor condition. Moderate grades and curves.	....*do*.....	Movement in hills poor because of steep, forested slopes. Movement in plains poor because of steep-banked streams. Snow from February through March may exceed 10 inches and greatly hinder movement.
From North Korea. Low mountains and flat plains.	Two lanes; gravel surface; good condition. 0- to 3-foot shoulders.	Single track, 4′8½″ gage. Change-of-gage facility near border. Passes over several bridges and through many tunnels.	Movement poor to unsuited because of steep slopes, local dense forests, steep-banked streams, and rice paddies.

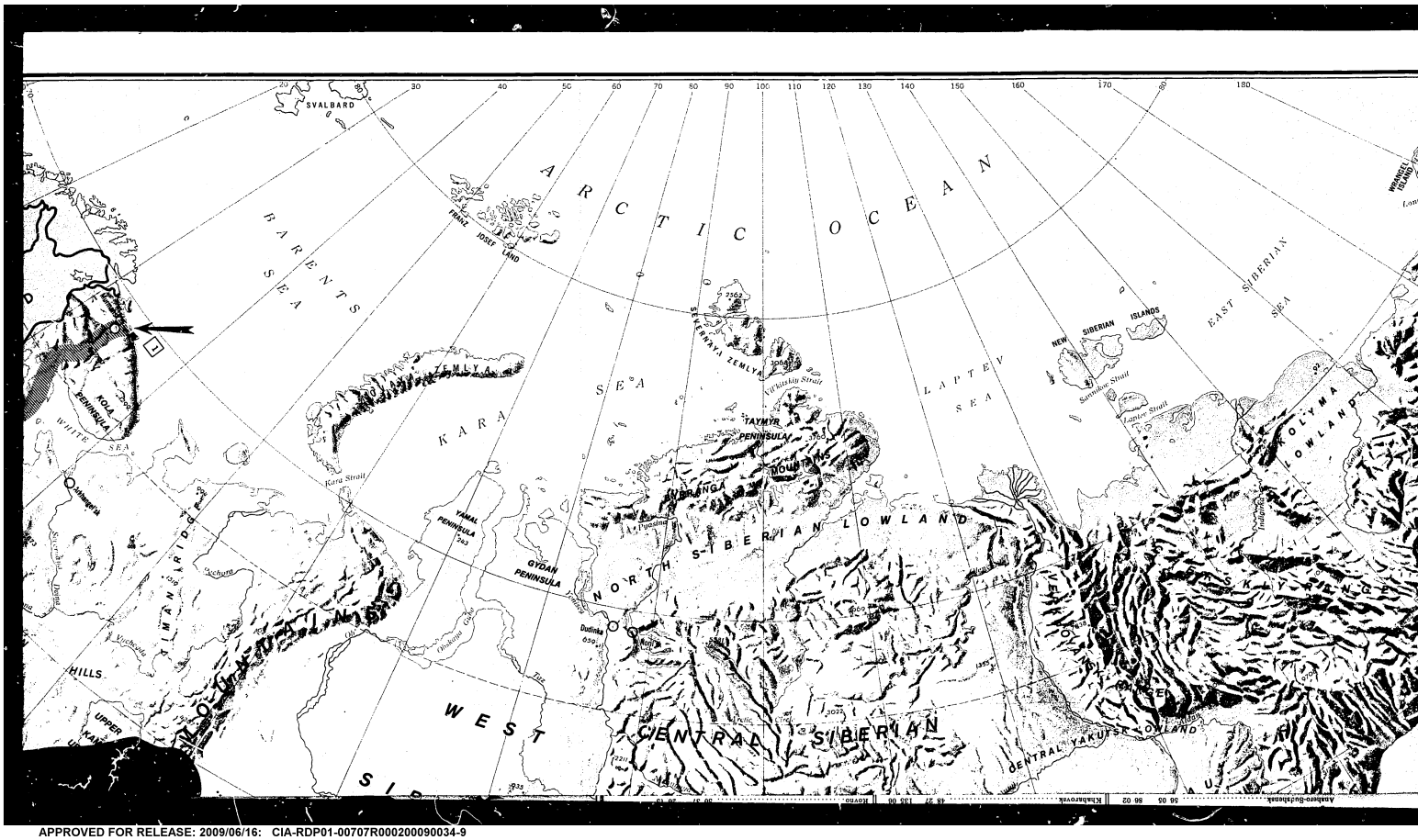
FIGURE 45. Air approaches (U/OU)

ELEMENT	NORTHERN SECTOR	EASTERN SECTOR	SOUTHERN SECTOR	WESTERN SECTOR
Mean cloudiness (percent).	Maximum 70 to 90 May thru October; minimum 30 to 80 November thru April, except 70 to 80 over Barents Sea.	60 to 90 all year except 40 to 60 over northwestern Sea of Okhotsk and western Sea of Japan during winter.	Minimum 45 or less in summer west of Pakistan, in autumn from Pakistan to Mongolia, and in winter east of Mongolia. Maximum 40 to 80 in winter west of Pakistan, in spring from Pakistan to Mongolia, and in summer east of Mongolia.	Maximum 55 to 90 during winter; minimum 30 to 75 in summer. Most extensive in north.
Thunderstorm days (per month).	Rare all year.....	Rare north of 45° N. except infrequent in June, July, or August. Generally infrequent south of 45° N., with maximum 3 or less in June thru November.	April thru October maximum 3 to 7 over rugged terrain in west; 3 to 10 over rugged terrain in east. Central sections have varied frequencies; maximum 5 to 10 in June thru August.	Maximum May thru August; 1 to 5 in north and 3 to 8 in south. Infrequent or rare in the remaining months except 1 or 2 in April and September in south.
Icing.....	Mean height of freezing level at surface in winter and near 5,000 feet in midsummer. Icing most likely during summer.	Mean height of freezing level, surface to 2,000 feet in winter, and 4,000 to 15,000 feet in summer; highest in south. Icing most likely in winter.	Mean height of freezing level, surface to 5,000 feet in winter (highest in west), and 13,000 to 15,000 feet in summer. Icing most likely during spring thru autumn in east and during winter in west.	Mean height of freezing level, surface to 4,000 feet in winter, and 6,000 to 13,000 feet in summer; highest in south. Icing is a hazard throughout year.
Turbulence.....	Light to severe in migratory lows and fronts.	Light to moderate over mountains of Japan; moderate to severe likely during winter. Light to moderate in cumuliform buildups, and moderate to severe in thunderstorms. May be severe in extratropical and tropical cyclones and cold fronts. Severe to extreme near jet stream during winter in south.	Light to moderate at low levels on hot summer days and in cumuliform buildups. Light to severe over mountains. Moderate to severe in thunderstorms and in lows and cold fronts.	Light at low levels on hot summer days and in cumuliform buildups. Moderate to severe in thunderstorms and possibly extreme in thunderstorms over mountains. Moderate to severe in lows and cold fronts. Various degrees of orographic turbulence over mountains.
Upper winds, direction..	Variable but predominantly westerly.	Predominantly westerly up to at least 55,000 feet.	Predominantly westerly up to at least 55,000 feet, except variable winds likely at lowest levels, particularly in summer.	Predominantly westerly up to at least 55,000 feet, except variable winds likely at lowest levels.
Upper winds, speed (in knots).	Mostly light; maximum mean speeds 20 to 35 between 30,000 and 40,000 feet during all seasons, and up to 50,000 feet during winter.	Maximum mean speeds 25 to 55 in north all seasons, and 50 to 110 autumn through spring in south between 30,000 and 40,000 feet.	Maximum mean speeds 40 to 90 between 30,000 and 50,000 feet during winter.	Maximum mean speeds 30 to 50 between 30,000 and 40,000 feet during all seasons, and up to 50,000 feet during winter.

Places and features referred to in this chapter (u/ou)

	COORDINATES		COORDINATES		COORDINATES
	° 'N.	° 'E.	° 'N.	° 'E.	° 'N.	° 'E.
Akademgorodok	54 49	83 09	Irtyah (strm)	61 04	68 52	Podol'sk	55 26	-37 34
Akaha	50 16	113 17	Ishevsk	56 50	53 12	Poltava	49 36	34 32
Aktogay	46 57	79 80	Kaliningrad	54 42	20 31	Polyarnyy	69 12	33 27
Aleksandrovskoye	60 25	77 53	Kama (strm)	55 25	50 49	Poti	42 09	41 41
Alma-Ata	43 18	76 57	Kamchatka Peninsula (pen)	56 00	160 00	Pridneprovsk	48 25	35 08
Amu Darya (strm)	43 40	59 01	Kandalaksha	67 10	32 25	Prokhladnyy	43 46	44 02
Amur (strm)	52 56	141 10	Kaqustin Yar	48 35	45 45	Prokop'yevsk	53 52	86 47
Andishan	40 45	72 20	Karaganda	49 49	73 08	Prut (strm)	45 30	28 12
Angara (strm)	58 06	93 00	Kaunas	54 54	23 56	Pskov	57 49	28 21
Angarsk	52 32	103 55	Kazan'	55 50	49 05	Riga	56 59	24 07
	41 01	70 09	Kemerovo	55 22	86 02	Rostov	47 14	39 42





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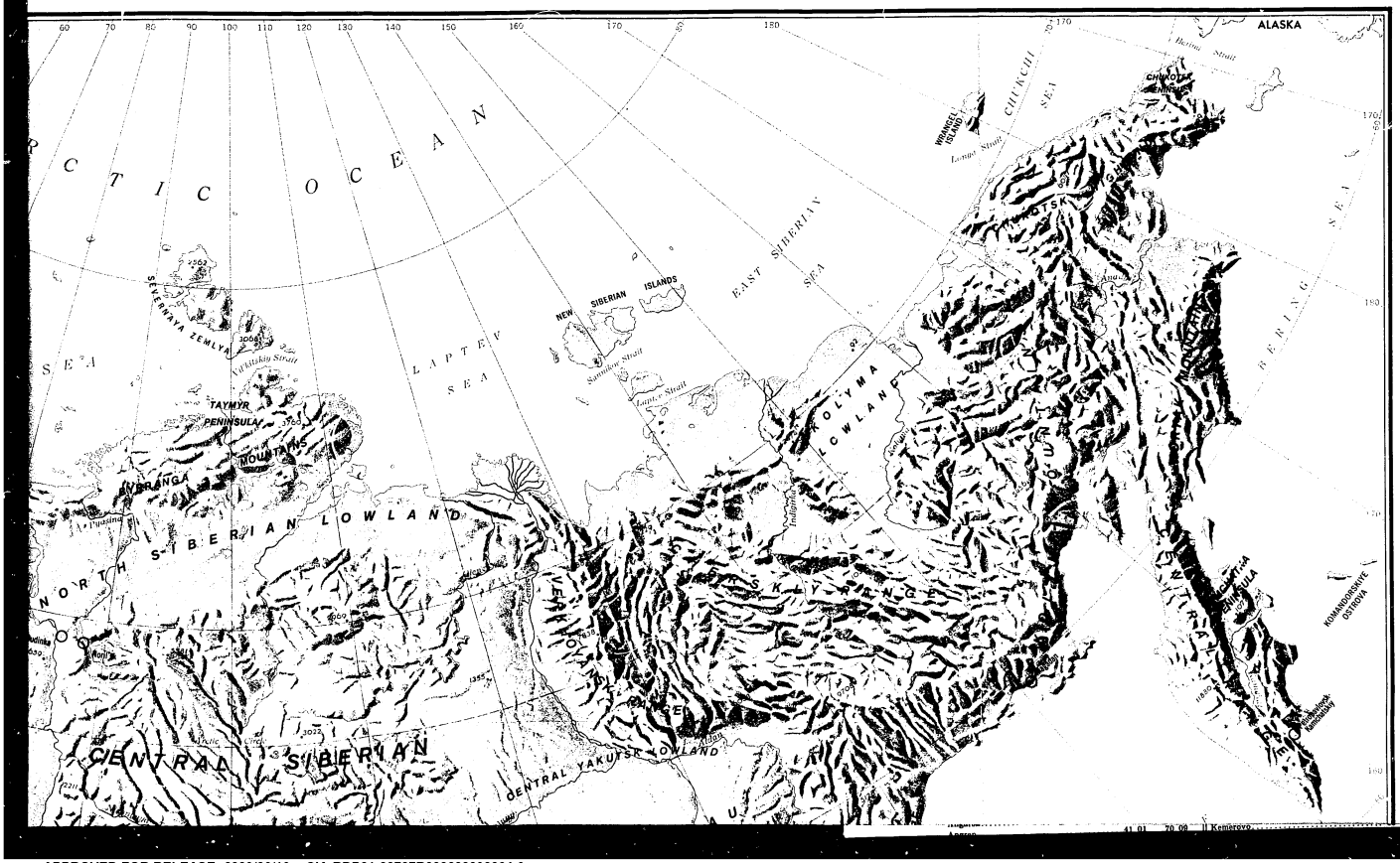
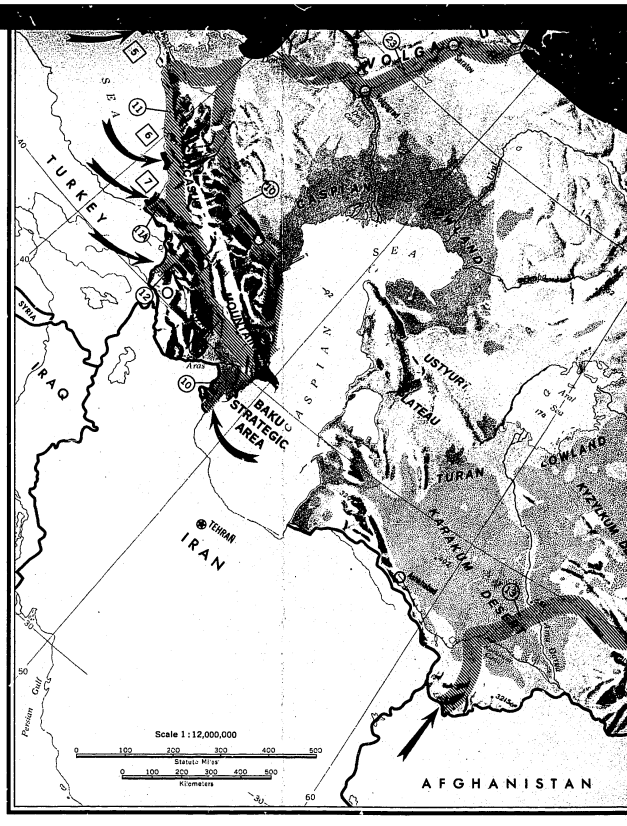


Anadyr'-Sudzhensk	56 05	86 02
Aral Sea (*sea*)	45 00	60 00
Arkhangel'sk	64 34	40 34
Artëm	43 22	132 11
Arys'	42 26	68 48
Asbest	57 01	61 30
Ashkhabad	37 57	58 23
Astara	38 26	48 52
Baku	40 24	49 54
Baltic Sea (*sea*)	58 00	18 00
Barents Sea (*sea*)	74 00	36 00
Barnaul	53 20	83 43
Batumi	41 39	41 39
Baykal	51 32	104 48
Baikal, Lake (*lake*)	54 00	109 00
Bekabad	40 12	69 18
Belomorsk	64 32	34 46
Belovo	54 25	86 18
Bereznik	59 25	56 49
Bering Sea (*sea*)	60 00	175 00
Bering Strait (*strait*)	64 00	169 00
Black Sea (*sea*)	43 00	35 00
Blagoveshchensk	50 18	127 32
Bratsk	56 13	101 40
Brest	52 06	23 42
Bug (*strm*)	50 07	20 25
Carpathian Mountains (*mts*)	47 00	25 30
Caspian Sea (*sea*)	42 00	50 00
Caucasus Mountains (*mts*)	42 00	45 00
Chardzhou	39 06	63 35
Chelyabinsk	55 09	61 25
Cheremkhovo	53 07	103 08
Chernigov	51 30	31 17
Chimkent	42 56	59 47
Chimkent	42 18	69 35
Ching-ho (People's Republic of China)	44 39	82 50
Chita	52 02	113 39
Chu	43 36	73 45
Crimean Peninsula (*pen*)	45 00	34 00
Danube (*strm*)	45 20	29 40
Daugava (*strm*)	57 00	24 00
Desna (*strm*)	50 33	30 32
Dikson, Ostrov (*ist*)	73 31	80 27
Dnepr (*strm*)	46 30	32 18
Dnepropetrovsk	48 29	35 00
Don (*strm*)	47 04	39 18
Donetsk	48 00	37 48
Dudinka	69 25	86 12
Dushanbe	38 34	68 48
Dzerzhinsk	56 14	43 30
Dzhankoy	45 43	34 23
Ekimchan	53 04	132 58
Elektrostal'	55 47	38 27
Engel's	51 29	46 07
Feodosiya	45 03	35 23
Fergana	40 23	71 47
Finland, Gulf of (*gulf*)	60 00	27 00
Frunze	42 52	74 36
Gor'kiy	56 18	43 53
Grodno	53 40	23 51
Groznyy	43 19	45 39
Gudermes	43 21	46 06
Hailar (People's Republic of China)	49 12	119 45
Harbin (People's Republic of China)	45 45	126 39
Il'ichëvsk	46 19	30 40
Irkutsk	52 19	104 15
Khabarovsk	48 27	135 06
Khar'kov	49 58	36 17
Khasan	42 25	130 39
Khimki	55 54	37 27
Kiselevsk	54 00	86 41
Kiyev (Kiev)	50 27	30 31
Kokand	40 32	70 55
Kola Peninsula (*pen*)	67 20	37 00
Kolyma (*strm*)	69 30	161 00
Komsomol'sk	50 35	137 01
Konotop	51 14	33 11
Krasnotur'insk	59 46	60 12
Krasnovodsk	40 00	53 00
Krasnoyarsk	56 01	92 56
Krivoy Rog	48 00	33 27
Kronshtadt	59 59	29 47
Kuldja (People's Republic of China)	43 54	81 21
Kuril Islands (*isls*)	46 10	152 00
Kuybyshev	53 15	50 13
Kusnetsk	53 07	46 36
Kyshtym	55 43	60 33
Lena (*strm*)	72 25	126 40
Leninskan	40 47	43 51
Leningrad	59 56	30 22
Luga	58 44	29 50
L'vov	49 51	24 01
Lyubertsy	55 40	37 51
Magadan	59 34	150 48
Magnitogorsk	53 25	59 02
Makhachkala	42 59	47 29
Mineral'nyye Vody	44 13	43 07
Minsk	53 54	27 35
Moscow	54 45	37 36
Murmansk	68 58	33 04
Mys Shelagskiy (*cape*)	70 06	170 26
Mytishchi	55 55	37 45
Naberezhnyye Chelny	55 42	52 19
Nakhodka	42 50	132 54
Neris (*strm*)	54 54	23 53
Nevel'	56 01	29 56
Nezhin	51 02	31 52
Nikopol'	47 35	34 23
Nizhneudinsk	54 55	99 03
Nizhniy Tagil	57 56	60 01
Noril'sk	69 20	88 11
Novaya Zemlya	59 18	142 48
Novokuznetsk	53 47	87 12
Novorossiysk	44 44	37 47
Novosibirsk	54 59	82 59
Novo-Troitsk	51 12	58 20
Ob' (*strm*)	66 45	69 30
Odessa	46 29	30 43
Okhotsk, Sea of (*sea*)	55 00	150 00
Omsk	55 00	73 19
Orenburg	51 48	55 07
Orsk	51 15	58 34
Partizansk	43 08	133 09
Pavlodar	52 17	76 59
Penza	53 12	45 01
Perm'	58 01	56 12
Petropavlovsk	54 52	69 09
Petropavlovsk-Kamchatskiy	53 01	158 43
Petrovsk-Zabaykal'skiy	51 17	108 51
Podkamennaya Tunguska	61 36	90 08
Rovno	50 37	26 15
Rustavi	41 32	45 02
Sekhalin (*isl*)	51 00	143 00
Samarkand	39 40	66 58
Saratov	51 33	45 56
Semipalatinsk	50 25	80 13
Serov	59 36	60 35
Sevastopol'	44 36	33 33
Severodvinsk	64 34	39 50
Shchëkino	54 00	37 31
Shologontsy	66 13	114 14
Simferopol'	44 57	34 07
Sovetskaya Gavan'	48 59	140 15
Sretensk	52 15	117 43
Sukhumi	43 01	41 00
Sumgait	40 36	49 37
Sverdlovsk	56 50	60 37
Svobodnyy	51 22	128 09
Syktyvkar	61 40	50 49
Syrdar'ya (*strm*)	46 03	61 00
Syzran'	53 07	48 26
Tallinn	59 25	24 44
Tashkent	41 18	69 17
Tashtagol	52 46	87 53
Tbilisi	41 43	44 48
Temirtau	50 04	72 58
Terespol'	52 52	24 18
Teribërka	69 10	35 09
Tien Shan (*mts*)	42 00	80 00
Tiksi	71 38	128 52
Tol'yatti	53 30	49 29
Tomsk	56 33	84 56
Troitsk	54 05	61 35
Tuapse	44 06	39 05
Tula	54 13	37 36
Ufa	54 49	56 03
Ulan-Ude	51 51	107 37
Ural Mountains (*mts*)	60 00	60 00
Usol'ye-Sibirskoye	52 46	103 39
Usuriysk	43 48	131 58
Ust-Ilimsk	58 03	102 39
Vasino	49 05	140 17
Vayzgach, Ostrov (*isl*)	70 27	58 40
Verkhoyansk	67 35	133 27
Verkh-Neyvinskiy	57 16	60 06
Vil'nyus	54 41	25 16
Vladivostok	43 08	131 54
Volga (*strm*)	45 55	47 52
Volgograd	48 40	44 28
Volkhov	59 55	32 20
Volzhskiy	48 49	44 46
Vorkuta	67 30	64 02
Voronezh	51 40	39 15
Voroshilovgrad	48 34	39 [illegible]
Vyborg	60 43	28 4
White Sea (*sea*)	65 30	38 00
Yakutsk	62 02	129 44
Yaroslavl'	57 39	39 53
Yenisey (*strm*)	71 50	82 40
Yerevan	40 11	44 30
Yevpatoriya	45 11	33 22
Zagorsk	56 19	38 09
Zaporozh'ye	47 50	35 09
Zeya (*strm*)	50 15	127 35
Zyryanka	65 44	150 53



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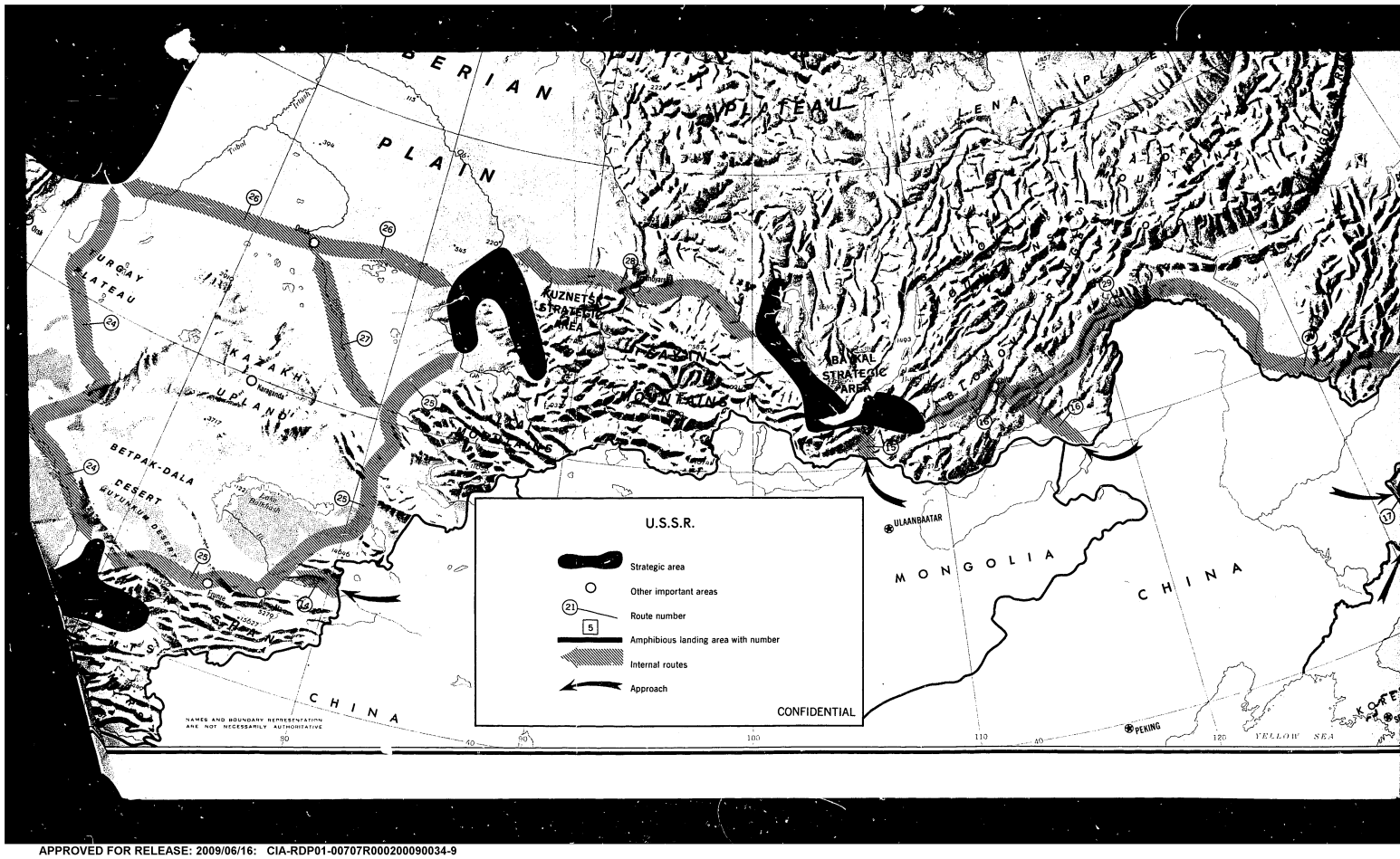

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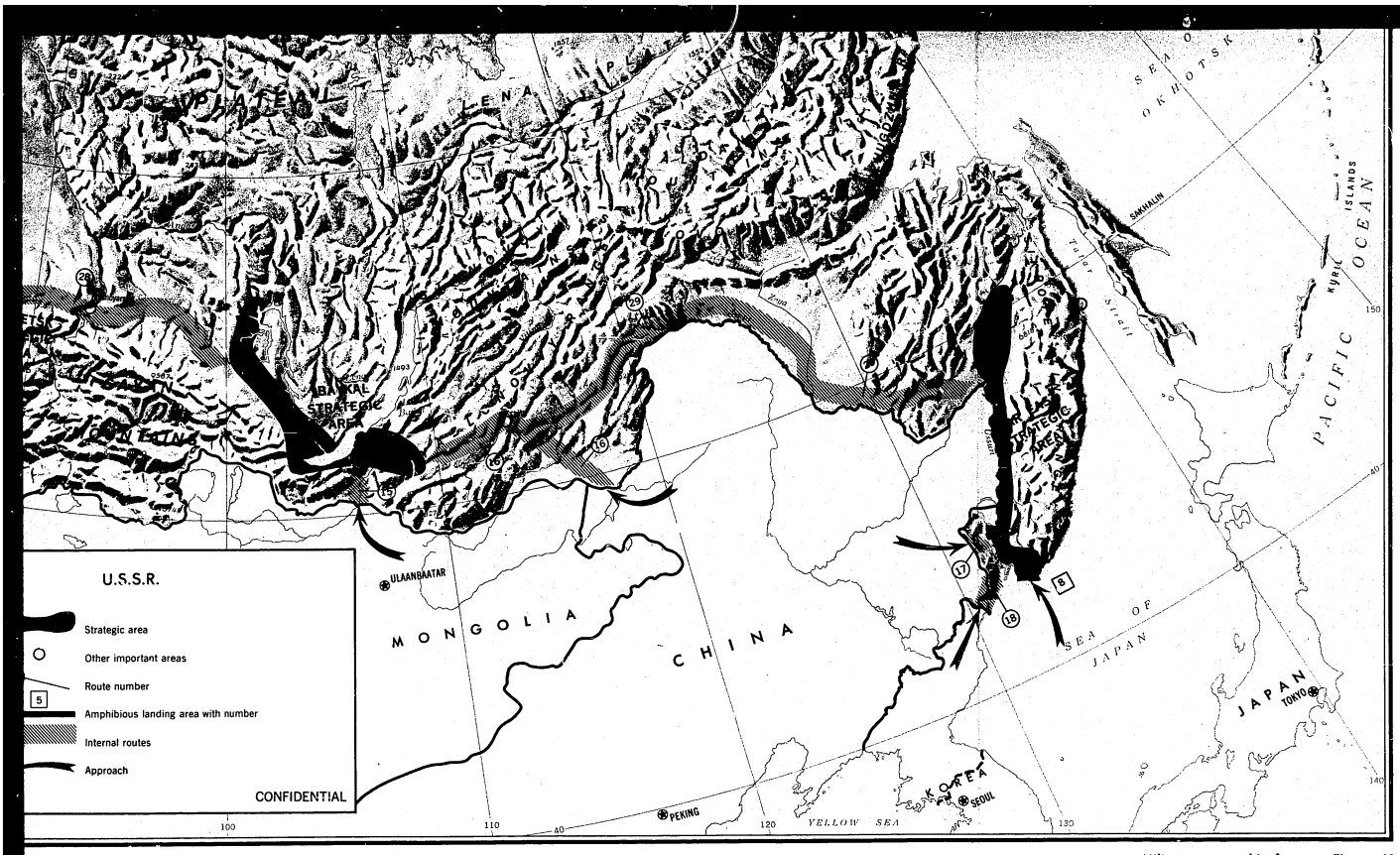

Military geographic factors Figure 46

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